Heterogeneity in inflation expectations: evidence from the Eurozone

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Spanish households consistently demonstrate a significantly higher tendency to overestimate inflation compared to other major Eurozone countries, despite similar levels of realized inflation. Using data from the Joint Harmonised EU Programme of Business and Consumer Surveys, we delve into the factors underlying this phenomenon. The influence of compositional effects or of specific subgroups of individuals is marginal in explaining this difference. The findings reveal that Spanish households exhibit a notable overreaction in their expected inflation responses to contractionary monetary policy measures, even when there are no substantial disparities in realized inflation rates among countries. This overreaction is accompanied by a more pessimistic economic outlook, indicative of a stagflationary perspective of the Spanish households. We determine that around 60% of the observed difference in inflation expectation errors can be attributed to the different response of Spanish households to such contractionary monetary policy shocks.

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I. Introduction

Accurately gauging and comprehending inflation expectations holds paramount significance for central banks and policymakers, as it is integral to the effective execution of monetary policies and the preservation of economic stability (Armantier et al. [2013]). Household inflation expectations play a significant role in shaping economic decisions such as consumption, saving, and investment, and have a substantial impact on inflation dynamics within the economy (Vellekoop and Wiederholt [2019]; Andrade et al. [2023]). Given its importance, the literature has dedicated extensive attention to the investigation of inflation expectations' formation. This inquiry is particularly pertinent in the current juncture, as both Europe and the USA grapple with some of the highest inflation rates experienced in recent decades. This study endeavors to scrutinize the development of inflation expectations among households across multiple nations within the Eurozone, in fact the Eurozone presents an intriguing subject of examination owing to the coexistence of a uniform monetary policy for all member states, notwithstanding disparities in both inflation levels and expectations. Our investigation seeks to ascertain whether variations in inflation expectations can be attributed to the centralized monetary policy administered by the European Central Bank. We center on five major Eurozone countries: Spain, Italy, Germany, France, and the Benelux region. We aim to scrutinize variations in both realized inflation rates and households' inflation expectations within this set of Countries.

We utilize data about households' expected inflation from the Joint Harmonised EU Programme of Business and Consumer Surveys conducted by the European Commission. It is worth noting that surveys have emerged as a pivotal instrument in the academic literature for comprehending inflation expectations. Coibion and Gorodnichenko [2015], for instance, make use of US surveys that encompass forecasts from a spectrum of sources, including professional forecasters, consumers, firms, and central bankers. Their research investigates the adjustment of mean forecasts in response to external shocks, revealing evidence of incomplete adjustment on impact, indicative of information rigidities. Bordalo et al. [2020] have observed that individual forecasters tend to exhibit an inclination to overreact to news. Mankiw et al. [2003] has highlighted notable disparities between households' and professional surveys, aligning with the concept of a model where information updating for households is characterized by stickiness.

A notable finding from our analysis is that households in every country, on average, overestimate inflation. The most significant evidence, however, pertains to the tendency of Spanish households to overestimate inflation to a much greater extent compared to households in other European Union countries, even when the realized inflation rates are similar across countries. This result holds robustly across different measures of inflation and time periods. Drakos et al. [2020]) documents heterogeneity in expectation formation related to demographic characteristics of respondents such as age, gender or education using Eurobarometer survey data. Hence, our initial investigation focuses on determining whether variations in household characteristics (compositional effects)

might account for the disparities between Spain and the other countries. To do so, we employ an Oaxaca-Blinder decomposition approach, which enables us to discern whether specific subgroups within the overall population formulate their inflation expectations differently compared to analogous subgroups in other countries. The outcomes of our analysis indicate that the propensity of Spanish households to consistently overestimate inflation cannot be attributed to variations in household characteristics or different perceptions of inflation measures. Furthermore, it does not appear to be driven by specific demographic or socioeconomic groups within the countries, as the observed difference in inflation expectations persists across various categories. Instead, we posit that this enduring dissimilarity in inflation expectations across all groups can be attributed to the impact of monetary policy shocks of the European Central Bank (ECB). These shocks seem to be integrated into the expectations of Spanish households in a distinct manner compared to those in other Countries, leading to the observed discrepancy.

Our objective is to uncover potential disparities in the impact of a centralized monetary policy on inflation and the inflation expectations held by households. This inquiry is prompted by the recognition of a noteworthy gap in the existing literature, which has yet to furnish adequate empirical evidence on this pressing issue, despite its profound implications for policymaking. Forsells and Kenny [2002] use European Commission's Consumer Survey to quantitatively estimate inflation expectations in the Eurozone. They find that the surveyed expectations are an unbiased predictor of future price developments. Arnold and Lemmen [2008] focuses on Countries within the Eurozone and finds that consumers' responses to the surveys suggest that inflation expectations depend more on past national inflation rates than on the ECB's anchor for price stability. They also find that inflation uncertainty increases in countries that have a smaller influence on ECB policy. While some studies have explored the effects of specific monetary policies implemented by the European Central Bank across different Eurozone countries (Burriel and Galesi [2018]; Ciccarelli et al. [2013]), there is no systematic evidence on the effects of monetary policy shocks on the varying ability to control inflation expectations among different countries. The extent of monetary policy non-neutrality is a classic question in macroeconomics, but it is challenging to measure the causal effect of policy (Christiano et al. [2005]). To explore this possibility, we utilize a dataset of high-frequency financial-market identification (as in Nakamura and Steinsson [2018]; Gertler and Karadi [2015]), constructing monetary policy shocks based on ECB policy announcements and their co-movement with stock prices (as Jarociński and Karadi [2020] for the Eurozone and Gürkaynak et al. [2005] for the United States). We identify two distinct types of structural shocks transmitted through central bank announcements. The first type is a conventional tightening monetary policy shock, leading to a contractionary effect and reducing the expected value of future dividends, consequently decreasing stock prices. The second type is a negative information monetary policy shock, whereby the central bank cuts interest rates based on private information about the general economic situation that is not publicly available. With

this policy the central bank aims to mitigate the potential negative effects of an impending economic downturn, and it discloses its private information to the market.

By employing a projection method, we identify that the divergence in expectation errors can be traced back to the heightened responsiveness of Spanish households' expected inflation to monetary policy contractions, as compared to households in other countries. This behavior holds true even when there is no substantial difference in the future realized inflation rates among these nations. It's noteworthy that this pattern persists regardless of whether the monetary policy contractions take on a traditional or information-based form. In response to information monetary policy tightening Spanish households immediately increase their expected inflation to a greater extent than households in any other country. This overreaction is consistently accompanied by a downturn in Spanish industrial production and a notably pessimistic outlook regarding the future state of the economy. Nevertheless, these effects tend to subside over the long term. Similar patterns emerge when we examine the response to traditional monetary policy tightening, although the overreaction occurs at a later stage. Initially, Spanish households react similarly to their European counterparts, but as time progresses, they display a propensity to overreact with regard to their inflation expectations, thereby accentuating their overestimation error. Intriguingly, these overestimated inflation expectations align with a decline in industrial production and a more negative economic outlook.

In conclusion, our research suggests that Spanish households tend to incorporate a stagflationary perspective of the economy when formulating their expectations. This tendency is particularly evident when the effects on industrial production and economic optimism in response to tightening monetary policy are more pronounced in Spain compared to other European countries. However, the opposite is not observed; when European households have more pessimistic economic outlooks and experience greater impacts on industrial production, they do not overreact to the same extent as Spanish households in terms of inflation expectations. This implies that the inclination to overestimate inflation, coupled with a pessimistic economic outlook, is a unique characteristic of Spanish households. Moreover, the cumulative effect of the identified shocks is particularly significant in explaining the difference in expectation errors between Spain and other countries, accounting for approximately 60% of these differences, with a more pronounced impact of traditional monetary policy shocks than information shocks.

