Household Perceived Sources of Business Cycle Fluctuations: a Tale of Supply and Demand*

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Abstract

The ECB's Consumer Expectation Survey queries households in the largest six euro area countries about their expectations for a wide range of macroeconomic and individual-level variables. We document strong correlations between these expectations, which we use to identify two principal components that explain a significant portion of the variance of all expectations. Judging from the sign of the loadings on expected prices and quantities, we interpret these components as capturing households' perceptions of the sources of macroeconomic dynamics, with the first capturing supply-side shocks and the second component reflecting demand-side shocks. A panel analysis shows that the first and the second household-level principal component scores are associated with opposite movements in household realized consumption and precautionary savings, uncovering the differential effects of supply and demand shocks.

JEL: D1, D8, E2, E3

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1 Introduction

Household expectations are critical to macroeconomic theory and policy discussions as virtually every decision that households make, for example consumption and savings, depends on predicting future outcomes of relevant economic variables. While previous studies have primarily focused on household-level inflation and output expectations due to data limitations, we assert that studying a broader range of expectations that households hold is essential to comprehend their perceptions of the types of shocks affecting the economy and hence the implications for households' behaviour.

In this paper, we use expectations about ten macroeconomic and individual-level variables to identify the households' perceived sources of macroeconomic developments and quantify how they influence realized consumption and precautionary savings. The paper offers implications to policymakers on how they could adjust their policy and communication strategies to elicit the desired real outcomes from households.

Our analysis relies on the monthly Consumer Expectations Survey (CES) administered by the European Central Bank (ECB). This survey covers 6 major European economies, including Belgium, France, Germany, Italy, Spain, and the Netherlands, and comprises a representative panel of around 10,000 households. We focus on expectations about ten key variables, including output growth, inflation (over two different horizons), unemployment rate, house price growth, interest rates on mortgages, own income growth, own financial situation, own access to credit, and own spending on durable goods. The advantage of this survey, relative to existing ones, is that most of the above mentioned expectations are quantitative rather than qualitative, i.e. households provide specific numerical values for their responses.

We show significant correlation between household expectations across multiple variables. For example, households expect lower inflation and higher output growth simultaneously, confirming previous research findings by Candia, Coibion, and Gorodnichenko (2020). We also find that high inflation expectations correlate with high forecasts for house price growth, while low expected unemployment rates are associated with high expected output growth. Interestingly, our investigation also reveals that household expectations about aggregate-level variables are intertwined with their expectations about individual-level variables. For instance, when households anticipate high output growth, they also tend to expect higher personal income growth.

We explore the common drivers behind the correlated expectations by leveraging the large cross-sectional dimension of our data and using a Principal Component Analysis (PCA) on the full set of expectations. Our baseline analysis uses variation across households and pools together all months and countries of the sample, and it reveals that the first two principal components account for more than 40% of the joint variation in all expectations.

Judging from the signs of the loadings on expected prices and quantities, we interpret the principal components as household perceived sources of the business cycle.

The first component, explaining the highest fraction of variance in the data, captures a supply-side view of macroeconomic developments. Households anticipate a better economy while expecting lower inflation, suggesting that they believe supply-side shocks, such as an oil shock, will impact the economy. The second component, on the other hand, portrays a different story: households expect higher inflation when they forecast higher output growth. This is consistent with a Phillips curve and more generally with demand-side business cycle.

Repeating the PCA in each month separately shows that the loadings of the principal components are stable over the months in our sample, pointing to the fact that households across the euro area have been expecting supply-side forces to be more important (in terms of explained variance) than demand-side ones. Similarly, performing the PCA separately by country shows that the loadings are similar across countries, so that no specific country drives our baseline results.

Lastly, we investigate how supply and demand shocks, represented by the principal component scores which are orthogonal to each other, relate to household consumption and precautionary savings. We normalize the first and second principal component scores so that a unit increase in them is associated with an 1 percentage point increase in expected economic growth. Our fixed-effect analysis shows that a unit increase in the supply-side shock (i.e., a unit increase in the first principal component score) is associated with a) a decrease in realized nondurable spending by 0.45% and no change in realized durable spending, b) a decrease in expected spending growth of 0.35 percentage points, and c) an increase in precautionary savings by 1.5%. Conversely, a unit increase in the demand-side shock (i.e., a unit increase in the second principal component score) is associated with a) an increase in realized nondurable spending by 0.7% and an increase in the probability of spending on durable goods by 0.5 percentage points, b) an increase in expected spending growth of 0.4 percentage points, and c) no change in precautionary savings.

In summary, our findings suggest that the supply and demand shocks, both normalized to an increase in expected economic growth, are systemically associated with household consumption and savings choices and have often opposite effects. An increase in the supply-side view of macroeconomic dynamics is associated with a decrease in realized and planned spending (most likely because of decreasing inflation expectations) and with an increase in precautionary savings. On the other hand, an increase in the demand-side view of macroeconomic dynamics is associated with an increase in realized and planned spending (consistent with increasing inflation expectations) but not with precautionary savings.

Relation to the Literature. The evidence we provide in this paper aims at understanding how households form their expectations and how this relate with consumption and savings decisions. Candia, Coibion, and Gorodnichenko (2020) and Andre et al. (2022) have recently shown that households tend to think differently than experts or professional forecasters about the transmission of shocks and co-movements of variables such as inflation and unemployment. In particular, while professionals relate low inflation with high unemployment, in line with demand-driven co-movements, households associate low inflation with rising output and decreasing unemployment. Along similar lines, Kamdar (2019) finds that a single component or factor, which can be linked to "sentiment", explains the bulk of variation in survey responses on unemployment and inflation expectations in the U.S. during the last 40 years. We add value to this recent literature by exploring a broader range of expectations across several different countries to show that households have both a supply-side and a demand-side view on the business cycle fluctuations.

Policy makers ultimately care about (i) whether households and firms understand policy communication and policy changes in the intended way, and (ii) how such understanding translates into expectations that shape real outcomes and decisions. Our findings speak to both elements. Regarding the first element, the evidence points to strong inattention, especially during low inflation periods. Recent works such as Carvalho and Nechio (2014), Bottone, Tagliabracci, and Zevi (2021), Van der Cruijsen, Jansen, and De Haan (2018), Kamdar (2019), Coibion, Gorodnichenko, Knotek, et al. (2020), De Fiore, Lombardi, and Schuffels (2021), and Coibion, Gorodnichenko, and Weber (2022) tend to find that, although some households might form expectations about monetary policy, inflation, and unemployment in a way consistent with a Taylor-type rule or with standard models used in policy institutions, most households do not react (in terms of expectation updating) to policy announcements such as those presented in Federal Open Market Committee (FOMC) statements, or even more unique announcements such as the implementation of an Average Inflation Targeting (AIT) strategy in 2020. Regarding the second element, identifying the link between expectations and decisions in the data is a non-trivial task. Three recent papers were the first to exploit CES data in order to tackle different variants of the expectations-outcomes link (Christelis et al. (2020), Coibion, Dimitris Georgarakos, et al. (2021), and Diomitris Georgarakos and Kenny (2022)). They point to strong effects of financial concerns as well as economic uncertainty (mostly due to Covid-19) on spending, investment, marginal propensities to consume as well as precautionary savings. On the side of firms decisions, Coibion, Gorodnichenko, and Ropele (2019) use a randomized trial within Italian firms and find that higher inflation expectations on the part of firms leads them to raise their prices, increase demand for credit, and reduce their employment and capital. We complement these papers by analyzing more systematically a broader set of

expectations and how their main drivers are related to spending and saving.

More broadly, our findings should help better disentangle among alternative theories of expectation formation and behavior. Survey evidence consistently points to patterns of expectations and decisions that are difficult to square with full information rational expectations (FIRE): recent personal experiences, simple associative memory, under and over reaction, as well as naive extrapolation seem to be main elements shaping household expectations abut inflation, unemployment, or house prices. Several different conceptual frameworks have been proposed to explain these findings (Fuster, Laibson, and Mendel (2010), Malmendier and Nagel (2015), Kuchler and Zafar (2019), Angeletos, Huo, and Sastry (2020), Kohlhas and Walther (2021) and Andre et al. (2022) among others). These frameworks tend to fall either on the noisy rational expectations approach, or within more behavioral models of expectation formation.

2 Data

2.1 Consumer Expectations Survey

We use data from the novel Consumer Expectations Survey (CES), which is administered by the European Central Bank (ECB). Our sample goes from April 2020 to November 2022.[1] The CES is a representative household-level online survey with a panel dimension, carried out in 6 major European economies (Belgium, France, Germany, Italy, Spain, and the Netherlands) and sampling 10,000 survey participants every month.[2]

The large sample size allows the survey to be representative both at the euro area level and at the country level. Respondents complete a background questionnaire upon entering the panel, providing one-time information which hardly changes over time such as age, gender, household size, and housing tenure. Expectations about several variables are asked at monthly frequency, while information about non-durable consumption and savings is provided at quarterly frequency. See Christelis et al. (2020), Bańnkowska et al. (2021), and Diomitris Georgarakos and Kenny (2022) for more information about the survey.

The CES survey is a comprehensive source of household expectations about economic variables, making it valuable for analyzing household perceptions of the business cycle. We next outline the variables we use in our statistical analysis and present some descriptive statistics.

[1]While the CES had a pilot phase that started in January 2020 (wave 1), the data is only available for analysis since April 2020 (wave 4).

[2]The sample contains approximately 2,000 participants from the four largest economies, and 1,000 from Belgium and the Netherlands.

2.2 Descriptive Statistics

In this paper we use information about household-level demographics, income, spending, and expectations.[3] Disposable income refers to the 12 months preceding the interview and is provided in brackets, so our measure of household income is the median of each bracket.[4] Nondurable spending, which is asked at a quarterly frequency, refers to spending on nondurable goods and services in the month preceding the interview and we annualize it. Precautionary savings is constructed using the quarterly survey question asking households how much they think they need to put aside in total savings to deal with unexpected events. To insure comparability across countries, we perform country-specific purchasing power parity (PPP) adjustment for those three variables. "Spent on Durables (0-1)" is a dummy variable capturing whether households have spent on durable goods in the month preceding the interview and captures spending on cars, home appliances, and luxury items.

