

# The limits of the ECB's inflation forecasts

Christian Conrad & Zeno Enders

*Heidelberg University*

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## Summary

The surge in inflation in recent years was not only a concern for central banks but also worried consumers and politicians. The European Central Bank has been criticized for basing its monetary policy on inflation forecasts that underestimated actual inflation development in 2021 and 2022, leading to adjustments in monetary policy that were too late. But why is it so challenging to accurately predict inflation over longer forecast horizons, and what implications does this have for monetary policy? In this article, we argue that the ECB's inflation forecasts are uninformative for horizons of more than one year and that the ECB should consider this insight when designing its monetary policy.<sup>1</sup>

## Introduction

Inflation forecasts are of central importance for the monetary policy decisions of the European Central Bank (ECB). But how well and over what horizons can the ECB predict inflation? And why has the ECB underestimated the development of inflation in 2021 and 2022 for so long? In this article, we argue that the ability to forecast future inflation rates is generally limited and that the ECB should account for this limitation in its monetary policy strategy. In our view, the ECB's overestimation of its forecasting capabilities in 2022 led to its late response to the 2021-2022 inflation surge.

Since the review of its monetary policy strategy in July 2021, the European Central Bank has been pursuing a symmetric inflation target for consumer price inflation within the eurozone of two percent per year (Deutsche Bundesbank, 2021).<sup>2</sup> This target is to be achieved in the medium term, i.e., after twelve to 18 months. The focus on the

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<sup>1</sup> This text is based on Conrad and Enders (2023) and provides an overview of the results in Conrad et al. (2024).

<sup>2</sup> Prior to this, the inflation target was defined as "below, but close to 2 percent". The last review took place in 2003. It is planned that the strategy will be reviewed every five years from 2021.

medium-term horizon is due to the fact that monetary policy cannot influence inflation instantaneously but only with a certain time lag. It should, therefore, not react to short-term, purely temporary deviations from the target. Otherwise, it could happen that monetary policy takes acute countermeasures, but the effect of the measures only kicks in when inflation has already returned to the target. This would be destabilizing and thus detrimental to the goal of price stability.

The results of the 2021 strategy review were shaped by the fact that in previous years with very low inflation rates, the so-called zero lower bound for interest rates robbed the ECB of many opportunities to move inflation towards the targeted two percent. Put simply, central banks cannot set their key interest rate to (substantially) negative values. One instrument that can still be used to stimulate the economy and hence inflation is "forward guidance": by announcing the future interest rate path (as credibly as possible), it is possible to influence the long-term interest rate. In theory, this is expected to have a stimulating effect in the short term (Eggertsson and Woodford, 2003). The ECB has taken these insights into account by explicitly linking the future development of the key interest rate to its inflation forecasts in its strategy review: A normalization of the then very expansionary monetary policy should only take place when the inflation forecast in the middle of the forecast horizon (which covers up to three years) was at the target of two percent and remained there for the rest of the forecast period, whereby a temporary rise in inflation above the target level should be tolerated (European Central Bank, 2021a).<sup>3</sup>

Forecasts of future inflation are, therefore, a key input for the ECB's monetary policy decisions. Based on this strategy, the ECB did not raise its key interest rate in December 2021, despite an inflation rate of 4.6% at the time, because its inflation forecasts suggested that inflation would fall below the target of 2% again in the medium term. Specifically, ECB President Christine Lagarde argued at the press conference on the monetary policy decision on December 16, 2021:

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<sup>3</sup> Philip Lane, the ECB's Chief Economist, said in 2021: "Specifically, our forward guidance now reads: 'In support of its symmetric two per cent inflation target and in line with its monetary policy strategy, the Governing Council expects the key ECB interest rates to remain at their present or lower levels until it sees inflation reaching two percent well ahead of the end of its projection horizon and durably for the rest of the projection horizon, and it judges that realized progress in underlying inflation is sufficiently advanced to be consistent with inflation stabilizing at two per cent over the medium term. This may also imply a transitory period in which inflation is moderately above target.'" (Lane, 2021).