This distinctive characteristic of Spanish households may be linked to the fact that, on average, they have shouldered a considerably higher level of personal debt over the past 25 years in comparison to other European Union countries (Medialdea García and Sanabria Martín [2022]). Consequently, when they become more apprehensive about the state of the economy, they may be more inclined to incorporate this debt burden into their inflation expectations. However, there is a need for further research on this

topic. Expanding the scope of this research to include other countries within the Eurozone would be highly valuable in order to uncover common patterns and behaviors. By examining and comparing inflation expectation dynamics across a wider range of countries, we can gain insights into whether the trends observed in Spain are unique to that specific country or part of a more widespread phenomenon.

The remainder of this paper is structured as follows. Section II describes the data used in our analysis. Section III presents our empirical methodology for analyzing the reasons behind Spanish households' consistent overestimation of inflation. In Section IV, we present the main empirical results of our study. Section V concludes and outlines potential avenues for further research.

II. Data

This section presents a comprehensive description of the data employed in this study. The data encompasses three main components: inflation and industrial production data, the Joint Harmonised EU Programme of Business and Consumer Surveys, and the dataset containing ECB policy announcements for deriving monetary policy shocks. The dataset spans from the beginning of 2004 to the end of 2022.

A. Data for inflation and industrial production

As main measure of inflation we use the Harmonized index of consumer prices (HICPs) inflation, with monthly frequency data of percentage annual inflation. The HICPs are calculated according to harmonised definitions and therefore provide the best statistical basis for comparisons of consumer price inflation across different countries. Regarding industrial production data, we use it as a proxy of the gross domestic product of a country, we don't use GDP since there are only quarterly data available. Industrial production data are derived from OECD and they refer to the output of industrial establishments and covers sectors such as mining, manufacturing, electricity, gas and steam and air-conditioning.

B. Data for inflation expectations: The Joint Harmonised EU Programme of Business and Consumer Surveys

This section provides an overview on the Joint Harmonised EU Programme of Business and Consumer Surveys. In this study, our focus is on a dataset from five countries: Spain, Italy, Germany, France, and Benelux. The dataset captures various attributes of respondents, such as their wealth quartile, education level, occupation, age, and gender.

We focus on the following two questions from the survey:

- By how many per cent do you expect consumer prices to go up/down in the next 12 months? This question aims to assess respondents' quantitative expectations regarding price trends over the upcoming year for their own country
- How do you expect the general economic situation in your country to develop over the next 12 months? This question seeks to gauge respondents' qualitative perceptions of the national economic situation for the following year. It is categorized into five options (++: a lot better, +: a little better, =: the same, -: a little worse, - -: a lot worse).

To analyze the second question, we create a dummy variable that captures households' optimism about the future state of the economy. This dummy takes a value of -1 if the response to the previous question was "-" or "- -", and zero otherwise. We will denote this variable as $optimism$[1].

[1]It is important to elucidate our rationale for this specific choice, wherein we employ negative responses for

The Joint Harmonised EU Programme of Business and Consumer Surveys involves approximately 40,000 consumer interviews per month within the Euro area. The dataset is a repeated cross-section.

C. *Evidence of heterogenity of Spanish households' expectations*

Figure 1 displays the histogram of the mean values over the entire time sample considered for HICP inflation, inflation expectations, and the mean error on inflation expectations. The error is defined as the realized inflation in the following year minus the expected inflation:

$$\text{exp\_err}_{ij,t} = \pi_{j,t+12} - E_{i,t}(\pi_{j,t+12}) \tag{1}$$

where i denotes the individual, j the country and t the time.

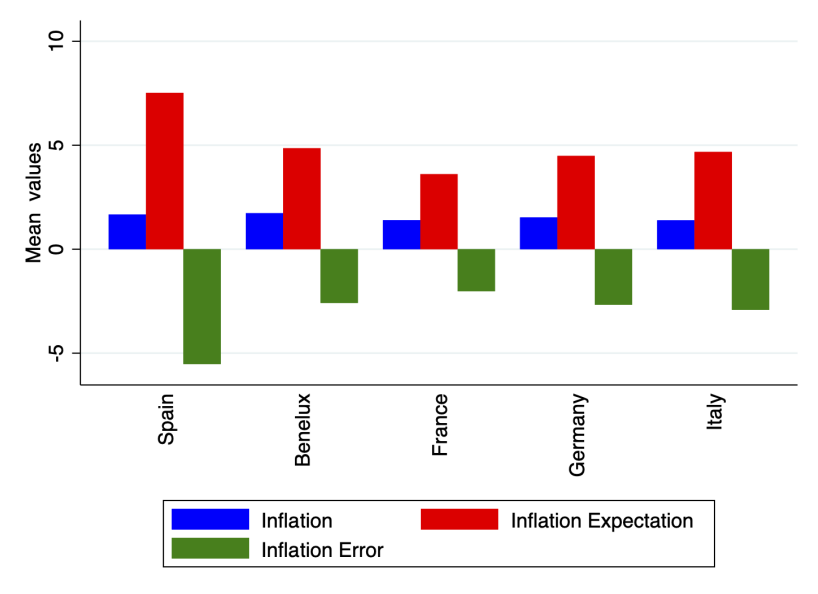

Figure 1. : HICP realized inflation, expected inflation and error on expectations, average across all the sample

From figure 1, it is evident that households across Eurozone countries, on average, overestimate inflation, leading to a negative estimation error. Notably, Spanish house-

expectations and then invert their sign. We have made this selection based on our belief that it is more informative to examine the reactions of households with a pessimistic viewpoint rather than an optimistic one. It is noteworthy that we have also conducted the same methodology using positive responses regarding the future economic outlook, and the results exhibit no qualitative disparity

holds stand out with an estimation error that is nearly twice as large as that of households in other countries. Despite experiencing similar realized inflation rates, Spanish households consistently expect significantly higher inflation. This stark difference in inflation expectations motivates our research to investigate the underlying reasons behind this phenomenon. This result is robust to different measures of inflation and time periods, as it is shown in appendix A.A2

D. Data for monetary policy shocks

The dataset utilized in this thesis comprises high-frequency financial-market surprises in the euro area, constructed by Jarociński and Karadi [2020]. The dataset covers 196 policy announcements made by the European Central Bank from January 2004 to October 2022. These announcements typically occur after the ECB Governing Council's monetary policy meeting and consist of a press statement at 13:45, followed by a press conference at 14:30 that lasts approximately one hour. To capture the market's reaction to these announcements, we employ 30-minute windows around press statements and 90-minute windows around press conferences, starting 10 minutes before and ending 20 minutes after the event. [2] When a press conference follows a press statement, we sum the responses in the two windows to calculate our surprise measure. The use of narrow windows minimizes the influence of unrelated regular news announcements, which can bias our measure, particularly in Europe. The dataset records surprises in the Eonia interest rate swaps with maturities ranging from 1 month to 2 years and the Euro Stoxx 50, a market capitalization-weighted stock-market index comprising 50 blue-chip companies from 11 Eurozone countries. In our analysis, we identify two structural shocks transmitted through central bank announcements using a high-frequency identification approach and sign restrictions classification:

- High-frequency identification: we examine the co-movement between the stock price index and the change in the interest rate during the policy announcement window. This approach allows us to determine whether the decision to change the interest rate was unexpected by the market. If the change was not anticipated, stock prices would react immediately after the announcement. The immediate stock market response is informative about the announcement's long-run economic consequences.
- Sign restriction: to classify the two structural shocks, we apply sign restrictions, focusing on the sign of the co-movement between the stock index and the unexpected change in the interest rate.

A negative co-movement shock corresponds to an increased interest rate accompanied by a drop in stock prices. Conversely, a positive co-movement shock represents the orthogonal shock associated with an increase in both interest rates and stock prices.

[2] We approximate the duration of the press conference as one hour, acknowledging that some conferences may be shorter or longer, which introduces some noise in this measure.

