Inflation expectations in the euro area: post-pandemic trends and policy implications

Compilation of papers

Policy Department for Economic, Scientific and Quality of Life Policies
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Inflation expectations in the euro area: post-pandemic trends and policy implications

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Inflation expectations: quo vadis?

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Abstract

Against the backdrop of the recent surge in inflation, we discuss available measures of inflation expectations and implications for monetary policy in the euro area. While long-term expectations are currently still in line with the ECB’s inflation target, the risk of a further rise increases should actual inflation remain high for an extended period of time. If expectations de-anchor the ECB may face difficult trade-offs.

This paper was provided by the Policy Department for Economic, Scientific and Quality of Life Policies at the request of the committee on Economic and Monetary Affairs (ECON) ahead of the Monetary Dialogue with the ECB President on 7 February 2022.
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<tr>
<td>CES</td>
<td>Consumer Expectations Survey</td>
</tr>
<tr>
<td>ECB</td>
<td>European Central Bank</td>
</tr>
<tr>
<td>HICP</td>
<td>Harmonised index of consumer prices</td>
</tr>
<tr>
<td>HICPX</td>
<td>HICP excluding energy and unprocessed food (core inflation)</td>
</tr>
<tr>
<td>NEIG</td>
<td>Non-energy industrial goods</td>
</tr>
<tr>
<td>NGEU</td>
<td>NextGenerationEU</td>
</tr>
<tr>
<td>SIGE</td>
<td>Survey on Inflation and Growth Expectations</td>
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<td>SPF</td>
<td>Survey of Professional Forecasters</td>
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EXECUTIVE SUMMARY

- The recent sharp increase of inflation well above the ECB’s inflation target of 2% has raised concerns that inflation expectations could de-anchor. Well-anchored inflation expectations are an important condition for price stability and persistent deviations of actual inflation from the inflation target become more likely if expectations de-anchor.

- There is no unique measure of inflation expectations. Measures of inflation expectations are available for private households, firms, financial markets, and professional forecasters. These measures differ in terms of their scope, their horizon, and the way they are compiled resulting in different strengths and limitations. Short-run inflation expectations provide information about near-term inflation developments. Long-run inflation expectations can serve as an indicator for the credibility of a central bank to achieve its inflation target. Consumer and firm expectations are of particular interest because they can have a direct impact on consumer prices. However, due to the shortcomings of inflation expectations measures for private households (e.g., large deviation from actual inflation; only available for the short-run) and firms (e.g., only qualitative measures available; only for the short-run), measures from financial markets and surveys of professional forecasters are in the focus when the anchoring of long-run expectations is discussed.

- Inflation expectations are important for economic decision-making and are driven by several factors, including monetary policy. Inflation expectations have a direct impact on wage and price setting. By affecting the real interest rate, they have also an impact on intertemporal decisions of private households and firms on savings, consumption, and investment, which in turn can influence inflation. As a result, an increase of inflation expectations tends to put upward pressure on actual inflation. Inflation expectations can be influenced by several factors, such as recent inflation trends, personal experiences, or monetary policy. Given the multitude of transmission channels, it is difficult to gauge the precise impact of expectations on the economy as well as the determinants of fluctuations in inflation expectations.

- All available measures for short-run inflation expectations have sharply increased and indicate that inflation will remain above the inflation target for some time to come. There are several factors in place putting upward pressure on inflation for the time being. These factors include supply bottlenecks raising the cost of inputs and shipment of goods, a relatively high willingness to pay of consumers due to substantial extra savings built up in the pandemic period, and tight labour markets leading to upward pressure on wages. Moreover, price pressure could remain high if commodity prices continue trending upwards as a result of the progressing energy transition.

- Long-run inflation expectations have inched up recently and are now in line with the modified inflation target of the ECB. Before the pandemic, long-run inflation expectations were somewhat below the inflation target of the ECB for several years indicating that expectations were de-anchoring to some extent. With the recent increase in inflation, long-run inflation expectations have returned to the target of the ECB. However, a final assessment on how firmly expectations are anchored at the inflation target is not possible at the current juncture.

- The risks for de-anchoring of long-run inflation expectations increase if actual inflation remains high for an extended period of time. In principle, it is more convenient for the ECB to deal with inflation above rather than below its target, as it is easier for monetary policy to dampen than to stimulate inflation, in particular at the zero lower bound. According to its modified strategy, the ECB can tolerate high inflation for some time. However, if inflation remains above its target for
an extended period, the ECB may face a delicate trade-off. A tightening of monetary policy could lead to stress in financial markets, particularly in sovereign bond markets, while complacency in face of high inflation risks that long-run inflation expectations de-anchor above the inflation target and that upward pressures on consumer prices will further increase.
1. INTRODUCTION

The recent surge in inflation in the euro area has raised concerns about prospects for inflation in the longer term. Consumer price inflation increased sharply in the course of 2021 and reached 5% in December, a record-high since the beginning of the monetary union. The assessment of the European Central Bank (ECB) that the increase above the 2% inflation target is mainly a temporary phenomenon is increasingly being questioned. Higher long-run inflation expectations could be a main driver of a persistent increase in inflation. However, so far there is little evidence that recent increases in short-run expectations are systematically passed-through to long-run expectations.

The debate whether the increase in inflation is transitory or permanent is closely linked to the anchoring of inflation expectations. Short-run expectations are predominantly driven by actual inflation and transitory factors, such as fluctuations in oil prices, while long-run inflation expectations are reflecting the credibility of the central bank to achieve its inflation target. Long-run expectations therefore also reflect the effectiveness of monetary policy and forward guidance with regard to expectation management. They are often anchored in the sense that short-run macroeconomic news are considered neutral with respect to inflation expectations in the long-run by market participants (Nautz et al., 2019). If long-run expectations persistently exceed the inflation target of the ECB, the risk increases that actual inflation persistently remains at elevated levels.

There is no obvious and unambiguous way to measure inflation expectations. Inflation expectation measures are available for private households, firms, financial markets, and professional forecasters. They differ in several aspects, such as their horizon, the way they are measured, or whether they provide quantitative or qualitative assessments, resulting in different strengths and limitations. Central banks use inflation expectations to assess their credibility with regard to their inflation target, to evaluate the impact of their policy, or to forecast future inflation. Firm and consumer expectations are of particular relevance for inflation as firms ultimately set consumer prices, taking the consumers’ willingness to pay into account. However, there is a lack of harmonised data when it comes to long-run expectations measures of firms and households for the euro area. Recent efforts by the ECB are aiming to improve the coverage of existing measures, for example, via the pilot Consumer Expectations Survey (CES).

The signalling channel of monetary policy aims to affect inflation expectations by providing information about the future stance of monetary policy. Inflation expectations are driven by a wide range of factors and do matter for economic choices of households and firms. The existing experimental and empirical evidence has so far struggled to provide clear evidence on how inflation expectations are formed and to which extent they can be directly influenced by monetary policy. Monetary policy effects tend to be under-estimated by market participants (Ball and Croushore, 2003). Monetary policy announcements and surprises often have a direct impact on financial market expectations while inflation expectations of households and firms do, for example, not systematically respond to all monetary policy announcements (Coibion et al., 2020; Lamla and Vinogradov, 2019). Empirical determinants of successful anchoring of inflation forecasts in the long-run include institutional factors, such as credibility and central bank independence.

In this paper, we discuss different measures of inflation expectations and their recent developments as well as the risk of their de-anchoring. We start with an overview of the role of inflation expectations in theory (Section 2). We proceed by discussing different measures of inflation expectations and their current developments (Section 3). In Section 4 we address the risks of a de-anchoring of inflation expectations, before we conclude with a summary of our results and implications for monetary policy (Section 5).
2. INFLATION EXPECTATIONS AND ECONOMIC DECISIONS

2.1. How inflation expectations affect economic decisions

Inflation expectations are important for economic decision making. As they affect price and wage setting, inflation expectations are an important intermediate target for policymakers, and they are relevant for the propagation of monetary policy shocks (Sousa and Yetmann, 2016). In theoretical models, inflation expectations of households and firms have direct effects on the wage and price setting and affect consumption and investment decisions via the perceived real interest rate (Figure 1).

The intertemporal decision on consumption and saving of private households depends on the real interest rate. If inflation expectations change, and in turn the perceived real interest rate changes, households will adjust their consumption pattern. For example, if the real interest rate declines, private households—ceteris paribus—will favour consumption today compared to future consumption and reduce their savings. Moreover, inflation expectations can have also an impact on wage negotiations when households consider their real income.

Firms are also influenced by inflation expectations via the perceived real interest rate when they plan their investment. Moreover, for a firm real income streams depend on their final goods prices and on the general price level. In a scenario of rising inflation expectations, firms try to anticipate the change in the price level and alter their price setting behaviour accordingly. As firms are ultimately setting consumer prices, the impact of inflation expectations on their decision making is particularly relevant.

Financial market expectations are relevant because they influence financial prices and financing conditions. Inflation expectations in financial markets are derived from financial asset prices, which also provide information about the uncertainty about future inflation via risk premia. Professional forecasts have the potential to affect other expectations, in particular those of households (Carroll, 2003) but they might in turn be influenced by financial market expectations or consumer and firm expectations.

Figure 1: Transmission mechanism of inflation expectations


In practice, the relationship between inflation expectations and economic decision-making of households and firms is more complex than in theory as it involves several other factors. These
factors include, e.g., employment perspectives, income expectations, or liquidity constraints. For example, if households or firms interpret higher inflation expectations as a bad signal for the economic outlook, the resulting negative income effect may dominate potential positive effects of a lower real interest rate and lead to lower levels of consumption or investment (Candia et al., 2020). Moreover, inflation expectations are affected by a variety of factors making it difficult to gauge the underlying factors and the economic impact of changes in expectations. For example, expectations of consumers are driven by the prevailing economic environment as one important factor. Consumers who have experienced high inflation systematically have higher inflation forecasts (Ehrmann and Tzamourani, 2012; Malmendier and Nagel, 2016). There is also some evidence that households and firms tend to react stronger to inflation dynamics if they have experienced high inflation over an extended period of time (Coibion et al., 2020). Personal shopping experiences also have the potential to affect inflation expectations. Socio-economic characteristics, such as income and education, are additional important factors.

There is rich empirical evidence that expectations affect behaviour of firms and households, implying that monetary policy can influence economic activity by managing expectations. The empirical evidence for households at the zero lower bound suggests that consumption responds positively to an increase in the inflation expectations (Coibion et al., 2020). Recent evidence from a multi-country survey of consumers for the euro area confirms that higher inflation expectations also lead to a higher probability of goods purchases by consumers (Duca et al., 2018). To the extent that monetary policy can affect expectations, they can be used as a policy tool by central banks (Sousa and Yetmann, 2016; Coibion et al., 2020). However, identifying the effect of monetary policy decisions on expectations is difficult. Evidence for qualitative expectations in the euro area suggests that firms’ expectations respond to unexpected monetary policy shocks. Firms increase price expectations for their own goods after an interest rate increase (Eminidou and Zachariadis, 2022).

2.2. Expectations and information rigidities

Inflation expectations can provide valuable information, even though it is a well-established stylised fact that inflation forecasts are subject to substantial errors. Part of the forecast errors are due to the unpredictability of future shocks and inflation expectations often react to shocks with a significant delay. Even in the presence of large forecast errors, inflation expectations can still contain useful information, for example, about the direction of changes in future inflation or the degree of anchoring of inflation expectations.

Information frictions or information rigidities recognise the role of informational limitations for expectation formation and delayed adjustment of expectations. They can be derived from both sticky and noisy information models and are useful to understand why market participants respond to changes in inflation with a delay. According to sticky information models, slow updating of information across agents occur due to the costs of acquiring new information. Noisy information models assume that the variable to be predicted is not directly observable and that each agent only observes an individual noisy signal instead. It has been shown that both kinds of models imply predictability of forecast errors, a finding which contradicts the conventional view of rational expectations under full information (Coibion and Gorodnichenko, 2012). The related concept of rational inattention argues that agents cannot perfectly distinguish between news about the current state of the economy and news about the future, which results in a dampened or delayed response (Maćkowiak et al., 2020). These models can also be used to explain why it is difficult for agents to distinguish between transitory and permanent shocks, in particular in an environment of changing inflation dynamics. However, inattention to news and to monetary policy does not imply that inflation expectations do not matter...
for decision making of households or firms. Several studies have demonstrated that expectations do matter for decision making (Coibion et al., 2020). Evidence from New Zealand shows, for example, that firms respond to higher inflation expectations by increasing prices but the degree of pass-through is limited and quickly diminishes over time. This suggests that firms consider the underlying shocks to be temporary and will only change prices continuously if they believe that inflation has changed persistently (Coibion et al., 2020).

2.3. Anchoring of inflation expectations

Anchoring of inflation expectations is directly related to the credibility of monetary policy (King, 1995). There is no unique definition or indicator for the anchoring of inflation expectations. One obvious criterion is that inflation expectations are anchored if they are in line with an (implicit or explicit) inflation target of the central bank over longer time horizons, usually over 5 years (Bernanke, 2007; Kumar et al., 2015, Bems et al., 2021). While this concept refers to the mean, other concepts of anchoring refer to the distribution of expectations, arguing that the lower the dispersion of individual expectations, the better inflation expectations are anchored. Well-anchored expectations should also rarely be revised and be stable over time so that the degree of anchoring can be also measured by the degree of sensitivity to new information (Carvalho et al., 2020). If households and firms do not adjust their expectations in response to economic news this could therefore also be the result of well-anchored inflation expectations and a successful monetary policy (Coibion et al., 2020). When inflation expectations are de-anchored in the sense that they deviate from the inflation target it might be difficult to figure out whether an adjustment of expectations towards the inflation target is due to a re-anchoring or an accidental and temporary result of other factors, such as commodity price fluctuations.

Empirical evidence on de-anchoring of inflation expectations in the euro area is mixed. Empirical tests of anchoring based on financial market data investigate whether inflation expectations or inflation uncertainty respond to macroeconomic or monetary policy news (Gürkaynak et al., 2005). Another possibility is to test whether changes in short-run expectations propagating into long-run expectations, which is more likely in case of persistent inflation dynamics (Mehrotra and Yetman, 2018). Several studies have found evidence for a potential de-anchoring of inflation expectations in the aftermath of the global financial crisis and the European debt crisis. Some evidence for financial markets in the euro area suggests that medium-run inflation expectations (2-5 years) have been de-anchored in the sense that they respond to macroeconomic news or changes in short-run expectations after 2011, while long-run expectations (over 5 years) did not change and remained in line with the 2% level (Nautz et al., 2017). Long-run inflation expectations among professionals slightly decreased during the European sovereign debt crisis in 2013 but the overall distribution remained in line with the slightly but below 2% target of the ECB. At the same time, uncertainty regarding long-run inflation increased substantially (Dovern and Kenny, 2020).

The degree of anchoring depends on a variety of institutional factors. Relevant factors include central bank independence, transparency regarding instruments and objectives as well as sustainable fiscal policy (Bems et al., 2021). A natural question is whether systematic under- and overshooting of inflation targets will lead to adjustments and de-anchoring of long-term expectations. Given the existing evidence on information rigidities and the sluggish adjustment of expectations over time, de-anchoring would require substantial and sustained deviations of actual inflation from the inflation target. Before the pandemic, actual inflation in the euro area was below the inflation target for an extended period of time and there was concern that inflation expectations might have lost their anchor. At the current juncture, the probability of a prolonged period of elevated inflation has increased, giving rise to the risk of a de-anchoring of expectations above the inflation target of the ECB.
3. MEASURES OF INFLATION EXPECTATIONS AND CURRENT DEVELOPMENTS

Inflation expectations are available for firms, consumers, professionals and financial markets. Inflation expectations can be derived from prices in financial markets as well as from surveys of firms and consumers or professional forecasters. Market-based measures can also reflect risk premia, which implies the need to disentangle the expectation and the risk component. Survey-based measures for consumers and households are not explicitly available for euro area inflation; professional forecasts are often based on small samples. Nevertheless, both kinds of measures are potentially useful for predicting future inflation (Meyler and Grothe, 2015).

For the euro area, the coverage of inflation expectations is incomplete. Measures of inflation expectations available for the euro area differ remarkably with regard to coverage, frequency and number of participants (Table 1). Inflation expectations of consumers and firms are usually only available for a horizon of up to one year, while market-based measures and professional forecast are available for longer horizons. Market-based measures can be derived on a daily basis. Survey measures are only available at monthly or quarterly basis, which makes it difficult to use these data to identify the effects of monetary policy (Bańkowska, et al., 2021). The ECB recently started a project to increase the availability of harmonised data for consumer expectations. However, the data are still only available for a relatively short time period.

Table 1: Key features of different empirical measures of inflation expectations for the euro area

<table>
<thead>
<tr>
<th>Name</th>
<th>Agent</th>
<th>Geog.</th>
<th>Horizon</th>
<th>Target</th>
<th>Frequency</th>
<th>Sample</th>
<th>Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>European Commission Consumer Survey (ECCS)</td>
<td>Households</td>
<td>Individual countries</td>
<td>1 year ahead</td>
<td>Consumer Prices</td>
<td>Monthly</td>
<td>2004</td>
<td>~25000</td>
</tr>
<tr>
<td>ECB Consumer Expectations Survey (CES)</td>
<td>Households</td>
<td>Individual countries</td>
<td>1 year ahead, 3 years ahead</td>
<td>Prices</td>
<td>Monthly</td>
<td>2020</td>
<td>~8000</td>
</tr>
<tr>
<td>European Commission Business Survey (ECBS)</td>
<td>Non-financial corporations</td>
<td>Individual countries</td>
<td>3 months ahead</td>
<td>Producer Prices</td>
<td>Monthly</td>
<td>1962</td>
<td>~70000</td>
</tr>
<tr>
<td>ECB Survey of Professional Forecasters (SPF)</td>
<td>Professionals</td>
<td>Euro Area (EA)</td>
<td>Multiple</td>
<td>HICP (HICPX)</td>
<td>Quarterly</td>
<td>1999</td>
<td>~75</td>
</tr>
<tr>
<td>ECB Survey of Monetary Analysts (SMA)</td>
<td>Professionals</td>
<td>EA</td>
<td>Multiple</td>
<td>HICP (HICPX)</td>
<td>6-weekly</td>
<td>2019</td>
<td>~30</td>
</tr>
<tr>
<td>Consensus Economics (CE)</td>
<td>Professionals</td>
<td>Individual countries</td>
<td>Multiple</td>
<td>HICP (HICPX)</td>
<td>Monthly/quarterly</td>
<td>1990</td>
<td>~30</td>
</tr>
<tr>
<td>Euro Zone Barometer (EZB)</td>
<td>Professionals</td>
<td>Individual countries</td>
<td>Multiple</td>
<td>HICP</td>
<td>Monthly</td>
<td>2002</td>
<td>~30</td>
</tr>
<tr>
<td>Swaps/bonds</td>
<td>Market</td>
<td>EA (Individual countries)</td>
<td>Multiple</td>
<td>HICP excl. Tobacco</td>
<td>Daily</td>
<td>2005</td>
<td></td>
</tr>
</tbody>
</table>


3.1. Household surveys

Inflation expectations of private households are usually far above actual inflation. Households are often not aware of recent inflation dynamics as measured in official statistics and believe consistently that inflation has been higher than it actually was (Dräger and Nghiem, 2021). At the same time, disagreement about future inflation across households is much higher than among professional forecasters (Coibion et al., 2020). Nevertheless, consumer inflation expectations can reflect trend changes in inflation dynamics (Lane, 2019).
**Inflation expectations in the Consumer Survey of the European Commission have risen sharply.**

In the European Commission’s Business and Consumer Survey, consumers are asked about the change in consumer prices in the last 12 months and about the expected change in consumer prices in the next 12 months. Therefore, the survey does not provide information about the long-term inflation expectations of private households. The survey reports quantitative consumer inflation expectations on a quarterly basis—qualitative expectations are available at a monthly basis—and is available for the countries of the European Union for long time periods. The survey data shows that consumers systematically perceive inflation to be considerably higher than it actually is (Figure 2). The large gap between the quartile-results indicates a huge dispersion of answers across consumers. There is a high correlation between perceived and expected inflation, suggesting that perceived inflation is one important determinant of expected inflation. Even though the systematic difference between perceived and actual inflation makes it difficult to interpret the survey in quantitative terms, it might be useful to identify the direction of changes in inflation expectations (Lane, 2019). In the course of 2021, consumer inflation expectations have increased considerably. Expectations are now at their highest level since 2008.

**Figure 2: Perceived and expected inflation by consumers and actual inflation**

![Graph showing perceived and expected inflation](image)


*Notes:* Quantitative data collection was started by the European Commission on quarterly basis in 2004. The latest observation corresponds to the 3rd quarter of 2021.

**Due to the shortcomings of existing consumer survey data the ECB has started a pilot Consumer Expectations Survey (CES).** The survey was launched in January 2020 and is conducted online at a monthly and quarterly frequency for six euro area countries (Bańkowska et al., 2021). Overall, the survey provides more detailed and more timely information about inflation expectations compared to the EU Consumer Survey. The survey provides also information about long-run inflation expectations for a horizon of three years and about inflation uncertainty. It is based on a quasi-experimental set-up, which allows the analysis of different scenarios, also providing quantitative information on durable and non-durable consumption plans. The survey is conducted online each month with approximately 10,000 participants during the pilot phase. So far, 6 countries are included (Belgium, France, Germany, Italy, The Netherlands and Spain) with the country coverage planned to be increased over time.
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(Bańkowska et al., 2021). First results of the CES from December 2020 look promising. Expected inflation deviates substantially less from actual inflation than the expectations from the EU Consumer Survey.

### 3.2. Firm Surveys

**Data on firm expectations in the euro area from the business survey of the European Commission are of qualitative nature.** The firm survey corresponds to the consumer survey as it is available for the countries of the European Union at a monthly basis for a long time period. In the survey, the participants are asked about their own price setting for the next three months ahead. Therefore, the survey only covers short-run expectations. Moreover, the survey does not provide information on the expectations of firms about overall consumer price inflation. The survey only provides qualitative results because firms are asked whether they plan to increase or decrease prices. The results are presented as the balance between the share of firms planning to increase and to decrease prices. In the last months of 2021, the indicator reached record-high levels in the manufacturing, service, and retail industries in the euro area (Figure 3). Price pressure is particularly high in the manufacturing and retail industries.

**Even though firms are the heart of consumer price developments, existing information on firm expectations is limited.** The relation between the firm’s own selling prices, aggregate producer prices and consumer prices is complex. Therefore, quantitative survey data on inflation expectations of firms in addition to expectations about their own prices would be particularly useful for monetary policy. There is also no explicit information regarding long-run inflation expectations, which is important to analyse the anchoring of inflation expectations at the firm level.

**Figure 3: Selling price expectations of euro area firms over the next three months**

Source: European Commission – Business and Consumer Survey.

Notes: The figure shows the balance (percentage points) between the share of firms indicating that they will raise their prices and the share of firms indicating that they will lower their prices. The latest observation corresponds to December 2021.

**The Bank of Italy collects data on inflation expectations of firms for the near term and for the long term.** The Survey on Inflation and Growth Expectations (SIGE) has been conducted by the Bank of Italy on a quarterly basis since 1999. At the beginning, only industrial and non-financial service firms participated. Since 2013, also firms from the construction industry are participating. The survey covers firms with 50 or more employees. A total of 1,000 firms participate in the survey and the results can be decomposed by geographic location, number of employees, and industry. The firms are asked about
their quantitative expectation for consumer price inflation 6, 12 and 24 months ahead. These answers serve as indicators for short-term inflation expectations. In addition, firms are asked about their long-run inflation expectations over the period in 3 to 5 years. Since 2017, the participating firms receive different information: 60% of the firms receive the current inflation rate as information, 20% receive the ECB’s inflation target as information, and the remaining 20% receive no information.

In the fourth quarter 2021, Italian firms’ inflation expectations were roughly 3% for all horizons. In the course of 2021, inflation expectations have risen in line with the increasing actual inflation (Figure 4). While the term structure of inflation expectation was positively sloped between 2014 and 2020, recently long-run inflation expectations were lower than short-run expectations. This suggests that the firms expect high inflation to be transitory at least to some extent. However, inflation expectations for all horizons are currently above the inflation target of the ECB.

Figure 4: Italian firms’ consumer price expectations

Source: Bank of Italy - Survey on Inflation and Growth Expectations (SIGE).
Notes: The includes industrial, non-financial services and construction firms. The latest observation corresponds to the 3rd quarter of 2021.