Most importantly for our analysis, the survey asks households about their expectations for a range of aggregate-level variables, such as the overall economy, inflation, unemployment rate, house prices growth, and interest rates on mortgages. It also asks about individual-level variables, such as income growth, spending growth, access to credit, financial situation, and plans to buy durables. These expectations are provided as numerical values, except for access to credit and financial situation, which are measured on a 1-5 qualitative scale, and plans to buy durables, which are indicated by a 0-1 variable. All expectations refer to a time horizon of 12 months, except for expected inflation, which is also asked at a 3-year horizon.

Table 1 presents some basic descriptive statistics (mean, 10th percentile, median, 90th percentile, and total number of observations) for the variables under exam. It shows that the median household earns 35,000 euros in annual income, is 42 years old, and spent around 17,000 euros in non-durables over the previous 12 months. Over the following 12 months, the median household expects no growth in the economy and in personal income, 3% inflation, and a relatively high unemployment rate of 9.9%.

Turning to expectations, households feature a certain degree of disagreement about the expected future economic outlook. Figure 1 plots the distribution of expectations about economic growth, inflation, house price growth, unemployment rate, interest rate on mortgages, and own income growth over time. In the first part of the sample, when the first wave of the pandemic was at its peak, the distribution of most variables was widest. Households in the 10th percentile of the distribution were expecting a growth of -15% for the overall economy and of -10% for their own income, while those at the 90th percentile

[3]To correct for outliers, most quantitative variables are winsorised at the 10th and 90th percentiles of the weighted distribution in each month and country.

[4]Because it is asked in the background questionnaire, disposable income is only provided by each household once.

Table 1: Descriptive statistics of some variables over the whole sample

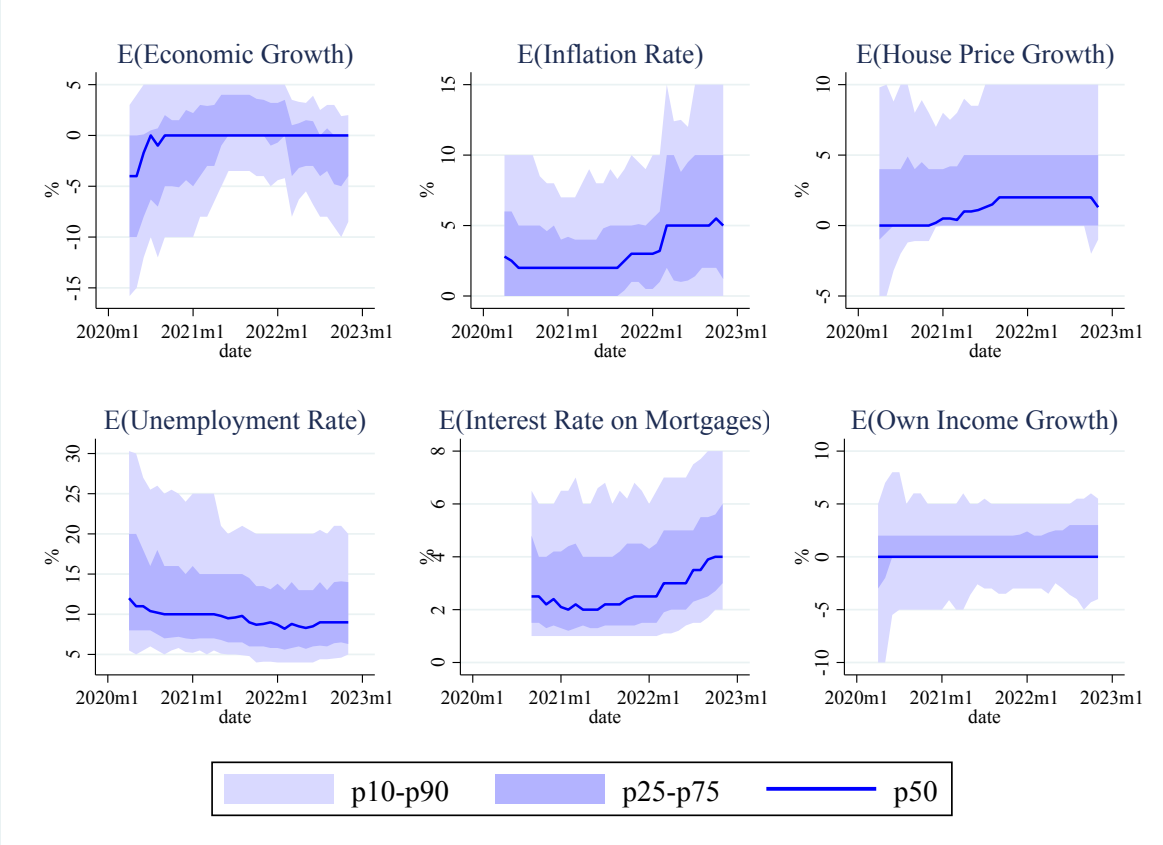
	Mean	p10	Median	p90	N
Age	50.63	26.00	42.00	80.00	396,384
Disposable Income	34,596.87	12,500.00	35,000.00	67,500.00	396,384
Nondurable Spending	17,590.39	7,500.00	16,968.00	28,560.00	134,156
Spent on Durables (0-1)	0.19	0.00	0.00	1.00	104,064
Precautionary Savings	7,227.99	500.00	4,400.00	19,600.00	118,991
E(Economic Growth)	-1.11	-8.00	0.00	5.00	396,384
E(Inflation Rate)	4.16	0.00	3.00	10.00	396,359
E(Inflation Rate 3Y)	3.37	0.00	2.00	10.00	391,212
E(House Price Growth)	2.44	0.00	1.10	9.90	396,384
E(Unemployment Rate)	12.11	5.00	9.90	23.60	396,384
E(Interest Rate on Mortgages)	3.37	1.00	2.80	7.00	347,462
E(Own Income Growth)	0.62	-4.00	0.00	5.00	396,384
E(Own Spending Growth)	2.51	0.00	0.00	10.00	336,030
E(Own Durable Spending)	0.30	0.00	0.00	1.00	395,547
E(Own Credit Access)	2.80	2.00	3.00	4.00	390,619
E(Own Financial Situation)	2.82	2.00	3.00	4.00	396,384

Note: "Age" is provided in four brackets ([18-34], [35-49], [50-64], 65+), and we assign the median value to each household. "Disposable Income" refers to the 12 months preceding the interview and it is PPP-adjusted. "Nondurable Spending" is asked at a quarterly frequency, it refers to spending on nondurable goods and services in the month preceding the interview, and it is annualized and PPP-adjusted. "Spent on Durables (0-1)" is asked at a quarterly frequency, and is a dummy variable capturing whether households have spent on durable goods in the month preceding the interview. "Precautionary Savings" is asked at a quarterly frequency, it refers to the amount households think they need to put aside in total savings to deal with unexpected events, and it is PPP-adjusted. All expectations are asked on a monthly basis and are based on a 12 months horizon except for "E(Inflation Rate 3Y)", which instead refers to a 3 years horizon. All expectations are provided as numerical values, except for own durable spending (where a dummy variable indicates whether the household plans to buy durables), own credit access (measured on a 1 to 5 qualitative scale), and own financial situation (measured on a 1 to 5 qualitative scale). The sample for all variables in the table covers the period from April 2020 to November 2022, except for the expectation concerning the interest rate, which starts in September 2020.

were expecting +5% and +7%, respectively. Another episode leading to more disperse distributions, especially regarding expected inflation, is the outbreak of the Russia-Ukraine war: while households in the 10th percentile of the distribution were expecting inflation to be 0%, those at the 90th percentile were expecting inflation to be 15%.

A precious feature of the data is the geographical disaggregation by country. Tables A.1-A.3 in Appendix A present the same descriptive statistics included in Table 1 broken down by country. Most notably, the distributions of income, spending, and expectations can be fairly different across countries. Given that in this paper we are not interested in

Figure 1: Evolution of household-level expectations over time



Note: The figure plots the 10th, 25th, 50th, 75th, and 90th percentiles of the distribution of expectations in each month of the sample. All expectations are measured monthly, with a 12-month horizon and reported as numerical values. The sample for the expectations covers the period from April 2020 to November 2022, except for the expectation concerning the interest rate on mortgages, which starts in September 2020.

explaining cross-country differences in expectations, for most of our empirical work we use the residuals from the following regression:

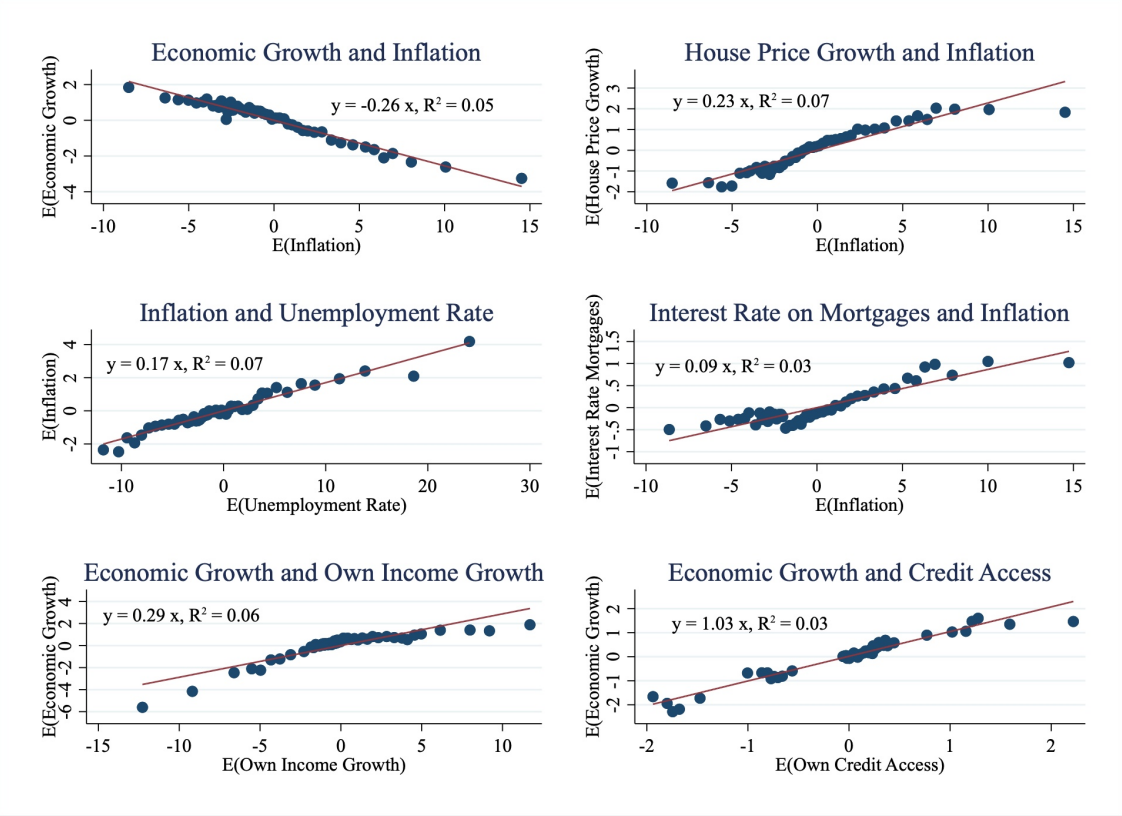
$$\mathbb{E}y_{h,c,t} = \alpha_{c,t} + \epsilon_{h,c,t} \tag{1}$$

where $\mathbb{E}y_{h,c,t}$ is the the value of the expectation about a variable y for household h in country c and month t, and $\alpha_{c,t}$ are country-month fixed effects. The residuals $\hat{\epsilon}_{h,c,t}$ have zero mean in each month and country, and make expectations comparable when we pool data across time and countries together.

3 Household Expectations Are Correlated

What are the households' perceived sources of macroeconomic dynamics? As a first hint, we analyze the pairwise co-movement between household-level expectations in Figure 2.

Figure 2: Pairwise Co-movement Between Expectations



Note: The blue circles on the graph represent the mean of the y-axis variable for 50 bins of the x-axis variable, while the red line shows the best fit of the underlying data. All expectations are measured monthly, with a 12-month horizon and reported as numerical values, except for the expectation about own credit access, which is measured on a qualitative scale from 1 to 5. The analysis combines data from all time periods and countries, and the sample for the expectations covers the period from April 2020 to November 2022, except for the expectation concerning the interest rate on mortgages, which starts in September 2020. All expectations are residualized using regression equation (1).

The blue circles represent the mean value of the y-axis variable in each of the 50 quantiles of the x-axis variable. To make expectations comparable, we residualize them using equation (1) so that in each month and country, (residualized) expectations have zero mean.

Figure 2 shows strong pairwise co-movement between expectations. Two such correlations were already noticed in the literature. First, the top-left panel illustrates a negative correlation between expected output growth and expected inflation, a pattern Candia, Coibion, and Gorodnichenko (2020) show holds also in the US from 1978 to 2020 and that they have defined the "supply-side interpretation of inflation". Second, the center-left panel shows the positive correlation between expected inflation and expected unemployment rate, which Kamdar (2019) noticed for the US from 1978 to 2019. Our first contribution in this paper is to show that similarly strong correlations arise between expectations about many other variables.

The top-right panel reveals a positive correlation between expected inflation and expected house price growth: if households believe inflation is higher over the following 12 months, they also expect house prices to grow over the same time horizon. The center-right panel shows that households expecting higher inflation also expect higher interest rates, consistent with the presence of a central bank operating a Taylor rule.

Expectations about aggregate variables also correlate with expectations about individual-level variables. The bottom-left panel displays the positive correlations between expected output growth and income growth. A percentage-point increase in expected income growth is associated with a 0.29 percentage-point increase in expected output growth. Therefore, households expect their income to grow when they believe the economy will strengthen. Finally, the bottom-left panel shows that households expecting higher output growth also expect improved credit access conditions.

These results together indicate that household expectations about both aggregate-level and individual-level variables are correlated. Because we believe these expectations are jointly determined by some underlying force (such as a shock to the economy), we proceed in Section 4 with a more formal analysis of the joint distribution of household expectations.

4 A Principal Component Analysis of Expectations

We have established in Section 3 that household expectations are correlated. To identify the common drivers behind expectations, we run a Principal Component Analysis (PCA) exploiting the large cross-sectional dimension of our data. The idea is to extract common components that can explain a significant share of the joint variation in expectations and have meaningful economic interpretation.

We use expectations for a range of aggregate-level variables, such as the overall economy, inflation, unemployment rate, house prices growth, and interest rates on mortgages. We also use expectations about individual-level variables, such as income growth, access to credit, financial situation, and plans to buy durables. Recall that these expectations are provided as numerical values, except for access to credit and financial situation, which are measured on a 1-5 qualitative scale, and plans to buy durables, which are indicated by a 0-1 variable. All expectations refer to a time horizon of 12 months, except for expected inflation, which is also asked at a 3-year horizon. Because the expectations about interest rate on mortgages only start from September 2020, our effective sample goes from September 2020 to November 2022.

4.1 Mathematical Background

The PCA is a statistical technique for reducing the dimensionality of a dataset. This is accomplished by linearly transforming the data so as to retain fewer dimensions of the initial data while preserving most of its variation.

Consider an $H \times E$ data matrix $\boldsymbol{X}$, where H is the number of households and E is the number of expectations. An observation about household h is an $1 \times E$ vector $\boldsymbol{x}_h = \{x_{h,1}, \ldots, x_{h,E}\}$, which provides the collection of household h expectations.

The PCA consists of extracting through an optimization problem a set of size K of E-dimensional vectors of weights $\boldsymbol{w}_k = \{w_{1,k}, \ldots, w_{E,k}\}$ mapping the data matrix $\boldsymbol{X}$ to a data matrix $\boldsymbol{S}$ of dimension $H \times K$, where K is chosen to be smaller than E in order to reduce dimensionality. The vectors $\boldsymbol{w}_k$ are the principal components or loadings. The new data matrix $\boldsymbol{S}$ is made of principal component scores $\boldsymbol{s}_h = \{s_{h,1}, \ldots, s_{h,K}\}$ given by:

$$s_{h,k} = \boldsymbol{x}_h \cdot \boldsymbol{w}_k \qquad h = 1, \ldots, H; \;\; k = 1, \ldots, K \tag{2}$$

The principal component scores inherit the maximum possible variance from the data $\boldsymbol{X}$, and each one of them is orthogonal to the others.

A simple example: Consider H households and $E = 3$ expectations about inflation (π), output growth (Y), and unemployment rate (U). If we perform a PCA and decide to retain $K = 2$ principal components, then we obtain two sets of weights $\boldsymbol{w}_1$ and $\boldsymbol{w}_2$ (each one 3×1) so that the principal components scores for household h are defined as:

$$s_{h,1} = x_h^{\pi} \cdot w_1^{\pi} + x_h^{Y} \cdot w_1^{Y} + x_h^{U} \cdot w_1^{U}$$

$$s_{h,2} = x_h^{\pi} \cdot w_2^{\pi} + x_h^{Y} \cdot w_2^{Y} + x_h^{U} \cdot w_2^{U}$$

where x_h^{π} is household h expectation about inflation, x_h^{Y} is household h expectation about output growth, and x_h^{U} is household h expectation about the unemployment rate.

As a consequence, we have reduced the dimension of our data from $\boldsymbol{X}$ with dimension $H \times 3$ to $\boldsymbol{S}$ with dimension $H \times 2$ while retaining most of the original variation.

4.2 Baseline Results

In our baseline analysis, we perform the PCA pooling all data across time and countries; i.e. our raw data matrix $\boldsymbol{X}$ has dimensions $(H \times T) \times E$, where $H \times T = 341,453$ is the total number of households across all $T = 27$ months, and $E = 10$ is the number of expectations about the variables under exam. Notice that this means that, in our baseline

Table 2: Loadings from the PCA that pools data across time and countries

	Component 1	Component 2
E(Economic Growth)	0.31	0.21
E(Inflation Rate)	-0.46	0.27
E(Inflation Rate 3Y)	-0.44	0.31
E(House Price Growth)	-0.23	0.42
E(Unemployment Rate)	-0.31	0.10
E(Interest Rate on Mortgages)	-0.23	0.15
E(Own Income Growth)	0.19	0.55
E(Own Financial Situation)	0.38	0.39
E(Own Credit Access)	0.33	0.29
E(Own Durable Spending)	0.04	0.20
% Variance Explained	25.22	15.38

Note: The analysis pools together data from all time periods and all countries, and the sample covers the period from September 2020 to November 2022. All expectations are asked on a monthly basis and are based on a 12 months horizon except for "E(Inflation Rate 3Y)", which instead refers to a 3 years horizon. All expectations are provided as numerical values, except for own durable spending (where a dummy variable indicates whether the household plans to buy durables), own credit access (measured on a 1 to 5 qualitative scale), and own financial situation (measured on a 1 to 5 qualitative scale). All expectations are residualized using regression (1).

analysis, we are not using the time dimension.[5] In Section 4.3 we present a robustness exercise where we repeat our analysis in each time period and show that the results are consistent over time.