"The inflation outlook has been revised up, but inflation is still projected to settle below our two percent target over the projection horizon. (...) inflation projections for 2023 and 2024 (...) are at 1.8% respectively. (...) Are we at target, given that our target is 2% over the medium-term (...)? Not quite (...) We are driven by data, and (...) under the present circumstances, as I have said before, it is very unlikely that we will raise interest rates in the year 2022. That still stands." (Lagarde, 2021)

### **Preparation of ECB forecasts**

Given the central importance of the forecasts for the ECB's monetary policy, we will first provide a brief overview of the aspects that are relevant to our discussion of the ECB projections.<sup>4</sup> The forecasts are based on a number of "technical assumptions" made by the ECB. To emphasize the dependence of the forecasts on these assumptions, the ECB itself does not refer to them as forecasts but as projections. These are assumptions about interest rates, exchange rates, energy prices, and fiscal policy (European Central Bank, 2006; Chahad et al., 2022). It is assumed that the development of interest rates and energy prices will follow market expectations, the exchange rate is assumed to remain constant and fiscal policy will follow national budget plans. In addition, the ECB prepares forecasts for the development of the global economy. There are four rounds of projections each year. The Broad Macroeconomic Projection Exercise (BMPE) in June and December is prepared by the entire Eurosystem. The projections in March and September, known as the Macroeconomic Projection Exercise (MPE), are updates of the BMPE by the ECB (Holm-Hadulla et al., 2021). In each of these four rounds, the national central banks (NCBs) of the Eurosystem contribute the short-term (11-month) inflation forecasts for their respective countries in the Narrow Inflation Projection Exercise (NIPE).

The BMPE follows an iterative procedure. First, the NCBs prepare forecasts for inflation and a number of other macroeconomic variables for their countries on the basis of the technical assumptions specified by the ECB. These projections are

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<sup>4</sup> The European Central Bank (2016) and Kontogeorgos and Lambrias (2022) describe in detail how the forecasts are made.

aggregated by the ECB (after possible revisions by the national central banks). In both procedures, BMPE and MPE, projections are produced at country levels and at the euro area level with a time horizon of two to three years (i.e., until the end of the second calendar year following the year in which the projections are produced), except in December when the following three years are taken into account (European Central Bank, 2021b, p. 18). A large number of quantitative (economic and econometric) models are used in the preparation of the inflation forecasts, but expert knowledge is also incorporated at various levels (European Central Bank, 2021b, p. 18). The final forecasts are, therefore, not solely model-based. However, the longer-term projections in the medium-term reference scenario, which extend the usual projection horizon (see above) by a further five years, are largely model-based (European Central Bank, 2021b, p. 32).

### **Problems with inflation forecasts**

As we now know, the ECB has significantly underestimated the actual development of inflation in 2021 and 2022, even over shorter forecast horizons. Figure 1 shows the development of inflation in the Eurozone from the fourth quarter of 2020 to the fourth quarter of 2023. The blue lines represent the ECB's inflation projections, starting from the quarter in which they were published. The forecast for the current quarter is referred to as the nowcast. Since the fourth quarter of 2020, the ECB has significantly underestimated the rise in inflation in the short term and until the first quarter of 2022, the long-term ECB projections (i.e., the 8-quarter projections) have predicted inflation to decline below 2%. The projection from the second quarter of 2022 was the first to predict an inflation rate of over 2% in the medium and long term. These misjudgments regarding inflation have contributed to the ECB not raising the key interest rate before July 2022, which has led to increasing criticism of its forecasts and, therefore, its monetary policy. In December 2021, in a guest article (Conrad et al., 2021) for the *Frankfurter Allgemeine Zeitung* (FAZ), we pointed out the uncertainties associated with the long-term projections and argued that aligning monetary policy with these projections is problematic.