At the euro area level, the available survey data is not useful for assessing firms’ long-term inflation expectations. They merely depict the short-term trends in firms’ own price setting and are only available in qualitative terms. The quantitative data of the Bank of Italy are far more instructive, as they explicitly ask about consumer price inflation for different time horizons. In particular, inflation expectations for the period between 3 to 5 years from now can be useful for analysing the anchoring of inflation expectations at the micro level. Also, in the literature the need to create large and representative firm surveys with quantitative information and a better coverage has been emphasised (Coibion et al., 2018; Andrade et al., 2021). Such surveys should include control groups to distinguish between firms which are informed or uninformed about recent developments, as in the survey of the Bank of Italy.

### 3.3. Professional forecasts

Survey-based measures of professional forecasters are available for long time periods and a large number of countries. The surveys summarise the forecasts of financial institutions and research institutes on a regular basis. The mean over all forecasts is used as a measure of expectations. Surveys of professional forecasters are available from different sources, most prominently from Consensus Economics. The ECB also conducts a survey of professional forecasters. However, the ECB survey provides less detailed information than Consensus Economics and is only available on a quarterly basis.
beginning in 2004, while data from Consensus Economics is available at a monthly basis starting in 1989. Usually, the differences across different surveys of professional forecasters are relatively small.

**Consensus Economics collects annual forecasts for the current and the next year on a monthly basis and forecasts for up to 10 years on a quarterly basis.** The short-run forecasts for the current and the next year mainly reflect the impact of short-run factors, while the long-run forecasts for up to 10 years can be interpreted as a measure of the credibility of the central bank to achieve its inflation target. The forecasts are fixed event forecasts (i.e., for a specific year) and are available for a broad range of countries beginning in 1989. Participants include both private banks and research institutes. In the case of short-run forecasts, names of participants are published with the individual entries, which tends to increase the credibility of forecasts due to reputation effects (Beckmann and Czudaj, 2018). Consensus Economics has a good track record compared to forecasts of the International Monetary Fund (An et al., 2018) which is in line with the evidence that the combination of forecasts can reduce the forecast error compared to individual forecasts (Bates and Granger, 1969). Standard deviations of the individual forecasts provide information about the uncertainty about future inflation, which is one dimension of anchoring of inflation expectations.

A weakness of the surveys is that they are based on a small number of participants and that they do not provide regular information about the factors influencing the forecasts. The number of participants varies across countries and over time and is usually below 50. Respondents usually only provide quantitative forecasts so that no direct conclusion regarding the underlying expectation building mechanism can be drawn. Forecasters may use inflation expectations of firms or private households as indicators in econometric models, rely on market-based indicators or are guided by an assessment of the ability of a central bank to achieve its inflation target. Another caveat is that individual forecasts for longer horizons are not published.

**Euro area inflation forecasts of professionals for 2021 and 2022 have strongly increased recently.** The forecasts for 2021 have been revised upwards throughout the year with incoming data on actual inflation (Figure 5). The forecasts for 2022 have been revised upwards since July 2021 reflecting that professionals increasingly assessed drivers of price pressures to be more persistent. In the most recent survey, the mean forecast for headline HICP 2022 was well-above 2%. Forecasts for core HICP in 2022 were still below 2%, indicating that the increase in headline inflation forecasts is to a large extent due to energy prices (or food, alcohol, and tobacco, which are also excluded), influences usually perceived to be temporary. The standard deviation of forecasts across forecasters for 2021 declined throughout 2021 as the forecast is increasingly based on actual figures for monthly inflation over time. The standard deviation of inflation forecasts for 2022 by contrast increased markedly at the end of 2021, indicating that forecast uncertainty has increased. However, uncertainty seems to be concentrated on the prospects for energy prices as the standard deviation for core inflation remained relatively flat.
The forecasts of Consensus Economics are broadly in line with the ECB Survey of Professional Forecasters. According to the ECB survey, inflation forecasts have been revised upwards for 2021 to 2023 from the third to the fourth quarter of 2021 (Figure 7). However, the upward revision for headline HICP was smaller for 2023 and the forecasts for 2022 and 2023 remained below 2%, indicating that forecasters assess high inflation in 2021 to be mainly due to transitory factors. Core inflation forecasts have also been revised up. While underlying inflation is expected to increase in both 2022 and 2023, it is forecast to remain contained below 2%.
Forecasts for consumer price inflation have been raised substantially for all euro area countries, while forecast uncertainty has diverged. Figure 8 shows that in the course of 2021 Consensus Forecast expectations for 2022 have been strongly revised upwards for all countries covered. According to the latest forecasts, Germany will experience the highest inflation rate in 2022. At the same time, forecast uncertainty as measured by the standard deviation of individual forecasts has diverged, with uncertainty for Italy and Spain having increased particularly strongly.
Long-run inflation forecasts have increased only slightly and are now in line with the modified inflation target of the ECB. The increase in short-run forecasts has not been accompanied by a substantial upward revision of long-run expectations, suggesting that changes in short-run expectations have had little impact on long-run expectations yet. Following continuous slight adjustments during 2021 long-run expectations are now in line with the modified inflation target of the ECB (Figure 9). The standard deviation across forecasts as a measure of uncertainty among participants increased between April and July 2021, but returned to low levels in October. However, uncertainty has changed again from October to January. Long-run inflation forecasts for some countries recently slightly exceeded 2%, including for Germany, Austria, and France, while expectations for other countries remained below 2% (Figure 10). Overall, long-run expectations are for all countries relatively close to 2% after 2027. Uncertainty among participants displays a clear downward trend over the long-run. Both, forecasts and uncertainty over the medium run, have increased slightly compared to the corresponding October survey.

Surveys of professional forecasters also provide information about the distribution of forecasts. For example, throughout 2021 the distribution of forecasts for 2022 from Consensus Economics has shifted to higher values of inflation (Figure 11). The ECB survey of professional forecasts also provides the distribution of long-run forecasts. These have shifted to higher values of inflation over the last quarters, albeit to a smaller extent (Figure 12). The share of long-run forecasts above 2% is still relatively low.

Figure 9: Consensus: Long-run expectations for HICP Inflation – euro area

Source: Author’s own illustration based on data from Consensus Economics.
Inflation expectations in the euro area: post-pandemic trends and policy implications

Figure 10: Consensus: Long-run expectation for HICP Inflation – by country

Source: Author's own illustration based on data from Consensus Economics based on the January 2022 survey.

Figure 11: Consensus: Distribution of expectations for HICP inflation in 2022 – euro area

Source: Author's own illustration based on data from Consensus Economics.

Figure 12: SPF: Distribution of long-term inflation expectations (5 year ahead) – euro area

Source: Author's own illustration based on data from ECB, SPF.
3.4. Financial markets

Financial market instruments can be used to derive inflation expectations of market participants. These instruments include inflation-indexed bonds, inflation-linked swaps and inflation options. However, market prices for these instruments are not only driven by “genuine” inflation expectations, but also by other factors, such as risk or liquidity premia. The inflation risk premium can be conceptualised in the following way: investors are typically risk-averse and therefore are eager to hedge against tail events (high inflation or low inflation). The risk premia vary over time and can be positive or negative depending on the economic environment. Also, the market structure of the respective financial instrument plays a role and might give rise to an additional liquidity premium. Thus, market prices can be decomposed into “genuine” inflation expectations and other factors. However, these other factors are not observable and have to be estimated. This has to be considered, when financial market instruments are used to gauge inflation expectations.

Estimated decompositions of market prices of inflation swaps find that “genuine” inflation expectations fluctuate less than risk premia. According to recent estimates, the risk premium in the euro area was positive until 2013, while it turned negative afterwards (Burban et al., 2022). In these periods it reached magnitudes of up to 0.5 percentage points. With the beginning of the pandemic, market participants expected the downside risks to future inflation to dominate so that the risk premium exhibited large negative values. In the course of the pandemic, the risk premia became smaller and were “slightly positive” in November 2021 (Burban et al., 2022).

One instrument to hedge against future inflation are inflation-indexed government bonds. Inflation-indexed bonds – as nominal bonds – provide principal and interest payments. However, the payments of inflation-indexed bonds are corrected for the realised inflation rate. Thus, the price of inflation-index bonds includes inflation expectations of market participants. The break-even inflation rate – that corresponds to expected inflation – is the difference between yields of nominal and inflation-indexed bonds with similar maturity.

In the euro area, the liquidity of inflation-indexed government bonds is relatively low. The share of inflation-linked bonds in the total amount of governments bonds outstanding is roughly 10% (Agence France Trésor, 2021; Dipartimento del Tesoro, 2021) for the largest suppliers of inflation-indexed bonds (France and Italy). For Germany and Spain, the share is even smaller at about 5% (Deutsche Finanzagentur, 2021; Tesoro Público, 2021). The low liquidity compared to nominal bonds gives rise to a liquidity premium for inflation-indexed bonds (Camba-Mendez, 2020).

Break-even inflation rates derived from 10-year government bonds have increased and seem to be broadly in line with the inflation target of the ECB currently. At the end of 2021 break-even inflation rates were 1.8% for France and 1.7% for Germany (Figure 13). In the period before the pandemic, break-even inflation rates were below the inflation target for several years. At the beginning of the pandemic in March 2020, the break-even inflation rates fell from roughly 1% to close to 0%, but then quickly recovered since May 2020 and surpassed the pre-pandemic value in January 2021.
Inflation expectations in the euro area: post-pandemic trends and policy implications

Figure 13: Break-even inflation rates derived from 10-year bonds

Source: Datastream, Refinitiv.

Notes: Break-even inflation rates derived from bond markets equal the difference between nominal bond yields and real yields from inflation-linked bonds of similar maturity. Break-even inflation rates do not equal “genuine” inflation expectations as a risk and liquidity premium also affect break-even inflation rates. The latest observation corresponds to 14 January 2022.

Another instrument to hedge against future inflation are inflation-linked swaps (ILS). The swap market is more flexible than the inflation-indexed bond market as the contracts can be adjusted bilaterally to the specific needs of buyers and sellers. This results also in a relatively large variety of maturities, for which inflation expectations can be derived. In principle, two parties swap a payment that depends on the difference of a fixed benchmark level of inflation and realised inflation in a specific time period. The resulting ILS rate reflects inflation expectations of market participants, even though it depends also on other factors, such as risk premia.

Inflation expectations based on euro area inflation-linked swaps have increased strongly and now exceed the pre-pandemic level. The ILS rates show that market participants expect inflation to remain elevated in the near future (Figure 14). The one-year ILS rate is currently close to 3%. Long-run inflation expectations for horizons of 5 to 10 years have increased recently according to the ILS rates and are now in line with the ECB inflation target. The five-year forward inflation swap five years ahead (5y5y), which is frequently used in monetary policy discussions, has exhibited a similar pattern. Before the pandemic, long-run inflation expectations were below the inflation target for several years according to the ILRs rates.

Figure 14: Euro area inflation swaps

Source: Refinitiv.

Notes: Market prices from inflation swaps cannot directly be interpreted as “genuine” inflation expectations. Market prices are also influenced by an inflation risk premium. The latest observation corresponds to 14 January 2022.
A third instrument that can be used to gauge inflation expectations of market participants are **inflation options**. Inflation options can be used to derive probability distributions for inflation expectations of market participants. The probabilities cannot be interpreted as physical probabilities as investors are usually risk-averse so that especially in high and low inflation periods risk premia can drive market prices. Neglecting the risk premium (equal to a risk-neutral view) option price data in November 2021 indicate that market participants assign a probability of about 50% to a scenario with inflation above 2% on average for the next 5 years (Figure 15). In contrast, in March 2020, when the pandemic began, the probability for inflation rates below 1% was equal to roughly 80%. Currently, financial market agents assign the lowest probability since 2010 on inflation rates below 1% and the highest probability on inflation rates above 2%. This suggests that inflation expectations currently shift in the direction of a de-anchoring to the upside rather than to the downside, even though the risk premium has to be taken into account.

**Figure 15: Average inflation over the next 5 years (risk-neutral option-implied distribution)**

![Figure 15: Average inflation over the next 5 years (risk-neutral option-implied distribution)](Image)

**Source:** Author’s own illustration of ECB data (ECB 2021, p. 25; Schnabel 2021, p. 14).

**Notes:** Market prices of inflation options cannot directly be interpreted as “genuine” inflation expectations. Market prices are also affected by an inflation risk premium. A risk-neutral option-implied distribution assumes that the risk premium is zero. The observations correspond to the start of the quarter and the latest observation is 12 November 2021.
4. DE-ANCHORING OF INFLATION EXPECTATIONS AHEAD?

Over the last couple of years, long-run inflation expectations gradually slipped below the central bank target rate. The euro area experienced an extended period of underlying (core) inflation undershooting the ECB’s inflation target, although the central bank, faced with the zero lower bound for the main policy rate, implemented sizable unconventional monetary policy measures. Over time, market participants appear to have to some extent lost confidence in the capability of the ECB to shift inflation back to the target range. Both market-based as well as survey-based inflation expectations fell considerably below 2% between 2015 and 2020. The decline in inflation expectations has led the ECB to make use of unconventional monetary policy measures, and the limited success of this policy to lift inflation back to target, in turn, likely contributed to concerns that the ECB may have indeed run out of effective instruments. With the recent rise in inflation, the euro area may have left this low-inflation environment.

4.1. Expectations in the face of surging inflation

Inflation has increased strongly and is expected to remain elevated for the time being. Several factors are contributing to the current upsurge of inflation (Beckmann et al., 2021). So far, energy prices and supply bottlenecks have been major drivers, with the potential to also lift the inflation rate in 2022. Wholesale energy prices are only gradually passed through to consumers. There is also a considerable lag in the pass-through of producer prices (pushed up by prices for energy and raw materials and transport costs). Higher producer prices – up almost by 24% y-o-y in November 2021 – will eventually fuel consumer price inflation via non-energy industrial goods (NEIG) prices (Koester et al., 2021). Fiscal policy has held up demand during the COVID-19 crisis and can be expected to remain supportive as the general escape clause remains in place, suspending European fiscal rules until 2023. Grants from NextGenerationEU (NGEU) funds distributed to Member States over the next couple of years and an effective relaxation of rules as a likely outcome of the current debate on a reform of the Stability and Growth Pact will allow Member States to keep a rather supportive fiscal policy stance also in the following years. On top of that, the pandemic left households with huge amounts of extra savings increasing their willingness to pay and with the potential to fuel a post-crisis expenditure boom. Finally, although there has been no signal of accelerated wage growth yet, the recent surge in inflation will likely trigger second-round effects in upcoming wage negotiations. In contrast to the situation after previous crises, labour markets in many Member States are tight and the unemployment rate in the euro area (7.2%; Nov. 2021) has never been lower in the history of the monetary union. Workers and unions can be expected to strive for nominal wage increases in 2022 and beyond that exceed inflation after average real wages have declined in 2021. Higher wage dynamics would be particularly important as a driver of higher services inflation (2.4% y-o-y in December 2021). Second-round effects via higher wage increases have not taken place yet, but the current combination of high inflation and tight labour markets raises the risk that accelerating wage pressure will fuel inflation in the coming years.

So far, market participants expect increased inflation to be temporary with long-run expectations around the 2% target. While market-based indicators suggest that inflation will remain above the inflation target for the time being, long-run expectations have shifted close to 2%. Long-run expectations of professional forecasters have also increased somewhat and are now in line with the inflation target of the ECB. This is consistent with the view that market participants believe that the central bank can control inflation. One reason behind might be that it is easier for central banks to reduce inflation if it is above target than lifting inflation when it is below the target, particularly at the zero lower bound. As a consequence, recent shifts of inflation expectations could be interpreted such that they have indeed re-anchored at the ECB’s target rate. There is, however, also the possibility that
long-term inflation expectations are still de-anchored and will continue to rise going forward on the back of persistent overshooting of actual inflation.

4.2. Credibility is key: Central bank policies and communication

The ECB has in principle tools at its disposal to maintain price stability. The institutional setup of the ECB, in particular its independence from national governments and its clear mandate of maintaining price stability, is conducive to avoid runaway inflation. The ECB has all the necessary monetary policy tools at its disposal: It can reduce and reverse asset purchases, drain excess liquidity from the monetary system, increase interest rates, and use macroprudential instruments. Even if a strict tightening of monetary policy may be economically costly in terms of output, there is the possibility to control inflation if required. As long as the ECB credibly signals determination to maintain price stability, inflation expectations over the medium and longer term should remain at the inflation target. This, in turn, will contribute to moderating price pressures and facilitate the task of maintain price stability over the medium run.

The risk of de-anchoring of expectations increases, the longer inflation remains elevated. The longer households and firms experience high inflation, the more likely they are to revise their long-run expectations upwards. Expectations about short-run inflation have already increased substantially and the rich evidence for slow adjustment of expectations suggests that long-run expectations could further be revised up going forward.

The determination of the ECB to fight inflation is called into question when actual policies are not consistent with the inflation outlook. Recently, the ECB revised its inflation forecast for 2022 in its macroeconomic projection from 1.7% (in September 2021) to 3.2% (December 2021). Despite this remarkable revision, monetary policy remained largely unchanged; the ECB continued to rule out interest rate hikes in 2022 and projects to continue with net asset purchases for the entire year 2022, though with volumes declining over time. There are indeed reasonable arguments to avoid premature tightening and a fall-back into a low-inflation environment as long as inflation is expected to return to target in the medium term anyway (Schnabel, 2021). In order to avoid the impression of complacency, the ECB explicitly points to the possibility of more persistent and broad-based inflationary pressures. Instead of only considering the most likely outcome for inflation, it looks at a probability distribution in the inflation outlook. Schnabel (2021) proposes a risk-management approach in the presence of higher uncertainty in the inflation outlook in order to prepare for all eventualities and to be able to act swiftly if necessary. Nevertheless, the credibility of these assurances will be tested with the degree and duration of deviations from the inflation target to the upside, and scepticism about the ECB’s willingness to fight elevated inflation will grow, and so does the risk of de-anchoring of inflation expectations.

The central bank may also have to respond to structural changes like the green transition which can create upside risks to price stability in the medium term. The path of energy prices could become a relevant factor for monetary policy decisions and long-run expectations. Energy prices are notoriously volatile and therefore central banks usually “look through” fluctuations of energy prices when they focus on the core inflation rate in their assessment of underlying inflation. However, the green transition of the economy may require persistent increases in fossil fuel-based retail energy prices via carbon taxes, aggravated by surging demand for “transition fuels” like natural gas. Monetary policy will have to react if a persistent increase in energy inflation contributes to a de-anchoring of inflation expectations and hence poses a risk to price stability in the medium term (Schnabel, 2022). Sustained price pressure could also come from metal prices, which are pushed up by strong demand partly related to the energy transition. Another source of structural upward pressure on prices could
come from food prices if unfavourable weather becomes the norm rather than the exception as a result of global warming and productivity of staple food crops is reduced over the coming years on a global scale (Beckmann et al., 2021).

4.3. The risks of financial and fiscal dominance

Inflation expectations could de-anchor to the upside if market participants believe that the ECB is restricted in its ability to control inflation. Long-term inflation slipped below target in recent years when the ECB seemed to be unable to lift inflation back to 2%. Similarly, a de-anchoring to the upside becomes more likely if market participants question the determination of the central bank to fight inflation due to trade-offs with other objectives of the central bank like cohesion of the monetary union and integrity of the financial system.

Sudden monetary policy tightening could be disruptive for financial markets. Due to the long period of low interest rates (and therefore a considerable decline in the reference interest rate), asset prices, including equity prices and house prices, have increased considerably. If a sudden and sharp tightening of monetary policy led financial markets to reassess their outlook for nominal and real interest rates, this could send asset prices tumbling and cause turbulences in the financial system. Wherever these assets are primarily held – e.g. insurances, pension funds, banks, households – a sizable loss of market value in financial assets may have dire consequences. Moreover, the banking system had to adapt to the persistent low interest rate environment but kept on its business model of maturity transformation. This implies that bank assets (mostly credit to firms and households) have longer duration than bank liabilities (refinancing via deposits or bonds). If refinancing costs increase sharply, while the large stock of longer-term credits continues to deliver low revenue (as low as 1-2% in the case of mortgages), already thin profit margins of banks may turn negative. Leaving the zero interest rate environment after many years is unprecedented. The ECB may face a trade-off between forceful monetary policy tightening in order to rein in inflation and financial stability issues. Moreover, as the Eurosystem is the single largest holder of government debt, the central banks’ balance sheet would also be strongly affected with negative equity as a possible result.

Rising interest rates may get highly indebted governments into trouble. Due to elevated government debt and budget deficits in some Member States, monetary policy tightening can have considerable side effects. If the ECB ceased to purchase government bonds (let alone selling assets), there would likely be an increase of average returns of government bonds, and risk spreads of highly indebted periphery states like Greece and Italy could swell. This would lead investors to rethink the argument that financing conditions for governments will remain favourable for an (almost) indefinite future (Blanchard et al., 2020), raise concerns about sustainability of public debt for some Member States and put additional pressure on refinancing conditions via rising risk spreads, potentially leading into a self-fulfilling sovereign debt crisis. Therefore, the ECB will hardly ignore this “fragmentation risk” (Krauss, 2021) and balance its actions to control inflation with the need to maintain favourable financing conditions for national governments. If the inflation outlook requires a forceful and immediate response of monetary policy, financial and fiscal dominance could come into play and restrict the ECB in its policies (Fiedler et al., 2020).
5. CONCLUSION

The available measures of inflation expectations for the euro area only partly meet the needs of the ECB. Measures of inflation expectations are available for private households, firms, financial markets, and professional forecasters. These measures differ in terms of their scope, their horizon, and the way they are compiled, resulting in different strengths and limitations. Short-run inflation expectations provide information about the outlook for inflation in the near term. Long-run inflation expectations can serve as an indicator for the credibility of a central bank to achieve its inflation target. While inflation expectations of consumers and firms are most important for central banks as they ultimately matter for price setting and in turn consumer price inflation, available measures exhibit the largest gaps here. Consumer surveys are only available for short-term inflation expectations and measured expectations systematically exceed actual inflation. Firm inflation expectations are also only available for the short-term, provide information about expected prices of individual firms but not for overall inflation, and are only available in qualitative terms. As a result, inflation expectations of professional forecasters and market-based inflation expectations, which are available for the long-run in quantitative terms, are in practice more relevant for monetary policy analysis. The ECB started a pilot Consumer Expectations Survey to improve the available data for consumer inflation expectations. The Bank of Italy conducts a survey on firm expectations in Italy, which includes long-run expectations on overall inflation in quantitative terms, that provides an avenue to improve the available data on inflation expectations of firms in the euro area.

While short-run expectations indicate that inflation in the euro area will remain elevated for the time-being, long-run inflation expectations are in line with the inflation target of the ECB. All available measures for short-run expectations have increased recently reflecting the surge in actual inflation and the expectation that the factors behind will remain in place in the near-term. Current drivers of inflation include supply bottlenecks, a high willingness of consumers to pay due to extra savings built up since the beginning of the pandemic, and tight labour markets. While it is uncertain when the impact of these factors will subside, more structural developments, such as demographic change or the transition towards green energy, have the potential to put upward pressure on prices in the medium-term. Long-run inflation expectations have increased as well but are currently in line with the inflation target of the ECB. However, as there is some evidence that long-run inflation expectations have been de-anchored at least slightly in the low inflation environment before the pandemic, it is uncertain how firmly they are re-anchored at the current juncture.

If inflation remains well-above the inflation target for an extended period of time, the ECB may face difficult trade-offs. According to the modified inflation target, the ECB can tolerate inflation above its target for some time. Moreover, in practice it is easier for the ECB to deal with inflation above its target rather than with inflation below its target in particular at the zero lower bound. However, the longer inflation remains above the inflation target of the ECB, the more likely it becomes that long-run inflation expectations will rise above its inflation target. In such a scenario, the ECB may face difficult trade-offs. On the one hand, increasing long-run inflation expectations would indicate that the ECB has lost credibility to achieve its inflation target and put further upward pressure on actual consumer prices. This, in turn, would require even stricter measures to keep inflation in check, increasing the economic costs of disinflation later. On the other hand, a decisive tightening of monetary policy could trigger stress in financial markets in general and in sovereign bond markets in particular, potentially leading into another sovereign debt crisis in the euro area or a return to the low-inflation environment that prevailed before the pandemic.
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What to expect from inflation expectations: theory, empirics and policy issues

Luigi BONATTI, Andrea FRACASSO and Roberto TAMBORINI
Abstract
We examine the role of inflation expectations in conditioning monetary policy, addressing three of its facets. The first concerns the channels through which inflation expectations impinge upon actual inflation, and their policy implications. The second facet regards the technical and empirical issues involved in keeping track of inflation expectations for monetary policy purposes. The final facet is an assessment of inflation expectations vis-à-vis the current upsurge of inflation, wondering whether, after being unanchored on the downside, can now become unanchored on the upside.