Under this framework, the interest rate surprises ϵ_t are linear combinations of the two orthogonal structural shocks:

$$\epsilon_t = \alpha \cdot \epsilon_t^{info} + \beta \cdot \epsilon_t^{conv}$$

The restrictions enable the decomposition of each month's announcement surprise into a traditional monetary policy shock component and a central bank information shock component. Following the methodology of Jarociński and Karadi [2020], we calculate posterior draws of the shocks by assuming a uniform prior on the space of rotations, conditional on satisfying the sign restrictions in a VAR model (Rubio-Ramirez et al. [2010]).[3] This approach allows us to identify two different types of contractionary monetary policy shocks:

1) Conventional tightening monetary policy shock: firstly, monetary tightening leads to a contraction that reduces the expected value of future dividends. Secondly, the higher interest rates increase the discount rate at which these dividends are discounted. As a result, according to the classical asset pricing theory, the stock prices declines.

2) Negative information monetary policy shock: in contrast, the central bank may lower interest rates based on private information about the general economic situation that is unknown to the market. For example, the central bank may possess private data on firms or public finances of governments that are not publicly available. In this case, the central bank cuts interest rates anticipating an upcoming recession and aiming to mitigate the negative effects of a potential crisis. By announcing the decision to lower interest rates, the central bank discloses its private information about the weakened state of the economy, making stock prices fall.

Figure 2 depicts a scatter plot of the shocks, illustrating the surprises. More than 40% of the data points lie in quadrants I and III, where there is a positive co-movement between prices and interest rates. Table 1 presents the mean, variance, and correlation of the two identified shocks using the described methodology.

[3]To compute the posterior draws of the shocks and the associated impulse responses we proceed as follows. We use a block-Choleski structure on the shocks, with the first two shocks forming the first block. Next, we impose the sign restrictions on the contemporaneous responses to the first two shocks following Rubio-Ramirez et al. [2010]. For each draw of model parameters from the posterior we find a rotation of the first two Choleski shocks that satisfies the sign restrictions. The prior on the rotations is uniform in the subspace where the sign restrictions are satisfied. More in detail, for each draw of from the posterior we compute its lower-triangular Choleski decomposition, C. Then we postmultiply C by a matrix $Q = \begin{bmatrix} Q^* & 0 \\ 0 & I \end{bmatrix}$, where Q^* is a 2 × 2 orthogonal matrix obtained from the QR decomposition of a 2 × 2 matrix with elements drawn from the standard normal distribution. We repeat this until finding a Q such that CQ satisfies the sign restrictions. Then CQ is a draw of the contemporaneous impulse responses from the posterior, and the other quantities of interest can be computed in the standard way. The above procedure, with the QR decomposition of a randomly drawn matrix, implies a uniform prior on the space of rotations Q^*. Look at Jarociński and Karadi [2020] for further details of the model.

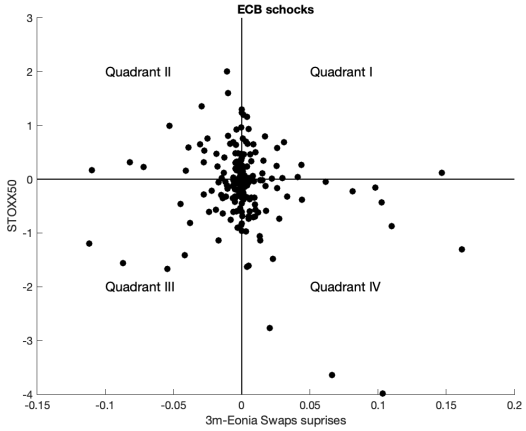

Figure 2. : Scatter shocks

Table 1—: Comparison of Conventional MP and Info Shock

	Conventional MP	Info Shock
Mean	0.0046	-0.0018
Variance	0.0011	0.0008
Correlation	0.00885	

We observe that the shocks are orthogonal and have, on average, opposite signs, indicating that contractionary monetary policy shocks predominate in both types of shocks. Furthermore, the traditional monetary shocks are, on average, larger than the information shocks.

In the appendix A.A3, we provide a histogram illustrating the temporal evolution of the contributions of each shock to the Eonia interest rate swaps with maturities ranging from 1 month to 2 years, specifically for both the traditional monetary policy shock and the information monetary policy shock.

III. Methodology

In this section, we endeavor to elucidate the difference in expected inflation rates among Spanish households in comparison to those of other nations, notwithstanding similar levels of realized inflation.

Initially, we investigate whether this variation can be ascribed to distinctions in observable household characteristics across different countries or if it is explicable by specific subpopulations.

Subsequently, we put forth aprojection method to explore the possibility that this incongruity may be attributed to dissimilar sensitivities of inflation expectations of Spanish households in response to announcements from the European Central Bank, relative to other countries.

A. Controlling for Household Characteristics

To account for household characteristics and determine if the difference in expectation errors persists after controlling for observable factors, we employ a regression analysis. The regression model is specified as follows:

$$\text{exp\_err}_{ij} = \alpha + \delta_j D_j + \gamma_j X_i + \eta_{ij} \tag{2}$$

We regress the expectation error for individual i in country j on D_j, which represents a country dummy variable, and X_i, representing observable characteristics of respondent i. It is important to notice that we can have different coefficients γ_j for each country j. In this manner, we can assess whether disparities in expectations may be attributed to specific subpopulations formulating their expectations differently across various countries. The country dummy for Spain is omitted, and thus, all the coefficients are relative to Spain. It is of particular interest to reconfigure the prior regression 2 with respect to mean values, utilizing Spain as the reference, by employing the Oaxaca-Blinder decomposition. The decomposition equation can be expressed as:

$$\begin{aligned}\Delta\overline{Y} &= \overline{Y}^{SP} - \overline{Y}^{C} \\ &= \underbrace{\sum_{i=1}^{K} \gamma_i^C(\overline{x}_i^{SP} - \overline{x}_i^C)}_{\text{E}} + \underbrace{\sum_{i=0}^{K} \overline{x}_i^C(\gamma_i^{SP} - \gamma_i^C)}_{\text{C}} + \underbrace{\sum_{i=1}^{K} (\overline{x}_i^{SP} - \overline{x}_i^C)(\gamma_i^{SP} - \gamma_i^C)}_{\text{I}}\end{aligned}$$

The "endowment (E)" component quantifies the contribution of differences in observed characteristics, such as education levels or household wealth, to the divergence in expected inflation error. The "coefficients (C)" component captures the influence of differences in coefficients, indicating how the impact of these observed characteristics on expected inflation may vary between Spain and other Eurozone countries. Lastly, the

"interaction (I)" component accounts for the combined effect of differences in observed characteristics and coefficients, representing the interaction between the two groups.

B. *Reaction to ECB monetary policy shocks*

We shall now elucidate our intended approach for examining whether the distinct response of Spanish households to central bank policy shocks, in contrast to other countries, could potentially account for the persistent inflation overestimation observed among Spanish households. To undertake this investigation, we shall make use of the monetary policy shocks detailed in section II.D, encompassing both a conventional monetary policy tightening and an adverse information monetary policy tightening. We will assess the reactions of five key variables to these shocks, namely, the forecasting error, expected inflation, realized inflation, industrial production and optimism. Our methodology involves the application of a projection technique for estimating the ensuing effects:

$$
\begin{aligned}
y_{ij,t+n+12} = \alpha_t + \beta_{j,n}^{\text{conv,y}} D_j \cdot \text{mp\_tight}_t + \beta_{j,n}^{\text{info,y}} D_j \cdot \text{bad\_info}_t + \zeta_j \text{infl}_{j,t-1} + \\
\lambda_j \text{ind\_prod}_{j,t-1} + \delta_j D_j + \gamma X_i + \eta_{ijt}
\end{aligned} \tag{3}
$$

Here, i denotes the individual household, j represents the country of the household, and n indicates the number of months ahead. D_j is the country dummy, and X_i denotes the observable characteristics of respondent i. We also control for inflation and industrial production in the period preceding the shock.