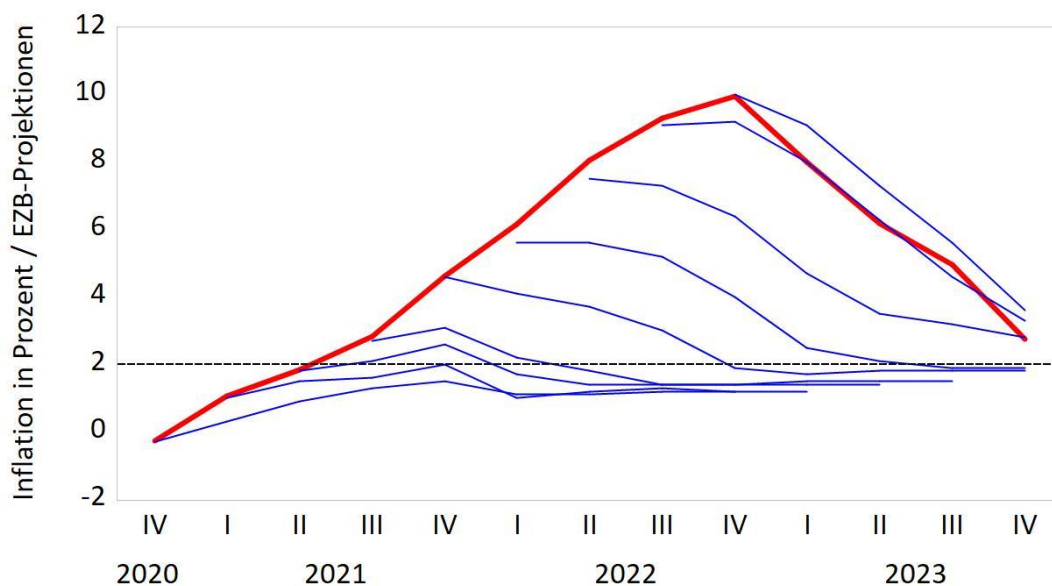


Figure 1: The red line shows realized inflation (percentage change in the HICP compared to the same quarter of the previous year) in the Eurozone. The blue lines show the ECB projections from the respective quarters. The black dashed line corresponds to the 2% target.

This leads to the question of why it is so difficult to accurately predict inflation over longer forecast horizons. Generally speaking, short to medium-term inflation is heavily influenced by economic developments. In order to forecast inflation, it is therefore necessary to predict changes in variables such as economic growth and unemployment and also to understand the precise relationship between these variables and inflation. There are various problems with this: firstly, we only have a rough idea of the current economic development in real time. This is because economic growth is only measured on a quarterly basis and is initially only estimated imprecisely. In the case of Germany, the first estimate of GDP growth is published by the German Federal Statistical Office around 30 days after the end of each quarter and is often revised significantly subsequently. This problem is exacerbated by the fact that the revisions are particularly severe at turning points in the economic cycle. It is thus difficult to make inflation forecasts on the basis of this data, which is subject to great uncertainty.

Second, there may be structural changes over time in the relationship between inflation and its determinants that are difficult to detect in real-time. Since forecasting models usually assume stable relationships, such structural changes typically lead to a decrease in the forecasting performance of the models before they are adjusted to the

new situation. For example, forecasting models for inflation typically assume a negative correlation with unemployment: the so-called Phillips curve. If the correlation weakens unnoticed, which seems plausible from today's perspective for the years before the pandemic, a fall in unemployment can lead to a significantly lower rise in inflation than the forecast models predict on the basis of the previous relationship.

Thirdly, unprecedented situations may arise. For example, the impact of the fiscal rescue measures during the coronavirus pandemic could only be vaguely assessed, as the pandemic and the measures had no comparable predecessors. To make matters worse, there was a lack of clarity about the nature of the economic disruption. Normally, falling production figures and rising prices are to be expected after supply-side problems, while both production and inflation fall after disruptions on the demand side. During the pandemic, however, there was a difficult mix of ordered business closures and further restrictions on supply as well as consumer and investment restraints on the demand side. This made forecasting inflation during the pandemic and after the end of the restrictions particularly complex. The ECB assumed that the rise in inflation was mainly driven by supply-side shocks such as supply chain problems, which led to the forecast that inflation would quickly fall again as soon as these problems were resolved. In reality, however, high "pent-up demand" also led to strong inflation (Enders, 2022, English et al., 2024).

Fourthly, Russia's war against Ukraine exemplifies an unforeseen development that inevitably leads to forecast errors. For example, the ECB explained its underestimation of inflation, particularly in the first quarter of 2022, with the surprising rise in energy prices in response to the Russian invasion of Ukraine (Chahad et al., 2022). It becomes even more complicated when the ECB wants to predict how its own monetary policy decisions will affect inflation. For example, the ECB must anticipate how different economic actors will react to the decisions and what implications this will have in the aggregate. In Conrad et al. (2022), we showed that after unexpected interest rate hikes by the central bank the majority of German households adjust their inflation expectations upwards rather than downwards, as expected in the textbook. Such behavior can counteract the intended effect of the monetary policy measure.