This paper was provided by the Policy Department for Economic, Scientific and Quality of Life Policies at the request of the committee on Economic and Monetary Affairs (ECON) ahead of the Monetary Dialogue with the ECB President on 7 February 2022.
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<tr>
<td>AD</td>
<td>Aggregate demand</td>
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<tr>
<td>AS</td>
<td>Aggregate supply</td>
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<tr>
<td>CPI</td>
<td>Consumer price index</td>
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<tr>
<td>ECB</td>
<td>European Central Bank</td>
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<tr>
<td>GDP</td>
<td>Gross domestic product</td>
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<tr>
<td>NAIRO</td>
<td>Non-accelerating-inflation rate of output</td>
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<tr>
<td>NRI</td>
<td>Natural rate of interest</td>
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<tr>
<td>OG</td>
<td>Output gap</td>
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<td>RE</td>
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EXECUTIVE SUMMARY

- We review the channels through which expectations of future inflation feed onto actual inflation, and their policy implications. These are traced back to households and firms and the way their expectations go through aggregate demand and aggregate supply.

- First, different kinds of expectations are relevant for different channels. Second, granted that future inflation expectations contain valuable information for the policymakers, it does not necessarily follow that they should be included in the monetary policy rule. Third, unanchored expectations do not necessarily imply that inflation gets out of control.

- Results of empirical studies about the role of inflation expectations in households’ and firms’ behaviour are mixed. Likely, they are conditioned by the actual inflation climate prevailing at the time: low and stable inflation may favour low and stable expectations and induce individuals to disregard the effect of current and future inflation on their economic decisions. The opposite occurs when inflation is on the rise, when disregarding present and future inflation may produce large losses.

- The overall picture of theoretical and empirical studies is more shadowed than usually believed. Granted that information on future inflation expectations has to be carefully assessed and processed along with other information about the contingent state and the evolution of the macroeconomy, caution suggests it should not be given the role of polar star of monetary policy.

- We also suggest that further work is necessary to clarify the theoretical setting and to provide guidance for the interpretation of the various empirical measures of inflation expectations and their role in the ECB’s projection models used for policy purposes.

- We find that more conceptual clarity is necessary about the degree of anchoring of inflation expectations, for instance as to whether inflation expectations should be anchored to the central bank target or to its forecasts. Greater clarity as to the alternate uses of the various metrics (as well as of survey-based and market-based datasets) could help to reduce complexity and facilitate the interpretation of the empirical evidence.

- It could appear appealing to policy makers to lower agents’ perceived real interest rates by raising their inflation expectations when the nominal interest rates are stuck at the zero lower bound. Hence, a central bank may be tempted to use strategically its inflation projections for managing agents’ expectations. However, this could undermine its credibility.

- In the light of the current upsurge of inflation, we discuss whether, after being unanchored on the downside, inflation expectations can now become unanchored on the upside. The evidence is mixed, but the early belief (hope) that expectations remain anchored to the 2% target seems to resist. Yet, we warn that the key area where the interplay between inflation, inflation expectations, and monetary policy will be critical is that of financial markets, not so much because inflation is a concern per se, but because central banks will deem inflation to be high enough to put an end to the era of easy money.

- In the current situation, the ECB’s problem is to convince the public that, if the current price hikes persisted, it would not permit inflation to steadily rise much above 2%. Indeed, analysts and market participants could believe that the risk of financial fragmentation and tensions in the euro area’s sovereign debt market may make the ECB more reluctant than other central banks to act decisively by pushing up financing costs to dampen inflation.
1. INTRODUCTION

It is a central tenet of modern central banking, backed by mainstream academic research, that the evolution of the inflation rate finds one main driver in its own expectations, and that key to inflation control is "expectations management" with a view at keeping expectations firmly "anchored" to the central bank's target (Woodford, 2003).

These convictions seemed largely supported by, and conducive to, the so-called “Great Moderation” epoch. They also have spurred renewed investigations in search of explanations for the prolonged stagnation across advanced economies, and particularly in the euro area, that followed the 2007-08 global financial crash and the 2008-09 Great Recession, with inflation dwelling quite below the major central banks’ targets, and even spells of deflation. The outbreak of the COVID-19 pandemic has replicated the same phenomena on a grander scale. Overall, all along the past decade, there has been substantial convergence in academia and central banks in assigning a significant role to falling, or "unanchored", inflation expectations behind the "reflation fatigue" manifested by conventional as well as unconventional monetary policies (Draghi, 2016; Schnabel, 2020; Lane, 2020).

The second half of 2021 witnessed the acceleration of inflation across advanced economies, quickly approaching or overshooting reference values of 2%-3%, as a consequence of faster than expected recovery from the COVID-19 pandemic and bottlenecks in supply chains, first and foremost in energy. This sudden scenario reversal is challenging central banks in the opposite and symmetric way compared to the way the past decade of low inflation challenged them. Not surprisingly, inflation expectations remain at centre stage in three different, but interrelated, issues: whether or not the current inflation spike will take hold, whether or not economic agents are confident in central banks’ willingness/ability to keep inflation under control, whether or not central banks will in fact succeed in this endeavour.

In this paper, we will examine the role of inflation expectations in the present context of the euro area, and hence in conditioning monetary policy, addressing three of its facets. The first, in section 2, concerns the theoretical channels through which inflation expectations are supposed to impinge upon the actual inflation rate. These are traced back to households and firms and the way their expectations go through aggregate demand and aggregate supply. Then, we explore the policy implications. We also review available evidence about these theoretical channels, in particular whether households and firms do behave according to their (reported) inflation forecasts. The overall picture is more shadowed than usually believed.

The second facet, in section 3, regards the technical and empirical issues involved in keeping track of inflation expectations for monetary policy purposes. We probe into the work done by the Eurosystem’s Expert Group on Inflation Expectations (ECB, 2021b) that illustrates in great detail various empirical measures of inflation expectations and analyses their relationships, also in projection models used for policy purposes. Here, acknowledging the great strides forward on this ground, we point out some problems that remain to be addressed.

The final facet considered in section 4 is an assessment of inflation expectations vis-à-vis the current upsurge of inflation in the euro area, wondering whether, after being unanchored on the downside, can now become unanchored on the upside. The evidence is mixed, and difficult to discern, also for the reasons discussed in section 3, but the early belief (hope) that expectations remain anchored to the 2% target seems to resist. Yet we warn that the key area where the interplay between inflation, inflation expectations, and monetary policy will be critical is that of financial markets, not so much because in those markets inflation is a top concern per se, but because their true top concern is whether central banks will see inflation high enough to put an end to the era of easy money.
2. DO INFLATION EXPECTATIONS AFFECT ACTUAL INFLATION?

Studies about the role of expectations in the evolution of inflation revolve around three issues:

1) Whose expectations, and through what channels, affect actual inflation?
2) What are the implications for central banks?
3) What is the evidence?

2.1. A review of theory

As to the first issue, ideas can usefully be organised around the double-entry scheme of Table 1. The channels through which inflation expectations affect actual inflation can ultimately be traced back to aggregate demand and supply shifts, where it is generally agreed that inflation responds to demand excesses over supply, in addition to autonomous cost-price shocks. Behind aggregate demand and supply, the relevant agents can be households and firms through their forward-looking decisions1.

Table 1: The channels of inflation expectations

<table>
<thead>
<tr>
<th></th>
<th>Aggregate demand (AD)</th>
<th>Aggregate supply (AS)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Households</strong></td>
<td>Demand for consumption and durable goods</td>
<td>Wage indexation</td>
</tr>
<tr>
<td><strong>Firms</strong></td>
<td>Demand for capital goods</td>
<td>Wage indexation Cost push Price making</td>
</tr>
</tbody>
</table>

Source: Authors’ own elaboration.

On the AD side, the households channel is related to the so-called **intertemporal price effect**, that is to say the effect that expected inflation exerts on the allocation of households’ expenditure over time. Expenditure may concern current consumption goods as well as durable goods, in particular houses. For the former, the expectation of higher prices in the future incentivises more purchases in the present, which in turn create a pressure on current prices. For the latter, which are sensitive to the cost of borrowing, expected inflation goes through the calculation of the **real interest rate** along the loan maturity horizon. This falls as expected inflation rises, so that demand for durable goods is boosted.

The firms’ AD channel hinges on the real interest rate as the main determinant of the demand for capital goods and operates as with households’ demand for durable goods.

On the AS side, the role of households is more complex as it goes through the labour market in interaction with firms, and it depends on the **system of wage indexation** prevailing in the economy. The underlying principle is the absence of monetary illusion in wage bargaining, according to which labour supply and labour demand are regulated by the real value of wages. For labour supply to remain unchanged as consumer prices rise, nominal wages should also rise in parallel, creating the notorious **price-wage spiral**. How this principle works and its effects depend on the institutional features of the labour market.

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1 A comprehensive view of these channels can be found in Rudd (2021), ECB (2021a), ECB (2021b).
The long-lived literature on "nominal rigidities" of Keynesian inspiration of various vintages focuses on the point that wage contracts are set in nominal terms and have a predetermined duration. This feature, in combination with no monetary illusion, has two significant consequences. The first is that wage contracts are necessarily forward-looking, and as a rule they embody a forecast of the future consumer price index (CPI) to which the nominal wage rate is linked in order to safeguard the contractual real wage rate. The second is that, throughout the contract life, the nominal wage rate is not changed, so that unanticipated changes in the CPI, also dubbed "inflation surprises" determine deviations of the real wage, actually paid by firms and earned by workers, from the contractual one.

This view of the labour market introduces the need for a distinction between future expected inflation, "one (contractual) period ahead", and previously expected inflation for the current period, "one (contractual) period earlier". In theory, future expected inflation is relevant only at the time of contract renegotiation; hence future higher expected inflation will be passed onto nominal wages and firms' costs with an effect on future CPI and inflation rather than on the current one. As long as a given contractual arrangement is in force, the relevant mechanism is the "inflation surprise" described above, i.e. any difference between the current inflation and the inflation that was expected when the contract was signed. Contingent responses of workers and firms to inflation surprises determine the so-called "short-run" labour supply and demand, and eventually the AS function vis-à-vis current inflation. This is generally drawn as increasing in inflation surprises because higher than expected inflation reduces the real cost of labour for firms, which may expand employment and production.

This distinction between expected inflation "one period ahead" and "one period earlier" is important conceptually, though in practice it may be blurred by the simple fact that wage contracts are not perfectly synchronised across the economy. In a given year, wage contracts with future expiration coexist with others that are under renewal. The latter may well bring future expected inflation to the present. Moreover, the extent to which inflation surprises give rise to more employment and production with unchanged nominal wages, or the slope of the short-run AS function, also depends on the response of workers' labour supply. If the reaction in the face of a lower real value of the contractual nominal wage is a shortage of labour supply strong enough, firms may be induced to raise nominal wages to retain workers even in advance of the formal contract renewal. This mechanism, clear symptoms of which are now detected across advanced economies recovering from the pandemic, may well embody into nominal wages and prices not only current but also future higher inflation.

Other sources of shocks to firms' costs of production, most notably those of raw materials and intermediate inputs, may have an impact on current prices depending on the goods market structure and firms' pricing policy. Generally, the result is some degree of pass-through from cost shocks to selling prices, which entitles to think that expected future cost shocks may also have an impact on current inflation.

The firms' AS channel is more articulated and encompasses other aspects of firms' forward-looking decisions. The now canonical firms' AS channel of influence of future expected inflation on current...
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Inflation is the so-called “Calvo pricing model” (Calvo, 1983) embedded into the New Keynesian macro-models with monopolistic competition and sticky prices. The reason is that higher expected inflation is equivalent to a fall in the relative price of, and hence an increase in the demand for, the good produced by each single firm. Profit maximisation under monopolistic competition would lead each firm to match an increase in demand with a combination of higher production and price. However, a share of firms, with some probability, will not be able to change their price in the future, and hence set the current price as a combination between the present and future (higher) optimal price. At the same time, current inflation is also spurred by increases in AD in excess of AS, though less than if the prices of all goods were freely changed at all times.

2.2. Implications for monetary policy

In order to organise ideas a little bit of algebra may be useful. Let us adopt today’s benchmark for central banking, i.e. the New Keynesian "three equation model", though it includes some, but not all, of the channels of inflation expectations in Table 1. The three equations determine the output gap, the current inflation rate, and the nominal interest rate.

The output gap (OG) is the percentage difference between the current gross domestic product (GDP) and the potential GDP, or more pragmatically, the reference GDP that the central bank considers consistent with inflation remaining in line with its target (also known as "non-accelerating-inflation rate of output", NAIR). The output gap is positive (negative) whenever the current real interest rate falls below (rises above) the level consistent with the NAIR (the so-called "natural rate of interest", NRI). In turn, the current real interest rate results from the nominal rate set by the central bank net of the expected inflation rate. Note therefore that, given the policy rate, the output gap shows a positive relationship with expected inflation.

Current inflation is represented as a positive function of expected inflation and the output gap. Though customarily dubbed (New Keynesian) Phillips Curve, this should more properly be defined as an AS function in the setup with sticky prices and/or wage described above. In the canonical form, that we employ below, expected inflation enters as the short-run, "one period ahead", expectation held by price-making firms in diversified goods markets.

The determination of the policy interest rate is typically given by some format of the Taylor Rule, according to which it is pinned down by the nominal value of the NRI (NRI + the inflation target) and is raised above (reduced below) whenever current inflation is above (below) the target, while also taking into account whether the output gap is positive or negative. In cases in which inflation and the output gap send opposite signals, the relevant case being excess inflation and negative output gap ("stagflation"), the dynamic control of the system requires that the reaction to excess inflation should be larger than that to the negative output gap, i.e. the policy rate should be raised by more than excess inflation, though less than in the case of "pure inflation targeting" with no consideration at all of the sign of the output gap.

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7 The split between the two is determined by the demand elasticity of firm’s product.
8 With reference to Table 1, this mechanism is relevant for the share of private expenditure that is sensitive to the real interest rate, which typically includes investment in capital goods by firms and households' purchases durable goods. Households’ purchases of consumption goods sensitive to the intertemporal price effect, but not necessarily to the real interest rate (e.g. households inactive in the financial markets: Galì et al., 2007; Bibliie, 2008), can also be added with a reinforcing effect of expected inflation.
9 This condition ensures that the real interest rate increases above the NRI, which is necessary in order to realign GDP with the NAIR. Yet this is strictly necessary only insofar as the real interest rate is the single transmission mechanism between monetary policy, GDP and inflation.
Since the three equations are interdependent, it is possible, and useful, to examine the system solutions, i.e. how each respective variable is determined after all the relevant reciprocal interdependencies have been worked out. In order to focus on the issues of interest here, let us consider that the output gap and the current inflation can be hit by an exogenous shock. The current inflation rate $\pi_t$ and the policy interest rate $i_t$, result as follow (for simplicity we leave the output gap in the background):

1.\[ \pi_t = \pi^* + a_1(\pi^*_{t+1} - \pi^*) + a_2u_{pt} + a_3u_{yt} \]
2.\[ i_t = r_t + \pi^* + b_1(\pi^*_{t+1} - \pi^*) + b_2u_{pt} + b_3u_{yt} \]

$\pi^*_{t+1} = \text{expected inflation}$, $\pi^* = \text{inflation target}$, $r_t = \text{NRI}$, $u_p = \text{price shock}$, $u_y = \text{demand shock}$, the coefficients $a_n$, $b_n$ ($n = 1, 2, 3$) are combinations of the parameters of the three equations.

As far as the role of expected inflation is concerned, note the following:

- Current inflation deviates from its target in proportion to the deviation of expected inflation from the target.
- Nominal interest rate reacts to deviations of expected inflation from the target.

It is worth stressing that these two features result from the interdependencies among the three equations, though they are not present in their original form. Look in particular at the policy rate: for it to be reactive to deviations of expected inflation from the target, it is not necessary that the central bank includes inflation expectations explicitly into its policy rule. Reacting to the current excess inflation is sufficient to "bring in" the effect of inflation expectations as they impinge upon both the input variables of the policy rule. On the other hand, this finding lends support to the common practice of central banks to monitor the evolution of inflation expectations.

The next key issue is: \textbf{how is expected inflation determined?} Various possible answers are available, both on theoretical and on empirical grounds. Let us first introduce the now widely used distinction between "anchored" and "unanchored" expectations.

2.2.1. \textbf{Anchored expectations}

The most common definition of anchored expectations is that they are in line with the inflation target and are insensitive to transitory shocks. These features are easily inserted into our equation (1) by positing that $\pi^*_{t+1} = \pi^*$ independently of the shocks $u_p$, $u_y$. Therefore,

1.\[ \pi_t = \pi^* + a_2u_{pt} + a_3u_{yt} \]
2.\[ i_t = r_t + \pi^* + b_2u_{pt} + b_3u_{yt} \]

Both inflation and the policy rate hover around their respective targets as a consequence of the shocks. Their co-evolution over time is dictated by the time path of the shocks, provided that, in compliance with the definition of anchoring, the shocks are transitory, i.e. they should peter out over time. An example is provided by the simulation in Figure 1.

To begin with, the simulation reproduces the "old normal" regime, with non-zero real and nominal interest rates. The inflation target is 2% and the NRI is 1%, which implies a target policy rate of 3%. The values of the coefficients $a_n$, $b_n$ are obtained from values of the structural parameters of the three equations commonly found in the empirical literature. The economy is hit by an inflation spike $u_{pt} =$
3%, which displays low persistence as is presently believed (30% of the previous period’s shock is left in each next period)\(^{10}\).

**Figure 1: An inflationary shock with anchored inflation expectations**

![Figure 1: An inflationary shock with anchored inflation expectations](image)

Source: Authors’ own elaboration.

The story told by the graph is that the shock pushes current inflation above its target (4.7% vs. 2%) and it triggers an increase in the policy rate (6.5% vs. 3%) at a level that generates a higher real interest rate than the NRI (4.5% vs. 1%). Subsequently, as is common in this class of models, the economy is driven back to target variables along a path dictated by the (exogenous) dynamic evolution of the shock. The adjustment is completed in few (4) periods. As we will see shortly, anchored expectations make the whole task of inflation control easier and smoother.

Recall that this result hinges on the hypothesis that the shock is transitory; whether the persistence of the shock is low or high may of course have practical implications but is irrelevant to the long-run properties of the system. Finally, the distinction should be kept in mind between the persistence of the shock and the speed of the return to equilibrium (how long is the long run). The former is hard to detect in the data *ex ante* (generally, we cannot track “shocks” but their effects)\(^{11}\). The speed of adjustment of the observable variables is instead the true matter of concern, and this may depend on intrinsic features of the economy that generate leads and lags in the adjustment process (an example is the case with adaptive expectations presented below).

In order to add some more up-to-date features, we also present in Figure 2 a simulation resembling today’s stagflationary scenario, such that the inflation spike \(u_{pt} = 3\%\) is concomitant with a large negative output gap, \(u_{yt} = -5\%\), (think of the fallout of the pandemic). The output-gap shock displays the same low persistence as the inflationary one, which captures the widespread observation that the pandemic recession is now recovering at quick pace. We embed this scenario in the "new normal" regime where, in line with much empirical literature, the NRI is set negative, namely at \(-2\%\), which implies that the target policy rate is zero.

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\(^{10}\) Technically this figure measures the autocorrelation of the shock over time, how much of today’s shock remains tomorrow. The speed of transition is the complement to 1 of the persistence.

\(^{11}\) For instance, it is seldom clarified whether the persistence of shocks should be interpreted as a single shock (say an oil price increase) that is distributed over time (the total shock is the summation of the each period’s bit of the shock) or as a sequence of shocks of decreasing magnitude (like earthquakes).
On impact, the stagflationary scenario is characterised by the fact that the response of current inflation (3.5% instead of 4.7%) is dampened by the concomitant negative pressure of the output gap. The path followed by the policy rate is worth noting. The initial spell of negative values indicates that the negative output gap dominates over the inflation pressure not because the central bank so wishes but because of the intrinsic dimension of the recession. Moreover, starting at the zero lower bound, in order to obtain a negative shadow policy rate some "unconventional" contrivances are necessary. Subsequently, the policy rate remains stuck at the zero lower bound. Again, this is not due to a violation of the Taylor Rule by the central bank, but it is the result of the conflicting pressures of inflation and the slack in economic activity traded-off through the Taylor Rule. As a matter of fact, the inflationary shock (and the output gap) are reabsorbed eventually, over slightly more time than in the previous case, despite the central bank appears to remain passive. As to the persistence of the adjustment process the same caveat as above apply.

Figure 2: A stagflation scenario with anchored expectations

2.2.2. Unanchored expectations

Expectations are called unanchored as they are not kept in line the central bank’s target, the symptom being that they result to be sensitive to shocks, or better to the consequent evolution of the actual inflation. In this regard, the inflation equation (1) warns that expected inflation has the potential of becoming self-fulfilling, with a pass-through rate given by the parameter \(a_1\) (in our simulation equal to 0.7) interfering with the adjustment process and the reversion to the central bank's target. On the other hand, it would be unlikely that, in the long run, expected inflation remains permanently different from actual inflation, hence the way in which expectations are revised should present some consistency with the long-run tendency of actual inflation.

A natural starting point is the theoretical benchmark provided by the notion of rational expectations (RE). For our purposes we may define the (short-run) RE of inflation those obtained by taking the statistical expected value of the evolution of actual inflation dictated by equation (1), denoted by \(E(\pi_{t+1})\) i.e.

\[
\pi^e_{t+1} = E(\pi_{t+1}) = \pi^a + a_1 E(\pi_{t+1}) - \pi^a) + a_2 E(u_{pt+1}) + a_3 E(u_{yt+1})
\]

There are two key implications. First, RE require knowledge of the statistical relationship of future values of \(u_p\) and \(u_y\) with their current values. Second, RE do retain the potential of being self-fulfilling, but they also have the desirable property that they realign themselves with actual inflation and the inflation target if the central bank controls inflation properly as seen above.
This can easily be seen under one of the most common hypotheses about shocks, namely that \( u_p \) and \( u_y \) follow a random walk (equivalent to zero persistence), which means that they contain no information about their future values (no business for professional forecasters!). Consequently, \( E(u_{pt+1}) = E(u_{yt+1}) = 0 \). Then the solution of equation (5) warrants that \( E(\pi_{t+1}) = \pi^* \) which brings us back to the case of anchored expectations of equation (1).

Note that the coincidence of \( RE \), which do track the evolution of the inflationary process, with anchored expectations, which do not, only occurs thanks to the hypothesis of random-walk shocks. This however does not seem to fit today’s conjuncture, when concern of central banks and forecasters is with the persistence of the shocks. Persistence means that past observations of the shocks do convey information about their future values. This is typically encapsulated in their nonzero autocorrelation coefficient, which in fact we have set to 0.3 in the previous scenarios (see also fn. 10). Therefore, assuming that \( E(u_{pt+1}) = 0.3u_p \), \( E(u_{yt+1}) = 0.3u_y \), the stagflationary scenario looks like in Figure 3.

Figure 3: A stagflation scenario with short-run rational expectations

The most important feature is that now expected inflation does track shocks and actual inflation, which seems to fit the definition of unanchored expectations (as the Figure shows, expected inflation is strictly correlated with actual inflation). On impact, expected inflation jumps from 2% to 3.5% as a result of the anticipation of the next period’s evolution of shocks, which, recall, decrease over time. As a consequence, also the initial spike of inflation is larger than with anchored expectations (4.6% instead of 3.5%). Differently from the case with anchored expectations, the central bank reacts by setting the policy rate well above zero (1.3%). We can thus draw two interesting lessons.

First, central banks may be justified in monitoring inflation expectations. If they are anchored, monetary policy may react more smoothly or even remain passive as in Figure 2. If they are not, monetary policy should be more reactive. On the other hand, as we pointed out in the comment on the policy-rate equation (2), it is not necessary that the central bank targets inflation expectations directly, since even the simplest Taylor Rule triggers, indirectly, the right reaction to the extent that expected inflation is embodied in actual inflation.

Second, the simulation shows that the process, in spite of seemingly unanchored expectations, converges back to the initial equilibrium along a trajectory that, as already explained, is dictated by the path of the shocks. This finding warns that unanchored expectations may not necessarily be synonymous with the inflationary process being out of control. Yet, we may wonder whether this
reassuring result is only due to the hypothesis of RE, one that is highly demanding to be met by forecasters, and has become increasingly questioned also at the theoretical level.

