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Inflation expectations in the euro area: trends and policy considerations

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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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LIST OF ABBREVIATIONS

CES	Consumer Expectations Survey
CISS	Composite index of systemic stress
CPI	Consumer Price Index
ECB	European Central Bank
GDP	Gross domestic product
OIS	Overnight indexed swap
SPF	Survey of Professional Forecasters

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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 area [1]. 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 level [2]. 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 Coibion 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 %
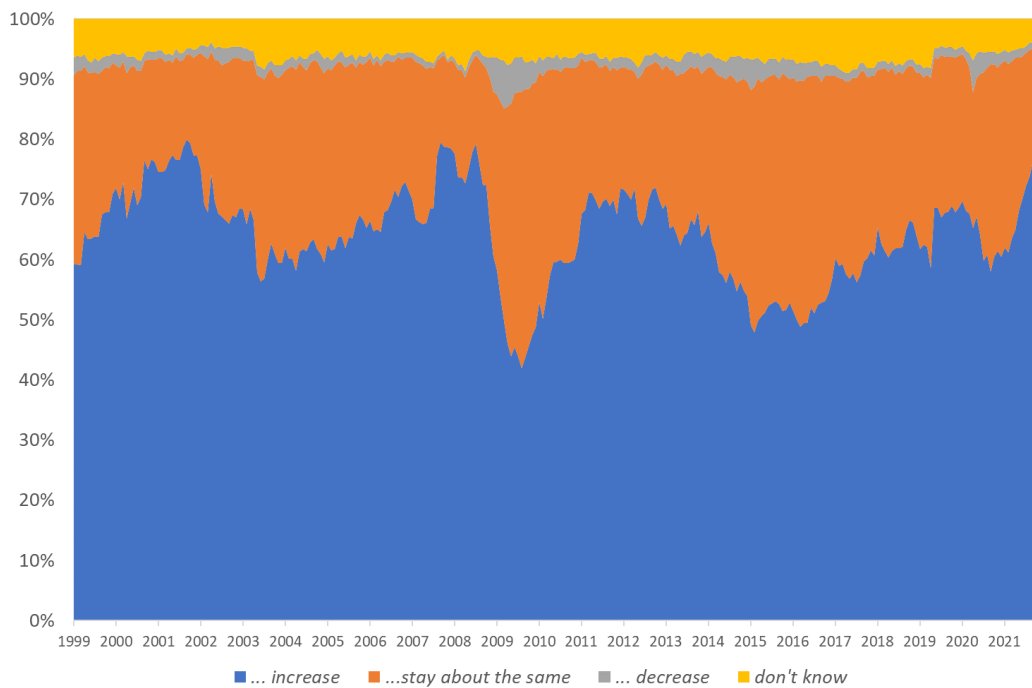
Source: European Commission (Consumer survey).

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[3]. 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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[3]   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.