## **ECB loses confidence in its own forecasts**

The public discussions about the quality of the ECB's inflation forecasts, which began at the end of 2021, have also made the ECB think more critically about its own forecasts. As Christine Lagarde argued in an interview with "Madame Figaro" on August 25, 2022:

"We can no longer rely exclusively on the projections provided by our models - they have repeatedly had to be revised upwards over these past two years. There are things that the models don't capture." (Lagarde, 2022)

The ECB's declining confidence in its own forecasting capabilities led to a transition to a "meeting-by-meeting" approach and a stronger focus on incoming data. The President of the French central bank, François Villeroy de Galhau, summarized this development concisely on 16 June 2023:

"We are data driven, we are not forecasts driven." (de Galhau, 2023)

## **Limits of predictability**

While the ECB primarily points to problems with the assumptions regarding global economic development when analyzing its forecast errors and also promises improvements to the models used, we see a more fundamental problem. In our view, the focus of monetary policy on the medium and long forecast horizons can only be justified if inflation forecasts at these horizons are informative. In Conrad et al. (2024), we, therefore, systematically evaluate the performance of the ECB forecasts. We are not only interested in the underestimation of the inflation trend in 2021-2022 but also in the general information content of the forecasts since 2001. For the entire observation period, we initially come to a positive conclusion: we find no evidence of a systematic bias in the ECB forecasts for the forecast horizons of one to eight quarters. This means that the ECB has neither systematically underestimated nor overestimated actual inflation. There is also no evidence that existing information is not used efficiently.

To illustrate our further results and to motivate our following analysis, Figure 2 shows a scatter plot of ECB projections and actual realized inflation. Forecast horizons of one quarter (left), four quarters (center), and eight quarters (right) are considered. The dashed line corresponds to the 45-degree line. If the projections were perfect, i.e., if projections and subsequent realizations matched exactly, all points should lie exactly on this line. A test of this hypothesis is known as the Minzer-Zarnowitz regression. For the 1-quarter projections, all points of the scatter plot are indeed close to the 45-degree line. A regression of realized inflation on the ECB projections has a coefficient of determination of 92 percent and the joint null hypothesis that the intercept is zero and the slope is one cannot be rejected. The large forecast errors for the quarters 2022Q1-2022Q3 are nevertheless clearly visible.

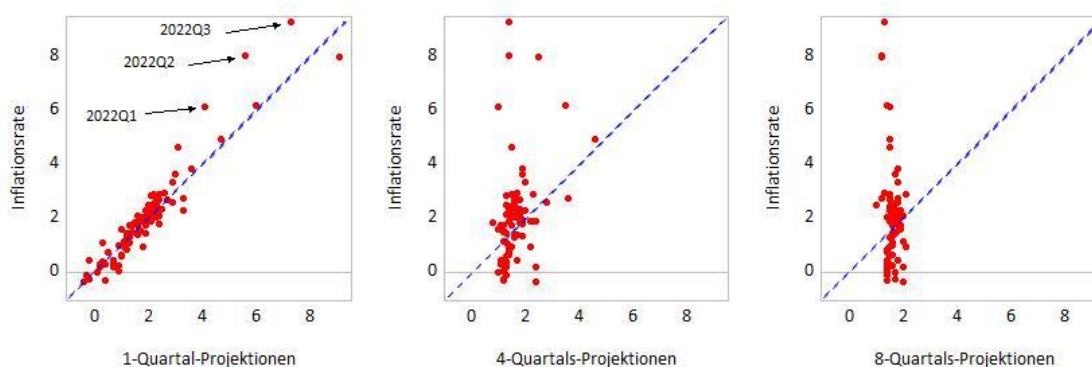


Figure 2: Scatter plot of realized inflation and ECB projections. Left: Forecast horizon of one quarter; center: forecast horizon of four quarters; right: forecast horizon of eight quarters. Data for the period 2001Q2-2024Q1 are used.