$y_{ij,t+n+12}$ represents the following variables:

1) $\pi_{j,t+n+12}$: realized inflation in country j at time $t+n+12$
2) $\text{E}_{i,t+n}(\pi_{j,t+n+12})$: expected inflation formulated at time $t+n$ by individual i for inflation in country j at time $t+n+12$
3) $\text{exp\_err}_{ij,t+n} = \pi_{j,t+n+12} - E_{i,t+n}(\pi_{j,t+n+12})$: error on expectations, representing the difference between realized inflation and expected inflation
4) $\text{ind\_prod}_{j,t+n+12}$: realized industrial production in country j at time $t+n+12$
5) $\text{optimism}_{ij,t+n}$: expectation formulated at time $t+n$ by individual i for the economic outlook at time $t+n+12$ of country j.

mp_tight_t and bad_info_t represent conventional and information tightening monetary policy shocks, respectively. The omitted variable, D_{Spain}, allows us to interpret all coefficients as differences relative to Spain. Additionally, we include inflation at time $t-1$ in the left-hand side of the equation, ensuring that it is not affected by the shocks at time t.

By employing this approach, we can discern how our variables of interest respond to shocks that transpired n months earlier. Analyzing the reactions of the forecasting error, expected inflation, and realized inflation allows us to carry out a beta-decomposition

of the error response. This framework empowers us to ascertain whether the difference in the forecasting error among Spanish households can be attributed to the response of expected inflation or realized inflation. To conduct a thorough analysis and facilitate cross-comparisons, we also investigate the responses of realized industrial production and expected economic outlook. These variables offer insights into households' perceptions of the broader economic landscape. Respondents' sentiments regarding the general economic situation are captured by question 6 of the questionnaire, as detailed in section II.

C. *Historical contribution to the error term*

Utilizing the coefficients $\beta_{j,n}^{\text{conv,y}}$ and $\beta_{j,n}^{\text{info,y}}$ obtained from regression 3, we can perform a historical decomposition to evaluate the impact of the shocks on the observed differences in the inflation error. To be more precise, we calculate the cumulative effect of contractionary shocks over the 36 months leading up to time t by taking into account both the adverse information and conventional contractionary monetary policy shocks:

$$\text{exp\_err\_info}_{tj} = \sum_{n} \beta_{j,n}^{\text{info,exp\_err}} \cdot \text{bad\_info}_{t-n}, \tag{4}$$

$$\text{exp\_err\_mon\_pol}_{tj} = \sum_{n} \beta_{j,n}^{\text{conv,exp\_err}} \cdot \text{mp\_tight}_{t-n}. \tag{5}$$

IV. Results

In this section, we present the outcomes of both the Oaxaca-Blinder decomposition and the assessment of responses to monetary policy shocks. Our results suggest that neither compositional effects nor variations in expectations formation among specific demographic groups across different countries can adequately explain the marked divergence between Spain and other nations. Nevertheless, when we consider dissimilar responses to monetary policy shocks, we observe that this factor plays a pivotal role in elucidating a substantial portion of the disparity between Spain and other countries. Specifically, the primary driver of this variation is disparities in the expected inflation responses to both traditional and information monetary policy shocks. The cumulative influence of monetary policy shocks accounts for approximately 50% to 60% of the error term across different countries.

A. Controlling for Household Characteristics

In the outset, it is crucial to highlight, as depicted in figure 1, that households, on average, exhibit a tendency to overestimate inflation, leading to negative forecasting errors. Consequently, a positive coefficient associated with the country dummies or observables imply a lesser degree of overestimation in future inflation. Table 2 provides the regression coefficients pertaining to regression 2, encompassing two distinct time periods[4]. In this initial table, we maintain fixed across Countries the γ_j coefficients to discern, on average, the impact of the controls incorporated in our model. These controls encompass individual characteristics such as income, age, gender, and education. We observe that the difference with respect to Spain is positive and statistically significant for each country, in both time periods, even after accounting for observable characteristics. Furthermore, we find that households with higher levels of education, older age, greater wealth, and male gender tend to exhibit smaller errors in their inflation expectations.

We present then a summary of the Oaxaca-Blinder decomposition outcomes in Table 3, where γ_j may vary across different Countries. In this analysis, we employ Spain as the reference country, where the first row quantifies the difference between the errors in estimating inflation among Spanish households and those in various other countries. Subsequent rows within the table delineate the contributions of diverse components in the Oaxaca-Blinder decomposition. The influences of endowments and the interaction component appear relatively modest, indicating that differences in household characteristics across countries do not significantly account for the observed variation. Notably, the primary contributor to the observed disparity is the coefficient term, whose seize is primarly driven by a constant term, displayed in the last row of the table.

To gain a more in-depth understanding, we offer an extensive Oaxaca-Blinder decomposition comparing Spain and France. It is worth emphasizing that the distinction

[4]We opt to disaggregate the analysis for these two distinct time periods, as it is noteworthy to observe that this discrepancy persists even amid the COVID-19 period and amidst the conflict in Ukraine.

	(2004-2020)		(2020-2022)	
VARIABLES	exp_error	exp_error	exp_error	exp_error
benelux	3.316***	2.593***	3.634***	2.982***
	(0.0238)	(0.0271)	(0.0858)	(0.0929)
france	4.336***	3.388***	2.205***	1.266***
	(0.0286)	(0.0307)	(0.109)	(0.116)
germany	3.420***	3.199***	2.394***	2.324***
	(0.0252)	(0.0281)	(0.0983)	(0.106)
italy	3.004***	2.347***	3.884***	3.582***
	(0.0260)	(0.0295)	(0.0955)	(0.108)
income_q2		0.440***		0.632***
		(0.0265)		(0.103)
income_q3		1.232***		1.496***
		(0.0270)		(0.103)
income_q4		1.847***		2.586***
		(0.0272)		(0.103)
edu_q2		0.219***		0.353***
		(0.0219)		(0.0869)
edu_q3		0.956***		1.728***
		(0.0253)		(0.0926)
age_q2		0.388***		0.533***
		(0.0312)		(0.127)
age_q3		0.896***		1.278***
		(0.0321)		(0.127)
age_q4		2.121***		2.827***
		(0.0332)		(0.132)
male		0.735***		1.147***
		(0.0173)		(0.0630)
Constant	-6.526***	-8.688***	-2.832***	-6.770***
	(0.0184)	(0.0389)	(0.0688)	(0.154)
Observations	1,544,808	1,274,394	167,475	146,834
R-squared	0.019	0.029	0.013	0.031

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 2—: Regression of error on expectations on country dummies and observables. Two time periods considered: 2004-2020 and after Covid crisis.

between France and the other countries is minimal when Spain serves as the reference point. For a full set of Oaxaca-Blinder decompositions for all countries, please consult the appendix in section A.A4.

Table 4 reveals that coefficient terms for households with higher education levels, greater wealth, older age, and male gender tend to be positive. This suggests that among these groups, not only are expectations more precise (as demonstrated in table 2), but there is also less divergence observed within these more precise categories of individuals across countries. In contrast, greater heterogeneity is observed across countries among individuals with lower levels of education, lower income, younger age, and females. Nevertheless, it is crucial to observe that there exists a consistent difference in inflation expectations error, which remains constant across all individual characteristics.