To complete our exploration, we thus turn to another possible form of unanchored expectations, namely the hypothesis that expectations are formed adaptively\(^\text{12}\). In the basic formulation we assume here, forecasters follow an “error correction mechanism”: expected inflation elaborated in the present period \(t\) for next period \(t+1\), \(\pi_{\text{et}, t+1}\), is the same as the one elaborated in \(t-1\) for \(t\), \(\pi_{\text{et}, t}\), corrected for the forecast error observed in the present period \((\pi_t - \pi_{\text{et}, t})\). As is intuitive, this mechanism makes expected inflation entirely endogenous to the inflation process, or indeed unanchored according to the standard meaning. Consequently, the central bank’s ability to control the inflation process is brought to the fore. The simulation result is presented in Figure 4.

Figure 4: A stagflation scenario with adaptive expectations

![Figure 4: A stagflation scenario with adaptive expectations](Source: Authors' own elaboration.)

As can be seen, the inflationary process changes significantly. In the first place, expected inflation takes a hump-shaped path. Initially, the revision of the expectation lags behind actual inflation, with the result that the latter increases less than with RE. In the second place, there follows a spell of time during which expected inflation accelerates while the actual one decelerates, and at some point expected inflation overshoots actual inflation. In the third place, the hump-shaped path of expected inflation is mirrored by the policy rate.

This pattern is consistent with the different nature of adaptive expectations with respect to RE. These latter track the shocks and load the bulk of the shocks, as well as of the inflation spike, upfront. Adaptive expectations track actual inflation and catch up with it progressively, and so does the policy rate. Finally, it remains true also in this case that eventually the process converges and inflation is brought under control, though it takes much more time. The reason is that adaptive expectations introduce much

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\(^{12}\) Whilst the early generation of RE theorists condemned the hypothesis of adaptive expectations as irrational, it has been rehabilitated in the successive studies on learning as a basis of rational expectations, where “rational” denotes the consistency of the learning-adaptive mechanism with the actual processes in the economy (Evans and Honkapohja, 2001).

\(^{13}\) That is to say,

\[ \pi_{\text{et}, t+1} = \pi_{\text{et}, t} + \alpha(\pi_t - \pi_{\text{et}, t}) \]

The coefficient \(0 < \alpha < 1\), also called “gain factor”, plays a critical role as it determines the direction and speed of revision of the expectation. Positive \(\alpha\) means that higher than expected inflation in this period is translated into an upward revision of expected inflation for the next period. In our simulation we have set \(\alpha = 0.5\). In more sophisticated learning algorithms, \(\alpha\) can be calibrated so as to optimise the fitness of the process.
more inertia, which is not to be confused with the persistence of the shocks themselves (here it is the same as in the previous scenarios)\textsuperscript{14}.

The finding that unanchored expectations, at least according to their standard meaning, may not necessarily be problematic for inflation targeting should be understood with some attention. First, it raises the issue of the kind of empirical controls that can be deployed. Even our simple simulations show that, during the adjustment process, expected inflation, actual inflation and the policy rate can find themselves in very different configurations, all consistent with inflation control, but which may be hard to detect empirically with respect to other configurations with inflation out of control (think of the phase in which expected inflation accelerates while actual inflation decelerates in Figure 4). Second, our simulations, beside being simple, embed two critical features that impinge upon the underlying New Keynesian model even at the highest levels of sophistication (the so-called dynamic stochastic general equilibrium models). One is that it is constructed so as to display strong tendency to stability. The other is that the dynamic behaviour of the economy is essentially extrinsic, i.e. it is dictated by the time path of shocks, which are assumed to peter out over time\textsuperscript{15}.

\subsection*{2.2.3. Summing up}

The messages of the foregoing review of the theoretical channels through which expectations of future inflation feed onto actual inflation, and their policy implications, can be summarised as follows.

First, different kinds of expectations are relevant for different channels. For instance, for one channel generally regarded as critical for the development of inflation, wage indexation, expectations "one period earlier", and expectations "one period ahead", play different roles and may well interact.

Second, granted that expectations "one period ahead" are transmitted to current inflation, and that therefore they contain valuable information for the policymakers, it does not necessarily follow that they should explicitly be included in the monetary policy rule. We have seen that even the basic format of the Taylor Rule keeps inflation under control under different hypotheses of expectation formation.

Third, unanchored expectations according to their standard definition of being sensitive to short-run macroeconomic developments may make inflation control less smooth, but they do not necessarily imply that inflation gets out of control. However, identifying whether or not this is the case in specific circumstances may be a hard empirical task because the outcome depends, \textit{inter alia}, on how expectations are formed.

Finally, the leading models for policymaking reviewed above focus on short-run expectations (why this is beyond the scope of this paper), whereas central bankers' conventional wisdom focuses on expectations about inflation in the long run as key to the control of inflation. Though less currently employed, theoretical models that include formation of long-run inflation expectations support this wisdom (Evans and McGough, 2018; Garcia-Schmidt and Woodford, 2019; Gobbi et al., 2019; Rudd, 2021). However, these models also show that long-run expectations elaborated consistently with the evolution of the factors that determine inflation (e.g., in a New Keynesian setup, future output gaps and interest-rate paths) give relevance to the forecasts of these factors rather than of inflation \textit{per se}\textsuperscript{16}.

\begin{footnotesize}
\begin{enumerate}
\item The degree of inertia depends on the extent of the error correction mechanism, i.e. the gain factor $\alpha$ in fn. 11. Higher $\alpha$ reduces inertia.
\item These two features have been matter of deep reconsideration and criticisms in the face of the failure of this class of models to anticipate, explain, and manage episodes of high instability such as the global financial crisis of 2008-09 (e.g. Stiglitz, 2011, Vines and Wills, 2020)
\item Gobbi et al. (2019) show conditions whereby endogenous long-run expectations, i.e. update upon observing the actual state of economy, do drive the system out of policy control.
\end{enumerate}
\end{footnotesize}
2.3. **Do households and firms behave consistently with their inflation expectations?**

Before turning to the empirical evidence about the effects of future inflation expectations on current inflation, it is necessary to dispel a potential source of confusion. From the point of view of the policymakers, the monitoring of inflation expectations may be motivated by two reasons. One may be that they do believe in the theoretical arguments expounded above, and therefore also believe that gauging inflation expectations adds important information to their policy decision making. Note that this motivation would hold even if inflation expectations expressed by agents turned out to be wrong (which is excluded by theory, at least in the long run, but may well happen, at least for a non-negligible time). In fact, what matters is that agents act upon their expectations, and the policymakers need know what economic decisions are made in the economy in response to their own policy decisions. Another motivation may be that the policymakers believe that agents’ expectations are right (in some statistical sense), if anything because they possess some self-fulfilling capacity, in which case expectations are gauged as providers of direct information about the future evolution of inflation in comparison with, or in addition to, the information that the policymakers possess.

In both cases, whether or not (some) economic agents are good forecasters, the key issue is to ascertain the extent to which 1) agents act upon their forecasts consistently (agents may be good forecasters but may not use their forecasts consistently), 2) their forecasts are transmitted to current inflation (agents may act consistently upon their forecasts, but these do not add relevant information to the evolution of inflation).

With these aims in mind, it is also important to distinguish the forecasts conveyed by ordinary households and firm managers from the ones from professional forecasters. The former are much more volatile and imprecise than the latter, and seem loosely related to policy announcements. Nonetheless, as far as inflation control is concerned, the former are also more relevant than the latter (Coibion et al., 2018).

As a matter of fact, studies aimed at these purposes have been growing over time in parallel with the development of the different theoretical channels reviewed above (Coibion et al. 2018 provide an up-to-date discussion of the literature). It seems fair to notice that, in spite of the widespread theoretical conviction that both conditions 1) and 2) hold true, the evidence is not uncontroversial.

In this field, like others in economics, households’ behaviour is particularly contentious. Households’ sentiments and forecasts have long been surveyed with increasing accuracy (ECB, 2021a), and recent studies have revived evidence of the predictive capacity of households’ inflation forecasts (Coibion and Gorodnichenko, 2015; Reis, 2021). On the other hand, it is well established that households’ forecasts display high cross-variability, gross point misperceptions and endemic inattention towards ongoing developments and announcements (Coibion et al., 2018, 3.1). As far as the intertemporal price effect is concerned, the evidence is mixed. Beside findings of positive relationship between reported expected inflation and current consumption, other studies cast doubts that households’ make consistent use of their forecasts (Schnabel, 2020 expands on this point). Even more blurred is households’ behaviour in relation to the real vs. nominal interest rate.
This finding adds up to the long-lasting scepticism that the real interest rate is as key to firms’ investment decisions as predicted by theories of various inspirations, and therefore that it is the fundamental leverage to control economic activity by monetary policy.\footnote{Scepticism dates back to White (1956), and recurrently surfaces through time: Dixit (1992), Bond and Jenkinson (1996), Gennaioli et al. (2016), Schnabel (2020).}

As to the channel of inflation expectations envisaged by the New Keynesian Phillips Curve, empirical strategies and results are notoriously contentious (Rudd, 2021). Also, direct investigations of the role of price expectations in firms’ decision-making end up with controversial results. One of the most comprehensive studies (Blinder et al., 1998) conveys scepticism that the role of forecasts is systematic and consistent across firms and time. More recent waves of studies (Enders et al., 2021; Coibion et al., 2018) tend to be more supportive, although the specific channels and mechanisms remain in doubt, and sometimes firms’ reported decisions associated with inflation forecasts are at odds with theory.

An important consideration to be kept in mind is that results of empirical studies are likely to be conditioned by the actual inflation climate prevailing at the time. Low and stable inflation may favour low and stable expectations and, at the same time, induce individuals to disregard the effect of current and future inflation on their economic decisions. As a consequence, it is low and stable inflation that creates its own favourable conditions rather than the other way round. The opposite occurs when inflation is on the rise, when disregarding present and future inflation may produce large losses (Heymann and Leijonufvud, 1991; Rudd, 2021).\footnote{Similar results have been detected in various contexts as reported by Nakamura et al. (2018), Averez et al. (2019), Sigurdsson and Sigurdardottir (2016), Grigsby et al. (2021)}

These notes of caution do not entail the conclusion that future inflation expectations are irrelevant to the actual dynamics of inflation, or that they do not contain useful information for central banks’ mission of price stability. Caution is not in contrast with the finding that inclusion of professional forecasts of inflation do improve the predictive power of forecasting models, albeit to a modest extent (Banbura et al., 2021). Caution rather suggests that information on future inflation should not be given the role of polar star of monetary policy, while it has to be carefully assessed and processed along with other comprehensive information about the contingent state and the evolution of the macroeconomy.
3. THE ANCHORING OF INFLATION EXPECTATIONS: CONCEPTS, METRICS, USES

The work done by the Eurosystem’s Expert Group on Inflation Expectations led to the publication of an influential analysis (ECB, 2021b) that illustrates in great detail various empirical measures of inflation expectations and analyses their relationships, as well as the role played by inflation expectations in the European System of Central Banks’ projection models used for policy purposes.

The report shows, using the results from accurate empirical analysis, that the several factors impact on expectation formation; in particular, the report reveals that inflation expectations depend on the inflation regime, whereby the updating of expectations becomes more or less backward-looking according to the actual inflation regime in which the observers operate. This is in line with the idea, explained in Section 2.3, that the inflation regime may sometimes drive expectations, and not only the other way round (see Rudd, 2021).

A pride of place in the ECB report is given to the anchoring of inflation expectations. The degree of anchoring plays a potentially important role both in macroeconomic models and in the real world if, as discussed in Section 2.2, the long-term expectations act as a gravitation point for people behaviour and actual inflation. Indeed, should long-term expectations stray from the central bank’s inflation objective, its ability to achieve the mandate of price stability could be seriously jeopardised in terms of effectiveness and timeliness. For this reason, it is indeed of utmost importance to understand what are the drivers of inflation expectations: are they affected by exogenous macroeconomic shocks or by the inflation regime? Do they respond to monetary policy decisions? Are they altered by central bank’s communication? The answers to these questions are of paramount importance as they determine whether the central bank should somehow engage directly with the re-anchoring of expectations, thereby creating a re-anchoring channel of monetary transmission.

The abundance of information and evidence provided in ECB (2021b) allows the reader to appreciate the abundance of alternative statistical metrics that can be used to assess the degree of anchoring of the short- and long-term inflation expectations. Notably, the richness in the set of available metrics seems more a problem than a boon for policymakers. As the authors of the report explicitly maintain, different metrics may provide conflicting signals as we lack of a unified framework to understand how to interpret and act upon them. In the attempt at dealing with this issue, the ECB report makes a step forward and presents a “heat map” in real time, a tool that provides a synthetic overview of the multitude of pieces of empirical evidence regarding the different dimensions of the anchoring of inflation expectations at any given point in time over different time horizons.

However, while commendable, this graphical tool to report the available empirical evidence on the alleged degree anchoring of inflation expectations does not help to solve the substantial underlying uncertainty regarding the concept. No general yardstick on how to derive conclusions from the available information is indeed offered to the readers and the policymakers; this would require more theoretical and policy considerations. Clearly, this is not a shortcoming of the ECB report perse, as the study does not deal with theoretical issues, but aims at offering all the empirical evidence that one can obtain by employing the state-of-the-art techniques available in the literature. And yet, if the uncertainty regarding the unanchoring of expectations remains mainly a theoretical issue connected with the vagueness of the concept, no empirical tool alone can truly help. Notably, while the high uncertainty regarding the concept is explicitly acknowledged by the authors of the ECB
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In what follows, we summarise the main unsolved issues that emerge from the analysis provided in the ECB report (ECB, 2021b) and we will offer some tentative considerations on the caution that should be used when dealing with the concept of anchoring, and on the theoretical work that would be needed (and that the ECB could help develop).

3.1. Measuring and interpreting the unanchoring of inflation expectations: an unfinished business

Three main approaches have been used in the literature to assess the anchoring of inflation expectations. The first one is a level-based assessment, whereby the analyst typically compares long-term expectations to the inflation target. The second approach regards the responsiveness of long-term expectations to short-term developments (in actual inflation, macroeconomic news, monetary policy decisions, and the like). The third one, less widespread, refers to higher moments of inflation expectations (either their values or their responsiveness). Notably, the first two approaches are well connected with the definitions used in Section 1 of this work, whereas the third one is connected with the impact of second moments deriving from individual heterogeneity (in turn associated with uncertainty and risk).

These three main categories of approaches include a number of different empirical strategies. At risk of oversimplifying a sophisticated topic, the ECB report suggests that the unanchoring of inflation expectations can be identified when one or more of these conditions occur:

- The mean/median value of individual long-term expectations is far the central bank objective (level).
- Unanticipated macroeconomic shocks/news impact on long-term expectations (responsiveness).
- There is a large “disagreement” across individuals around the median estimate (higher moments).
- The distribution of expectations is very skewed, and the skewness changes over time (higher moments).
- The variation in short-term expectations is transmitted to long-term expectations (responsiveness).
- Market-based implicit forecasts and survey-based expectations do not move together (level and responsiveness).

Some of these empirical approaches are clearly distinct and focus on different dimensions: this is the case of the gap between the mean/median value of expectations and the central bank inflation target and the correlation between short- and long-term expectations. Others overlap, as in the case of the responsiveness of higher moments of inflation expectations to macroeconomic news (for instance when the skewness changes over time).
3.1.1. Interpreting individual metrics

While each of these metrics makes sense, their exact interpretation remains partially unclear.

a. Level-based assessment

Even the most straightforward approach, that is the level-based assessment, can be tricky.

As noted by ECB (2021b), the lack of precision in the definition of price stability (i.e., around 2% over the medium term) might affect the benchmark against which expectations can be compared with, and it may influence the horizon at which expectations should theoretically be anchored.

However, the ambiguity is much greater if one introduces ad hoc derogations to the very definition of anchoring as closeness to the inflation target: Domit et al. (2015) (and ECB, 2021b, p. 63) allow for inflation expectations to deviate from the target and be anchored if they are in line with the central bank forecasts.

Moreover, it is not entirely clear whether one should focus on the absolute divergence between long-term point inflation expectations and the inflation target or rather on the occurrence of significant breaks in the evolution of the time series of inflation expectations. While it is uncontroversial that a large deviation from the target associated with a break-point in the series signals a lower degree of anchoring, it remains unclear how to interpret either the presence of a non-negligible divergence without a break or the presence of multiple breaks associated with repeated oscillations of the expectations around the target.

Finally, considering the existence of multiple sources of inflation expectations (i.e., households, firms, professional forecasters, investors), it remains unclear how to combine different empirical findings: should expectations be similar in levels or rather move in the same direction or even be subject to almost coincident structural shocks?

b. Responsiveness-based assessment

One could make similar considerations for the responsiveness-based assessment. For instance, as the results are sensitive to the specification of the regression used to estimate the extent of the responsiveness, the interpretation is conditional on the specification. Unless a single specification is adopted, no clear-cut conclusions can be derived. One could argue that finding one specification associated with coefficients of macroeconomic determinants significantly different from zero is enough to conclude that expectations are not anchored. But given that the misspecification of the empirical model biases the estimates of the parameters, this would be incorrect.

Moreover, as well explained in the ECB report, finding statistically significant coefficients may be interpreted differently in the light of the underlying regime. A positive response of inflation expectations to macroeconomic news in a period when inflation and inflation expectations are low may signal a re-anchoring, rather than the unanchoring.

This suggests how it is important to interpret level-based and responsiveness-based tests simultaneously, using a state-contingent approach. But this is indeed what makes room for conflicting signals coming from allegedly complementary approaches.

c. The assessment based on higher moments

The assessment based on higher moments of the distribution of expectations is even more controversial. Not only there are several moments to consider, but there is no clear benchmark for the assessment. When the disagreement among observers becomes excessive? How to compare a larger support for a distribution centred on a value close to the target and a small support relatively far from
the target. How are changes over time in any of the moments to be interpreted, and in their relationship?

This is not to say that these higher moments are not important and impossible to interpret. Rather, these considerations suggest that: i) their interpretation can hardly be straightforward and thus central banks have to offer very detailed explanations to the public; ii) the inclusion of higher moments in macroeconomic models and in policy rules remains a real challenge. Both suggestions call for the use of judgement by policymakers, and this may be political controversial and bring about problems in communication.

3.1.2. Combining metrics

As mentioned above, the most reasonable approach is to combine different metrics. But this is indeed a daunting task, especially short of a clear theoretical support. To show the complexity of interpreting multiple sources of information, we offer some thought experiments in what follows.

Imagine, to start, a situation in which the median value of the expected inflation is far from the central bank target, but the following conditions hold: i) the distribution is highly concentrated on this value, ii) long-term expectations are unaffected by unanticipated macroeconomic news, and iii) the short-term movements in observed inflation are not correlated with long-term expectations. The first piece of evidence (about the median value) reveals a worrisome unanchoring of expectations from the target, whereas each of the other three metrics is compatible with well-behaved expectations. It is only the combination of these four different pieces of information that makes it possible to conclude that it is plausible that expectations are unanchored. More precisely, they appear as anchored to a value of inflation that is far from the target. In this case, seemingly contrasting criteria can be easily combined by the observer so as to form coherent conclusions, whose direct policy implication is the necessity for the central bank to take action.

Consider, however, other circumstances in which more ambiguous and controversial conclusions may be reached.

Imagine, for instance, the case of a bimodal distribution of expectations that has a median value of 2% central bank credibility could be measured in two ways: using higher moments of the distribution of expectations, one could consider the low share of population that is convinced that inflation will remain in a small interval around the inflation objective of 2%; using the median value of individual expectations, one could appreciate the limited divergence of expectations from the target. According to the first criterion, expectations are unanchored, whereas the second metric suggests that, on average, inflation expectations are in line with the target. What metrics should prevail? The heat map in ECB (2021b) seems to attribute more weight on the latter, but the interpretation of the evidence would change if the heat map was accompanied by a graph plotting the bimodal distribution of expectations, as this would signal a serious disagreement among observers.

What is worth noticing is that adding a graph with the distribution of expectations to the heat map would not solve the main problem at stake. The problem remains the interpretation of a given state of affairs without a clear theoretical background. For instance, what types of distributions of inflation expectations represent a problem? Recalling the discussion in Section 1.1., what macroeconomic channels could be affected? The entire distribution of individual expectations, for instance, could be immaterial in wage negotiations and price-setting dynamics if these latter reflected only the expectations of the median worker. The impact of a bimodal distribution of individual expectations on consumption and investment could instead depend on the joint distribution of expectations, on the one hand, and of income and wealth of the holders of the expectations, on the other hand.
This trivial example strengthens the case for making progress in the macroeconomic modelling of expectations, as well as in their measurement, as clearly advocate also in the ECB report (ECB, 2021b).

Similar considerations could be offered as to what concerns two distributions of individual expectations that have the same median value, but different degrees of skewness. Although there seems to be a consensus on the interpretation of skewness as a measure of the balance of risks ahead, one could interpret it also as an (inversed) measure of central bank credibility. Again, there is no yardstick to compare a symmetric distribution centred on 2% with a very large support spanning both deflation and high inflation rates, a very skewed distribution centred on 2% with a relatively small support, and a symmetric distribution with values concentrated around a figure that is considerably far from 2%.

While some uncertainty is doomed to remain, we suggest that further work is necessary to clarify the theoretical setting and to provide guidance for the interpretation of the empirical evidence. For instance, the ECB could propose some ordering among the tests for assessing the degree of anchoring of expectations. One could first look at the alignment of the point estimates with the central bank’s objective, then consider the balance of risks from the probability distribution of individual expectations, and finally look at the responsiveness of expectations to macroeconomic news and to the observed past inflation. Other orderings are possible. Ideally, the integration of some of these metrics in different components of the macroeconomic models used to support policymaking could follow this preliminary clarification.

3.1.3. The underlying theoretical and policy issues

It could be argued that our observations over-emphasise the interpretative problems regarding the anchoring of expectations. Whether the alternative signals are either controversial or difficult to interpret is, in the end, an empirical issue.

While we do acknowledge this point, we would like to stress that part of the problems in interpreting alternative metrics remains the product of unsolved theoretical and policy issues. The tension among the alternative criteria stems, for instance, from the lack of clarity as to the reasons why we should be interested in alternative metrics in the first place. The debate about central bank’s credibility and the anchoring of expectations often conflates a number of correlated but independent concepts.

For instance, when ECB (2021b) discusses the uncertainty and the balance of risk in section 2.2.2 of the report, the section opens with a proviso that reveals the need for digging deeper into these concepts:

“if (emphasis added) central bank credibility depends not only on anchoring mean inflation expectations but also on minimising perceived inflation uncertainty and risks”. Clearly, one thing is using the distribution of expectations to assess the anchoring of inflation, and another is being concerned with the dispersion of expectations as a problem in its own merit.

By the same token, as anticipated, more clarity is necessary on whether inflation expectations should be anchored to the central bank target or to the central bank forecasts. If both aspects are important for different reasons, it would help to use different terms and expressions to describe these two diverse types of anchoring.

In a nutshell, we maintain that greater clarity as to the alternate uses of the metrics (as well as of survey-based and market-based datasets) could help to reduce complexity and facilitate the interpretation of the empirical evidence.

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20 Clearly, this issue is different from the one addressed in ECB (2021b), that is whether movements in the shape of the distribution of expectations can help to anticipate movements in the central tendencies.
It is worth noticing that we are not suggesting to disregard any available piece of information, and this is why we appreciate the ECB report (ECB, 2021b). Indeed, it is well possible that the tension among alternative metrics cannot be completely eliminated as it stems from the large number of distinct aspects that central bankers need to consider in making informed decisions. To the extent that theoretical concepts, metrics and interpretative keys are clearly spelled out, we believe that this kind of complexity may be managed. This may make it difficult to encompass all kinds of information into a fully-fledged macroeconomic model, but theory-based principles and empirical evidence could certainly help the central bankers to use their judgement, as suggested by modern decision-making theory (Svensson, 2005)²¹.

In fact, not only do we not call for using fewer metrics, but we suggest that additional measures that the ECB report does not dwell in and that could be considered as well.