Table 2 presents the findings of our analysis on the first $K = 2$ principal components, which account for more than 40% of the total variance.[6] The first takeaway is that the first principal component offers a supply-side perspective of macroeconomic developments. Households expecting economic growth also forecast lower inflation and house prices, indicating that supply-side shocks may be expected in the economy.[7] The second takeaway is that the second principal component is a demand-side view of macroeconomic dynamics. Households forecasting economic growth also expect higher inflation, suggesting demand-side business cycles.

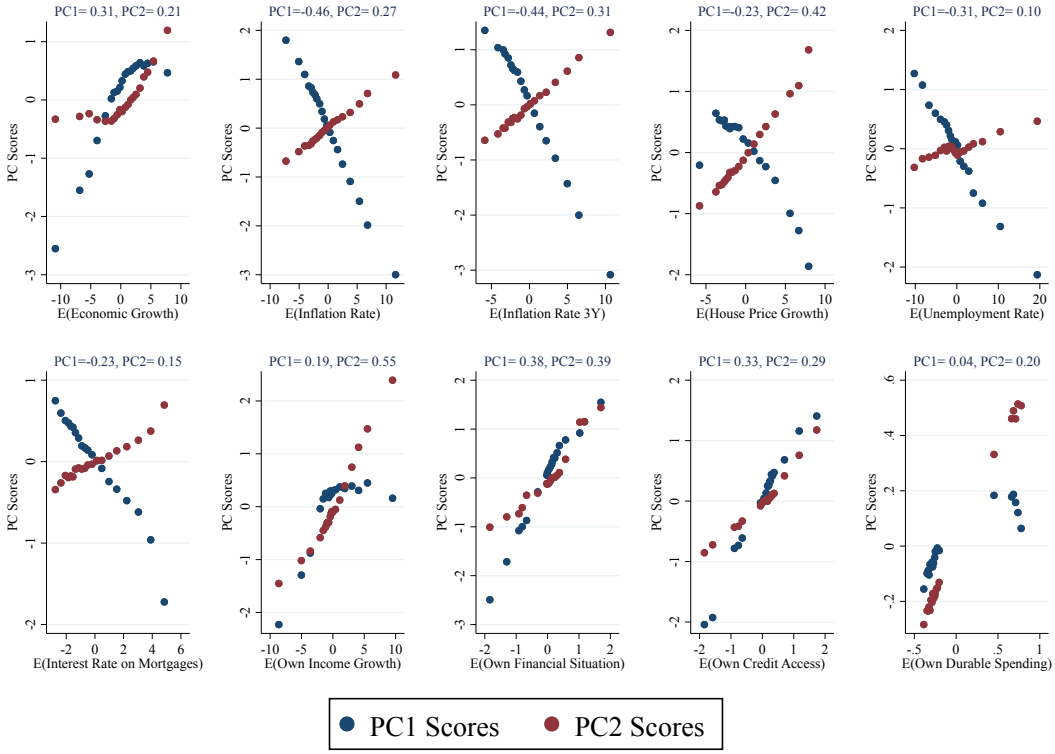
Our findings also demonstrate that the perceived supply-side source of business cycle fluctuation, as represented by the first principal component, is the most significant factor in explaining the variation in the data. The first component alone explains over 25%

[5]Models that exploit the time dimensions, such as dynamic factor models, require for identification many more time observations than what we have in our sample.

[6]The third principal component only contributes with 11% of additional variance and for this reason we only focus on the first two components.

[7]What matters is not the absolute sign of the principal component but the relative one across loadings. Therefore, we interpret the first component as a generic supply-side (e.g., an oil shock) force rather than a "positive" supply-side force (e.g., an oil shock that decreases inflation and improves aggregate activity).

Figure 3: Pairwise correlations between principal component scores and expectations



Note: The circles show the mean of the y-axis variables (first (in blue) and second (in red) household-level principal component scores extracted from (2)) for 50 bins of the x-axis variable (household-level expectations residualized using regression (1)). The analysis pools together data from all time periods and all countries, and the sample covers the period from September 2020 to November 2022. All expectations are asked on a monthly basis and are based on a 12 months horizon except for "E(Inflation Rate 3Y)", which instead refers to a 3 years horizon. All expectations are provided as numerical values, except for own durable spending (where a dummy variable indicates whether the household plans to buy durables), own credit access (measured on a 1 to 5 qualitative scale), and own financial situation (measured on a 1 to 5 qualitative scale).

of the total variance, indicating the relatively stronger influence of household perceived supply-side forces compared to demand-side ones, at least within the sample considered here.

4.2.1 Interpreting the Principal Component Scores

Recall that, as highlighted in equation (2), the principal component scores are summary measures of household expectations. A non-parametric way to look at the components in Table 2 is by plotting both the first and second principal component scores against the expectations (as residualized through equation (1)), and Figure 3 displays such pairwise correlations. The circles show the mean of the y-axis variable (blue for the first principal component scores, red for the second principal component scores) for 50 bins of the x-axis

variable (residualized expectations). Notice that the principal components (the loadings $\boldsymbol{w}$ of Section 4.1) represent the slopes in each of the graphs by construction.

Households with higher values of the first principal component scores tend to expect: a) higher output growth, b) lower inflation and house price growth, c) lower unemployment rate, d) lower interest rates on mortgages, e) higher own income growth, f) higher own financial situation, g) higher probability of accessing credit, and h) higher probability of buying durables. Therefore, the first principal component scores can be considered as a supply-side force (e.g., an oil shock) hitting the economy over the following 12 months.

Conversely, households with higher values of the second principal component scores tend to expect: a) higher output growth, b) higher inflation and house price growth, c) higher unemployment rate,[8] d) higher interest rates on mortgages, e) higher own income growth, f) higher own financial situation, g) higher probability of accessing credit, and h) higher probability of buying durables. Therefore, the second principal component score can be considered a demand-side source of business cycle fluctuations, possibly resulting from factors such as monetary policy shocks.

An important feature of the principal component scores is that they are orthogonal to each other by construction. Figure 4 plots the mean of the first principal component score for 50 bins of the second principal component score. Although the regression line coincides with the horizontal axis (again because the two principal component scores are orthogonal), it is interesting to note that there exist observations that span all four quadrants of the graph. Examining the relationship between scores and expected inflation and expected economic growth, we can classify each quadrant into high and low values of each expectation. Therefore, household-level principal component scores reflect the significance they attach to the various sources of future business cycle dynamics, and the combination of scores provides us with joint values of expectations for each household.

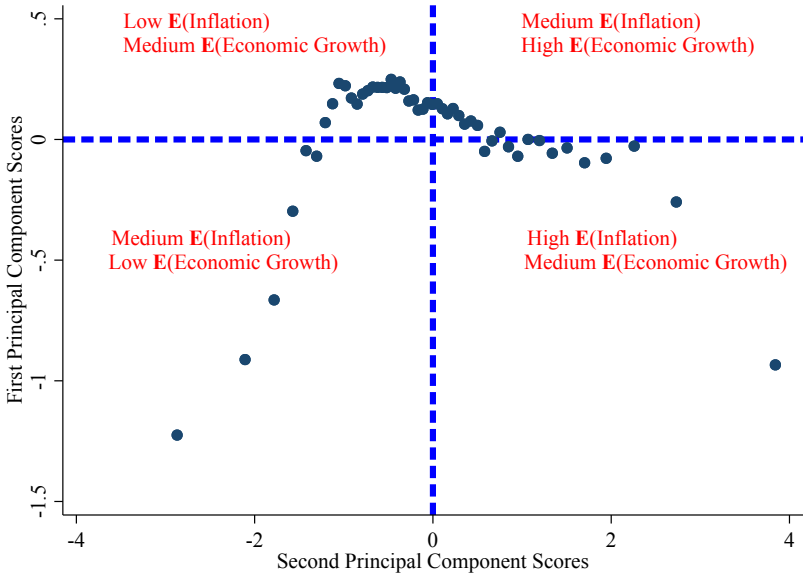
4.2.2 Principal Component Scores and Household Characteristics

Table 3 displays the results of simple OLS regressions of each principal component score on household observable characteristics,[9] shedding light on who are the households holding stronger supply-side and demand-side views of macroeconomic dynamics. We run the

[8] Intuitively, households expecting higher growth of the economy should also be expecting lower unemployment rates. This does not happen with the second principal component, but it is worth mentioning that the loading on unemployment w_2^U is relatively small, meaning that unemployment expectations get very little weight in determining the second principal component scores. Table 4 in Section 4.4 shows that this result is mostly driven by Italian households.

[9] Recall that all household observable characteristics are asked only once (in the background questionnaire) and thus do not change over time.

Figure 4: Diagram of PC scores and relation to expected inflation and economic growth



Note: The blue circles show the mean of the y-axis variables (first principal component score) for 50 bins of the x-axis variable (second principal component score). The scores divide the graph into four quadrants, which relates to the joint distribution of expectations.

following specification:

$$s_{k,h,c} = \alpha + \boldsymbol{\gamma} \boldsymbol{x}_{h,c} + \epsilon_{k,h,c}; \qquad k = 1, 2 \tag{3}$$

where $s_{k,h,c}$ is the kth principal component score (either the first or the second) for household h in country c, and $\boldsymbol{x}_{h,c}$ is a vector of household observable characteristics including age groups, education level, gender, housing tenure status, labor status, income level, and liquidity status.

The findings suggest that there exist associations between the observable characteristics of households and their perceived sources of business cycle dynamics. While the coefficients for the first and second score are mostly comparable, there are two noteworthy distinctions.

First, households with a tertiary education, compared to those with secondary education, tend to have a higher first principal component score, but not necessarily a higher second score. This suggests that households with a relatively higher level of education generally anticipate a stronger economic growth rate while projecting lower inflation. In other words, more educated households are more likely to adopt a supply-side perspective when considering fluctuations in the business cycle.