Country	France	Benelux	Germany	Italy
Difference with Spain	-3.648***	-2.960***	-2.895***	-2.395***
	(0.0323)	(0.0315)	(0.0324)	(0.0358)
Endowments	-0.350***	-0.162***	0.0467***	-0.375***
	(0.0187)	(0.0136)	(0.0120)	(0.0168)
Coefficients	-2.271***	-1.875***	-3.161***	-2.103***
	(0.0425)	(0.0411)	(0.0366)	(0.0394)
Interaction	-1.026***	-0.923***	0.219***	0.0833***
	(0.0337)	(0.0298)	(0.0213)	(0.0239)
Constant	-7.272***	-5.140***	-5.750***	-4.703***
	(0.135)	(0.128)	(0.116)	(0.152)

Table 3—: Main results of Oaxaca-Blinder decompositions

	(1)	(2)	(3)	(4)
VARIABLES	overall	endowments	coefficients	interaction
income_q2		-0.00690***	0.237***	-0.0177***
		(0.000969)	(0.0240)	(0.00221)
income_q3		0.0305***	0.385***	0.0579***
		(0.00219)	(0.0267)	(0.00448)
income_q4		0.0210***	0.308***	0.0145***
		(0.00222)	(0.0307)	(0.00206)
edu_q2		-0.0516***	0.351***	0.125***
		(0.00563)	(0.0263)	(0.00954)
edu_q3		-0.0442***	1.335***	-0.677***
		(0.0148)	(0.0543)	(0.0277)
age_q2		-0.0102**	0.389***	0.0677***
		(0.00452)	(0.0378)	(0.00677)
age_q3		-0.0275***	0.652***	-0.162***
		(0.00578)	(0.0358)	(0.00931)
age_q4		-0.225***	0.622***	-0.249***
		(0.00927)	(0.0364)	(0.0148)
male		-0.0367***	0.721***	-0.186***
		(0.00627)	(0.0460)	(0.0119)
Spain	-5.756***			
	(0.0282)			
France	-2.109***			
	(0.0157)			
difference	-3.648***			
	(0.0323)			
endowments	-0.350***			
	(0.0187)			
coefficients	-2.271***			
	(0.0425)			
interaction	-1.026***			
	(0.0337)			
Constant			-7.272***	
			(0.135)	
Observations	433,982	433,982	433,982	433,982

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 4—: Oaxaca-Blinder decomposition Spain-France

B. Results: reaction to ECB tightening monetary policy shocks

In line with equation 3, we analyze the coefficients of responses to monetary policy tightening shocks, denoted as $\beta_{j,n}^{\text{conv,y}}$ and $\beta_{j,n}^{\text{info,y}}$. Our interest lies in investigating whether Spain exhibits differential effects in comparison to other countries. Additionally, we aim to identify the primary driver behind the reaction of expectation errors, specifically whether it is influenced by variations in responses to shocks related to realized inflation or expectations themselves. Table 5 presents the coefficients derived from regressions 3 for different time horizons after the monetary shocks (n), specifically $n = 0$, $n = 12$, and $n = 24$.

time=0	France	Benelux	Germany	Italy
π_{t+12}	0.163	0.291	0.422	0.179
	(0.190)	(0.186)	(0.205)	(0.198)
$\text{E}_t(\pi_{t+12})$	-0.247	-0.579	-0.674	-0.763
	(0.932)	(0.937)	(0.915)	(0.929)
exp_err_t	0.410	0.870	1.096	0.942
	(0.951)	(0.941)	(0.965)	(0.957)
ind_prod_{t+12}	-1.053	-0.232	-1.479	-0.625
	(0.037)	(0.046)	(0.022)	(0.040)
optimism_t	-0.762	-0.925	-1.034	-1.211
	(0.043)	(0.047)	(0.055)	(0.052)
time=12				
π_{t+24}	-0.664	0.380	0.522	0.658
	(0.186)	(0.191)	(0.193)	(0.198)
$\text{E}_{t+12}(\pi_{t+24})$	-2.002	-1.579	-1.674	-1.863
	(0.980)	(0.985)	(0.978)	(0.976)
exp_err_{t+12}	1.338	1.959	2.196	2.521
	(0.931)	(0.995)	(0.891)	(1.004)
ind_prod_{t+24}	-0.165	-0.197	-0.306	-0.285
	(0.031)	(0.038)	(0.059)	(0.026)
optimism_{t+12}	-0.183	-0.208	-0.156	-0.105
	(0.041)	(0.053)	(0.040)	(0.064)
time=24				
π_{t+36}	0.338	-0.428	-0.531	-0.644
	(0.175)	(0.203)	(0.188)	(0.194)
$\text{E}_{t+24}(\pi_{t+36})$	-4.561	-4.607	-4.703	-4.811
	(0.994)	(0.988)	(0.982)	(0.976)
exp_err_{t+24}	4.899	4.179	4.172	4.167
	(0.950)	(0.956)	(0.964)	(0.972)
ind_prod_{t+36}	0.678	0.459	0.562	0.675
	(0.036)	(0.042)	(0.038)	(0.044)
optimism_{t+24}	0.181	0.215	0.228	0.131
	(0.041)	(0.049)	(0.043)	(0.052)

(a) traditional monetary policy tightening

time=0	France	Benelux	Germany	Italy
π_{t+12}	0.535	0.431	-0.631	0.179
	(0.122)	(0.208)	(0.245)	(0.133)
$\text{E}_t(\pi_{t+12})$	-5.726	-4.976	-5.232	-4.932
	(0.991)	(0.868)	(1.057)	(0.798)
exp_err_t	6.261	5.407	4.601	5.111
	(0.998)	(0.893)	(1.085)	(0.809)
ind_prod_{t+12}	0.976	0.673	0.922	0.598
	(0.056)	(0.044)	(0.092)	(0.120)
optimism_t	0.345	0.253	0.354	0.323
	(0.063)	(0.069)	(0.051)	(0.072)
time=12				
π_{t+24}	0.454	0.332	-0.567	0.064
	(0.206)	(0.165)	(0.287)	(0.197)
$\text{E}_{t+12}(\pi_{t+24})$	-1.534	-1.655	-1.069	-2.059
	(1.145)	(0.997)	(0.876)	(1.351)
exp_err_{t+12}	1.988	1.987	0.502	2.123
	(1.163)	(1.011)	(0.922)	(1.365)
ind_prod_{t+24}	0.106	0.205	-0.102	0.235
	(0.027)	(0.045)	(0.033)	(0.029)
optimism_{t+12}	0.103	0.108	-0.096	0.123
	(0.034)	(0.044)	(0.052)	(0.067)
time=24				
π_{t+36}	-0.481	-0.345	0.335	-0.556
	(0.194)	(0.209)	(0.176)	(0.159)
$\text{E}_{t+24}(\pi_{t+36})$	-0.433	0.533	0.321	-0.145
	(1.005)	(0.931)	(0.946)	(1.015)
exp_err_{t+24}	-0.048	-0.878	0.014	-0.411
	(1.024)	(0.954)	(0.962)	(1.027)
ind_prod_{t+36}	-0.853	-0.596	-0.672	-0.452
	(0.046)	(0.032)	(0.029)	(0.047)
optimism_{t+24}	-0.386	-0.453	-0.498	-0.533
	(0.047)	(0.038)	(0.054)	(0.041)

(b) information monetary policy tightening

Table 5—: Coefficients of IRF of inflation, industrial production and their expectations at 3 different time horizon: on impact, 12 and 24 months later

The first column reports the variables of interest, enabling us to analyze responses to both traditional monetary policy tightening and negative information monetary policy tightening.

From Table 5(a), we can observe that there is minimal differential effect on the error term and its components on impact. This indicates that, concerning inflation and expectations, Spain's response to traditional monetary policy tightening shocks is akin to that of other countries. Additionally, Spain demonstrates a relatively smaller reduction in industrial production and maintains a more optimistic outlook on the state of the economy. However, in the medium and long term, the error term becomes substantial, signifying a noteworthy reaction by Spanish households to the shocks. Specifically, they exhibit an increase in expected inflation, although there is no significant differential effect in terms of realized inflation. This uptick in expected inflation is accompanied by a decline in realized industrial production and a more pessimistic view of the future state of the economy in comparison to other countries.

