Heterogeneity in Household Inflation Expectations and New Keynesian Phillips Curve(s) in the Euro Area

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July 2025

"New identification approaches and new datasets are needed to reach an empirical consensus [about the New Keynesian Phillips Curve]."

— Mavroeidis et al. (2014)

The post-pandemic surge in inflation has reignited debates about the Phillips curve and the role of inflation expectations in monetary policy transmission. In modern macroeconomic frameworks, the New Keynesian Phillips Curve (NKPC) places inflation expectations at the heart of inflation dynamics, linking current inflation (π_t) to expected future inflation, economic slack (φ_t), and aggregate supply shocks (ε_t) (Woodford, 2003):

$$\pi_t = \alpha\varphi_t + \beta E_t(\pi_{t+1}) + \varepsilon_t. \tag{1}$$

This relationship underpins central banks' emphasis on well-anchored inflation expectations as critical for price stability (see, e.g., Schnabel, 2025).

After years of concern over a "flattening" of the Phillips curve, the recent inflation episode has prompted new work examining whether the Phillips Curve has steepened, has shifted, or is non-linear—that is, steeper when the labor market is tighter. Much of this work has focused on the United States (e.g., Benigno and Eggertsson (2023), Beaudry et al. (2025)). The Euro Area Phillips curve might differ notably from that of the United States, due to, for example, differences in labor market rigidities (Faber and Zullig (2025)), cross-country heterogeneity, or the extent to which inflation expectations are anchored. ECB policymakers are keenly interested in gaining a better understanding of the Euro Area Phillips curve (Schnabel, 2025).

This paper uses detailed household microdata at the country level from the European Commission's consumer survey to study the Euro Area Phillips curve. To the best of our knowledge, this rich, monthly, individual-level dataset has not previously been used to estimate the NKPC.

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This data facilitates our study of the slope and stability of the Euro Area Phillips curve with a particular focus on the role of expectations in determining inflation dynamics, and the drivers of pandemic-era inflation.

Most studies of the Euro Area Phillips curve that incorporate survey-based inflation expectations use the expectations of professional forecasters rather than consumers. This reflects the lack of availability, until recently, of quantitative inflation expectations data for the Euro Area. Although the European Commission has collected quantitative inflation expectations from consumers since 2004, these microdata are not publicly accessible.[1] They are, however, available upon request for research purposes (EC (2023)).[2] Coibion et al. (2018) recommend that the expectations of consumers, rather than those of professional forecasters, better proxy the beliefs that matter for firms' pricing decisions.

A key advantage of this dataset is its relatively large sample size. The survey covers all EU member states and five candidate countries.[3] Approximately 21,000 respondents are surveyed monthly in the Euro Area, with over 1,000 responses from each country. This sample size together with a detailed breakdown of individual characteristics such as age, education, income, and gender permits the construction of precise measures of inflation expectations for specific demographic groups, allowing us to extend the analysis of Binder (2015), who found that the expectations of higher-income, higher-educated, male, and working-age consumers played a more important role in the U.S. Phillips curve.

More importantly, the large sample size provides a close approximation to the complete cross-sectional distribution of expectations for each country. This allows us to apply the "heterogeneous beliefs Phillips curve" analysis of Meeks and Monti (2023) to the Euro Area. They show that accounting for heterogeneity in expectations by incorporating the full distribution of household expectations into the NKPC estimation significantly alters the estimated relationship for the US and UK. Their results lend support to a fully forward-looking NKPC once belief dispersion is properly modeled.

In addition to introducing a few methodological contributions to the approach of Meeks and Monti (2023), we also build on and extend another strand of the recent literature that uses regional variation to identify the slope of the microfounded NKPC (Hazell et al., 2022). This approach has gained prominence because it helps circumvent some of the serious identification challenges faced in traditional NKPC estimations—in particular, the endogenous monetary policy response to inflation or output shocks— as extensively discussed by Mavroeidis et al. (2014). The regional Phillips curve estimation approach has been applied to monetary unions including the United States and the Euro Area. Typically, an assumption is that longer-run inflation expectations are homogeneous across regions—which is essential when regional measures

[1] The survey question asks, "By how many per cent do you expect consumer prices to go up/down in the next 12 months? (Please provide a single figure estimate)."

[2] We have already obtained access to the microdata from the European Commission and have conducted some preliminary analyses.

[3] The survey is administered by national partner institutes using a harmonized questionnaire and common timetable, ensuring cross-country comparability (EC, 2023)

of inflation expectations are unavailable (see Binder et al. (2024))— but our data allows us to relax this assumption. Hindrayanto et al. (2019) and Schuffels et al. (2024) also caution against the assumption of a homogeneous slope of the Phillips curve across regions since this can bias union-wide estimates, an issue that we explore.

Empirical Approach

Traditional approaches imposing full-information rational expectations (FIRE), such as Gali and Gertler (1999), typically use GMM to estimate equation (1). When studies directly incorporate survey measures of expected inflation, as first proposed by Roberts (1995), they generally rely on the cross-sectional average of expectations (Mavroeidis et al., 2014). However, Adam and Padula (2011) show that this practice risks misspecifying the microfounded NKPC, as it implicitly assumes the law of iterated expectations holds for survey data. They demonstrate that, for survey-based expectations to be consistent with the underlying NKPC structure, this law must be satisfied. Coibion et al. (2018) further note that there are no established tests to verify this condition using survey data. They propose augmenting equation (1) with longer-term expectations (e.g., three- or five-year ahead) to test over-identifying restrictions implied by the law of iterated expectations. However, the European Commission survey only collects 12-month ahead expectations, precluding such direct tests.