Second, homeowners with a mortgage, as opposed to those who have paid off their mortgage, tend to expect a lower economic growth rate when predicting higher inflation. Therefore, similarly to more educated households, homeowners with a mortgage are more

Table 3: Relation between principal components scores and household characteristics

	Principal Component Scores	
	First	Second
Age 35-49	-0.3310***	-0.0800***
	(0.0080)	(0.0070)
Age 50-64	-0.6123***	-0.1104***
	(0.0083)	(0.0071)
Age 65+	-0.5878***	-0.1214***
	(0.0141)	(0.0120)
Education: Primary	0.1070***	0.0424***
	(0.0125)	(0.0101)
Education: Tertiary	0.0584***	-0.0085
	(0.0080)	(0.0068)
Male	0.2592***	0.0197***
	(0.0072)	(0.0057)
Mortgaged Homeowner	-0.0597***	-0.0095
	(0.0090)	(0.0073)
Renter	-0.0551***	0.1064***
	(0.0096)	(0.0074)
Working full	-0.0352***	-0.0154**
	(0.0084)	(0.0076)
Working part	-0.1174***	0.0466***
	(0.0112)	(0.0099)
Income	0.2291***	0.0841***
	(0.0069)	(0.0058)
Has Liquidity	0.6256***	0.2941***
	(0.0088)	(0.0073)
Observations	341453	341453
R^2	0.079	0.018

Note: Results from simple OLS regressions of principal component scores on household observables. The left column displays the coefficient of the regression of the first principal component score on household characteristics; the right column displays the coefficient of the regression of the second principal component score on household characteristics. The coefficients on the age groups are defined relative to the younger households (18-34 years old). The coefficient on male households is defined relative to female households. The coefficients on ISCED education are defined relative to secondary education. The coefficients on renters and mortgaged homeowners are defined relative to outright homeowners. The coefficients on working full-time and part-time are defined relative to households not working at all. "Has Liquidity" measures whether the household has enough liquidity to pay for an unexpected event equal to 1 month of her income, and in this analysis it is the only variable asked regularly and not just once.

inclined to expect supply-side shocks to impact the economy.

Repeating the PCA only on specific subgroups of the population identified from Table 3 (such as on highly educated households or mortgaged homeowners) barely changes our baseline findings in terms of both loadings and variance explained. To confirm this result, we repeat the baseline PCA but instead of using the residuals from equation (1) we use residuals from the following individual fixed-effect regression:

$$\mathbb{E}y_{h,t} = \alpha_h + \alpha_t + \epsilon_{h,t} \tag{4}$$

where $\mathbb{E}y_{h,t}$ is the value of the expectation about a variable y for household h in month t, α_h is an household fixed effect, and α_t is the month fixed effect.

In Appendix A, Table A.4 displays the outcomes of the PCA after the removal of individual fixed effects from expectations through equation (4). The findings are comparable to the baseline results in Table 2, including the loadings of the two principal components in terms of magnitude. The primary distinction is that the total variance explained decreases to approximately 32%. This is unsurprising as eliminating individual fixed effects reduces the dispersion of expectations, making it more challenging for the two principal components to account for the same amount of total variance.

Overall, these results imply that the identification of perceived sources of business cycle dynamics does not depend on household characteristics that do not vary over time such as education or age groups. Subsequently, we investigate the findings of the PCA when conducted separately for each month.

4.3 Results Month-by-Month

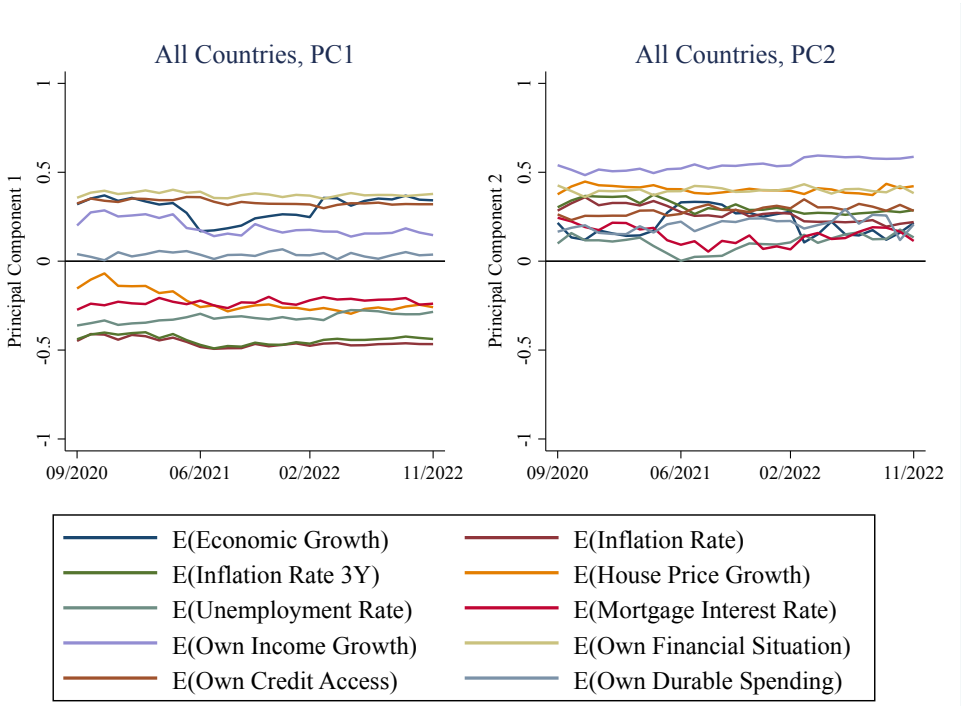
To assess the robustness of our findings from Section 4.2, where we analyzed all the months in our data together, we examine whether the results remain consistent when we conduct our analysis on each month separately.

Figure 5 plots the loadings over time, as computed from the PCA performed on a monthly basis. Remarkably, the benchmark patterns observed in Table 2 are confirmed and largely stable over time, indicating that in each month since September 2020 households have been expecting supply-side shocks to be more important that demand-side shocks for the evolution of the business cycle. For this reason, these results are not driven by specific events in any particular month such as COVID-related restrictions or the Russia-Ukraine conflict.

There are, however, some small fluctuations in a few of the weights. For instance, when examining the first principal component (left panel), we observe a decline in the weight assigned to expected economic growth during the latter half of 2021, while the weight assigned to expected house price growth has been increasing in magnitude over time. Nonetheless, the majority of weights remain stable over the entire sample period.

Finally, we again relate observable household characteristics to the scores computed when we run the PCA separately for each month. Figures A.1-A.2 in Appendix A show that the results highlighted in Table 3 are fairly consistent over time, indicating that the strong relationship between the observable characteristics of households and their perceived sources of macroeconomic dynamics are not driven by specific time periods.

Figure 5: Evolution of the principal components over time



Note: The figure plots the evolution of the first principal component (left panel) and the second principal component (right panel) over time after we perform the PCA in each month separately between September 2020 and November 2022.

4.4 Results Country-by-Country

We seek to investigate if the findings from Section 4.2-4.3, which pooled households across all six countries in the data for PCA analysis, change when the analysis is conducted separately for each country. Table 4 displays the results of this analysis, indicating that the principal components, which identify supply- and demand-side sources of macroeconomic developments, are highly consistent across countries both quantitatively and in terms of variance explained.[10]

The results reveal that the interpretation of the components from Section 4.2 remains unchanged in each country. The first component reflects a supply-side perspective of macroeconomic developments, as households anticipate high economic growth with lower inflation. The second component represents a demand-side view of business cycle fluctuations, as households predict higher inflation with an improved economic outlook. Moreover, the variance explained by each factor is comparable across countries, ranging from 24.6%

[10]There is one exception to this consistency. Intuition would suggest a negative loading on unemployment rate for the second principal component consistent with the positive loading on economic growth. While this is true in most cases, that is not the case in, e.g., Italy, where the loading on unemployment rate is positive and even larger in absolute value than the loading on economic growth. This is the reason why the loading on unemployment rate for the baseline analysis (pooling households from all countries) in Table 2 from Section 4.2 is (weakly) positive instead of negative.

Table 4: Results from the PCA run in each country separately, pooling data across time

	DE		BE		ES		FR		IT		NL	
	PC1	PC2	PC1	PC2	PC1	PC2	PC1	PC2	PC1	PC2	PC1	PC2
E(Economic Growth)	0.31	0.24	0.31	0.04	0.27	0.28	0.32	0.20	0.32	0.14	0.29	0.18
E(Inflation Rate)	-0.46	0.28	-0.45	0.23	-0.47	0.26	-0.46	0.24	-0.44	0.28	-0.45	0.33
E(Inflation Rate 3Y)	-0.42	0.32	-0.45	0.23	-0.45	0.31	-0.45	0.30	-0.43	0.32	-0.44	0.37
E(House Price Growth)	-0.31	0.40	-0.30	0.39	-0.25	0.40	-0.29	0.45	-0.12	0.44	-0.26	0.45
E(Unemployment Rate)	-0.27	-0.04	-0.29	0.10	-0.35	0.03	-0.25	0.09	-0.34	0.18	-0.30	-0.00
E(Interest Rate on Mortgages)	-0.19	0.10	-0.23	0.11	-0.25	0.11	-0.16	0.11	-0.27	0.20	-0.20	-0.05
E(Own Income Growth)	0.14	0.56	0.13	0.59	0.15	0.57	0.19	0.54	0.25	0.53	0.22	0.48
E(Own Financial Situation)	0.42	0.33	0.36	0.43	0.35	0.42	0.39	0.40	0.38	0.39	0.38	0.38
E(Own Credit Access)	0.34	0.29	0.34	0.36	0.33	0.25	0.35	0.30	0.33	0.26	0.36	0.27
E(Own Durable Spending)	0.00	0.27	0.05	0.25	0.06	0.13	-0.03	0.23	0.08	0.17	0.07	0.26
% Variance Explained	24.90	15.08	27.89	13.71	25.25	16.98	25.57	15.34	26.43	15.45	24.58	15.23

Note: The analysis pools together data from all time periods and is performed in each country separately. The sample goes from September 2020 to November 2022. All expectations are asked on a monthly basis and are based on a 12 months horizon except for "E(Inflation Rate 3Y)", which instead refers to a 3 years horizon. All expectations are provided as numerical values, except for own durable spending (where a dummy variable indicates whether the household plans to buy durables), own credit access (measured on a 1 to 5 qualitative scale), and own financial situation (measured on a 1 to 5 qualitative scale). All expectations are residualized using regression (1).

in the Netherlands to 27.9% in Belgium for the supply-side factor, and from 13.7% in Belgium to 17% in Spain for the demand-side factor. The total variance explained is approximately 40% in each country.