Figure 2: Inflation expectations from professional forecasters, in %
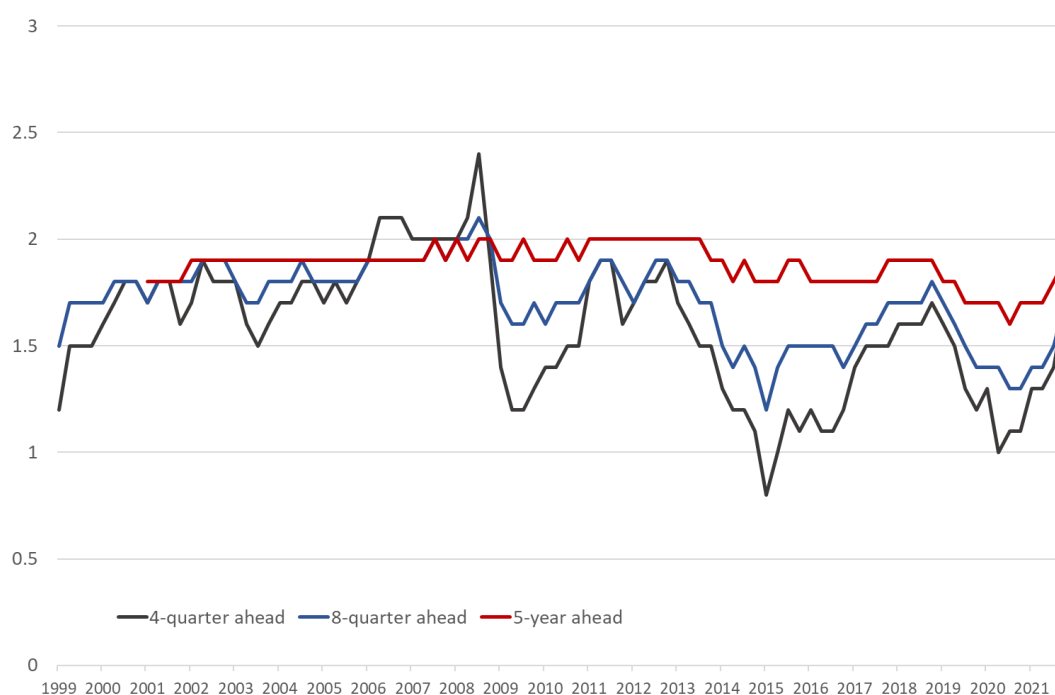
Source: ECB (SPF).

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[4]. Cieslak and Schrimpf (2019) show that communication on non-monetary information accounts for a significant part of the information

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[4]   See Nakamura and Steinsson (2018).

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 %
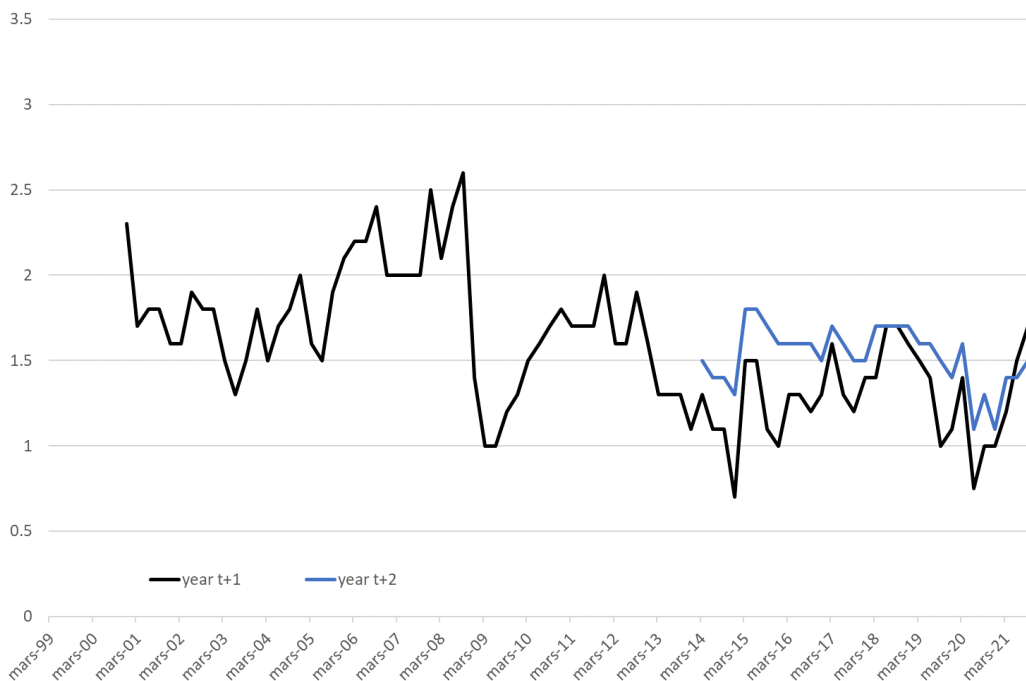
Source: ECB.