Shifting focus to Table 5(b), we observe that, unlike traditional shocks, information contractionary shocks do not manifest long-term effects on the error term. Both realized inflation and expected inflation differentials tend to converge to zero over the long term. However, in the short term, especially on impact, we notice that expected inflation for Spain reacts more vigorously compared to other countries. Additionally, Spanish households exhibit a higher level of pessimism concerning GDP, accompanied by a more pronounced contraction in realized industrial production compared to other countries. This suggests that when Spanish households receive unfavorable news about the state of the economy, they react more intensely compared to households in other countries by promptly updating their beliefs, maybe due to a more intense media coverage. It is important to note that the effects of the news disclosed by the European Central Bank have a shorter time horizon compared to conventional shocks,that are perceived more over time.

Regardless of the specific time horizon, we observe a tendency among Spanish households to overreact in terms of inflation expectations when they anticipate a worsening economic scenario and hold a more pessimistic outlook for the future economic situation. This pattern aligns with a stagflationary perspective held by Spanish households, which becomes evident in the long run for traditional shocks and in the short run for information shocks. One possible explanation for this difference could be the higher levels of personal debt among Spanish households compared to households in other countries over the last 25 years (Medialdea García and Sanabria Martín [2022]). However, it is crucial to emphasize that further analysis is required to provide precise numerical evidence and substantiate these findings.

In this section, we presented tables displaying the coefficients of the impulse response functions (IRFs) and their associated errors in a beta decomposition. To conduct a more

precise analysis, it is advisable to decompose the coefficients $\beta_{j,n}^{\text{conv,y}}$ and $\beta_{j,n}^{\text{info,y}}$ into two components. The first component, denoted as $\beta_{j}^{\text{conv,y}}$ and $\beta_{j}^{\text{info,y}}$, captures the country-specific effect. The second component, denoted as $\beta_{n}^{\text{conv,y}}$ and $\beta_{n}^{\text{info,y}}$, accounts for the temporal evolution of the coefficient in response to the shock. This decomposition allows for a precise assessment of the specific impact of a country's reaction relative to Spain. Furthermore, an important assumption of our framework is the symmetry in the responses to expansionary and contractionary shocks. However, in a more sophisticated analysis, it is necessary to study these shocks separately, as their responses may exhibit asymmetry. By considering and analyzing them independently, we can gain a more comprehensive understanding of the dynamics and differences in reactions to these distinct types of shocks.

C. Results: cumulative historical contribution of monetary policy shocks

In this section, we employ the coefficients obtained from the prior analysis to calculate the cumulative historical impact of contractionary shocks on the error term. Using equations 4 and 5, and cumulating the responses over the three years preceding the observation, we can ascertain the average contribution of these shocks to the error term.

Table 6 provides the outcomes, illustrating the average contribution of shocks to the error term for each country.

	France	Germany	Benelux	Italy
Difference in errors	3.648	2.960	2.895	2.395
Information mon. pol. shocks	0.546	0.577	0.546	0.461
Traditional mon. pol. shocks	1.126	1.225	1.332	0.921
Total contribution of mon. pol.	1.671	1.802	1.877	1.381
Explained difference	49%	61%	65%	57%

Table 6—: Cumulative effect of shocks on error on expectations

We observe that the cumulative contribution of contractionary shocks, encompassing both information monetary policy shocks and traditional monetary policy shocks, plays a pivotal role in elucidating the variations in average errors among different countries. Specifically, information monetary policy shocks exhibit an average contribution to the difference in the error on expectations ranging from 0.461 for Italy to 0.577 for Germany. Traditional monetary policy shocks exert a more pronounced impact, with average contributions ranging from 0.921 for Italy to 1.332 for Benelux. When we consider the total contribution of monetary policy shocks, which combines both information and traditional shocks, we find that it spans from 1.381 for Italy to 1.877 for Benelux. These figures indicate the overall influence of monetary policy shocks on the error term. Remarkably, the cumulative effect of these shocks can explain a significant portion of the difference in the error term between Spain and other countries. The total contribution

of monetary policy shocks accounts for approximately 49% for France, 61% for Germany, 65% for Benelux, and 57% for Italy. These findings underscore the significance of both information and traditional monetary policy tightening in explaining the difference in the error term between Spain and other Eurozone countries. Furthermore, the results emphasize that traditional monetary policy shocks wield a more substantial influence compared to information shocks in shaping this disparity.

V. Conclusion

Our research underscores the enduring tendency of Spanish households to overestimate inflation compared to their counterparts in other European Union countries, even when actual inflation rates are similar. This observation holds true across diverse measures of inflation and various time periods. We have identified that the distinct responses of Spanish households' inflation expectations to monetary policy shocks play a significant role in explaining a substantial portion of the variation in expectation errors. Our analysis, based on data from the Joint Harmonised EU Programme of Business and Consumer Surveys, explored potential explanations for this phenomenon. Initially, we considered compositional effects, accounting for the diversity in household characteristics within the Eurozone. However, we found that the difference in inflation expectations persisted across various demographic and household groups, indicating that it was not primarily driven by specific characteristics. Moreover, the Oaxaca-Blinder decomposition allowed us to rule out the possibility that this difference in inflation expectations was attributed to varying behaviors of the same groups of households across different countries.

Our analysis of high-frequency financial market surprises unveiled that the response of Spanish households to monetary policy shocks was the chief contributor to their inflation overestimation. Spanish households tend to overreact to tightening monetary policy, resulting in elevated inflation expectations, even when future realized inflation rates do not significantly differ across countries. This overreaction is consistently accompanied by a decline in Spanish industrial production and a more pessimistic economic outlook. Significantly, the cumulative impact of these monetary policy shocks accounted for a substantial portion of the discrepancy in the error term between Spain and other countries, ranging from 49% for France to 65% for Benelux. These results suggest that Spanish households tend to incorporate a stagflationary perspective of the economy when formulating their expectations.

For future research, it would be valuable to explore how Spain responds to expansionary shocks and assess whether their reactions are different and asymmetric; a more detailed analysis could involve a refined beta-decomposition, isolating country-specific coefficients independently of time. Additionally, extending this research to encompass other countries within the Eurozone would be beneficial for unveiling common patterns and behaviors. Comparing and contrasting the inflation expectation dynamics across a broader range of countries could help in discerning whether the observed trends in Spain are unique or part of a more widespread phenomenon. By delving deeper into these areas of inquiry, we can enhance our understanding of inflation expectations and their broader implications for households and policymakers, ultimately contributing to more effective economic decision-making and policy formulation.

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Appendix

A1. Historical evolution of inflation and inflation expectations

Figure A1 presents the evolution of realized inflation at time $t + 12$ (π_{t+12}) and the expected inflation at time t for time $t + 12$ ($\mathrm{E}(\pi_{t+12})$) over the entire time sample.