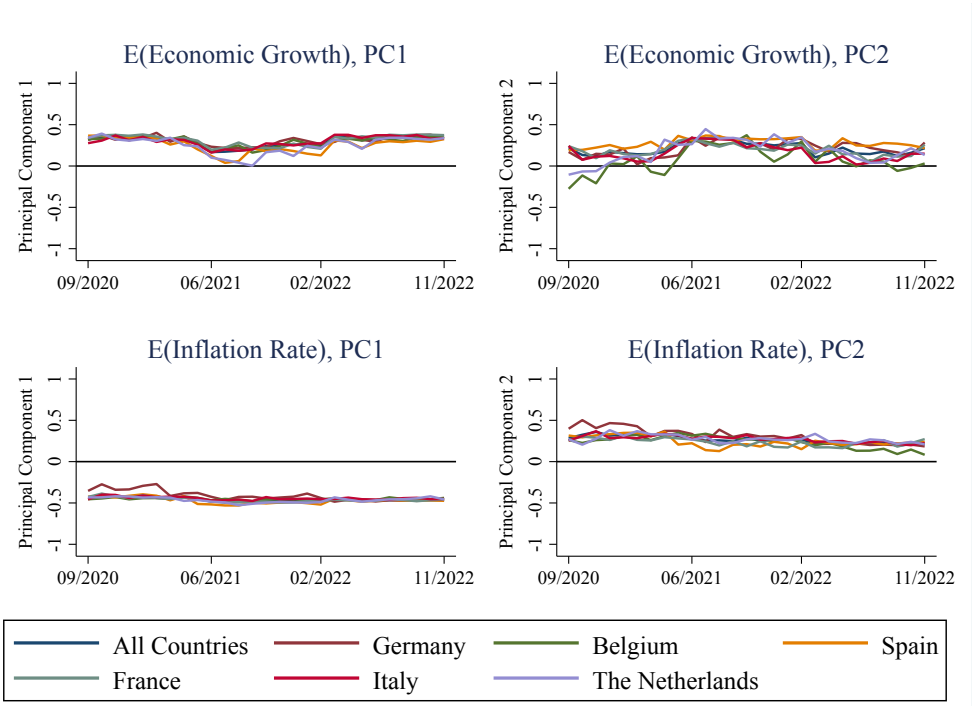
We finally run the PCA for each month and country separately, and Figure 6 plots the loadings on expected economic growth and expected inflation separately. The results are remarkably stable both across countries and over time, confirming that households across countries perceive the business cycle in an overall similar fashion.

The findings in this section suggests that the country of origin does not drive the household perceived sources of business cycle fluctuations. We next study how such perceived sources of macroeconomic developments relate to household decisions on real outcomes such as consumption and savings.

5 Linking Expectations to Consumption and Savings

In this section, our aim is to explore the relationship between household expectations, as represented by the principal component scores identified in Section 4, and their consumption expenditures and savings decisions. These scores, which capture the perceived sources of macroeconomic dynamics, are orthogonal to one another, providing independent variations in household spending and savings decisions. As a result, our analysis sheds light on how perceived supply- and demand-side shocks to the economy relate to household decisions

Figure 6: Evolution of specific loadings of the principal components over time in each country



Note: The figure plots the evolution of the loadings of expected economic growth (top panels) and expected inflation rate (bottom panels) in the first principal component (left panels) and the second principal component (right panels). The loadings results from a PCA run for each month and country separately between September 2020 and November 2022.

and, in turn, to the macroeconomy.

Our preferred specification is the following fixed-effect (FE) regression:

$$y_{h,c,t} = \alpha_h + \alpha_t + \alpha_{c,t} + \beta_1 s_{1,h,c,t} + \beta_2 s_{2,h,c,t} + \boldsymbol{\gamma} \boldsymbol{x}_{h,c,t} + \epsilon_{h,c,t} \tag{5}$$

where $y_{h,c,t}$ is the outcome of interest for household h in country c and month t (consumption and savings), $s_{1,h,c,t}$ and $s_{2,h,c,t}$ are the two principal component scores, $\boldsymbol{x}_{h,c,t}$ is a set of household-level controls, α_i is the household FE, α_t is the month FE, and $\alpha_{c,t}$ are the country-month FEs. The scores $s_{1,h,c,t}$ and $s_{2,h,c,t}$ in equation (5) are computed from the PCA by month of Section 4.3, and are rescaled so that a unit increase in each score is associated with a 1 percentage point increase in expected economic growth. The household-level controls $\boldsymbol{x}_{h,c,t}$ contain a measure of liquidity, with or without lags depending on the timing of the dependent variable, measuring whether the household has enough liquidity to pay for an unexpected event equal to 1 month of her income.[11]

[11]The monthly survey question is the following: "*Please think about your available financial resources, including access to credit, savings, loans from relatives or friends, etc. Suppose that you had to make an unexpected payment equal to one month of your household income. Would you have sufficient financial resources to pay for the entire amount?*".

Together with the FE specification of equation (5), we also estimate its pooled counterpart. This involves utilizing the scores $s_{1,h,c,t}$ and $s_{2,h,c,t}$ generated from the baseline PCA outlined in Section 4.2, where households from all months of the sample are combined, and we again normalize the scores so that a unit increase in each of them is associated with a 1 percentage point increase in expected output growth. By employing this specification, we have the ability to explicitly control in $\boldsymbol{x}_{h,c,t}$ for household characteristics that remain constant over time, such as disposable income, age, gender, education, homeownership status, employment status, household size, and region of residence.

5.1 Results on Realized Spending

We now discuss the connection between the principal component scores and spending on nondurable goods and services as well as past decisions to purchase durable goods. Nondurable spending is surveyed quarterly and includes spending on nondurable goods and services in the month preceding the interview. To make spending comparable across different countries, a purchasing power parity adjustment is performed, and logarithmic transformation is used. Spending on durables is surveyed quarterly since the start of 2021 using a dummy variable that captures whether households spent on durable goods in the month prior to the interview. The variable includes spending on cars, home appliances, and luxury items but excludes house purchases, holidays, and other major items. Further information on these variables are provided in Section 2.2, and Table 1 provides descriptive statistics.

To ensure the principal component scores precede spending in time, they are lagged twice along with the liquidity variable. The regression results in Table 5 show that the two principal component scores, capturing supply and demand shocks, have opposite effects on nondurable spending. In the fixed effects specification, a unit increase in the first score decreases spending by 0.45%. On the contrary, a unit increase in the second score increases spending by 0.73%. Recall that the first and second principal component scores are comparable because they are both normalized to a 1 percentage point increase in economic growth. Therefore, supply and demand shocks have opposite effects on nondurable spending, which must be explained by the way households forecast inflation, along with house price growth and interest rates (recall from Table 2 that the loadings of the first and second principal components imply opposite correlation between quantities and prices). Households that forecast lower growth of prices in the economy tend to spend less on nondurables and services (as indicated by the negative coefficient on the first score), whereby households that forecast higher growth of prices tend to spend more (as indicated by the positive coefficient on the second score).

Regarding durable consumption, the fixed effects specification does not show any

Table 5: OLS and FE Regression Estimates for Realized Spending

	Nondurable Spending$_{t-1}$		Spent on Durables$_{t-1}$ (0-1)	
	Pooled	FE	Pooled	FE
PC1 Scores$_{t-2}$	-0.0189***	-0.0045**	-0.0031***	0.0019
	(0.0013)	(0.0021)	(0.0009)	(0.0017)
PC2 Scores$_{t-2}$	0.0301***	0.0073***	0.0181***	0.0047**
	(0.0023)	(0.0026)	(0.0016)	(0.0021)
Has Liquidity$_{t-2}$	0.0467***	0.0062	0.0215***	-0.0034
	(0.0094)	(0.0103)	(0.0056)	(0.0074)
Has Liquidity$_{t-1}$	0.0613***	0.0082	0.0356***	0.0212***
	(0.0093)	(0.0105)	(0.0055)	(0.0071)
Demographic Controls	Yes	No	Yes	No
Household FE	No	Yes	No	Yes
Wave FE	Yes	Yes	Yes	Yes
Country x Wave FE	Yes	Yes	Yes	Yes
Observations	81,961	81,954	81,961	81,954
R^2	0.2062	0.0104	0.0288	0.0133

Note: The table presents results from estimating equation (5) and the OLS pooled counterpart. The first dependent variable measures the log of spending on nondurable goods and services undergone in the previous month; the second dependent variable measures whether the household bought any durable goods in the previous month. "PC1 Scores" and "PC2 Scores" refer to first and second principal component scores; we normalize them so that in each different specification (each column of the table), a unit increase in them is associated with a 1 percentage point increase in expected output growth. In the pooled specifications, the scores are identified from the baseline PCA of Section 4.2. In the fixed-effect specifications, the scores are identified from the PCA run separately in each month of Section 4.3. "Has Liquidity" measures whether the household has enough liquidity to pay for an unexpected event equal to 1 month of her income.

significant result for the first score, but it does so for the second score. A unit increase in the second score is associated with an increase the probability of spending on durables by around 0.5 percentage points. Combining the results for realized spending, we conclude that an increase in the supply-side view of macroeconomic dynamics (associated with an increase in expected output growth) tend to decrease nondurable spending. In contrast, an increase in the demand-side view of macroeconomic dynamics (associated with an increase in expected output growth) tend to increase both nondurable spending and the likelihood of spending on durables.