Looking at the middle and right-hand charts, the impression changes completely. At horizons of four and eight quarters, the coefficient of determination of the regression of realized inflation on the ECB projections falls to 10 and below 10 percent, respectively, which means that the projections at these horizons have hardly any explanatory power for the inflation realized later. However, this does not necessarily mean that the quality of the forecasts is poor. Assuming a stationary process for inflation with an unconditional mean of "close to, but below 2%"<sup>5</sup> and a quadratic loss function on the part of the ECB, the optimal projections should converge towards this unconditional mean as the forecast horizon increases. This is exactly what the chart reflects. As the forecast horizon increases, the variance of the forecasts decreases. How quickly the projections should converge toward the unconditional mean depends on the persistence of the inflation process. Hence, the forecast performance will

<sup>5</sup> For the largest part of our evaluation period, this corresponds to the ECB's inflation target.



naturally decrease as the forecast horizon increases until it corresponds to the forecast performance of a "naive forecast," which always predicts the unconditional mean.

Forecasts are, therefore, only informative on forecast horizons on which their forecast performance is significantly better than the forecast performance of the naive forecast. To empirically test up to which horizon the ECB's forecasts are informative, Breitung and Knüppel (2021) proposed an econometric test that is also based on the Minzer-Zarnowitz regression. We have applied this test to the ECB projections. Due to the orientation of monetary policy towards forecasts for inflation in twelve to 18 months, the question of informative forecast horizons is particularly relevant. Our empirical results show that the ECB forecasts are informative for horizons of up to one year only, with the greatest improvement compared to the naïve forecast being achieved at the shortest horizon of one quarter. For forecast horizons of more than one year, however, we find that the ECB forecasts are uninformative.

The fact that the uninformative horizon is already reached after one year, despite the considerable effort that the ECB puts into producing its forecasts, seems sobering at first. However, we can show that other forecasters, such as the "Survey of Professional Forecasters," do not deliver more informative forecasts. In principle, it should be noted that there are limits to predictability that are determined by the characteristics of the underlying inflation process, irrespective of the forecasting models used. Although we cannot generally rule out that more informative forecasts are possible, our results suggest that this forecasting limit is already reached after four quarters. Thus, we cannot conclude from our empirical results that the ECB's forecasts are not optimal. Even optimal forecasts can quickly become uninformative. However, the underlying inflation process and hence the limit of predictability can also vary over time and depends, in particular, on the behavior of monetary policy. We can indeed show in a theoretical macroeconomic model that a successful monetary policy makes inflation less predictable. The intuition for this is simple: in the extreme case, monetary policy is so successful in fighting inflation that in every period, the realized inflation corresponds to the inflation target plus a purely random shock. This means that the optimal forecast corresponds to the inflation target, i.e., the unconditional mean, even at a horizon of one period. Even at the shortest horizon, the optimal forecast is then already uninformative. There is evidence in the econometric literature on inflation

forecasts that the limit of predictability varies over time. For example, Stock and Watson (2007) show that the mean squared forecast errors of inflation forecasts were larger in the 1960s and 1970s than in the 1980s and 1990s. In this sense, inflation was easier to predict in the 1980s and 1990s. The latter period is characterized by less volatility in inflation and growth and is known as the Great Moderation. Among other factors, the successful monetary policy of the Federal Reserve Bank has led to a decline in the mean squared forecast error. However, Stock and Watson (2007) also argue that during the Great Moderation it became more difficult to identify variables that helped predict future inflation. In this sense, it became more challenging to make informative forecasts.

We already referred to the forecast limits and implications for the design of monetary policy in a guest article for the FAZ in September 2022 (Conrad, 2022). In the meantime, this argument has found its way into the discussion on how forecasts should influence monetary policy. For example, Alfred Kammer (IMF) argued in June 2023 at the ECB Forum on Central Banking in Sintra in his presentation on "Lessons from recent experiences in macroeconomic forecasting":

"We tend to find that at relatively short horizons (same year mainly) projections tend to do reasonably well. But moving out to even a 1.5 to two-year horizon both our and others' forecasts deteriorate very fast." (Kammer, 2023)

## **Conclusion**

What follows from these findings? As mentioned at the beginning, the ECB aims to achieve its inflation target over the medium term and would, therefore, not need to react to purely temporary deviations. However, if it turns out that it is only possible to predict very imprecisely whether deviations are temporary or permanent, or how high inflation will be in twelve to 18 months' time, it is questionable whether the medium and long-term forecasts should be used as a guide. In our opinion, the ECB has overestimated its forecasting capabilities by basing its monetary policy on these horizons. Tying monetary policy decisions to forecasts with a horizon of more than one year is hence not sensible.