In light of this limitation, Meeks and Monti (2023) derive a microfounded "heterogeneous beliefs Phillips Curve," which incorporates an additional term explicitly capturing the dispersion of expectations present in survey data:

$$\pi_t = \alpha\varphi_t + \beta E_t(\pi_{t+1}) + \sum_{k=1}^{K} \gamma_k s_{k,t} + \varepsilon_t, \tag{2}$$

where $s_{k,t}$ are functional principal component scores summarizing the cross-sectional distribution of inflation expectations, and γ_k are their associated coefficients. Meeks and Monti (2023) show that using up to $K = 3$ component scores is sufficient to capture most of the variation in expectations distributions for the US and UK. They find notable cross-country differences: While disagreement is the primary driver in the US, skew plays a larger role in the UK.

Our first step will be to estimate this heterogeneous beliefs Phillips Curve for the Euro Area as a whole. This will allow us to assess how the full distribution of household inflation expectations — beyond just the average — contributes to explaining inflation dynamics in the Euro Area. It also enables a direct comparison to the findings of Meeks and Monti (2023) for the US and UK. As in their study, we will investigate how changes in the distribution of expectations during the COVID-19 pandemic contributed to inflation dynamics.

In addition, we will estimate a "Hazell et al. (2022)-style" regional Phillips Curve, but relaxing the usual assumption that long-run inflation expectations are homogeneous across regions in a monetary union. Specifically, we can leverage cross-country variation to identify the slope of the Phillips Curve, using each member state's inflation expectations and slack. This serves as

a complement to our aggregate Euro Area analysis and helps mitigate potential endogeneity concerns inherent in time-series estimation by exploiting cross-sectional information.

In a second step, we plan to extend the framework of Meeks and Monti (2023) to a structural estimation approach. Because the underlying microfoundations remain valid, it is feasible to map the reduced-form parameters to structural parameters of the NKPC. We will pursue this via a GMM estimation strategy, which traditionally relies on instrumental variables to address endogeneity. As potential instruments, we consider high-frequency monetary policy surprises (Altavilla et al., 2019), as suggested by Eser et al. (2020), as well as DSGE-based monetary policy shocks (Christoffel et al., 2008; Darracq Pariès et al., 2018; Coenen et al., 2018), since they represent plausibly exogenous demand shocks that move the economy along the Phillips Curve, which in turn allows to identify the slope. Alternatively, we also consider the identified global demand shock from Baumeister and Hamilton (2019) as instrument.

Finally, following Inoue and Shintani (2018), we will apply a model selection procedure based on the quasi-marginal likelihood to formally compare different specifications, including models with and without heterogeneous beliefs terms. This approach constructs quasi-marginal likelihoods from our estimation criterion (such as GMM or minimum distance), effectively enabling Bayesian-style model comparison without requiring a fully specified likelihood function. It is particularly well suited to our setting, as it accommodates potential misspecification, the presence of endogeneity addressed via instruments, and even cases of weak or partial identification — all common challenges in estimating the NKPC. Thus, this allows us to rigorously assess whether incorporating the full distribution of household expectations substantively improves the model's explanatory power and whether specific demographic groups are more relevant than others in accounting for inflation dynamics.

Specifically, we plan to conduct the following model comparison exercises:

- A comparison between the Euro Area heterogeneous beliefs Phillips Curve and the more traditional NKPC specification of Gali and Gertler (1999), which does not incorporate survey-based heterogeneity;
- and comparisons within the heterogeneous beliefs framework itself by estimating separate models using only subsets of the expectations distribution, such as comparing high-income versus low-income households, motivated by the findings in Binder (2015).

Expected Takeaways

- We will be the first to analyze the role of the full heterogeneity of beliefs for the NKPC in the Euro Area, building on the heterogeneous beliefs framework of Meeks and Monti (2023).
- By combining their semi-parametric approach with a structural estimation strategy, we aim to provide novel insights into how heterogeneous expectations shape inflation dynamics.

This will allow us to quantify how the dispersion and higher-order moments of household inflation expectations affect the slope of the Phillips Curve, offering new evidence on expectation-driven inflation dynamics.

- Our analysis will also contribute to the ongoing debate about non-linearities in the Phillips Curve. Unlike existing studies that typically test for non-linearities using only average expectations or slack, we will examine whether non-linearities emerge when explicitly accounting for the full distribution of beliefs.

- By explicitly studying the COVID-19 period, we expect to shed light on the extent to which changes in the shape and dispersion of inflation expectations during this episode can help explain the unexpected inflation surge in the Euro Area. This will contribute to broader discussions on why standard Phillips Curve relationships appeared to break down during the pandemic and whether heterogeneous expectations provide a missing explanatory channel.

- Using the quasi-Bayesian model selection framework of Inoue and Shintani (2018), we will rigorously compare different NKPC specifications. This includes benchmarking our heterogeneous beliefs NKPC against the traditional Gali and Gertler (1999) model without survey expectations, as well as exploring which parts of the distribution — for example, expectations of high-income versus low-income households — drive inflation dynamics.

- Finally, we will provide new evidence on how the NKPC relationship varies across Euro Area member countries. This will shed light on how household inflation expectations influence inflation dynamics both at the union-wide and national levels, offering valuable guidance for the ECB's monetary policy communication and design.

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