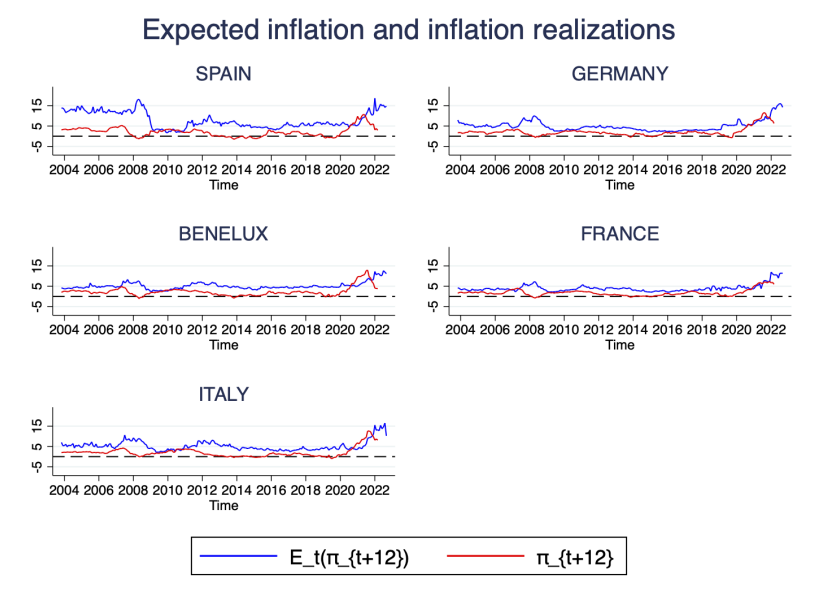

Figure A1. : Evolution in time of realized inflation (HICP index) and expected inflation (mean of Households' survey's answers)

As depicted in graph A1, the level of realized inflation (π_{t+12}) remains relatively stable over time for the five different countries considered. However, the level of inflation expectations ($\mathrm{E}(\pi_{t+12})$) in Spain is consistently higher compared to other countries.

Furthermore, we examine the standard deviation of inflation expectations across different countries. Figure A2 demonstrates that Spanish households exhibit the highest heterogeneity in terms of expectations, although this difference compared to other countries is not as different as their mean values.

A2. Different measures of inflation

In this section, we present alternative measures of inflation, distinct from the HICP, to demonstrate the robustness of our findings. This analysis aims to address whether the overestimation of future inflation by Spanish households can be attributed to their consideration of a different inflation measure when responding to the questionnaire.

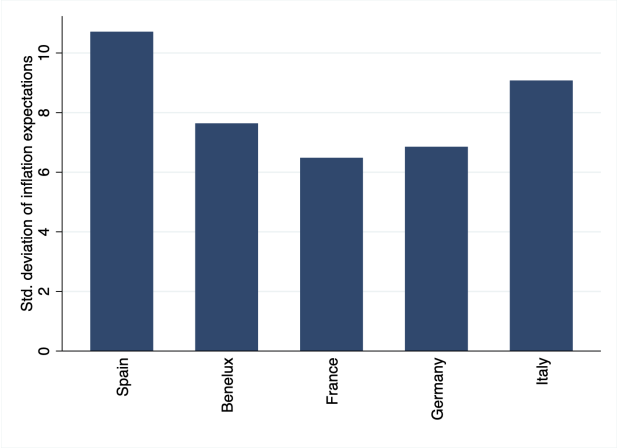

Figure A2. : Errors on expectations errors

Figures A3, A4, and A5 depict the average values of Harmonized Index of Consumer Prices (HICP) inflation for three distinct time periods. Despite potential variations in the magnitude of inflation levels, these figures consistently reveal the presence of the overestimation pattern exhibited by Spanish households. Therefore, it can be concluded that the discrepancy in inflation expectations is not solely influenced by the use of a different inflation measure as a reference.

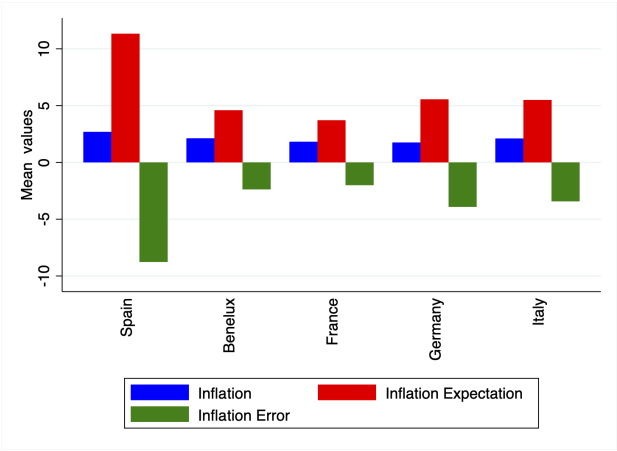

Figure A3. : HICP realized inflation, expected inflation and error on expectations, average (2004-2010)

In figures A6 and A7, we employ various inflation measures to account for the possibility that households consider different measures of inflation when formulating their

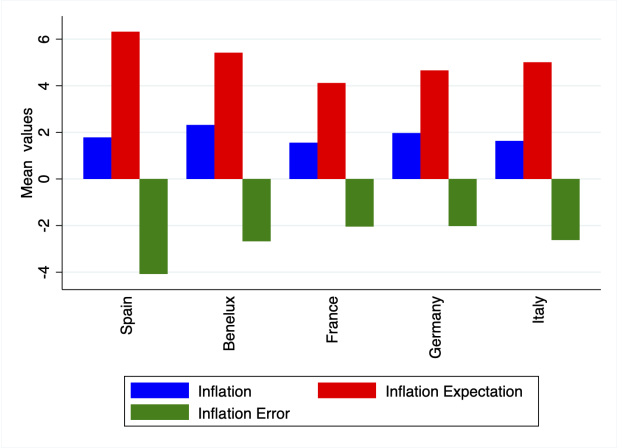

Figure A4. : HICP realized inflation, expected inflation and error on expectations, average (2010-2022)

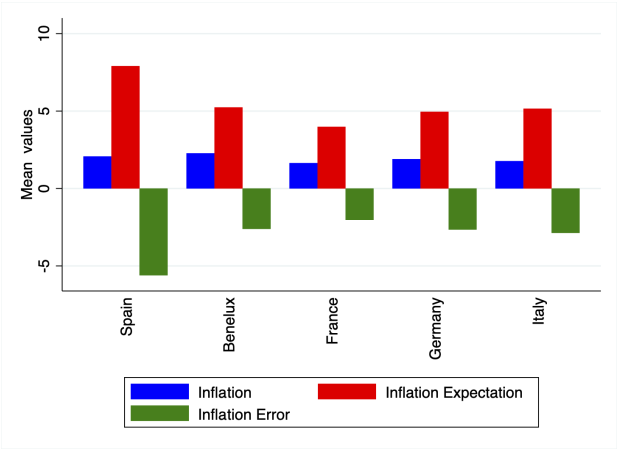

Figure A5. : HICP realized inflation, expected inflation and error on expectations, average (2020-2022)

expectations. Specifically, we utilize a housing price measure provided by Eurostat and a measure for food prices inflation. These measures are chosen based on their potential relevance in the popular view.

Notably, our analysis reveals no discernible differences in the observed patterns, thus indicating the robustness of our findings across different measures of inflation.

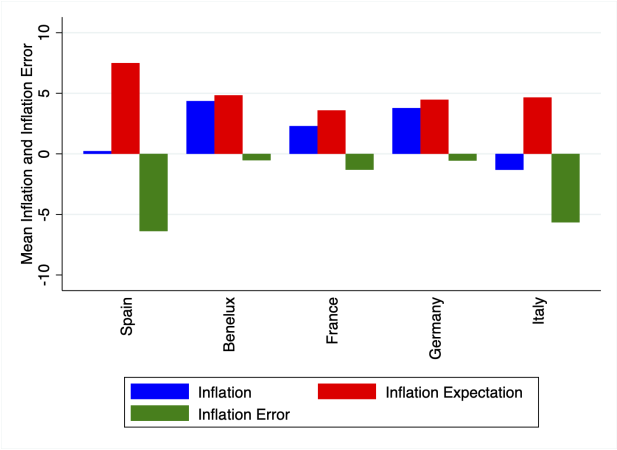

Figure A6. : Housing prices realized inflation, expected inflation and error on expectations, average whole sample

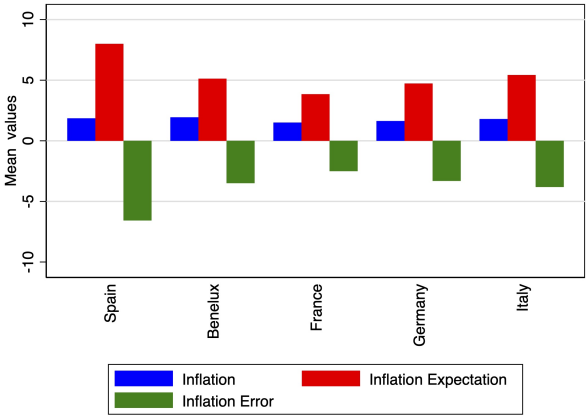

Figure A7. : Food prices realized inflation, expected inflation and error on expectations, average whole sample

A3. Monetary policy shocks with sign restrictions

We provide a histogram illustrating the temporal evolution of the contributions of information monetary policy shocks (plotted in black) and traditional monetary policy shocks (plotted in blue) to the Eonia interest rate swaps with maturities ranging from 1 month to 2 years, specifically for both the traditional monetary policy shock and the information monetary policy shock.