But there is another point: emphasizing the importance of forecasts on horizons for which the forecasts are not informative can lead to a loss of reputation in the long term. This can cause damage that should not be underestimated for an institution that is keen to build confidence in its own currency. To counteract this, the ECB should at least clearly state the uncertainties associated with its forecasts, i.e., publish probabilistic forecasts - such forecasts indicate probabilities that inflation will remain within certain limits.

Instead, the ECB temporarily refrained from quantifying forecast uncertainty when publishing its forecasts during and after the coronavirus pandemic. Instead, the ECB presented alternative scenarios showing how the inflation forecasts would behave under different assumptions. However, these scenarios do not allow any conclusions to be drawn about inherent forecast uncertainties. If the ECB had clearly communicated the uncertainty associated with the December 2021 forecast of 1.8% for 2023 and 2024 mentioned in the quote from ECB President Christine Lagarde, it would have become clear that the gap between the forecast and the 2% target was very small relative to the usual forecast error at this horizon. This is consistent with the fact that forecasts at these horizons are already uninformative and therefore not suitable for justifying adherence to the expansionary course at the time. In addition, empirical estimates suggest that monetary policy works faster than often presented by the ECB (e.g., Janssen et al., 2019, Corsetti et al., 2022, Mandler et al. 2022), so that in our view monetary policy should react to deviations of forecasts from the inflation target at shorter horizons already. In this respect, we advocate a more transparent approach that places greater emphasis on informative forecast horizons and the communication of forecast uncertainties.

The ECB is not alone in its forecasting errors. The ECB itself likes to point out that other forecasters (such as Consensus Economics) have also made similar errors when forecasting inflation in the eurozone in 2021 and 2022 (see, for example, Chahad et al., 2023). In addition, other central banks, such as the Federal Reserve and the Bank of England, have similarly underestimated the development of inflation. In 2021, they all initially assumed that the rise in inflation would be temporary and that there was thus no need for action. Other institutions, such as the International Monetary Fund,

were similarly wrong in their forecasts at the time.<sup>6</sup> The review of these forecasting errors has only just begun. In April of this year, a commission headed by the former Federal Reserve Chair, Ben Bernanke, presented a report on the preparation and communication of the Bank of England's forecasts and made suggestions for improvements. While one of these proposals is to refrain from publishing the so-called "fan charts", i.e., the probabilistic forecasts, the report also emphasizes the importance of quantifying forecast uncertainty both as important information for monetary policy decisions by the Bank of England and for communicating these decisions. In our view, it would also be important to clearly communicate the forecast horizons up to which the Bank's own inflation forecasts have been informative in the past.

## Literature

Breitung, J. and M. Knüppel (2021), How far can we forecast? Statistical tests of the predictive content, *Journal of Applied Econometrics*, 36, 369-392.

Chahad, M., A.-C. Hofmann-Drahonsky, B. Meunier, A. Page and M. Tirpák (2022), What explains recent errors in the inflation projections of Eurosystem and ECB staff?, *ECB Economic Bulletin*, 2022(3), 49-57.

Chahad, M., A.-C. Hofmann-Drahonsky, B. Meunier, A. Page and M. Tirpák (2023), An updated assessment of short-term inflation projections by Eurosystem and ECB staff, *ECB Economic Bulletin*, 2023(1), 61-65.

Conrad, C. (2022), Prognose-Grenzen, *Frankfurter Allgemeine Zeitung*, September 29.

Conrad, C. and Z. Enders (2023), The spectre of inflation. The forecasts of the European Central Bank, *Ruperto Carola*, 22, 24-31.

Conrad, C., Z. Enders and A. Glas (2022), The Role of Information and Experience for Households' Inflation Expectations, *European Economic Review*, 143, 104015.

Conrad, C., Z. Enders and G. Müller (2021), Die EZB setzt ihre Glaubwürdigkeit aufs Spiel, *Frankfurter Allgemeine Zeitung*, December 15.

Conrad, C., Z. Enders and G. Müller (2024), The ECB's projections and their limits, Mimeo.