If the disagreement among forecasters about their point estimates is commonly treated as a measure of aggregate uncertainty, there are other important dimensions of uncertainty that could be assessed. We refer to the degree of subjective uncertainty, that is the dispersion in the distribution of expectations for each individual (Engelberg et al., 2009; Glas and Hartmann, 2016; Lahiri and Sheng, 2010), and the correlated distributional asymmetries obtained by aggregating individual probability distributions. The three measures of uncertainty would provide valuable information, for instance, about the central bank’s credibility. The first one (i.e., aggregate uncertainty) regards the heterogeneity among the survey’s respondents; the second one (i.e., subjective uncertainty) captures cognitive and informational aspects that affect heterogeneous individuals with aggregate implications; and the last one refers to the average individual distribution asymmetry. Distinguishing these components allow policymakers to understand whether uncertainty reflects a situation where individuals have similar point estimates but high subjective uncertainty, from one where individuals have heterogeneous expectations with low subjective uncertainty, or a mixed of the two²². The report (ECB, 2021b) distinguishes these metrics when assessing the pre- and post-financial crisis (p. 22). For the conclusion that consumers tend to revise upward their expectations when uncertainty is high, on the contrary, it is not clearly specified what determinant of uncertainty matters the most. This is a minor example about the importance of exploring all empirical metrics while, at the same time, clarifying their individual purposes and their collective interpretation.

In sum, abundance of data and empirical evidence needs to be balanced by a strong theoretical background. The risk of forcing concepts into metrics, and vice versa, is very high. If the ECB could lead other central banks and the scientific literature along this line of analysis, it would provide a great contribution to itself and to the worldwide community. If the ECB could develop a clear communication strategy to offer a consistent and comprehensible interpretation of the multiple sources of empirical evidence about inflation expectations and their degree of anchoring, it would make a leap forward in central banking as well.

²¹ This exercise is the opposite of what done by those who use macroeconomic models to forecast non-core variables, as in Schorfheide et al. (2010).

²² Bloom (2014) discusses the role of uncertainty in the minds of consumers, managers, and policymakers. Cobon et al. (2020) show higher inflation expectations on the part of firms generate higher uncertainty about the outlook, and this may contributes to a reduction in employment and investment. Kumar (2020) shows that firms with larger forecast errors incur in larger increases in liquid assets. Fracasso et al. (2021) show that the uncertainty about the exchange rate affects the degree of firms’ pricing-to-market strategies.
4. EURO AREA INFLATION EXPECTATIONS: FROM BEING UNANCHORED ON THE DOWNSIDE TO BE UNANCHORED ON THE UPSIDE?

4.1. Are central banks influencing agents’ inflation expectations?

In the aftermath of the Great Recession, central bankers were forced to search for policy instruments that could allow them to stimulate the economy in a situation where inflation was persistently below their target and interest rates were constrained by the zero lower bound. Along with quantitative easing and forward guidance about the future path of policy rates, that have been adopted by the main central banks, it could appear appealing to policy makers to lower agents’ perceived real interest rates by raising their inflation expectations when the nominal interest rates are stuck at the zero lower bound. This can be thought of as a way to induce households and firms to increase their spending today and to immediately set higher nominal wages and prices, with an upward impact on current inflation (see e.g. Coibion et al., 2018). Although one may be sceptical—as we have seen—about the effectiveness of this channel for boosting the level of economic activity in a recessionary—or anaemic growth—environment, keeping perceived real interest rates as low as possible in the presence of heavily indebted private and public entities is crucial for avoiding that their position could become unsustainable and trigger destabilising financial crises.

Given the undeniable advantage that a central bank could reap from steering agents’ inflation expectations towards the desired direction, it is worth examining whether and how it can exert this influence, which may differ with respect to the type of agent, the length of the expectation horizon and the period considered. Indeed, the evidence mentioned by Coibion et al. (2018), that indicates a low reactivity of households’ and firms’ inflation expectations to monetary policy announcements (even major ones), concerns the period between the onset of the Great Recession and the outbreak of the COVID-19 pandemic, where inflation was low or very low in the advanced economies. Hence, as suggested at the end of section 2, it is legitimate to interpret this inattention as people’s rational reaction to decades of success by central banks in stabilising inflation at low levels, which made it unnecessary for those not directly or indirectly involved with financial markets to devote time and effort for being informed about monetary policy. Notice that, if this interpretation is correct, inflation expectations of households and firms should become more responsive to monetary policy news once the price level starts moving substantially and persistently upwards.

The greater attention that professional forecasters and financial market participants are supposed to pay to inflation developments and central banks’ communications is reflected in the movements of market-based measures of inflation, such as the 5y5y inflation swap rate. Inflationary expectations of these agents appear driven by both backward-looking and forward-looking determinants. In particular, studies indicate that trends in actual inflation and ECB’s announced inflation objective influence the longer-term inflationary expectations of the professional forecasters operating in the euro area, while their short- and medium-term inflationary forecasts are consistent with the Eurosystem’s projections (ECB, 2021b). This consistency may signal either that private experts recognise the central bank’s superiority in making predictions, or that the latter convey relevant information about central bank’s preferences and future strategies, or that central bank’s experts have the same information as private forecasters and process it in a similar manner (see Hubert, 2015; Łyziak and Paloviita, 2018).

The evidence that Eurosystem’s inflation targets and projections affect professional forecasters and financial market participants opens the possibility of their strategic use by the ECB for managing agents’ inflation expectations. Granziera et al. (2021) detect a systematic bias for medium-term
Eurosystem’s forecasts, suggesting that, when inflation is lower (higher) than its target, the ECB tends to overpredict (underpredict) inflation. They also document that the magnitude of this systematic bias towards the target is larger in absolute value when inflation is above the target. However, the obvious limit to the possibility of a repeated use of the Eurosistem’s forecasts for influencing private agents’ expectations is that systematic projection errors may undermine the credibility of monetary authorities and unanchor inflation expectations.

4.2. The ECB credibility problem before and after the pandemic

Signs that euro area long-term inflation expectations had become unanchored on the downside were apparent in the period preceding the COVID-19 pandemic, as a result of repeated downside surprises in inflation outcomes. Thus, one can agree with the report of Eurosistem staff on inflation expectations: “Overall, it is clear that longer-term inflation expectations in the euro area have become less well anchored over the years. This can be seen in both survey and market-based measures and across different un-anchoring metrics (levels, responsiveness and higher moments)” (ECB, 2021b, p. 74).

The decline in longer-term inflation expectations, in essence, reflected the public’s loss of confidence in the ECB’s willingness and ability to achieve its inflation aim. It is therefore understandable that, after the outbreak of the pandemic, the risk that euro area’s inflation expectations could become completely unanchored on the downside was considered high (see, e.g., ECB, 2021b, p. 74). Moreover, it is straightforward that whenever long-term inflation expectations are not aligned with the central bank’s inflation objective, the response of these expectations to a monetary policy shock can be desirable (Diegel and Nautz, 2020): under these circumstances, the effectiveness of monetary policy depends critically on its ability to re-anchor long-term expectations.

In 2021, it appeared increasingly clear that worldwide consumer price hikes, mainly due to the high energy prices and supply chain disruptions associated to the pandemic, were not going to fade away so quickly as many central bankers had initially affirmed. One after the other, advanced countries’ central banks had to revise their short-term inflation forecasts up, announcing their plan to gradually decrease the bond purchases implemented for tackling the pandemic and possibly start rising their policy rates. The ECB, which still in the summer of 2021 insisted on the purely transitory nature of the rise in inflation, appeared quite surprised in the subsequent autumn by the persistence of the upward pressure on prices. In October, for the first time after seven years, euro area’s 5y5y break-even inflation reached the 2% threshold (see Figure 5).

Figure 5: 5y5y forward break-even inflation in the euro area

Source: Refinitiv Datastream.

23 For an assessment of the reasons and implications of the inflation that followed the pandemic, see Bonatti and Tamborni (2021).
By the end of the year, with the euro area inflation touching 5%, the ECB had to raise its forecast for euro area inflation to 2.6% for 2021 and 3.2% for 2022, while predicting a return of inflation below its 2% target in the medium run (1.8% both for 2023 and 2024). Predictions of other international institutions and professional forecasters for inflation in the euro area do not diverge significantly from the ECB’s projections (see ECB, 2021c).

Market long-term forecasts implicit in the current pricing of financial assets are consistent with the ECB’s projections: at the moment, most market participants seem to prefer believing that the ECB, as the other advanced economies’ central banks, is right and inflation will decline sharply in the second half of 2022. The bullish trend that is going on for some time is based on this bet, and it will not take too long to understand if it is well founded, or if—as some fear—it is destined to end in a sharp downward adjustment in asset prices. What is apparent is that, at least for now, markets do not believe that we have entered a new regime, which—for structural reasons—will lead to persistently and considerably higher inflation than we have been accustomed to in recent years24.

It would therefore appear that markets’ longer-term inflation expectations are well anchored and that—thanks to the 2021 inflationary shock—the ECB has overcome the credibility problem due to the prolonged period in which it missed its (close to) 2% target. As a matter of fact, until recently, at the root of ECB credibility problem was that it sought repeatedly and unsuccessfully to push inflation upwards so as to get close to the 2% threshold, and the public became convinced that this was not possible. Indeed, the policy rates were already at zero or negative and the ECB was making extensive use of quantitative easing, but inflation remained stubbornly well below 2%. In other words, the ECB’s credibility problem depended on the fact that the tools available to a central bank to raise inflation (even unconventional ones) were already widely in use, but nevertheless proved powerless to reach the target. Its credibility problem amounted therefore to a problem of policy impotence.

Now and in the near future, the ECB’s problem is to convince the public that, if the current price hikes persisted, it would not permit inflation to steadily rise much above 2%. On its side, the ECB has the inertia of people’s inflationary expectations (after a long period of low or very low inflation), together with the awareness on the part of the public that—in case inflation remained at current levels or rose further—it would have policy tools able to lower it and bring it back to 2%. The credibility problem now lies in the ECB’s actual willingness to use these tools, should it be necessary to cool down inflation. In fact, everyone knows that their use would entail greater risks for the ECB than those faced by other central banks that reduce their current bond purchases and raise their policy rates. The reasons are well known: more than the fear of stifling the euro area economic rebound with a premature tightening in monetary policy as in 2011, it is the risk of financial fragmentation and tensions in the euro area’s sovereign debt market that may make the ECB reluctant to act decisively by pushing up financing costs if needed to dampen inflation. Only progress in the institutional architecture of the euro area and political developments in the Member States—in particular those whose governments are heavily indebted—can reduce this risk, thus strengthening the anti-inflationary credibility of the ECB.

24 For a short discussion of the possible structural causes of persistently higher inflation in the future, see Bonatti and Tamborini (2021).
5. CONCLUSION

In this paper, we examined the role of inflation expectations in conditioning monetary policy, addressing three of its facets. The first concerns the channels through which inflation expectations impinge upon actual inflation, and their policy implications. The second regards the technical and empirical issues involved in keeping track of inflation expectations for monetary policy purposes. The final facet is an assessment of inflation expectations vis-à-vis the current upsurge of inflation, wondering whether, after being unanchored on the downside, can now become unanchored on the upside.

Our theoretical review offers a picture more shadowed than usually believed. The channels through which inflation expectations impinge upon actual inflation are traced back to households' and firms' behaviour. We highlighted that, first, different kinds of expectations are relevant for different channels. Second, granted that future inflation expectations contain valuable information for policymakers, it does not necessarily follow that they should explicitly be included in the monetary policy rule. We have seen that even the basic format of the Taylor Rule keeps inflation under control under different hypotheses of expectation formation. Third, unanchored expectations, according to their standard definition of being sensitive to short-run macroeconomic developments, may make inflation control less smooth, but they do not necessarily imply that inflation gets out of control.

Do households and firms actually behave consistently upon their (reported) inflation expectations? The results of empirical studies that we have considered are mixed. It is important to notice that they are likely to be conditioned by the actual inflation climate prevailing at the time: low and stable inflation may favour low and stable expectations and induce individuals to disregard the effect of current and future inflation on their economic decisions. The opposite occurs when inflation is on the rise, when disregarding present and future inflation may produce large losses.

Therefore, we suggest caution in that information on future inflation expectations should not be given the role of polar star of monetary policy, while it has to be carefully assessed and processed along with other information about the contingent state and the evolution of the macroeconomy.

Further work is necessary to clarify the theoretical setting and to provide guidance for the interpretation of the various empirical measures of inflation expectations and their role in the ECB’s projection models used for policy purposes. In particular, more clarity is necessary on whether inflation expectations should be anchored to the central bank target or to its forecasts. Greater clarity as to the alternate uses of the metrics (as well as of survey-based and market-based datasets) could help to reduce complexity and facilitate the interpretation of the empirical evidence. By leading other central banks and the scientific literature along these lines, the ECB would provide a great contribution to itself and the worldwide community.

It could appear appealing to policymakers to lower agents’ perceived real interest rates by raising their inflation expectations when the nominal interest rates are stuck at the zero lower bound. Hence, a central bank may be tempted to use strategically its inflation projections for managing agents’ expectations. However, this could undermine its credibility.

Furthermore, in the light of the current upsurge of inflation, we discussed whether, after being unanchored on the downside, inflation expectations can now become unanchored on the upside. The evidence is mixed, but the early believe (hope) that expectations remain anchored to the 2% target seems to resist. Yet, we warn that the key area where the interplay between inflation, inflation expectations, and monetary policy will be critical is that of financial markets, not so
much because in those markets inflation is a concern per se, but because their true top concern is whether central banks will see inflation high enough to put an end to the era of easy money.

Finally, we argued that in the current situation, the ECB’s problem is to convince the public that, if the current price hikes persisted, it would not permit inflation to steadily rise much above 2%. Indeed, analysts and market participants could believe that the risk of financial fragmentation and tensions in the euro area’s sovereign debt market may make the ECB more reluctant than other central banks to act decisively by pushing up financing costs if needed to dampen inflation.
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Inflation expectations in the euro area: trends and policy considerations

Christophe BLOT, Caroline BOZOU and Jérôme CREEL
Abstract

Most economic decisions of economic agents are based upon expectations of inflation. Inflation expectations play an important role for the determination of inflation and the transmission of monetary policy. They are not observable and are inferred from alternative indicators. We show that all these measures generally fail to predict inflation. We also assess their anchoring and show that long-term expectations are better anchored to the inflation target than inflation expectations at shorter horizons.

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<table>
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<th>Abbreviation</th>
<th>Description</th>
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<tbody>
<tr>
<td>CES</td>
<td>Consumer Expectations Survey</td>
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<tr>
<td>CISS</td>
<td>Composite index of systemic stress</td>
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<td>CPI</td>
<td>Consumer Price Index</td>
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<td>ECB</td>
<td>European Central Bank</td>
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<td>GDP</td>
<td>Gross domestic product</td>
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<td>OIS</td>
<td>Overnight indexed swap</td>
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<td>SPF</td>
<td>Survey of Professional Forecasters</td>
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EXECUTIVE SUMMARY

- Most economic decisions of economic agents are based upon expectations of inflation and inflation expectations play an important role for the determination of inflation and the transmission of monetary policy, through their effects on the real interest rate.

- Inflation expectations are not observable and should be inferred either from surveys or from financial markets data. Despite the availability of alternative measures, these indicators have some shortcomings either related to their reliability, to their regular availability and to some biases in their respective measures.

- A new survey has been launched by the Eurosystem to quantitatively assess expected inflation from households in the euro area. It has yet been shown that households update their expectations infrequently. There is also strong heterogeneity across individuals stemming from personal (subjective) experience regarding past inflation. Surveys from professional forecasters may be more reliable because they are more in line with macroeconomic models. But this information stems from a limited number of respondents who are not representative of decisions taken by all firms and households. Finally, market-based data are available at a high frequency but suffer from biases resulting from time-varying premia and liquidity premia.

- Two important questions about these indicators are whether they are useful for forecasting inflation and whether they are well anchored. A review of published inflation forecasts shows that all indicators have underestimated inflation. For example, all indicators of inflation expectations in 2020 failed to predict that inflation in 2021 would rise so much.

- We assess the anchoring of inflation expectations by evaluating the sensitivity of the indicators to cyclical surprises, grouped into three categories: macroeconomic, monetary and financial surprises. If long-term expectations seem to be well anchored to the inflation target, we show that the anchoring of inflation expectations depends on the horizon and on the source of inflation expectations.

- In the post-COVID-19 era, supply bottlenecks have arisen, and actual inflation has started increasing. There is a risk that higher inflation expectations may feed wage and price-wage spirals. Provided this rise remains under control, it would help the ECB reach its inflation target after several years of undershooting.

- Although inflation expectations play a key role for the transmission of monetary policy, it has been shown that they are too volatile, and/or too dispersed, and/or insufficiently revised to be used as a policy tool by central banks. In the end, the effectiveness of monetary policy is easily assessed when scrutinising actual inflation performance.
1. **INTRODUCTION**

The primacy of the inflation rate objective in the mandate of some central banks, like the European Central Bank (ECB), has emerged as a consequence of the introduction of forward-looking inflation expectations in macroeconomic modelling (see the seminal papers by Kydland and Prescott, 1977, and Barro and Gordon, 1983). The return of inflation in the past few quarters, more substantially in the United States (US) than in the euro area, though, has therefore revived debates on its determinants and on its future trend. It has also questioned the orientation of monetary policy and the trade-off between the objective of inflation and other objectives (like financial stability) that central banks may follow.

From this, it appears that the dynamics for inflation in 2022 will notably depend on how these inflation expectations will adjust to the surge of inflation. It may be reminded though that still a few months ago, concerns were not on the rise of inflation but on sustained low inflation that may have resulted from the de-anchoring of inflation expectations.

At the core of central banks’ reflections nowadays, two main components emerge, nicely summarised by Isabel Schnabel (2021): “The standard prescription for monetary policy is to ‘look through’ temporary supply-side shocks and to only take policy action if inflation expectations and wage bargaining give rise to second-round effects posing a threat to price stability. The difficulty with this prescription is that aggregate inflation expectations are unobservable, requiring policymakers to employ various proxy measures.”

In the following, we will describe briefly the different measures of inflation expectations that are frequently used in the literature and by analysts. Then, we will discuss their respective forecasting performance and investigate the extent to which inflation expectations are well anchored. In a final stage, we will explain why tracking inflation expectations is so important: inflation expectations have an impact on actual inflation and they may facilitate the transmission of monetary policy decisions to households and firms.
2. ALTERNATIVE MEASURES OF INFLATION EXPECTATIONS

As emphasised by Isabel Schnabel, inflation expectations are not directly observable by national statistical institutions. They are proxied either through financial markets data or by surveys from firms, households, and professional forecasters. There is consequently no unique measure of expectations. The information content retrieved from those measures is not qualitatively identical, and each measure may suffer from some shortcomings.

2.1. Inflation expectations measured by households’ surveys

Macroeconomic models build on the interactions between economic agents, the behaviour of which is based on some hypotheses. As most of economic decisions have consequences for the future – investment and employment decisions for firms, saving for households... – they are inevitably influenced by expectations of inflation, hence their importance in forecasting current and future decisions. Surveys are regularly conducted from households, providing information on their economic sentiment. More precisely, households are asked about a comprehensive list of questions through which they provide information on their financial situation, their assessment of the economic situation and their expectations of saving, revenues and inflation. In the United States, the Michigan survey for instance asks a panel of households about their quantitative forecasts for inflation during next year and five years ahead. In the euro area, the consumer survey carried on by the European Commission asks households monthly whether they expect inflation to rise, to stay about the same or to fall in the next twelve months (Figure 1). The information is yet mainly qualitative and may not be used to precisely infer the level of inflation expected by households.

In January 2020, the Eurosystem has launched a new Consumer Expectations Survey (CES) to assess more precisely expected inflation in the euro area1. The survey is conducted monthly from a panel of 10,000 respondents located in Belgium, France, Germany, Italy, Spain and the Netherlands. The CES will notably ask households about past and expected inflation in the next twelve months as well as at a two- and three-year horizon. The information content of this survey will provide in the future more precise information on households’ expectations in the euro area, although only a few of them.

There is less information on firms’ expected inflation. In the euro area, economic surveys carried on by the European Commission ask firms in industry and services about their selling price over the next month or three months ahead. The questions provide information on a much shorter horizon about production prices than consumer prices. Some surveys are conducted from firms at the national level2. However, the information is not aggregated and generally not made public.

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1 See Bańkowska et al. (2021) for a detailed description of the panel and a first analysis of the key features of the first survey.
2 See for instance Colbion et al. (2018) for New-Zealand and Savignac et al. (2021) for France.
Figure 1: Share of households responding that over the next 12 months prices will ..., in %

Source: European Commission (Consumer survey).

Literature on the information content and the usefulness of these surveys has recently developed. It has notably been shown that survey-based expectations often deviate from full-information rational expectations models (Coibion et al., 2018). Households update their expectations infrequently and there is strong heterogeneity across individuals stemming from personal (subjective) experience regarding past inflation. Perception of recent inflation has notably a strong effect on expected inflation. Expectations are also formed according to their own consumption basket, which may be different from the representative consumption basket. Finally, perceived inflation is biased towards most frequent purchases and households pay less attention to the price of goods less frequently purchased like durable goods.

2.2. Professional measures

An alternative to households’ surveys is to retrieve information from professional forecasters. International institutions, national institutions and banks regularly assess the economic situation and provide macroeconomic forecasts, including on inflation. These institutions have certainly more knowledge about economics and their forecasts may be less biased compared to households’ expectations. In the euro area, the ECB Survey of Professional Forecasters (SPF) collects information on the expected rates of inflation, real GDP growth and unemployment in the euro area at several horizons. The survey is carried at a quarterly frequency since December 1999. It is conducted four times a year, in January, April, July and October. Questions concern the expected inflation for next year and 1-year ahead, 2-years ahead and long-term expected inflation (at the 5-year ahead horizon). It may notably be noticed that long-term expectations exhibit much less variability than 1-year and 2-year ahead inflation rates (Figure 2).

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A similar survey is realised by the Consensus Economics for instance. The list of indicators on which institutions provide forecasts is yet larger including, for instance, private consumption, industrial production, etc.
Compared to households’ surveys, we may expect that surveys from professional forecasters are more in line with macroeconomic models. Professional forecasters should notably have more knowledge on monetary policy decisions and should be aware of central banks objectives. We may consequently expect those forecasts to be less biased and potentially more anchored. However, this information stems from a limited number of respondents who are not representative of decisions taken by all firms and households.

2.3. Central banks forecasts

Eurosystem staff produces quarterly macroeconomic projections since 2000. These forecasts are communicated during the press conference, which follows the Governing Council meetings. Detailed information on these forecasts is available on the ECB website, explaining notably the hypotheses on which those forecasts are based. Thus, on the one hand, the ECB collects information on private – professional forecasters with the SPF – and, on the other hand, the ECB provide the private sector with information on its own expectations. The aim is notably shape private sector’s expectations. These forecasts play an important role for monetary policy since they provide information on the ECB expected economic outlook. The aim is to make monetary policy transparent since those forecasts help the Governing Council to assess risks to price stability. For instance, when the ECB expects inflation to remain below the target, private sector may infer that monetary policy will remain accommodative. This information is also crucial for understanding the financial markets’ response to monetary policy decisions. An expansionary decision – say a cut in the interest rate and/or an increase in assets purchases – may signal that central banks forecast a reduction of growth and inflation. Then, even if the announcement is expansionary, it signals bad news for the economy and this information may dominate the effect of the accommodative monetary policy. Cieslak and Schrimpf (2019) show that communication on non-monetary information accounts for a significant part of the information.

conveyed to financial markets. Besides, not only does communication – including macroeconomic projections – influence the transmission of monetary policy decisions but it may also influence private expectations if economic agents consider that central banks have more information or are able to provide a more accurate economic analysis (Hubert, 2015; Hubert and Maule, 2021).

Over the last year, the Eurosystem staff has significantly revised upward its inflation expectations for 2022. In December 2021, the one-year ahead (black line in Figure 3) inflation forecast reaches a record level at 3.2%. However, projections for 2023 – the 2-year ahead forecast (the blue-line) – suggests that inflation would converge below the 2% target suggesting that private agents may not expect monetary policy to become rapidly restrictive.

Figure 3: Eurosystem staff inflation projections, in %

Source: ECB.