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.[5] 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[6]. 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.

## 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 data[7].

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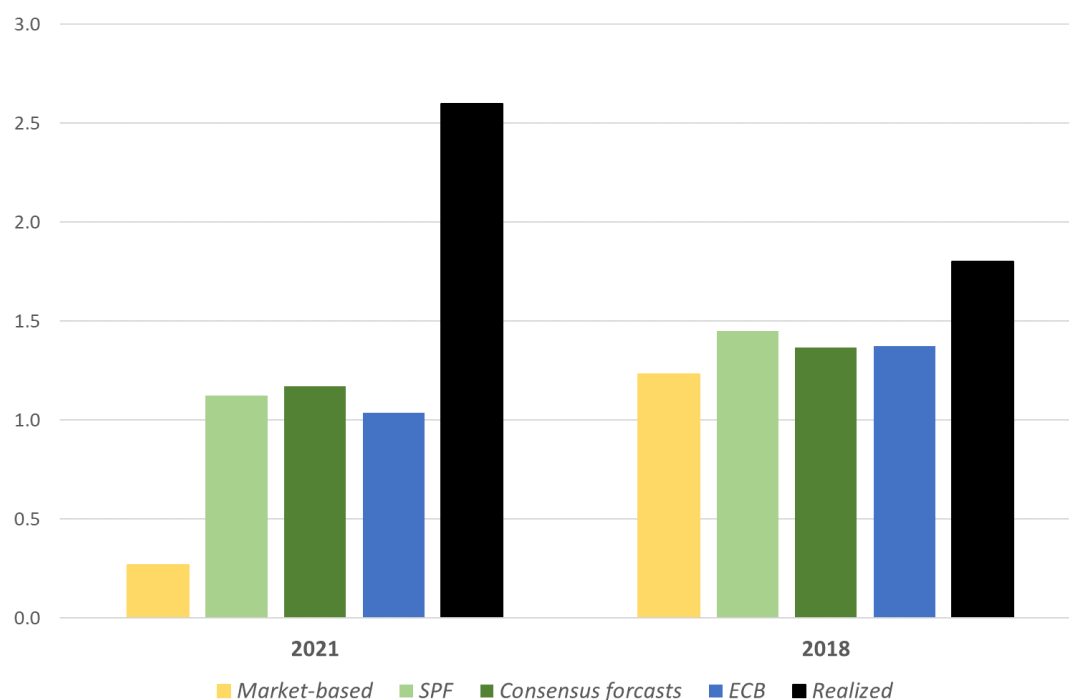
Sources: Refinitiv Eikon, ECB (SPF), Consensus forecasts.

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
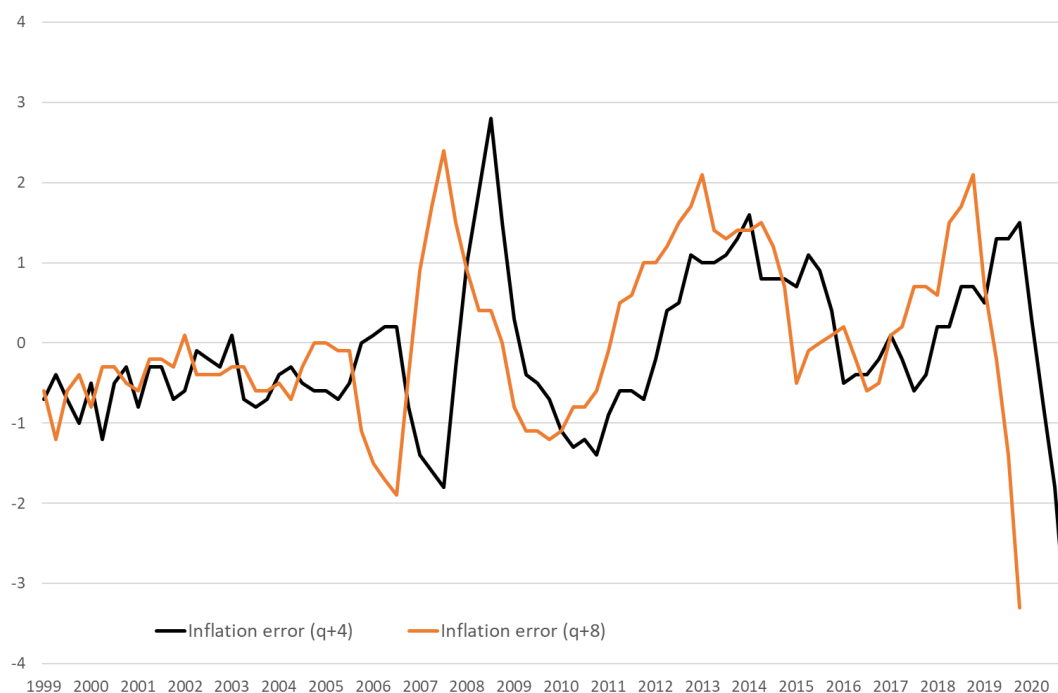
Sources: ECB (SPF), Eurostat.