Corsetti, G., J.B. Duarte and S. Mann (2022), One money, many markets, *Journal of the European Economic Association*, 20(1), 513-548.

de Galhau, F. V. (2023), The euro as a complementary asset in a more multilateral system, speech at the conference: The internationalization of the euro and the creation

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<sup>6</sup> Koch and Noureldin (2024) provide a current analysis of the forecast errors of the International Monetary Fund.

of the EU Capital Markets Union, Paris, 16 June, <https://www.banque-france.fr/en/governors-interventions/monetary-and-fiscal-policy-mix-addressing-disease-inflation/euro-complementary-asset-more-multilateral-system> (29.5.2024).

Deutsche Bundesbank (2021), Governing Council adapts forward guidance to new strategy, <https://www.bundesbank.de/de/aufgaben/themen/ezb-rat-passt-forward-guidance-an-neue-strategie-an-869858> (29.5.2024).

Eggertsson, G. B. and M. Woodford (2003), Zero bound on interest rates and optimal monetary policy, *Brookings Papers on Economic Activity*, 2003(1), 139-233.

Enders, Z. (2022), Der Staat freut sich als Schuldner, *econo*, 2022(3), 106-108.

English B., K. Forbes and A. Ubide (2024), Introduction, in English B., K. Forbes and A. Ubide (eds.), *Monetary Policy Responses to the Post-Pandemic Inflation*, Paris, CEPR, 1-30.

European Central Bank (2006), Monthly Bulletin, June, Frankfurt am Main.

European Central Bank (2016), A guide to the Eurosystem/ECB staff macroeconomic projection exercises, Frankfurt am Main.

European Central Bank (2021a), Account of the monetary policy meeting of the Governing Council of the European Central Bank held in Frankfurt am Main on Wednesday and Thursday, July 21-22, 2021, <https://www.ecb.europa.eu/press/accounts/2021/html/ecb.mg210826~16a0691c87.en.html> (29.5.2014).

European Central Bank (2021b), Review of macroeconomic modeling in the Eurosystem: current practices and scope for improvement, *ECB Occasional Paper Series*, No 267.

Holm-Hadulla, F., A. Musso, D. Rodriguez Palenzuela and T. Vlassopoulos (2021), Evolution of the ECB's analytical framework, *ECB Occasional Paper Series*, No 277.

Janssen, N., G. Potjagailo and M. H. Wolters (2019), Monetary policy during financial crises: Is the transmission mechanism impaired?, *International Journal of Central Banking*, 15(4), 81-136.

Kammer, A. (2023), Remarks at the ECB Forum on Central Banking: Lessons from recent experiences in macroeconomic forecasting, June 28.

Koch, C. and D. Noureldin (2024), How we missed the inflation surge: An anatomy of post-2020 inflation forecast errors, *Journal of Forecasting*, forthcoming.

Kontogeorgos, G. and K. Lambrias (2022). Evaluating the Eurosystem/ECB staff macroeconomic projections: The first 20 years. *Journal of Forecasting*, 41, 213-229.

Lagarde, C. (2021), Monetary Policy Statement, ECB Press Conference of December 1, [https://www.ecb.europa.eu/press/press\\_conference/monetary-policy-statement/2021/html/ecb.is211216~9abaace28e.en.html](https://www.ecb.europa.eu/press/press_conference/monetary-policy-statement/2021/html/ecb.is211216~9abaace28e.en.html) (29.5.2024).

Lagarde, C. (2022), Interview with Christine Lagarde, conducted by Morgane Miel, <https://www.ecb.europa.eu/press/inter/date/2022/html/ecb.in220825~7c5db6d1b3.en.html> (29.5.2022).

Lane, P. (2021), The new monetary policy strategy: implications for rate forward guidance, *The ECB Blog*, <https://www.ecb.europa.eu/press/blog/date/2021/html/ecb.blog210819~c99d1b768e.en.html> (29.5.2024).

Mandler, M., Scharnagl, M. and Volz, U. (2022), Heterogeneity in euro area monetary policy transmission: results from a large multi-country BVAR model, *Journal of Money, Credit and Banking*, 54(2-3), 627-649.

Stock J. H. and M. W. Watson (2007), Why Has U.S. Inflation Become Harder to Forecast?, *Journal of Money, Credit and Banking*, 39(s1), 3-33.