2.4. Market-based measures

Finally, inflation expectations may be inferred from financial markets. Two instruments – inflation swaps and inflation-linked bonds – can be used by financial investors to hedge against the inflation risk. The price of those instruments provides information on expected inflation for short (1- and 2-year ahead) and longer horizons (5- and 10-year ahead). Inflation-indexed bonds are bonds issued by national treasuries. Compared to non-indexed bonds, the value of the principal is adjusted to account for the inflation rate. The return calculated from those bonds provides an assessment of the real interest rate and the difference between the nominal return from a standard bond and the real return from the indexed bonds is the implicit average expected inflation rate – called the break-even inflation rate – until the maturity of the bonds. The alternative instrument is the inflation swap used in financial transactions between private agents. It is a financial contract through which the inflation risk can be transferred from one party to another. One party pays a fixed rate cash flow on a notional principal amount while the other party pays a floating rate linked to a price index, such as the Consumer Price Index (CPI). The price paid by the party paying the floating rate corresponds to the inflation-adjusted rate multiplied by the notional principal amount.
Market-based data are available at a high frequency, which makes their use appealing for empirical investigations. With daily information, we may notably assess the impact of central bank announcements of asset purchases on this proxy of expected inflation. These data also enable to assess whether inflation expectations are well anchored. It is yet recognised that market-based data may not be interpreted as a direct measure of inflation expectations as they also include time-varying risk premia or liquidity bias resulting from the depth of financial markets on which those assets are issued. Figure 4 clearly illustrates that market-based data exhibit higher volatility. It also seems that the recent surge in the inflation rate in the euro area has been transmitted to expected inflation rates. By the end of December 2021, the 1-year ahead expected inflation has risen to 3.4%. Besides, the 5-year inflation 5-year ahead, which is often scrutinised by central banks as an indicator of the anchoring of long-term expectations, has converged to the 2% target for the first time since 2014.

Figure 4: Market-based inflation expectations, in %

Source: Refinitiv Eikon.

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5 See Blot et al. (2021).
6 These biases may however be corrected to extract a better proxy for expected inflation. See D'Amico et al. (2018) for instance.
3. FORECASTING PERFORMANCE OF EXPECTED INFLATION MEASURES

An important issue regarding those indicators is whether they are helpful for predicting inflation. According to the Eurostat’s last release, the inflation rate in the euro area in 2021 reached 2.6%. Looking backward at forecasts released since the end of 2020 may provide some insights on the ability of forecasters to predict inflation correctly. However, we observe that all indicators of inflation have underestimated the inflation. The recent increase in the market-based data reflect an upward revision for the inflation rate but one year ago, those indicators were standing at much lower levels: 0.8% in December 2020 suggesting that year-on-year inflation rate in December 2021 would be weaker than the 5%, which has been finally recorded. It seems that recent increase in market-based inflation indicators have reacted to current information on inflation.

If we consider the average expected inflation all over the year 2020, financial markets predicted that inflation rate in 2021 would stand at 0.3% (Figure 5), 2.3 points below the realized actual inflation rate. Even though survey indicators seem to perform better, the rise in inflation was not precisely predicted. The same holds for the ECB since on average in 2020 inflation for 2021 was expected to reach 1%. It may be argued that the year 2021 was very specific since it has followed an unprecedented shock. The lockdown periods were characterised by supply and demand features and the subsequent economic rebound triggered supply chain bottlenecks. Those events and their consequences were clearly hard to predict. However, even when looking at another year – 2018 for instance –, it seems that none of the expected inflation measures perform well in predicting inflation.

Inflation errors are indeed large, and it even seems that their variance has dramatically increased since 2007, as highlighted below by comparing the SPF measure 4 and 8 quarters ahead with the realized inflation (Figure 6). The mean of inflation errors is close to 0 but, the standard-deviation is high: 1 point for both horizons. These results are generally confirmed when investigating more properly the forecasting performance of survey and market-based data7.

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7 See Bauer and McCarthy (2015) for the United States.
Figure 5: Expected and realised inflation in 2021 and 2018, in %

Sources: Refinitiv Eikon, ECB (SPF), Consensus forecasts.

Note: For market-based date, the forecast for year (t) is calculated as the daily-average of the 1-year ahead inflation expectation during the year (t-1). For survey data and ECB projections, we also considered the average inflation forecasts – based on quarterly data and monthly data (for the Consensus forecasts) – released on year (t-1).

Figure 6: Inflation errors from the ECB Survey of Professional Forecasters, in points

Sources: ECB (SPF), Eurostat.
4. ARE INFLATION EXPECTATIONS ANCHORED?

Another key issue with inflation expectations is whether they are anchored on the inflation target or not. This is crucial for the credibility of monetary policy and the effectiveness of monetary policy transmission. As emphasised earlier, central banks often refer to the long-term inflation expectation to assess their ability to anchor expectations to the 2% target. Bankowski et al. (2021) have specifically addressed this issue in their presentation of the new CES survey. Even if there is no historical information on how households have revised their long-term inflation expectation across time, we may infer across a large panel of individuals whether inflation expectations are anchored in the euro area. Results from this first survey indicate that median expected inflation seems to be well anchored to the 2% target (Figure 7). It may also be noticed that households' expected inflation is lower when the score measuring the trust in the ECB is higher.

Figure 7: Are household’s inflation in the euro area anchored? in %

As illustrated by Figure 2, the 5-year expected inflation from the SPF exhibits a low variability. From 2001 until the 2019-Q1, it has always been between 1.8 and 2%, in line with the inflation target, which was defined as an inflation rate close, but below, 2% from 2003 to July 2021. In 2019, it started to decrease reaching a trough at 1.6% in 2020-Q3 before rising to 1.9% according to the latest survey. The SPF also asks respondents to inform their probabilities associated to different inflation ranges. This may provide another indicator of anchoring. As highlighted (again) by Isabel Schnabel: “aggregating inflation expectations as a point estimate can be misleading because it disregards the distribution of inflation expectations.” It may yet be noticed that we have no information on the methods used by forecasters to build their forecasts and the probabilistic scenarios. Except for large international institutions, it is not clear whether forecasts are model-based or not and whether and when those forecasts and models are frequently revised and re-estimated. Thus, this information may be fragile, and we should be cautious when interpreting those statistics.

We observe that the probability of the 5-year ahead inflation expectations to be below 1.5% had decreased from 2001 to 2008 but increased continuously from 2009 to 2020 when it reached a peak at 49.5%. In 2020-Q3, nearly half of SPF respondents believed that inflation would remain below the inflation target for a sustained period. It has decreased since then, which may be related to the rise of
the inflation rate but also maybe because of the revision of the inflation target (Figure 8). Conversely, the proportion of respondents forecasting an inflation rate above 2.4% has reached 20% in 2021-Q1 for the first time since the introduction of the survey.

Figure 8: Inflation anchoring: an insight from probability distributions, %

Source: ECB (SPF).

This preliminary analysis provides some insights into the ability of the ECB to anchor inflation expectations. It is yet needed to be completed by more robust empirical analyses.

One method to assess the degree of anchoring of inflation expectations is to analyse the reactions of medium- and long-run inflation expectations when new information is released to the market (Gürkaynak et al., 2010). Two situations may occur. On the one hand, inflation expectations respond strongly to business news releases, hence, highlighting the fact that market participants do not expect the central bank to respond credibly and quickly to changing economic conditions. On the other hand, medium- and long-term inflation expectations may not respond to cyclical surprises, thus indicating that market participants are confident that the central bank can and will respond to shocks to ensure that inflation returns to target over the policy-relevant horizon. In this latter context, inflation expectations are considered anchored.

In what follows, we assess the degree of anchoring of medium- to long-term inflation expectations in the euro area based on market-based inflation expectation indicators and responses to the ECB’s SPF. To assess anchoring, we evaluate the sensitivity of the indicators to cyclical surprises, which we group into three categories: macroeconomic, monetary and financial surprises. Long-term inflation expectations are anchored if they are in line with the central bank’s inflation target and if they do not react to surprises.

From the following regression, we construct estimates drawing on two different horizons, daily and quarterly, and from two different sources of inflation expectations, market-based and professional forecasts:

\[ \Delta E_n^t = c + \kappa \text{Shock}_t + \beta X_t + \epsilon_t \]
The first estimation (Table 1) uses daily data and is based on market-based inflation expectations at various horizons. These measures are available with high frequency and, therefore, can reflect new information available to market participants in a timely manner.

The vector of $\text{Shock}_t$ is composed of macroeconomic, monetary, and financial shocks. Macroeconomic shocks are measured by the two Scotti measures (surprises and uncertainty) and by inflation and GDP announcements. Financial shocks are measured by daily variations in the VSTOXX (D.VStoxx) and monetary policy (mp) shocks using the daily shocks for the 2-year overnight indexed swap (OIS) rate estimated by Altavilla et al. (2019). The shocks are estimated on all the monetary policy window on the days of meetings of ECB Governing Council. The vector of control variables $X_t$ includes daily variations in the price of oil, the reference rate for interbank deposits (EONIA) and the lag of the first difference of the inflation expectation variable.

Our second estimation (Table 2) is based on quarterly data. We regress quarterly changes in professionals’ inflation expectations, as measured by the SPF at different horizons (1-year, 2-year, 5-year, q4 and q8). Unlike market-based inflation expectations, the SPF is only available in quarterly frequency. Macro surprises include the Scotti activity surprise and the flash estimate of GDP. Financial shocks are measured by the sovereign composite indicator of sovereign stress (CISS). The vector of control variables includes quarterly changes in the price of oil, the benchmark interbank deposit rate (EONIA) and the lag of the inflation expectation variable. We also include a monetary policy shock measures by the quarterly sum of Altavilla et al. (2019) surprises. All explanatory variables are taken with a lag to account for the timing of SPF releases.

Table 1: Responses of market-based inflation expectations to shocks

<table>
<thead>
<tr>
<th></th>
<th>Change in inflation expectations at different horizons</th>
<th>1 year</th>
<th>2 years</th>
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Source: Authors’ estimations.

Note: $p$-values in brackets. The estimations accounts for robust standard errors. Sample: 1 June 2009 – 10 January 2022

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* We have considered the monthly and quarterly flash estimates for previous month inflation and previous quarter GDP.
Table 1 shows the estimation results for market-based inflation expectations, with the different columns corresponding to the different horizons. The results show a negative and significant effect of financial shocks suggesting that a financial shock reduces inflation expectations. Moreover, the longer the maturity of expectations, the smaller the effect, suggesting that long-term expectations are less sensitive to financial shocks and henceforth better anchored.

The monetary shock does not affect inflation expectations, regardless of the maturity of expectations. Macroeconomic shocks measured by the Scotti indices do not significantly affect inflation expectations, except the shock on uncertainty at a 2-year horizon. On the other hand, macroeconomic surprises, as measured by inflation and GDP announcements, have a significant effect on inflation expectations. Indeed, inflation announcements have a positive and significant effect on expectations, which decreases as the maturity of expectations increases. These results suggest that market-based inflation expectations adjust to current developments of inflation even at long horizons. GDP announcements have a negative and significant effect on inflation expectations, especially for the shortest horizon. Thus, inflation expectations are not well anchored to the ECB’s target.

Table 2: Response of SPF inflation expectations to shocks

<table>
<thead>
<tr>
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<th>Change in SPF inflation expectations at different horizons</th>
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<td>GDP flash</td>
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Source: Authors’ estimations.

Note: p-values in brackets. The estimations accounts for robust standard errors. Sample: 1999Q1-2021Q4.

Table 2 shows the results of the estimations for SPF inflation expectations, the different columns corresponding to the different horizons. These estimations should be interpreted very cautiously since the change in a quarterly variable may not strictly be interpreted as the reaction to news. It is a less accurate analysis of the anchoring of expectations compared to daily market-based data. The results show that the inflation expectations of professionals are well anchored, in contrast then with market-based expectations. SPF expectations do not react globally to macroeconomic shocks, except for spf_q4 and spf_q8. The SPF_q4 is negatively and significantly impacted by GDP announcements, positively by Scotti activity surprises and positively by monetary shocks. The SPF_q8 is negatively affected by changes in the sovereign CISS.
5. **WHY DO INFLATION EXPECTATIONS MATTER?**

Inflation expectations and their anchoring are important in two respects: first, they intervene as determinants to the actual inflation rate; second, they intervene in the transmission of monetary policy decisions to the general public: households, firms and the financial sector.

5.1. **Inflation drivers**

There are three main drivers of inflation, where the first two are cyclical components while the latter is more structural. The first cyclical component relates to the incidence of real activity: a boom is expected to generate a rise in inflation whereas a slack is expected to limit inflation. This part of inflation is commonly referred to the Phillips-curve component. The second cyclical part of inflation, and the most volatile one, relates to energy prices and, more broadly to commodity prices. Finally, the structural part of inflation relates to long-term inflation expectations, in line with the expectations-augmented version of the Phillips curve.

This latter component has been shown as a very important one after the Great Recession when some “missing disinflation” had supposedly emerged. Indeed, the economic slack that had followed the crisis was expected to produce a decline in the inflation rate that was not reported in the actual data. According to Coibion and Gorodnichenko (2015) on US data and Hubert and Lemoigne (2018) on European data, the expectations-augmented Phillips curve was well alive. Inflation expectations significantly explained inflation. In the US, while real activity was depressed between 2009 and 2011, households’ inflation expectations were positively oriented. In contrast, Ball and Mazumder (2021) do not find strong support for inflation expectations in the explanation of actual inflation in the euro area whereas they do for the US. Drawing on a battery of different sources of inflation expectations in the euro area, where they distinguish between households, firms, professional forecasters and market-related expectations, Alvarez and Correa-Lopez (2020) show that inflation expectations’ surveys on households and firms better predict inflation than professional forecasters and financial markets, confirming the Coibion et al. (2018b) outcome on US data.

Inflation expectations are also important for inflation for they might become self-fulfilling. D’Acunto and Weber (2022) recall that recent research with micro data documents finds that higher inflation expectations often result in higher consumer spending before prices actually increase. In the post-COVID-19 era, after supply bottlenecks have arisen and actual inflation has started increasing, higher inflation expectations may feed wage increases that would add to the costs of firms. The latter may then pass through their higher labour costs into final goods’ prices and confirm larger inflation expectations.

5.2. **Inflation expectations and the transmission of monetary policy**

The mere existence of a link between inflation expectations and actual inflation gives central bankers a crucial role: while their mandate includes price stability, it requires from them to anchor inflation expectations and, thus, make the structural part of inflation stable and have it remain on the targeted trend. If they achieve that, they will gain (or keep) credibility and they will have to use their policy rates very rarely, except during cyclical – temporary – variations in real activity and oil prices. Meanwhile, they will also limit the risk of self-fulfilling prophecies. Otherwise, central banks will have to overuse their policy rates to re-establish their credibility.

If inflation expectations are an important component for central bankers, two complementary questions remain: first, what are the drivers of inflation expectations? Second, what are their consequences on private agents’ decisions?
First, Kose et al. (2019) recall that inflation expectations are mainly driven by the institutional setting in which monetary policy is implemented. Advanced economies under an inflation targeting regime have shown better anchoring of inflation expectations than non-inflation targeting countries. However, they also report that when actual inflation is below the inflation target, de-anchoring of expectations is not uncommon. Besides the institutional setting, they also show that inflation expectations in advanced economies depend on shocks to trade: higher trade openness raises inflation expectations a little, whereas it reduces it in emerging economies.

Second, households' decisions on consumption and savings and firms' decisions on investment and hiring rest on the value of perceived real interest rates, hence not only on nominal rates but also on their inflation expectations. Then, the transmission of monetary policy decisions on households' and firms' decisions must rest on nominal policy rates and on possible shifts in inflation expectations. Under a zero lower bound, the transmission of forward guidance to the real economy is highly dependent on its ability to raise inflation expectations. In the case of Italy, Coibion et al. (2020a) show a stronger causal effect of inflation expectations on firms' prices under a zero lower bound. They also show that employment does not decline after a rise in inflation expectations under the zero lower bound, in contrast with the same situation when policy rates are unconstrained.

The importance of inflation expectations in households and firms' decisions gives policymakers some scope for using communication strategies to drive these inflation expectations (Coibion et al., 2020b). As a matter of fact, inflation expectations per se cannot be used as a policy tool: they are too volatile, and/or too dispersed, and/or insufficiently revised after delivering more information in the media (Coibion et al., 2021a) to be used as a substitute for policy rates. However, improved communication can be helpful. Its impact on perceived real interest rates may be limited by the “information effect” highlighted by Nakamura and Steinsson (2018) though: communicating on present and future policy rates may transmit nominal rates and also in inflation expectations, thus leaving the real interest rate constant. To pass policy decisions through private decisions, Coibion et al. (2021b) show that extending communication to mortgage rates or long-term interest rates may modify quite substantially the beliefs and inflation expectations of households with an impact on their perceived real interest rates.
6. CONCLUSION

Inflation expectations play an important role for the determination of inflation and the transmission of monetary policy, through their effects on the real interest rate. It is therefore of utmost importance for central banks to rely on accurate measures. However, this variable is not observable and should be inferred either from surveys or from financial markets data. Despite the availability of alternative measures, they all have some shortcomings either related to their reliability, to their regular availability and to some biases in their respective measures.

It has been documented in the empirical literature that those measures often fail to predict realised inflation. This is confirmed with the recent surge of inflation. All indicators of inflation expectations in 2020 failed to predict that inflation in 2021 would rise so much. They have now been adjusted upward for 2022 but we cannot exclude the risk that indicators have over-reacted and may overshoot inflation in 2022. We can neither exclude that updated expectations may fall short of future realised inflation.

It is therefore important for central banks to consider alternative measures and, meanwhile, not to overly rely on these indicators when taking monetary policy decisions. Besides, the effect of monetary policy on inflation expectations – notably on households and professional forecasts – is not robust enough to make them a channel of monetary policy transmission.

Finally, if long-term expectations seem to be well anchored to the inflation target, we have showed that the anchoring of inflation expectations depends on the horizon and on the source of inflation expectations, in line with earlier papers on this topic. One cannot be overly confident that inflation expectations are and will remain anchored, another argument for dismissing inflation expectations as a policy tool.

In the end, the effectiveness of monetary policy is easily assessed when scrutinising actual inflation performance. The long period of low inflation 2013 to 2020 has illustrated that despite expansionary measures, the ECB has failed to reach its inflation target of an inflation close but below 2% in the medium run.
REFERENCES


Abstract

Inflation expectations are key inputs into monetary policy, but they also represent one of the most difficult variables to measure. Inflation expectations are particularly difficult to pin down in a low inflation environment in which important relative prices experience large changes. The available measures of inflation expectations differ widely across different sources and could be used at most as an additional element in monetary policy decisions, but not as a target.

This paper was provided by the Policy Department for Economic, Scientific and Quality of Life Policies at the request of the committee on Economic and Monetary Affairs (ECON) ahead of the Monetary Dialogue with the ECB President on 7 February 2022.
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<td>ECB</td>
<td>European Central Bank</td>
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<tr>
<td>GDP</td>
<td>Gross domestic product</td>
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<td>HICP</td>
<td>Harmonised index of consumer prices</td>
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<tr>
<td>OAT</td>
<td>Obligation assimilable du Trésor</td>
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<td>SPF</td>
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EXECUTIVE SUMMARY

- **Inflation expectations are considered key to monetary policy** as they play an important role in economic agents’ prices and wage-setting decisions.

- **Different measures of inflation expectations matter to different economic agents.** In practice, households, firms, and financial markets form their inflation expectations by looking at the dynamics in different prices (goods, services, wages and assets). Theoretical models’ assumptions tend to deviate from reality.

- **The measures of inflation expectations used in models and by central banks to forecast future inflation are, in most cases, not representative of heterogeneous groups of firms and households.** Typically, the Survey of Professional Forecasters (SPF) is used, which, to a large extent, relies on financial markets expectations and provides numerical expectation measures.

- **The overview of available measures of actual inflation suggests differences across indicators relevant to different agents, as well as in their inflation expectations.** Such differences tend to be more relevant in an environment of low inflation in which relative prices (e.g. energy or food versus services) experience large changes. This is the case in the current environment.

- **In the EU, wage setting is a key moment in which inflation expectations affect actual inflation in a persistent manner** given that in most countries, wage negotiations have a two-year time horizon.

- **In the euro area, current inflation expectations do not seem to imply the potential for inflationary pressures.**
1. INTRODUCTION

Inflation expectations are considered key to monetary policy because they affect households, firms and financial markets’ decisions about how they spend, save, set prices and wages and invest. Such choices affect the economy as a whole and hence actual inflation. Inflation expectations are incorporated into macro-economic models and in central banks’ formulation of their own inflation expectations to set an informed monetary policy. However, as it will be argued below, accounting for the different ways inflation expectations are formed across different agents in the economy is a very complex exercise. Figure 1 offers an overview of the economic agents, the key variables for transmission mechanisms relevant to them and (traditional) economic models’ design features.

In practice, there are three key variables for which inflation expectations are relevant: i) the real interest rate (defined as the difference between the nominal interest rate and the expected inflation rate), which affect companies’ investment and households’ intertemporal choice between consumption and saving, ii) wage setting, which should maintain the purchasing power of consumers, and iii) the price setting by companies, which should incorporate future prices of factors of production (including capital and intermediate goods).

In traditional micro-funded macroeconomic models, households’ optimal choice (utility maximisation) is defined through the Euler equation, and companies’ price setting is the result of the profit maximisation (accounting for the degree of competition in the market). At aggregate level, the Phillips curve, which is a synthesis of the relation between prices and labour market performance, defines the dynamics between inflation (inflation expectations) and wages.

Figure 1: Overview of how inflation expectations affect economic agents’ choices and how models take them into account

Source: Authors’ elaboration based on ECB (2021a), p. 12.

Theoretical models developed by Phelps (1967), Friedman (1968), and Lucas and Rapping (1969) were the first to explicitly incorporate inflation expectations into a Phillips curve relation. The more recent
version of this relationship is the micro-founded New Keynesian Phillips curve (NKPC) that characterises current inflation as a function of firms’ expectations about future inflation and a firm’s marginal cost.

In practice, different agents are interested in different categories of prices that are relevant to their future choices. However, in ‘traditional’ models, agents are homogeneous and they form their expectations in a rational way (i.e. no information asymmetry exists), hence their expectations converge to a single value. In this framework, most economic models concentrate on “the” price level, usually of the only good (which could be a composite) and a representative agent who forms expectations to guide their consumption choices. Implicitly, it is thus the consumer prices index which matters for the so-called Euler equations, which in many models determine consumption choices based on the difference between (nominal) interest rates and expected price increases. Similar reasoning applies to firms’ profit maximisation.

In these models, the central bank sets monetary policy following a rule, in which the interest rate responds to output developments (i.e. the output gap, but possibly also employment) and incorporates the inflation expectations of the representative agent.

In recent times, many of the models’ assumptions illustrated above have been challenged and new models developed but, above all, the problem facing the European Central Bank (ECB) (and other central banks) at the present juncture does not seem to be addressed by the features of most models.

First, the price of one important input, energy, has increased dramatically, implying that the price expectations of consumers might diverge greatly from that of producers of industrial goods.

Second, different sectors of the economy have been impacted in very different ways by the COVID-19 recession and recovery, making “one good” models even less representative of the current reality.

Third, some demand-supply mismatch induced by the rebound after the pandemic is creating market frictions. Different agents might thus form very different expectations as different prices matter for them; and in some extreme cases, the price might no longer matter because the good or service is no longer available.

Regardless of the model, in real life, there are two broad ways to measure inflation expectations. One is to ask firms and households through surveys about their expectations for future prices. This approach has the advantage that one can directly ask those who set the price of and buy goods and services, i.e. business managers and households. The disadvantage is that the respondents have no strong incentive to make the right prediction, as the replies are only entries into a spreadsheet and have no real implications for them. The other approach uses financial market information from securities, which are directly linked to inflation (see section 3 for concrete examples). The advantage of these market-based measures is that the investors in these instruments have a strong incentive to get the result right.

As it is illustrated more in detail below, the ECB monitors all these indicators, but it mostly relies on a specific source of inflation expectations, namely the Survey of Professional Forecasters (SPF).

Importantly, inflation expectations are considered as a measure of credibility of the central bank's inflation target. Inflation expectations that are well anchored to the monetary policy objective ensure the monetary policy transmission and reduce inflation persistence, therefore inflation expectations are generally assumed to be important determinants of actual inflation outcomes.

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1 More recently, models with heterogeneous agents have been developed.
In the following section, we briefly discuss the processes of forming inflation expectations among economic agents, as well as their implications, based on the empirical evidence provided by the literature. In section 3, we present an overview and assessment of the available measures of inflation expectations in the euro area. The next section describes the recent developments in euro area wages and evaluates the potential impact on inflationary expectations. The last section concludes.
2. INFLATION EXPECTATIONS: WHAT MATTERS TO WHOM?

In real life, the factors that drive households’ and firms’ expectations are different from those of financial market participants, as well as professional forecasters.