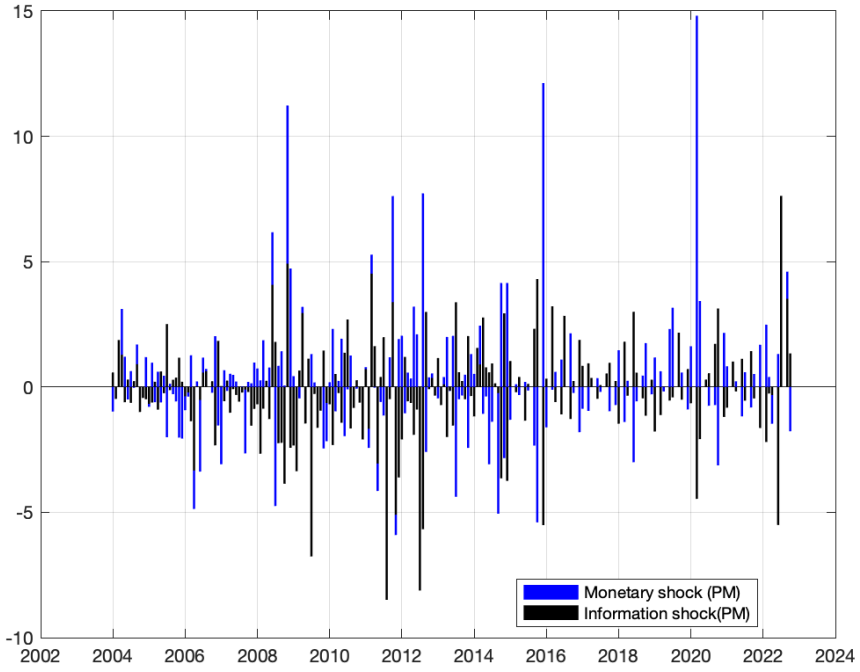

Figure A8. : Information and traditional monetary policy shocks for the Eurozone, contribution to the Eonia interest rate swaps with maturities ranging from 1 month to 2 years

A4. Oaxaca-Blinder decompositions

In this section we report the Oaxaca-Blinder decompositions for Spain with Benelux, Italy and Germany. Main results are similar to the ones reported in section IV for Spain-France.

VARIABLES	(1) overall	(2) endowments	(3) coefficients	(4) interaction
income_q2		-0.0364***	0.570***	-0.280***
		(0.0103)	(0.0446)	(0.0220)
income_q3		0.0271***	0.335***	0.0296***
		(0.00188)	(0.0291)	(0.00296)
income_q4		0.236***	0.129***	0.0765***
		(0.00705)	(0.0213)	(0.0126)
edu_q2		0.0275***	-0.0553*	-0.00627*
		(0.00184)	(0.0296)	(0.00337)
edu_q3		-0.230***	0.343***	-0.131***
		(0.00690)	(0.0396)	(0.0151)
age_q2		0.00271	0.277***	0.105***
		(0.00727)	(0.0303)	(0.0116)
age_q3		0.00697	0.801***	-0.214***
		(0.00539)	(0.0346)	(0.00970)
age_q4		-0.154***	1.055***	-0.492***
		(0.0103)	(0.0399)	(0.0189)
male		0.00910***	-0.00366	-5.73e-05
		(0.00157)	(0.0320)	(0.000501)
Spain	-6.182***			
	(0.0285)			
Benelux	-3.231***			
	(0.0140)			
difference	-2.951***			
	(0.0318)			
endowments	-0.112***			
	(0.0136)			
coefficients	-1.927***			
	(0.0418)			
interaction	-0.912***			
	(0.0306)			
Constant			-5.378***	
			(0.129)	
Observations	587,160	587,160	587,160	587,160

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table A1—: SPAIN-BENELUX Oaxaca-Blinder decomposition

VARIABLES	(1) overall	(2) endowments	(3) coefficients	(4) interaction
income_q2		-0.00889***	0.297***	-0.0356***
		(0.00202)	(0.0281)	(0.00370)
income_q3		0.0382***	0.351***	0.0521***
		(0.00303)	(0.0300)	(0.00480)
income_q4		0.0432***	0.424***	0.0585***
		(0.00316)	(0.0322)	(0.00493)
edu_q2		-1.68e-05	0.154***	-4.72e-05
		(0.000204)	(0.0362)	(0.000572)
edu_q3		0.0410***	0.272***	0.222***
		(0.00895)	(0.0164)	(0.0135)
age_q2		0.0802***	0.0818**	0.0332**
		(0.0125)	(0.0383)	(0.0156)
age_q3		-0.138***	0.320***	-0.0924***
		(0.0100)	(0.0446)	(0.0129)
age_q4		-0.433***	0.438***	-0.203***
		(0.0171)	(0.0489)	(0.0227)
male		0.00189**	0.277***	0.00171**
		(0.000923)	(0.0371)	(0.000855)
Spain	-6.182***			
	(0.0285)			
Italy	-3.691***			
	(0.0226)			
difference	-2.491***			
	(0.0364)			
endowments	-0.375***			
	(0.0169)			
coefficients	-2.153***			
	(0.0398)			
interaction	0.0370			
	(0.0238)			
Constant			-4.767***	
			(0.154)	
Observations	434,472	434,472	434,472	434,472

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table A2—: SPAIN-ITALY Oaxaca-Blinder decomposition

VARIABLES	(1) overall	(2) endowments	(3) coefficients	(4) interaction
income_q2		-0.00723***	0.264***	-0.0211***
		(0.00101)	(0.0244)	(0.00243)
income_q3		0.0303***	0.407***	0.0618***
		(0.00218)	(0.0268)	(0.00459)
income_q4		0.0267***	0.355***	0.0217***
		(0.00229)	(0.0306)	(0.00255)
edu_q2		-0.0630***	0.340***	0.116***
		(0.00532)	(0.0265)	(0.00920)
edu_q3		0.0385***	1.278***	-0.657***
		(0.0142)	(0.0530)	(0.0274)
age_q2		-0.0149***	0.410***	0.0769***
		(0.00476)	(0.0372)	(0.00720)
age_q3		-0.0235***	0.664***	-0.166***
		(0.00576)	(0.0358)	(0.00943)
age_q4		-0.226***	0.670***	-0.268***
		(0.00943)	(0.0374)	(0.0152)
male		-0.0288***	0.680***	-0.176***
		(0.00620)	(0.0460)	(0.0120)
Spain	-6.182***			
	(0.0285)			
Germany	-2.190***			
	(0.0156)			
difference	-3.992***			
	(0.0325)			
endowments	-0.268***			
	(0.0186)			
coefficients	-2.713***			
	(0.0430)			
interaction	-1.012***			
	(0.0340)			
Constant			-7.781***	
			(0.135)	
Observations	421,659	421,659	421,659	421,659

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table A3—: SPAIN-GERMANY Oaxaca-Blinder decomposition