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. Bańkowska 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 %

Source: CES – The latest observation is for December 2020.
Notes: Pooled data across waves. Using weighted data. Disagreement and inflation expectations are obtained from the open-ended question about individual expectation of changes in prices in general over the next 12 months.
Question asked: *How much higher (lower) do you think prices in general will be 12 months from now in the country you currently live in? Please give your best guess of the change in percentage terms. You can provide a number up to one decimal place.*
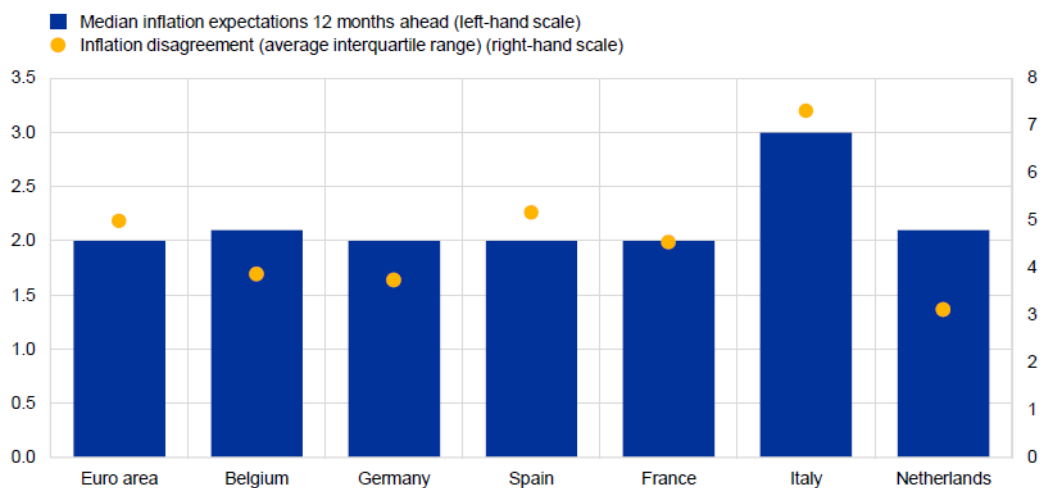
Source: Bańkowska et al., (2021).