5.2 Results on Planned Spending and Savings

We now examine how expectations relate to planned spending and savings. To construct precautionary savings, we use a quarterly survey question that asks households how much they think they need to save in order to deal with unexpected events. To make euro values comparable across countries, we adjust for purchasing power parity and take the

Table 6: OLS and FE Regression Estimates for Planned Spending and Savings

	Precautionary Savings		$\mathbb{E}$(Spending Growth)	
	Pooled	FE	Pooled	FE
PC1 Scores$_t$	-0.0058**	0.0153***	-0.5851***	-0.3492***
	(0.0024)	(0.0034)	(0.0059)	(0.0136)
PC2 Scores$_t$	0.0343***	0.0000	0.6539***	0.4117***
	(0.0043)	(0.0050)	(0.0105)	(0.0180)
Has Liquidity$_t$	0.6964***	0.2021***	0.4868***	0.2997***
	(0.0127)	(0.0218)	(0.0235)	(0.0395)
Demographic Controls	Yes	No	Yes	No
Household FE	No	Yes	No	Yes
Wave FE	Yes	Yes	Yes	Yes
Country x Wave FE	Yes	Yes	Yes	Yes
Observations	107,531	107,522	288,430	288,416
R^2	0.1615	0.0412	0.2027	0.0878

Note: The table presents results from estimating equation (5) and the OLS pooled counterpart. The first dependent variable measures how much households think they need to put aside in total savings to deal with unexpected events, it is PPP-adjusted and transformed in logs. The second dependent variable measures the growth in expected spending within the following 12 months. "PC1 Scores" and "PC2 Scores" refer to first and second principal component scores; we normalize them so that in each different specification (each column of the table), a unit increase in them is associated with a 1 percentage point increase in expected output growth. In the pooled specifications, the scores are identified from the baseline PCA of Section 4.2. In the fixed-effect specifications, the scores are identified from the PCA run separately in each month of Section 4.3. "Has Liquidity" measures whether the household has enough liquidity to pay for an unexpected event equal to 1 month of her income.

logarithmic transformation. To construct expected spending growth, we use a monthly survey question that asks households about their expected change in total spending over the next 12 months. We do not include this last expectation in our PCA of Section 4 because a significant number of households do not answer this question each month, but still we find it informative to use it as a dependent variable in this regression analysis. Section 2.2 provides further information on these variables and Table 1 provides descriptive statistics.

The regression results in Table 6 indicate that the principal component scores are associated with planned spending and savings. Again in each specification, the first and second principal component scores are normalized so that a unit increase in either of them is associated with a 1 percentage point increase in expected economic growth. Under the FE specification, a unit increase in the first score is associated with a 1.5% increase in precautionary savings and a decrease in expected spending growth of 0.35 percentage points. Conversely, a unit increase in the second score is not associated with precautionary savings but is related to an increase in expected spending growth of 0.41 percentage points.

These results on expected spending are consistent with those on realized spending of

Table 5: they tend to be related to inflation (as well as house price growth and interest rate) expectations. Households who expect higher inflation (and therefore have a lower first score) tend to increase their nondurable spending and their expected total spending. However, only supply-side shocks – as summarized by the first principal component score – are associated with precautionary savings. Taken together, the results from Tables 5-6 show that the joint distribution of expectations, as summarized by the principal component scores, move with consumption and precautionary savings. On one hand, an increase in the supply-side shock (that is, a higher first principal component score) tend to decrease realized nondurable spending and planned total spending while increasing precautionary savings. On the other hand, an increase in the demand-side shock (that is, a higher second principal component score) tend to increase realized and planned spending, but is not associated with precautionary savings.

6 Conclusions

Household expectations about a wide range of aggregate and individual level variables are correlated. Identifying the drivers behind them – and the ways households perceive the sources of macroeconomic dynamics – is crucial to inform policy and the communication to the public.

Two principal components explain a large fraction of the variance of the joint distribution of expectations. The first component reflects a supply-side view of future macroeconomic developments, whereby households associate higher growth of the economy with lower inflation. The second components, instead, reflects a demand-side view, leading households to forecast an improve of the economy together with an increase in inflation.

A fixed-effect panel analysis shows that supply and demand shocks, normalized to an equal increase in expected economic growth, relate to opposite movements in realized consumption. This means that, regardless of economic growth expectations, households with higher inflation (as well as house price growth and interest rate) expectations tend to systematically spend more on nondurables than households with lower inflation expectations. These results reinforce the idea that inflation expectations matter for the level of consumption in the economy, and thus managing inflation expectations is crucial to achieve price stability.

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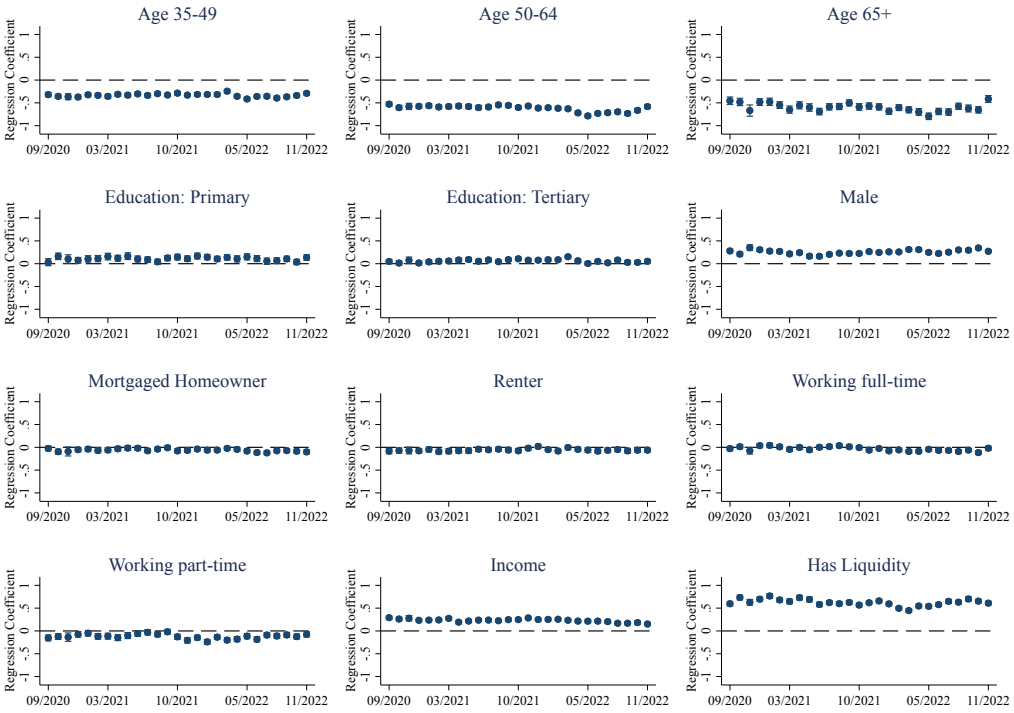
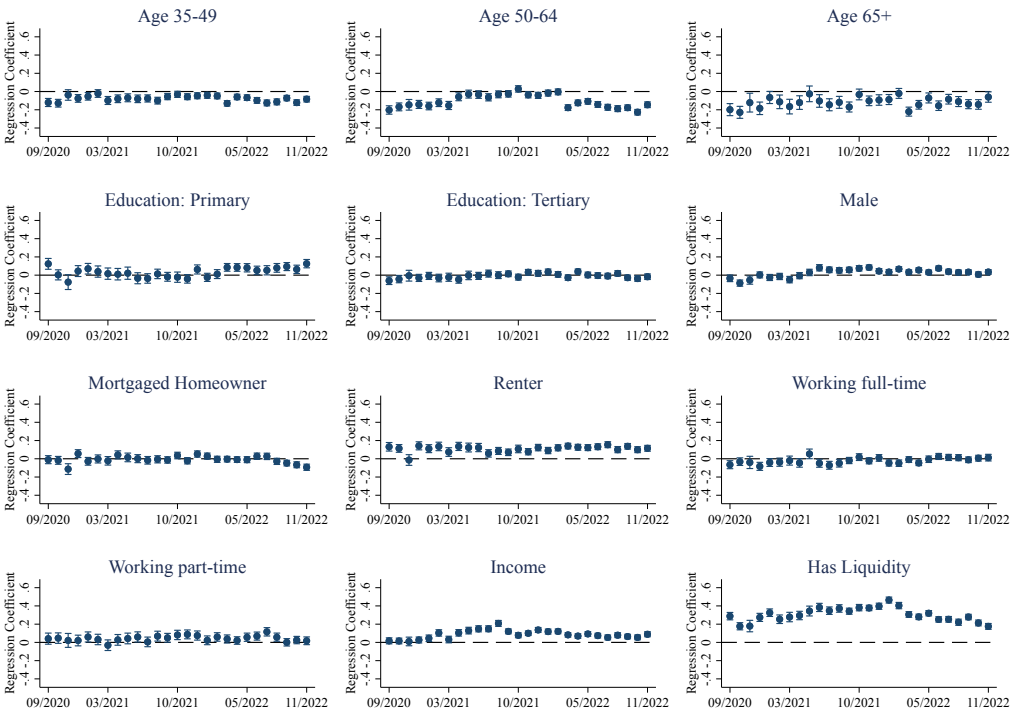
Appendix A Additional Figures and Tables

Figure A.1: Relationship over time between first PC scores and household observables



Note: Each month, we perform a PCA as discussed in Section 4.3 and regress the resulting first principal component score on household observables. The coefficients on the age groups are defined relative to the younger households (18-34 years old). The coefficient on male households is defined relative to female households. The coefficients on ISCED education are defined relative secondary education. The coefficients on renters and mortgaged homeowners are defined relative to outright homeowners. Finally, the coefficients on working full-time and part-time are defined relative to households not working at all.