As Coibion et al. (2020b) documents, opposite to investors, households and firms are less attentive to macroeconomic trends and monetary policy stance, especially in a prolonged period of low inflation. Their expectations are more backward-looking and can be shaped by inflation-related information they receive through the media. Individual expectations can be also influenced by their daily shopping experiences, in general or when purchasing specific goods and products (Kumar et al., 2015; Cavallo et al., 2017; D’Acunto et al., 2018). Households’ inflation expectations are particularly influenced by price changes in frequently purchased goods (such as groceries or fuel), creating a “veil of inattention” with respect to aggregate inflation and monetary policy announcements. For example, D’Acunto et al. (2018) present an analysis suggesting that high expectations are driven by the members of households who do the main grocery shopping. Dispersions in personal opinions about future inflation can be also driven by demographic and socio-economic characteristics (Easaw et al., 2013; Conrad et al., 2021).

For firms, especially for small companies or for those belonging to a specific sector, the price of specific production inputs (e.g. energy or commodities) may be particularly relevant in affecting the production costs and strongly affect expectations about future price dynamics. In the current context, energy prices may play such role.

Rising inflationary expectations have different implications on the behaviour of households, firms and financial market participants. As theoretical models, as well as some empirical evidence, suggest, households with higher inflation expectations are more likely to raise their current spending, especially on durable goods (D’Acunto et al., 2015; Duca et al. 2016). As they see their purchasing power being at risk, households are also likely to expect unions to negotiate higher wages. Inflation expectations also affect firms’ economic behaviour and, in turn, prices, capital investment and employment (Coibion et al., 2020a). Finally, higher inflation expectations pose risks to investors due to a reduction in expected real returns on financial assets, that also affect asset allocation.

Importantly, different prices, which are captured by different indicators are relevant to the different groups. For consumers, and households in general, the consumer price index, the harmonised index of consumer prices (HICP) in the euro area, is clearly the most important indicator. For firms, the GDP deflator, which captures the changes in prices of everything produced in an economy, should be the most relevant. For financial markets participants, inflation expectations are captured by the term premium that is applied on bonds, as this is what will compensate for potential loss in yields in the case of inflation rises (see Box 1).
Box 1: When HICP and the GDP deflator diverge

According to the argument illustrated above, different indicators of inflation, HICP and the GDP deflator, are likely to be relevant to households and companies, respectively, and affect their behaviour. Historically, the euro area GDP deflator and core HICP had been moving closely together up until 2010. It is with the financial crisis that behaviours started to diverge (see Figure 2). This lasted until around 2013, then the deviation declined. In 2018, trends started to diverge again but unlike during the financial crisis, the GDP deflator signalled a higher inflation rate than the HICP. With the outbreak of COVID-19, the increased volatility in the two indicators has made it difficult to identify a clear pattern, but in several quarters when the two indicators move closely together, the magnitude of the changes is very different (the GDP deflator exhibits much larger changes).

![Figure 2: Price developments in the euro area (annual rate of change)](image)

Source: Authors’ own elaboration based on Eurostat and FRED data.

Interestingly, around 2010, core HICP was pointing to higher inflation than the GDP deflator, after 2017 the opposite became true. A legitimate question relates to the implications, if any, of the divergent behaviour of the two measures on actual inflation. To what extent, and how, are inflation expectations likely to be affected? To what extent should the central bank, which targets the HICP, also monitor or consider GDP deflator developments in its inflation expectation formation? Similar considerations also apply to social partners: to what extent do the pattern differences of the two indicators impact the wage bargaining process and the outcome of negotiations.
3. MEASUREMENT OF INFLATION EXPECTATIONS

Inflation expectations are tracked through survey-based and market-based measures. Measures of expectations based on surveys capture the assessments made by consumers and businesses on inflation and the degree of their uncertainty about price developments. In comparison, market-based indicators reflect the investors’ perceptions of potential inflation risks (often at country level) and are measured through a term premium.

Among the surveys-based metric, special attention is given to the Survey of Professional Forecasters (SPF). This survey is based on the inflation projections, over the short- and long-term horizon, provided by financial or non-financial institutions experts, based within the European Union (EU) (Garcia, 2003). This indicator is particularly relevant to the ECB, and in general to central banks, to form inflation expectations.

According to the ECB SPF, in the last quarter of 2021, long-term (for 2025) inflation expectations in the euro area were at 1.9%, and the short- and medium-term at around 1.7%, the same levels as in 2018, which shows a stabilisation after a sharp decline over 2020. Among them, the short-term measure is seen to have moved most closely with actual headline inflation, whereas the longer-term metric appears rather steady and associated the least with actual inflation (Figure 3).

Figure 3: Survey of Professional Forecasters: inflation expectations vs. actual inflation (Percentage changes per annum)

Source: ECB data.

Beside the point estimates of inflation expectations, the ECB calculates the probability distributions (at different time horizons), which capture the heterogeneity of survey respondents’ expectations and offer measures of uncertainty and balance of risks related to possible inflation outcomes. The uncertainty is measured as the average standard deviation of the individual distributions, whereas the risk is estimated as average individual distribution asymmetries. Figure 5 suggests higher uncertainty, which increased at the onset of the pandemic, and persistent downward risks to central expectations since the financial crisis. Even though, since 2016 the trend in the balance has changed, it remains negative and with increased variations.
From a policy perspective, raising uncertainty and risk around these expectations tend to make the SPF a less reliable source of inflation expectation in monetary policy setting. Market-based inflation expectations are usually measured through estimates of the term premium, and its components, on sovereign bonds yields or swaps rates. Inflation swaps are simple contracts whose payoff is directly linked to the actual future inflation rate (the HICP for euro area inflation swaps). These swaps exist for many maturities, including from one to 10 years. From this term structure of inflation swap prices, one can also derive expectations about future inflation. For example, the difference between the 10-year rate and the five-year rate should (under certain conditions) be equal to the inflation rate expected in five years, for the following five years (the so-called “5years/5years” rate). Figure 4 below provides an illustration of the calculation made by the ECB for the euro area using inflation-linked swaps. It shows that the risk premium component comprises a major part of the recent developments in inflation expectations (Lane, 2021).

Figure 4: Survey of Professional Forecasters: risks and uncertainty around longer-term inflation expectations
(Variance-scaled percentage points; percentage points)

Source: ECB (2021a), Chart 5 – based on ECB (SPF) and Eurosystem staff calculations.
A recent analysis from the De Nederlandsche Bank (2021) has used this approach to look at the 1-year/1-year ahead inflation expectations to find out whether next year’s inflation will return to the ECB’s target.

Another example of market-based inflation expectations is given by the so-called “break-even” inflation rate. This is defined as the differential between a long-term nominal bond yield and the real yield available on an index-linked bond of the same maturity. This is the rate of inflation under which the expected nominal return to an investor will be the same, regardless of whether the investment is made in a fixed nominal income or an index-linked bond. In practice the break-even inflation rate is not a direct measure of inflation expectations as it also contains a premium against the volatility of inflation and the lower level of liquidity. Figure 6 provides an illustration of such a proxy of inflation expectations, based on French Treasury bonds (the difference between the Obligation assimilable du Trésor [OAT] and OAT€i, namely OAT indexed to the euro-area consumer price index). The French government has issued some of these bonds with a 2030 maturity. One can then obtain an estimate of the rate of inflation which bondholders expect by comparing the return on indexed and non-indexed bonds (of the same maturity and otherwise similar conditions). The chart suggests a convergence of expectations around 1.9% in late 2021, and then a decline at the end of the year, after a substantial increase following the outbreak of the pandemic.

Figure 6: Breakeven inflation, euro area


Note: (1) the difference between the yield of the OAT 2.50%, May 2030 and the yield of the OAT€i 0.7%, July 2030.
(2) the difference between the yield of the OAT 2%, May 2048 and the yield of the OAT€i 0.1%, July 2047.

Lastly, households’ inflation expectations are the most difficult to capture, and potentially the least reliable. In the EU, a survey exists and measures the balance between upward and downward expectations compared to current circumstances, instead of numerical expectations.
Figure 7 compares the balance of the responses with actual HICP. It clearly shows a co-movement of consumers’ short-term inflation expectations with actual HICP inflation (measured over the preceding 12 months). The correlation coefficient between the two measures is found to be around 0.79 over the sample period. We also found that consumer expectations are more weakly correlated with core inflation (correlation coefficient about 0.57), indicating the influence of energy and food prices on consumers’ perceptions of future prices, something that is not observed in the expectations of professional forecasters. Indeed, the latter is found to be slightly more linked to core inflation than to headline inflation for medium and long-term measures.

This tight correlation between consumer expectations for inflation one year ahead and actual inflation over the previous year suggests that consumer expectations tend to be myopic – highly correlated with past observation – and are unlikely to constitute a good predictor of actual inflation. This is line with the findings of the literature, mentioned in section 2, pointing to consumer expectations being affected by the current prices of goods that they frequently consume.

The available data on consumer inflation expectations has the further disadvantage that the survey results only give the balance between those expecting prices to increase over the next year and those who do not expect this to happen. In practice, this provides little information on the expected average rate of inflation, since those expecting an increase might fear a large increase whereas those expecting a fall in prices might have in mind a rather limited fall. For these two sets of reasons, consumer surveys are usually not used in economic models, nor do they formally enter the inflation forecasts of the ECB, though they are monitored, nonetheless.

Overall, no perfect measure of inflation expectation exists. On the contrary, all of the ones available seem to have important shortcomings. However, inflation expectations do have an impact on the behaviour of economic agents and can work as magnifiers of current inflation developments. For these reasons they need to be monitored and, for many central banks with inflation targeting strategy, anchoring inflation expectations is seen as an important tool to achieve their objective.
4. **HEADING TOWARDS A WAGE-PRICE SPIRAL?**

Against the background of which inflation expectations matter, to whom, and how to measure them, an important question is about how inflation expectations affect actual inflation and could amplify current dynamics. As highlighted in the introduction, inflation expectations are part of several transmission channels. However, the most influential and the one with a potentially more persistent effect is likely to be the wage setting. Higher persistent inflation expected by workers will likely make them demand an adjustment in nominal wages during wage negotiations, to compensate their expected loss of purchasing power. If they achieve this, it will raise labour costs and cause firms to increase their prices, which, in turn, would lead to another demand by workers for a pay rise, and thus a loop of consistent price increases would be set into motion.

In the current situation, where both HICP and the GDP deflator are raising, it is crucial to understand whether such trends will be incorporated in wage setting, and could make current inflation dynamics persistent. According to the data, this does not seem to be the case, at least for the time being.

4.1. **Wage developments in the euro area**

Wages represent another case of a large discrepancy between a simple concept in macroeconomic models and the multiple measures available to policymakers. In practice, wages can be measured in many different forms, for example as negotiated wage (increases), hourly wages actually paid, employee compensation (per week or month), wage costs to employers, etc. In addition, the widespread use of short-term work schemes since the start of the pandemic makes it even more difficult to find a single, representative measure of wages. Moreover, recent data is distorted by the unprecedented fall in employment and compensation per employee in Q2 2020, which was then followed by a sharp rebound in early 2021 (see Figure 8).

Figure 8: Compensation per employee and headline inflation in the euro area
(Annual rate of change)

![Figure 8: Compensation per employee and headline inflation in the euro area](chart.png)

Source: Authors’ own elaboration based on Eurostat and ECB data.

Unit labour costs moved opposite to wages in early 2020, with spikes in opposite directions in Q2. The first leg of output recovery allowed unit labour costs to greatly decelerate, but the growth rate...
remained even in Q2 2021, at 4% higher than before the pandemic. By contrast, wages (as measured by compensation per employee) were increasing to their pre-pandemic rate by early 2021.

Another problem with wage or labour cost measures is that they are available only with a rather long lag. The available data thus pre-dates the very recent surge in HICP inflation.

Several empirical studies document that the pass-through from labour costs to inflation in many European economies has diminished since the global financial crisis (Bobeica et al., 2019; Boranova, 2021). This coupled with recent observations of wage developments in the euro area do not imply the potential for inflationary pressures.

Figure 9: Compensation per employee and negotiated wage rates in the euro area
(Annual rate of change)

Source: Authors’ own elaboration based on ECB data.

Note: Compensation per employee is calendar and seasonally adjusted. Indicator of negotiated wage rates is neither calendar nor seasonally adjusted.

Koester and Grapow (2021) examine the wage adjustment mechanisms in the private sector in the euro area. According to their analysis, only a marginal fraction of private sector employees (3%) indexes their wages to inflation. Also, 18% of employees consider inflation developments during wage negotiations, based on mainly forward-looking inflation measures, excluding energy prices. These results suggest a negligible direct impact of inflation, as well as energy inflation on wage setting in the euro area.

Figure 10 illustrates the development of negotiated wages and core inflation, in comparison with the evolution of consumer-based inflation expectations in the euro area. The figure indicates, except during the 2008 financial crisis, only a weak link between inflation expectations and negotiated wage rates. The latter is observed to have moved rather closely with core inflation, although the pattern seems to have altered during the COVID-19 crisis.
Figure 10: Negotiated wage rates, consumer inflation expectations and actual inflation in the euro area

Source: Authors’ own elaboration based on Eurostat and ECB data.
5. CONCLUSION

Inflation expectations matter and are important to be monitored, as economic agents and financial markets act on their expectations of future price increases. However, the way expectations are formed in practice, and the determining factors, differ across agents.

We found that the data from consumer surveys has little predictive power. Consumers tend to expect more price increases in future when they see prices rising today. The surveys from professional forecasters, used by the ECB, seem to be less influenced by actual inflation. But the long-term inflation rates expected by professional forecasters have remained above the medium- and short-term rates for the last 12 years.

In many models, wages represent the element that transforms inflation expectations into higher actual inflation. However, we found little evidence that such a mechanism has been important for the euro area over the last decade (of low inflation).

The currently available measures of inflation expectations do not correspond to the inflation expectations which form a central part of the macroeconomic models used by central banks (including the ECB). Also, neither the professional forecasters, nor consumers, have anticipated the current surge in inflation that Europe is experiencing. They can provide some useful additional input in policy decisions, but the ECB should not try to target them directly.

Finally, central banks’ communication often addresses the expectations of financial market participants rather than those of households and firms. The communication strategies adopted by most central banks since the 1990s have largely been effective in anchoring the long-run inflation expectations of financial markets in advanced economies (Coibion et al., 2020b). In a forward-looking perspective, a fundamental question is whether recent, and quite abrupt changes, in inflation represent a risk of de-anchoring expectations. The SPF does not seem to suggest so, but it is too early to say whether this is the case.
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Should rising inflation expectations concern the ECB?

Karl WHELAN
Abstract

This paper discusses theory and evidence on inflation expectations. While near-term measures of expected inflation in the euro area have increased, forecasters and financial markets expect inflation to decline back to the ECB’s target by later this year. The paper provides some sceptical arguments in relation to the prominence given to measure of inflation expectations in monetary policy circles.

This paper was provided by the Policy Department for Economic, Scientific and Quality of Life Policies at the request of the committee on Economic and Monetary Affairs (ECON) ahead of the Monetary Dialogue with the ECB President on 7 February 2022.
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<td>CPI</td>
<td>Consumer price index</td>
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<td>ECB</td>
<td>European Central Bank</td>
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<tr>
<td>HICP</td>
<td>Harmonised index of consumer prices</td>
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<td>ILS</td>
<td>Inflation-linked swap</td>
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<td>SPF</td>
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EXECUTIVE SUMMARY

• This paper discusses the theory of how inflation expectations influence the inflation process and presents evidence on the behaviour of inflation expectations in the euro area.

• Expectations have played a central role in the story of how modern macroeconomics has changed its thinking about inflation over the past 50 years.

• Modern macroeconomics assigns a lot of explanatory power to changes in inflation expectations. The breakdown of the Phillips curve relationship in the 1970s, the decline in inflation rates in the early 1980s and the consistent low level of inflation over the past 20 years have all been explained by the changing behaviour of inflation expectations.

• Central bankers regularly discuss the need to use their communications strategies to help keep inflation expectations “anchored” near their target. In this sense, influencing inflation expectations has been increasingly viewed as an important tool of monetary policy.

• The paper reviews four sources of information on inflation expectations. Evidence is presented on measures of inflation expectations derived from consumer surveys, from business surveys, from the Survey of Professional Forecasters and from financial markets.

• Near-term measures of expected inflation in the euro area have increased but this seems to mainly reflect the increase in inflation that has occurred over the last year.

• Forecasters and financial markets expect inflation to decline back to the ECB’s target by later this year. Measures of longer-term inflation expectations remain “anchored” near 2%.

• The paper provides some sceptical arguments in relation to the prominence given to measure of inflation expectations in monetary policy circles.

• There is limited evidence of survey measures of inflation being useful for forecasting inflation. The traditional wage-bargaining mechanism through which expected inflation should raise inflation is likely to be weak in a world with low levels of unionisation.

• In the low inflation environment of recent years, inflation has perhaps not been “salient” for workers and thus has had limited influence on wage bargaining. If the current period of higher inflation continues for longer, it may change this pattern and lead to the re-emergence of the kind of wage-price inflationary spiral seen in the 1970s.

• Central bank efforts to influence the public’s inflation expectations may be limited in usefulness. Most people pay no attention to central banks and many have poorly informed opinions on inflation.

• If inflation remains high over the next few months, measures of near-term and medium-term inflation expectations will likely move up. There will also likely be an impact on wage inflation.

• ECB communications assuring the public in an attempt to keep inflation expectations anchored are unlikely to help much in the coming months.
1. INTRODUCTION

An important theme in modern macroeconomics is that the public’s expectations play a key role in determining how the economy evolves. This is particularly true when considering inflation and much of the research on inflation over the past 50 years has focused on the role played by inflation expectations and how these expectations have interacted with the actions of central banks as well as their organisational design.

The breakdown of the famous “Phillips curve” correlation between inflation and unemployment and the worldwide disinflation of the early 1980s have generally been attributed to inflation expectations rising in the early 1970s and then falling again as the result of an increased commitment of central banks to low inflation. More recently, the long period of low and stable inflation that preceded the COVID-19 pandemic has often been attributed to an “anchoring” of the public’s expectations due to the credibility of the commitments of central banks to maintaining low inflation.

Against this background, one of the concerns of central banks around the world is that the current increase in inflation, which they hope is just a temporary event, could raise the public’s inflation expectations and fuel further increases in inflation, perhaps triggering a “wage-price spiral” of the kind people associate with the 1970s.

This paper reviews the theory on the role that expectations play in determining inflation, assesses the evidence on how inflation expectations have evolved in the euro area over the past year and discusses whether the European Central Bank (ECB) should be concerned yet about rising inflation expectations. The paper is structured as follows.

Section 2 discusses the evolution of thinking in macroeconomics on the role played by inflation expectations from the 1970s to the pre-COVID-19 period.

Section 3 evaluates the various pieces of evidence on inflation expectations in the euro area over the past year. It concludes that, while the ECB should be concerned about the sustained high rate of inflation, the evidence on inflation expectations provides no particular reason to be more concerned. There is little sign at this moment of the emergence of an expectations-fuelled wage-price spiral. Longer-term inflation expectations have increased but this can be viewed as a positive development because these expectations are now aligning with the ECB’s target inflation rate of 2% whereas previously there was evidence of scepticism on the part of forecasters and financial markets about whether the ECB was going to achieve this target.

Section 4 puts forward some grounds for scepticism on the central role accorded to the public’s inflation expectations in modern macroeconomics. It argues that there is limited room for central banks to influence inflation expectations, other than by maintaining low inflation. If a de-anchoring of inflation expectations occurs in the next few years in the euro area, this is likely to be a consequence of the ECB failing to meet its inflation target rather than an important independent cause of a higher inflation rate. Conversely, it would be unwise to think that ECB can use a communications strategy to keep expectations anchored in the face of a sustained higher rate of inflation.

Section 5 contains some concluding thoughts.
2. INFLATION EXPECTATIONS IN MACROECONOMICS

2.1. Expectations and the Phillips curve

Expectations have played a central role in the story of how modern macroeconomics has changed its thinking about inflation over the past 50 years. During the 1960s, the most influential theory of inflation was the Phillips curve, which suggested there was a trade-off between inflation and unemployment. Governments could use macroeconomic policies set a low unemployment rate but this would occur at the expense of a high (but fixed) rate of inflation.

During the 1970s, the predictions of the Phillips curve ceased to hold as the “stagflation” combination of high unemployment and high inflation occurred across most advanced economies. In seeking an explanation for the breakdown in what had previously appeared to be a reliable relationship, economists pointed to the behaviour of expectations about inflation as the likely culprit. Macroeconomists gradually accepted the critique of the original Phillips curve most associated with Milton Friedman (1968) that its neglect of how inflation expectations were determined represented a serious flaw. Friedman pointed out that if governments picked a particular point on the Phillips curve associated with a higher rate of inflation, then over time the public would become used to this higher level of inflation and seek higher rates of wage inflation to compensate. Effectively, this would mean an “upwards shift” in the Phillips curve so that each unemployment rate was now associated with a higher inflation rate than previously.

More formally, Friedman’s expectations-augmented formulation of the Phillips curve can be written as

\[ \pi_t = E_t \pi_t + \gamma (u_t - u^*) \]

Where \( \pi_t \) represents inflation, \( E_t \pi_t \) represents the public’s expected value of inflation entering the period, \( u_t \) represents the unemployment rate, \( u^* \) represents the so-called “natural rate of unemployment” and \( \gamma \) is a measure of the sensitivity of inflation to deviations in the unemployment rate from this natural rate.

This expectations-augmented formulation of the Phillips curve meant that policy makers did not face a simple trade-off between inflation and unemployment. Indeed, rather than being able to pick a specific inflation rate associated with a specific unemployment rate, a given unemployment rate could be associated with any value of inflation. If the public expect 2% inflation, then the economy could have a steady unemployment equal to its natural rate and the inflation rate would be 2%. But if the public expected 10% inflation, then the same economy could have the same unemployment rate and instead inflation would equal 10%. And since low inflation is preferable to high inflation, the first outcome is clearly better than the second one.

Over the course of the 1970s and 1980s, the expectations-augmented Phillips curve became part of standard thinking in macroeconomics, being taught in textbooks and incorporated into policy advice. Economists recommended that central banks should operate in a way that credibly convinces the public that they are fully committed to maintaining low inflation. If this commitment is believed, the theory suggests that it can “anchor” inflation expectations at a desired low level, contributing to low inflation and macroeconomic stability.

Academic advice on how to structure central banks in a way that would contribute to low inflation expectations included recommendations that central banks operate independently of governments and that they be given explicit mandates to maintain price stability. These recommendations have had a huge influence on the design of central bank institutions over the past 30 years, with central banks becoming increasingly independent from political control and given more explicit inflation mandates.
The structure of the ECB—with a high level of independence and price stability as its primary objective—reflects these recommendations, which were highly influential at the time the Maastricht Treaty was agreed.

2.2. The behaviour of inflation expectations

On its own, the expectations-augmented Phillips curve is not a useful theory for predicting how inflation will behave. Without adding a theory of what determines the public's inflation expectations, the model cannot be used to explain or predict outcomes for inflation.

Friedman (1968) did not present a formal model of inflation expectations but he believed the public's anticipated inflation rates moved relatively slowly and were based on recent inflation rates. One simple formulation of this idea is the famous “accelerationist” Phillips curve in which expected inflation is determined by the previous period's observed inflation rate.

$$\pi_t = \pi_{t-1} + \gamma(u_t - u^*)$$

In this formulation, increases in inflation trigger higher inflation expectations and thus inflation can only be reduced by a period of unemployment above its natural rate. This version of the model implies an innate “persistence” in inflation. Once it has been low for a while, it will tend to stay low and vice versa for high inflation.

This version of the Phillips curve also implies a strong empirical prediction: Low unemployment rates should be associated with rising inflation and high unemployment rates should be associated with falling inflation. For many years, this prediction matched the data for inflation and unemployment in many countries and more complex empirically calibrated versions of the equation above were used by central banks to model and forecast inflation.

Over the past decade, however, the evidence suggests this correlation has not held up. Stock and Watson (2021) document a weakening in this correlation over time for the United States and similar results have been found for other countries. More generally, the persistence of inflation appears to have fallen over the past few decades. Technically, the accelerationist formulation of the Phillips curve imposes a coefficient of one on past values of inflation, meaning there is a full pass-through of past movements in inflation to today's value. However, various studies have shown that when this coefficient is estimated using statistical methods, it appears to have fallen well below one for many countries over the past 20 years.

Macroeconomists have argued that the most likely explanation for these changes is that the process determining inflation expectations had changed. Whereas in the past, the public may have had a “what have you done for us lately?” attitude when estimating future values for inflation, the impact of a long period of low inflation and the establishment of independent central banks with explicit inflation targets have combined to “anchor” inflation expectations at a low level. Under this interpretation, the public trusts the central bank's commitment to meeting its inflation target, so even if actual inflation overshot or undershot this target for a while, the public still assumes that inflation will get back to the central bank's target soon.