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, %
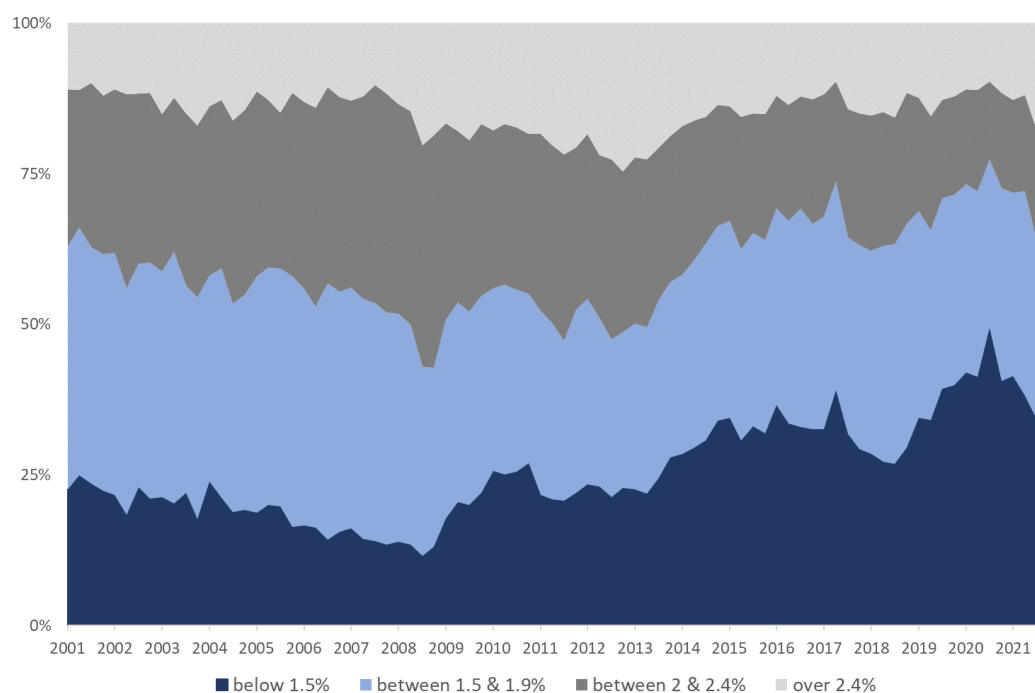
Source: ECB (SPF).

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:

$$\Delta E \pi_t^{lt} = c + \kappa Shock_t + \beta X_t + \epsilon_t$$

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 $Shock_t$ 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.[8] 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

	Change in inflation expectations at different horizons						
	1 year	2 years	3 years	4 years	5 years	10 years	5y5y
D.vstoxx	-0.034*	-0.027*	-0.030	-0.028***	-0.029***	-0.026***	-0.016***
	[0.01]	[0.01]	[0.01]	[0.00]	[0.00]	[0.00]	[0.00]
mp shock	0.00	0.00	-0.00	0.00	-0.00	0.00	0.01
	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]
Scotti surprise	0.036	0.041	0.017	0.021	0.018	0.009	0.006
	[0.03]	[0.03]	[0.02]	[0.02]	[0.02]	[0.01]	[0.01]
Scotti uncertainty	0.012	0.012*	0.006	0.008*	0.006*	0.003	0.002
	[0.01]	[0.01]	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]
Inflation flash	0.009*	0.007*	0.005**	0.004**	0.004**	0.003**	0.004**
	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]
N	3072	3072	3072	3072	3072	3072	2150
r2	0.112	0.216	0.215	0.245	0.241	0.199	0.094

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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[8]   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

	Change in SPF inflation expectations at different horizons				
	1 year	2 years	4 quarters	8 quarters	5 years
GDP flash	-0.004	0.002	-0.012***	-0.001	0.004
	[0.01]	[0.01]	[0.00]	[0.00]	[0.00]
Scotti activity	0.14	0.19	0.088	-0.002	-0.004
	[0.04]	[0.06]	[0.02]	[0.02]	[0.01]
mp shock	0.008	-0.060	0.017**	0.002	0.002
	[0.01]	[0.09]	[0.01]	[0.00]	[0.00]
Ciss	-0.038	-0.021	-0.004	-0.047*	-0.008
	[0.04]	[0.21]	[0.04]	[0.02]	[0.01]
	[0.05]	[0.07]	[0.03]	[0.02]	[0.01]
N	85	37	85	85	79
r2	0.311	0.029	0.439	0.276	0.369

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 than 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 to 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.

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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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