Recent research has also highlighted a potentially greater role for inflation expectations in past macroeconomic cycles than was understood at the time. Hazell et al. (2020) addressed the question of why US inflation had been so low in recent years despite a prolonged period of extremely low

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1 See O'Reilly and Whelan (2005) for evidence on inflation persistence in the euro area from the 1970s to the early 2000s.
2 Whelan (2021) provides graphs illustrating the falling correlation over time for the US case.
3 See, for example, Blanchard (2016) for a discussion.
unemployment. Using cross-sectional data from US states, they argued that the explanation for this outcome is that the sensitivity of inflation to unemployment (the $\gamma$ coefficient in our formulation) has always been small. Unlike the traditional story in which a major part of the US disinflation of the early 1980s was ascribed to the impact of high unemployment rates, Hazell et al. argue that disinflation was largely achieved by directly reducing inflation expectations.

The prominence given to the benefits of anchoring inflation expectations means it is hardly surprising that many in the central banking community are now concerned that the current higher rates of inflation prevailing in many countries are going to lead to a “de-anchoring” of inflation expectations that could lead to a wage-price spiral which may require central banks to cool economies to lower inflation, potentially putting them back into recession.
3. RECENT DATA ON INFLATION EXPECTATIONS

This section surveys the evidence on euro area inflation expectations, covering in turn households, businesses, professional forecasters and financial markets.

3.1. Households

When thinking about the possibility of a wage-price inflationary spiral, the most obviously important type of inflation expectations are the expectations of the general public. However, while it is easy to construct theories that assign a central role to inflation expectations, actually obtaining useful empirical measures of the public’s expectations turns out to be quite tricky. Some people pay close attention to inflation developments but many do not. Indeed, some members of the public are unclear what is meant by inflation. To give an example, in its recent Survey of Consumer Expectations, the ECB (2021b) found the following: "when asked how they conceptualise the term 'inflation', approximately 30% of respondents failed to recognise that it represents an increase in the general level of prices of goods and services."

The public’s inflation expectations can be evaluated by collecting answers from surveys. However, it is unclear what to do with the responses. Should central banks focus on the average anticipated value for inflation or should they focus on the median? These surveys tend to have a high fraction of respondents who report that they expect double-digit inflation even during times of low inflation. For this reason, presentations of data from household surveys tend to focus on the median value of expected inflation, because these values are less influenced by extreme outliers. I will follow that convention in my presentation here but it isn’t obvious that the opinions of poorly informed people about inflation should be completely discounted. They could still matter when determining overall inflationary pressures.

Another issue with measuring the public’s inflation expectations is that it appears that answers to questions about anticipated inflation can be sensitive to the design of the survey questionnaire. In the euro area, the most comprehensive measure of the public’s inflation expectations comes from the European Commission’s monthly consumer surveys. This survey asks consumers what they believe the inflation rate has been over the past year and what they expect it to be over the next year. Figure 1 shows the actual inflation rate, as measured by the year over year percentage change in the Harmonised Index of Consumer Prices (HICP), the median perceived inflation rate for the previous year from the Commission survey and the median expected inflation rate for the following year.

The evidence in Figure 1 suggests the Commission’s survey data on inflation expectations should be interpreted very carefully. The survey’s measure of the median perceived inflation rate over the previous year has been systematically greater than the actual inflation rate. Even more strangely, the perceived inflation rate over the previous year has always been higher than the expected inflation rate over the following year. Taken literally, it means the survey participants have expected a falling inflation rate in every survey since 2004, when the survey began asking respondents for a specific point estimate of inflation.

The median expected inflation from the Commission’s survey has also been systematically higher than the actual values recorded for HICP inflation. The biases for respondents in their estimates of both perceived and expected inflation have specific patterns with smaller upward biases evident for respondents with higher income and education.

How unusual is the behaviour of expected inflation in the Commission’s survey? The size and consistency of the over-estimation of likely inflation seems to be a greater problem with this survey...
than with comparable surveys reported elsewhere. Figures 2 and 3 show median survey estimates of expected inflation over the following year for the US and the UK. Figure 2 shows US Consumer Price Index (CPI) inflation and the median value of expected inflation from the University of Michigan consumer survey. Figure 3 shows UK CPI inflation and the median value of expected inflation from the Bank of England’s Inflation Attitudes Survey.

Over their histories, both of these surveys have had extended periods when median expected inflation exceeded actual inflation but they have also had periods when the two series were close and the average gap between expected and actual inflation has been much smaller. The average gap between expected and actual inflation has been 0.5% for the Michigan survey since 1990 and 0.8% for the Bank of England survey since 1999. For the European Commission survey, this gap has been 2.25% since 2004.

Is there something about the design of the survey that leads it to induce high estimates of inflation from the respondents? One potential issue is that, prior to being asked to provide a specific point estimate, the survey design provides three different possible opinions about possible positive inflation (prices can “increase more rapidly”, “increase at the same rate”, “increase at a slower rate”) but only one option for prices falling. ECB (2021b) argues that “This lack of symmetry may bias responses towards price increases.”

The weakness in the Commission survey’s measures of expected inflation and the limited information about other aspects of the respondents’ economic situation mean there is a need for a better source of information on this topic. The ECB is planning to fill this gap with a new Consumer Expectations Survey. In its report providing an evaluation of the new survey, ECB (2021b) noted that the new survey, which has a more precise and symmetric wording of the relevant question, had median values of expected short-term and medium-term inflation of about 2% during 2020, suggesting this survey may produce more realistic figures. At present, however, the ECB is not publishing regular monthly data from this survey.

In relation to developments over the past year, the Commission’s survey shows an uptick in expected inflation but this increase has been a bit smaller than the increase in actual inflation that has taken place. Median expected inflation over the following year was 3.6% at the end of 2019. At the end of September 2022, it was 5.2%. This contrasts with actual year-over-year HICP inflation, which was only 1.3% at the end of 2019 but had risen to 3.4% by September 2022. The Commission’s website that makes these data available only publishes the quantitative estimates of inflation on a quarterly basis and have yet to publish a fourth quarter figure. Since actual year-over-year inflation has accelerated to 5% by December, it seems likely that we will see further increases in the consumer expectations series.

Should the ECB be concerned about the increase in household inflation expectations? On balance, I would say no. The increase to this point seems to be a consequence of the rise in inflation, rather than something that is fuelling inflation itself. And the recent readings for median expected inflation are similar to the values seen during the years prior to the global financial crisis, when inflation remained moderate. At least as of yet, these indicators are not consistent with an expectations-driven wage-price spiral.

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4 The data in Figure 1 were obtained from https://ec.europa.eu/info/business-economy-euro/indicators-statistics/economic-databases/business-and-consumer-surveys/download-business-and-consumer-survey-data?time-series_en
Figure 1: HICP inflation and median values for perceived and expected euro area inflation from European Commission consumer survey

Source: Author’s calculations based on data from Eurostat and the European Commission.

Notes: The perceived inflation series reports the median value in the survey in response to a question about the behaviour of prices over the past 12 months. The expected inflation series reports the median value in the survey in response to a question about behaviour of prices over the next 12 months.

Figure 2: US CPI inflation and median expected inflation over the following year from the Michigan Survey of Consumers

Source: Author’s calculations based on data from Federal Reserve Bank of St. Louis and University of Michigan.

Figure 3: UK CPI inflation and median expected inflation over the following year from the Bank of England Inflation Attitudes Survey

Source: Author’s calculations based on data from Federal Reserve Bank of St. Louis and the Bank of England.
3.2. Businesses

Since prices are set by firms rather than consumers, another way to assess inflation expectations is to ask firms what they think is going to happen with prices. The European Commission also runs monthly business surveys that ask firms about pricing. The questions ask firms about how they expect their own selling prices to change over the next three months. It does not ask for a specific number but instead simply whether they expect their prices to increase, decrease or stay the same. From this, the Commission produce a diffusion index which subtracts the fraction of firms expecting a decrease from those expecting an increase. This approach differs from asking about the general rate of inflation but it may still provide some indication on the build-up of inflationary pressures.

The Commission undertakes a number of separate sectoral surveys. Figure 4 shows diffusion indices for the pricing question for the retail, services and industry surveys. In general, these surveys have shown a limited correlation with actual inflation, though there is some evidence that the surveys helped to predict the fall and subsequent rise in inflation during the global financial crisis.

Unsurprisingly, the business survey indices have increased over the past year and are at or close to the highest levels seen for these series. However, these developments are not that surprising given the current high levels of year-over-year inflation and given the weak correlation between these series and actual inflation, they are of limited value when projecting the possibility of a further rise in inflation in the coming months.

Figure 4: HICP inflation (right scale) and European Commission business survey diffusion indices of expected price changes over the next 3 months (left scale)

Source: Author’s calculations based on data from Eurostat and the European Commission.
3.3. Professional forecasters

If central banks are concerned about a wage-price spiral, then surveying the opinions of households or businessmen may not necessarily produce the most useful estimates. As discussed above, many of the respondents to consumer surveys believe the economy is experiencing double-digit rates of inflation even when inflation is actually close to zero. It is unlikely that these people will be able to convince their employers to give them double-digit wage increases based on their incorrect beliefs about inflation. By contrast, when trade unions are bargaining or when employers are considering the need to keep offering competitive pay rates that keep up with the cost of living, they are more likely to consider a well-informed forecast of inflation.

For this reason, central banks pay close attention to the inflation forecasts produced by independent professional forecasters. Both the Federal Reserve and the ECB publish a quarterly Survey of Professional Forecasters (SPF). The ECB has also recently begun publishing forecasts of monetary policy variables and inflation from a survey of monetary analysts, i.e. financial market experts that follow the ECB closely.

Figures 5 illustrate how the euro area SPF’s HICP average inflation forecasts for various calendar years have evolved over time since 2013. Over this period, the tendency was for the forecasters to set their initial forecasts equal to 2% but then gradually reduce them over time as inflation continued to undershoot the ECB’s inflation target. With the onset of the pandemic in early 2020, the forecasters reduced their projections for inflation for 2020 and subsequent years. However, from spring of last year onwards, the average forecast of inflation for 2021 and subsequent years began to rise as the pace of inflation picked up.

The most recent SPF was conducted in early October and published on 29 October. The results provided some comfort for central bankers worried about a de-anchoring of inflation expectations. The forecasters will have had access to the September HICP release which showed year-over-year HICP inflation increasing to 3.4% but they did not anticipate this pattern continuing into 2022 and subsequent years. The average forecasts for HICP inflation in 2022 was 1.9% and the average forecast for 2023 was 1.7%. The average forecasts provided for HICP inflation excluding energy, food, alcohol and tobacco were only marginally lower, suggesting the forecasters saw the impact of the surge in energy prices waning from this year onwards. Similar forecasts for HICP inflation were provided by the Survey of Monetary Analysts in their most recent survey, also conducted in October.

It is worth noting, however, that the medium-term forecast outcome is more uncertain than usual. In particular, the variance of the October SPF forecasts for HICP in 2023 is high relative to historical standards (see Figure 6).

Also comforting to central bankers will be the fact that the SPF average forecast for the longer-term HICP inflation rate was 1.9% in October which aligns almost perfectly with the ECB’s new precise target of 2% (see Figure 7). The SPF’s average forecast for longer-term inflation had dropped below 2% in the years prior to the pandemic and then dropped further to about 1.65% in the early stages of the pandemic. The higher inflation of recent months has led the forecasters to reverse these declines. Similarly, the median longer-term inflation forecast from the Survey of Monetary Analysts is also 1.9%. Rather than being concerned about rising inflation expectations being a sign of reduced credibility for the ECB, the Governing Council should be happy that, for now at least, long-term expectations are well aligned with its inflation target.

Again, however, it is worth noting that there is less certainty about the longer-term forecast than usual. Figure 8 shows that the variance for these forecasts is far larger than normal. Only the 2009:Q2 survey,
as the world economy began to emerge from recession, had these forecasts previously shown such a high variance.

While these results will have been comforting to the ECB, they are also somewhat out of date. Since October, HICP inflation has continued to increase and the anticipated easing of energy price inflation has not occurred. Year-over-year HICP inflation increased from 3.4% in September to 5% in December. Year-over-year energy price inflation increased from 17.4% in September to 26% in December.

The impact of recent data releases and the ongoing rise in energy prices has led to the ECB’s staff substantially increasing their forecasts for inflation in 2022. Their December projections show HICP inflation at 3.2% for 2022 as a whole, up from 1.7% in their September projections. The ECB staff still project inflation to fall back to 1.8% in 2023 and 2024.

The next SPF will be published in early February. It can be expected that the average forecast for HICP inflation this year will be marked upwards. The ECB will hope the forecasters agree with its prognosis that this jump in inflation will be temporary and “normal service will be restored” by next year.

Figure 5: Evolution of average SPF forecasts for HICP inflation for different years

Source: ECB Statistical Data Warehouse.
Figure 6: Variance of SPF forecasts for HICP inflation for different years

Source: ECB Statistical Data Warehouse.

Figure 7: SPF forecasts for longer-term HICP inflation

Source: ECB Statistical Data Warehouse.

Figure 8: Variance of SPF forecasts for longer-term HICP inflation

Source: ECB Statistical Data Warehouse.
3.4. Financial markets

A final source of inflation expectations stems from financial market data. Inflation can affect the outcome of various investment strategies so we can expect those involved in investing in these strategies to be paying careful attention to inflationary developments and base their investment on a careful assessment of the future path of inflation.

Movements in long-term bond yields can provide some information about the market’s expectations of inflation, though it can difficult to disentangle this from the market’s thinking about future short-term interest rates and longer-run real interest rates. Two other types of financial instruments, however, provide more precise estimates of the inflation expectations of financial markets.

**Inflation-Indexed Bonds**: A number of euro area Member States, including France and Germany, have issued inflation-indexed bonds. These bonds pay an agreed real rate plus a guaranteed additional compensation that depends on the inflation rate over the term of the bond. Comparing yields on normal government bonds with the yields on inflation-indexed bonds of the same maturity provides an estimate of the “breakeven inflation rate”, i.e. the level of inflation compensation provided by the bonds. While these breakeven inflation rates can be influenced by other factors such as market liquidity and the risk premia associated with uncertainty about inflation, they are regularly used to describe what the market’s view of future inflation is.

Evidence on breakeven rates for longer-term bonds suggest that market expectations of medium-term inflation fell sharply during the early stages of the pandemic but have now recovered to be better aligned with the ECB’s inflation target. For example, the French debt management agency reports that the breakeven rate calculated from comparing an inflation-indexed French government bond maturing in 2029 with a non-indexed bond of similar maturity fell from about 1.2% in early 2020 to as low as 0.4% in late spring 2020 but has recovered to be about 1.8% by the end of December5.

**Inflation-Linked Swaps (ILS)**: These are instruments in which two parties agree to swap cash flows with one party receiving a fixed payment and the other receiving payments that are linked to the inflation rate. The terms of the contracts provide an estimate of the market’s expected inflation rate over the relevant horizon. In the euro area, the relevant index used to calculate the inflation-linked payments is the HICP excluding tobacco.

This ILS contract is considered superior to breakeven inflation rates from inflation-indexed bonds as a measure of euro area inflation expectations because the inflation contract in the inflation-indexed bonds refers to a national price index rather than the euro area HICP and because there are fewer problems with liquidity effects 6. However, the ILS rate is still likely to be affected by time-varying risk premia associated with changing market perceptions of the extent of inflation risk.

Figure 9 reproduces a chart on ILS rates from Burban et al. (2021). It shows some volatility in ILS spot rates over the past year but the longer-term rates have returned to close to 2% in recent months. The one-year forward rate has also converged on 2%, suggesting the market still agrees with the ECB assessment that inflation will return to target in 2023. Burban et al. (2021) argue that much of the fluctuations in ILS rates over the past year was accounted for by changes in the inflation risk premium but subtracting off their estimates of the impact of this premium, their calculations still suggest that the inflation expectations component of the ILS contracts remains well aligned with the ECB’s 2% target over the medium and long-term.

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5 These data can be found at [https://www.aft.gouv.fr/en/oatis-key-figures](https://www.aft.gouv.fr/en/oatis-key-figures)

6 See Böninghausen, Kidd and de Vincent-Humphreys (2018) for a more detailed discussion.
3.5. **Summary**

To summarise, a wide range of measures of inflation expectations have, unsurprisingly, risen over the past year but, as of yet, these measures should probably not trigger a lot of concern for the ECB. Consumer and business surveys indicate the public is expecting a higher rate of inflation over the next year but these series seem to have largely responded to the rise in actual inflation. Expected inflation in the Commission’s consumer survey is still only at a level that has prevailed in the past when inflation rates were relatively low.

The ECB itself is expecting inflation to be above target this year. The staff’s December projections showed an inflation rate in 2022 of 3.2% and worsening conditions in energy markets may see this forecast marked up again in March. The more important issue for the ECB is what happens in future years. The ECB is forecasting a return to inflation rates close to its 2% target from next year onwards. They will be relieved that, for now at least, the forecasts provided by professional forecasters and by financial markets are in agreement. In addition, provided long-term expectations don’t increase further, the recent move of longer-term expectations towards 2% can be viewed as a positive endorsement of the credibility of the ECB’s commitment to meeting its target rate.

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Sources: Refinitiv and ECB calculations.  
Notes: The “1y1y ILS rate” is the one-year forward ILS rate in four years’ ahead, and similarly for the “1y1y ILS rate” and “5y5y ILS rate.” The latest observation is for 20 November 2021.

Source:  Burban et al. (2021).
4. SOME SCEPTICISM ON THE ROLE OF EXPECTATIONS

As discussed above, it has become conventional wisdom in macroeconomics that inflation expectations are a crucial determinant of inflation and that central bank communications aimed at anchoring the public’s expected inflation rate are an important part of monetary policy. Here, I will briefly present some reasons for scepticism about these ideas. In particular, I will cite some of the arguments in two recent papers and then raise a couple of other points.

4.1. Rudd (2021)

A recent paper by Federal Reserve economist Jeremy Rudd (2021) has the blunt title “Why Do We Think That Inflation Expectations Matter for Inflation? (And Should We?)”. Rudd provides a number of sceptical arguments against the usual formulation of the expectations-augmented Phillips curve.

First, Rudd points out that unionisation rates are low in modern economies so there is less room for the kind of formal wage bargaining envisaged in Friedman’s formulation of the Phillips curve in which employees put forward their expected rate of inflation as a baseline for negotiations on wage increases. Firms may feel the need to pay workers more money to keep up with the cost of living so they can hire new workers and prevent quits but this may simply take the form of a backward-looking adjustment based on recent changes in the cost of living rather than an annual negotiation in which expected future inflation plays an important role.

Second, Rudd argues that the low rate of inflation in recent years may have reduced the “salience” of cost of living increases as a factor in wage formation:

“the current period represents one in which inflation isn't on workers’ “radar screens” anymore (or is at least is only a very tiny blip), which in turn yields an outcome where current price inflation does not respond (much) to past inflation (because inflation is not a major factor in wage determination)”.

And Rudd notes that this is linked to a previous Fed Chairman’s definition of price stability:

“If this situation sounds like former Fed chair Alan Greenspan’s (2002) definition of price stability as “…an environment in which inflation is so low and stable over time that it does not materially enter into the decisions of households and firms,” that’s because it basically is.”

Rudd warns about the dangers of the so-called Average Inflation Targeting strategy recently adopted by the Fed. This approach seeks to offset shortfalls relative to a 2% inflation target by signalling to the public that they should allow inflation above 2% for a period. He notes that this could shift inflation dynamics into a new and more problematic situation:

“a policy of engineering a rate of price inflation that is high relative to recent experience in order to effect an increase in trend inflation would seem to run the risk of being both dangerous and counterproductive inasmuch as it might increase the probability that people would start to pay more attention to inflation and—if successful—would lead to a period where trend inflation once again began to respond to changes in economic conditions.”

In the context of the euro area, the concern would be that the current unintended jump in inflation makes inflation salient again and re-establishes the previous expectations-augmented Phillips curve relationships seen in previous decades.
4.2. Coibion et al. (2020)

Another important contribution in this area is Coibion et al. (2020). This paper reviews the question of whether monetary policy should attempt to influence the public’s inflation expectations as part of its monetary policy strategy and discusses a number of challenges to adopting this approach. Their paper makes many relevant points but I will highlight just two.

First, Coibion et al. highlight that the evidence suggests that many people pay little attention to inflation, apart from at particular times. For example, they illustrate that perceived inflation rates in consumer surveys are highly correlated with the price of petrol. This links again with the concept of salience. Many people fill their car with petrol on a regular basis so this is a large regular expenditure and a price that people know. Large changes in this price are salient and may affect expectations disproportionately.

Second, Coibion et al. discuss how most people pay very little attention to monetary policy. They describe a series of major policy changes introduced by various central banks that had essentially no impact on measures of the public’s inflation expectations. So central banks can work hard on their communications strategies but it’s not clear the general public are listening.

4.3. Some other grounds for scepticism

I would add some other sceptical points on the role of inflation expectations.

First, despite the considerable attention paid to survey measures of inflation expectations, they are not particularly useful in forecasting what is going to happen with inflation. ECB (2021a) conducts a thorough investigation of the forecasting properties of survey measures of inflation expectations and concludes “informing time-series models with survey expectations as regressors provides some – albeit not major – forecast gains.” There are few good reasons to assume a high value of expected inflation in a survey will translate into a high subsequent value of inflation.

Second, conversely, there is plenty of evidence that survey measures of inflation expectations are influenced by current and recent inflation rates. The current rise in survey measures of expected inflation may simply reflect the incoming data rather than providing any additional independent information about inflationary pressures.

Third, there is perhaps an excessive focus on the importance of long-term inflation expectations for monetary policy. Keeping long-term inflation expectations anchored is helpful in stabilising long-term interest rates but these expectations do not play an important role in determining inflation over the short- or medium-term. Workers who see inflation running at 5% for a year are likely to want a compensating wage increase even if they believe inflation will end up averaging 2% over the longer-term. The ECB can view long-term inflation expectations at 2% as a positive sign of its credibility but if those expectations move upwards significantly, it will be because inflation has consistently been above the ECB’s target. The “anchoring” seen in surveys and financial markets is arguably just a consequence of policy success rather than something that contributes directly to this success.

Fourth, it may be worth considering macroeconomic theories that place less reliance on unobservable movements in inflation expectations to explain events. So, for example, Hazell et al. (2020) interpret the Volcker disinflation as largely occurring because the monetary policy regime change gradually brought inflation expectations down. But an alternative interpretation could be that the Fed’s restrictive and volatile monetary policy of this period had a much larger negative effect on aggregate demand than could be summarised via the unemployment rate.
Perhaps rather than being the result of anchored inflation expectations, the pre-pandemic weakness of inflation across the advanced global economies had a different common cause: Weak global aggregate demand relative to global supply, perhaps due to the various factors that Summers (2014) referred to in his “secular stagnation” diagnosis.

And perhaps the current period of rising inflation reflects global demand outstripping global supply, particularly in countries that have perhaps applied excessive fiscal stimulus such as the United States. Rather than worrying too much about anchoring inflation expectations, the solution to keeping inflation on target may be better management of aggregate demand via monetary and fiscal policy.
5. CONCLUSIONS

The current period of rising inflation clearly presents a serious challenge for the ECB. The ECB Governing Council has been clear that it views this as a temporary phenomenon but the length of this “temporary” spell is increasing with every passing month. The ongoing surge in energy prices has meant that HICP inflation, having averaged 2.6% in 2021, will likely be over target by a greater amount in 2022. Given this, the ECB can be relieved that, by and large, their belief that inflation will return to normal rates in 2023 is shared by professional forecasters and investors. Longer-term inflation expectations remain anchored around its target rate of 2% and there is also limited evidence as of yet of a worker-led wage-price spiral underway.

The comfort taken from all of this should probably be limited. Inflation expectations tend to follow the behaviour of inflation itself. If the ECB cannot contain inflation in the coming months, we are likely to see increases both survey-based and markets-based measures of expected inflation in 2023 and perhaps a de-anchoring of longer-term inflation expectations.

More seriously, a run of many months in a row of HICP inflation over 5% is likely to make inflation a more salient issue with workers, particularly in the environment of an economic recovery with a strengthening labour market. And a strategy of ECB Governing Council members using “open mouth operations” to reassure the public about inflation is unlikely to be particularly successful in curbing inflation in the coming months. There may be time for inflation to cool off and the re-emergence of a wage-price spiral to be avoided but there may not be that much time.
REFERENCES