Figure A.2: Relationship over time between second PC scores and household observables



Note: Each month, we perform a PCA as discussed in Section 4.3 and regress the resulting second principal component score on household observables. The coefficients on the age groups are defined relative to the younger households (18-34 years old). The coefficient on male households is defined relative to female households. The coefficients on ISCED education are defined relative secondary education. The coefficients on renters and mortgaged homeowners are defined relative to outright homeowners. Finally, the coefficients on working full-time and part-time are defined relative to households not working at all.

Table A.1: Descriptive statistics over the whole sample for Belgium and France

	Mean	p10	Median	p90	N
Belgium					
Age	49.76	26.00	42.00	80.00	33,172
Disposable Income	37,035.69	17,500.00	35,000.00	67,500.00	33,172
Nondurable Spending	16,931.58	6,180.00	16,800.00	27,360.00	11,376
Spent on Durables (0-1)	0.17	0.00	0.00	1.00	8,229
Precautionary Savings	8,090.87	500.00	5,200.00	22,000.00	10,262
E(Economic Growth)	-2.36	-10.00	-0.50	3.00	33,172
E(Inflation Rate)	4.09	0.00	3.00	10.00	33,166
E(Inflation Rate 3Y)	3.30	0.00	2.20	8.90	32,660
E(House Price Growth)	2.60	0.00	2.00	7.00	33,172
E(Unemployment Rate)	14.41	5.00	11.00	30.00	33,172
E(Interest Rate on Mortgages)	3.07	1.00	2.70	5.50	27,924
E(Own Income Growth)	0.52	-3.00	0.00	4.00	33,172
E(Own Spending Growth)	3.22	0.00	2.00	10.00	26,603
E(Own Durable Spending)	0.24	0.00	0.00	1.00	33,078
E(Own Credit Access)	2.57	1.00	3.00	3.00	31,994
E(Own Financial Situation)	2.66	1.00	3.00	4.00	33,172
France					
Age	50.30	26.00	42.00	80.00	82,454
Disposable Income	35,579.36	17,500.00	35,000.00	55,000.00	82,454
Nondurable Spending	18,065.41	7,800.00	17,640.00	28,920.00	27,589
Spent on Durables (0-1)	0.16	0.00	0.00	1.00	21,748
Precautionary Savings	7,685.86	520.00	5,000.00	20,000.00	23,574
E(Economic Growth)	-1.48	-8.00	0.00	3.50	82,454
E(Inflation Rate)	3.24	0.00	2.00	10.00	82,451
E(Inflation Rate 3Y)	2.74	0.00	2.00	8.00	81,425
E(House Price Growth)	2.08	0.00	0.10	7.00	82,454
E(Unemployment Rate)	10.19	6.00	9.50	15.70	82,454
E(Interest Rate on Mortgages)	2.88	1.00	2.50	6.00	72,943
E(Own Income Growth)	0.14	-4.00	0.00	4.50	82,454
E(Own Spending Growth)	2.01	0.00	0.00	8.10	67,750
E(Own Durable Spending)	0.25	0.00	0.00	1.00	82,255
E(Own Credit Access)	2.74	1.00	3.00	4.00	81,343
E(Own Financial Situation)	2.76	2.00	3.00	4.00	82,454

Note: "Age" is provided in four brackets ([18-34], [35-49], [50-64], 65+), and we assign the median value to each household. "Disposable Income" refers to the 12 months preceding the interview and it is PPP-adjusted. "Nondurable Spending" is asked at a quarterly frequency, it refers to spending on nondurable goods and services in the month preceding the interview, and it is annualized and PPP-adjusted. "Spent on Durables (0-1)" is asked at a quarterly frequency, and is a dummy variable capturing whether households have spent on durable goods in the month preceding the interview. "Precautionary Savings" is asked at a quarterly frequency, it refers to the amount households think they need to put aside in total savings to deal with unexpected events, and it is PPP-adjusted. All expectations are asked on a monthly basis and are based on a 12 months horizon except for "E(Inflation Rate 3Y)", which instead refers to a 3 years horizon. All expectations are provided as numerical values, except for own durable spending (where a dummy variable indicates whether the household plans to buy durables), own credit access (measured on a 1 to 5 qualitative scale), and own financial situation (measured on a 1 to 5 qualitative scale). The sample for all variables in the table covers the period from April 2020 to November 2022, except for the expectation concerning the interest rate on mortgages, which starts in September 2020.

Table A.2: Descriptive statistics over the whole sample for Germany and Italy

	Mean	p10	Median	p90	N
Germany					
Age	50.66	26.00	57.00	80.00	79,827
Disposable Income	38,774.43	12,500.00	35,000.00	67,500.00	79,827
Nondurable Spending	19,837.12	9,276.00	19,440.00	31,200.00	26,976
Spent on Durables (0-1)	0.20	0.00	0.00	1.00	21,069
Precautionary Savings	7,417.51	600.00	4,400.00	20,000.00	23,575
E(Economic Growth)	-0.26	-5.00	0.00	4.50	79,827
E(Inflation Rate)	3.41	0.00	2.50	8.80	79,826
E(Inflation Rate 3Y)	2.57	0.00	2.00	6.60	78,750
E(House Price Growth)	2.93	0.00	2.00	10.00	79,827
E(Unemployment Rate)	6.79	4.00	6.20	10.00	79,827
E(Interest Rate on Mortgages)	3.29	1.00	2.60	7.00	70,454
E(Own Income Growth)	0.91	-3.00	0.00	5.00	79,827
E(Own Spending Growth)	2.68	0.00	0.00	9.00	68,462
E(Own Durable Spending)	0.29	0.00	0.00	1.00	79,679
E(Own Credit Access)	2.97	2.00	3.00	4.00	78,751
E(Own Financial Situation)	2.90	2.00	3.00	4.00	79,827
Italy					
Age	51.70	26.00	57.00	80.00	86,786
Disposable Income	30,628.46	12,500.00	27,500.00	55,000.00	86,786
Nondurable Spending	15,542.04	6,000.00	15,120.00	25,200.00	29,380
Spent on Durables (0-1)	0.20	0.00	0.00	1.00	23,229
Precautionary Savings	8,198.99	500.00	5,000.00	22,000.00	26,407
E(Economic Growth)	-1.84	-12.00	0.00	6.00	86,786
E(Inflation Rate)	6.10	0.00	4.00	15.00	86,783
E(Inflation Rate 3Y)	4.90	0.00	3.00	15.00	85,718
E(House Price Growth)	1.76	-3.80	0.00	10.00	86,786
E(Unemployment Rate)	18.19	8.00	13.00	40.00	86,786
E(Interest Rate on Mortgages)	3.94	1.00	3.00	8.00	76,582
E(Own Income Growth)	0.11	-10.00	0.00	10.00	86,786
E(Own Spending Growth)	2.77	-1.00	0.00	10.00	74,932
E(Own Durable Spending)	0.34	0.00	0.00	1.00	86,651
E(Own Credit Access)	2.74	1.00	3.00	3.00	85,859
E(Own Financial Situation)	2.75	2.00	3.00	4.00	86,786

Note: "Age" is provided in four brackets ([18-34], [35-49], [50-64], 65+), and we assign the median value to each household. "Disposable Income" refers to the 12 months preceding the interview and it is PPP-adjusted. "Nondurable Spending" is asked at a quarterly frequency, it refers to spending on nondurable goods and services in the month preceding the interview, and it is annualized and PPP-adjusted. "Spent on Durables (0-1)" is asked at a quarterly frequency, and is a dummy variable capturing whether households have spent on durable goods in the month preceding the interview. "Precautionary Savings" is asked at a quarterly frequency, it refers to the amount households think they need to put aside in total savings to deal with unexpected events, and it is PPP-adjusted. All expectations are asked on a monthly basis and are based on a 12 months horizon except for "E(Inflation Rate 3Y)", which instead refers to a 3 years horizon. All expectations are provided as numerical values, except for own durable spending (where a dummy variable indicates whether the household plans to buy durables), own credit access (measured on a 1 to 5 qualitative scale), and own financial situation (measured on a 1 to 5 qualitative scale). The sample for all variables in the table covers the period from April 2020 to November 2022, except for the expectation concerning the interest rate, which starts in September 2020.

Table A.3: Descriptive statistics over the whole sample for Spain and the Netherlands

	Mean	p10	Median	p90	N
Spain					
Age	50.23	26.00	42.00	80.00	82,903
Disposable Income	29,254.52	12,500.00	22,500.00	55,000.00	82,903
Nondurable Spending	15,723.52	6,900.00	15,000.00	25,680.00	28,013
Spent on Durables (0-1)	0.18	0.00	0.00	1.00	21,969
Precautionary Savings	5,344.07	360.00	3,400.00	14,400.00	25,383
E(Economic Growth)	-0.87	-10.00	0.00	6.00	82,903
E(Inflation Rate)	4.34	0.00	3.00	10.50	82,898
E(Inflation Rate 3Y)	3.84	0.00	2.50	10.00	81,845
E(House Price Growth)	2.66	-1.40	2.00	10.00	82,903
E(Unemployment Rate)	17.06	9.10	15.30	28.00	82,903
E(Interest Rate on Mortgages)	3.58	1.00	3.00	8.00	73,279
E(Own Income Growth)	1.48	-5.00	0.00	10.00	82,903
E(Own Spending Growth)	2.33	-1.00	0.00	10.00	71,345
E(Own Durable Spending)	0.31	0.00	0.00	1.00	82,746
E(Own Credit Access)	2.77	1.00	3.00	4.00	82,386
E(Own Financial Situation)	2.92	2.00	3.00	4.00	82,903
Netherlands					
Age	49.51	26.00	42.00	80.00	31,242
Disposable Income	37,815.50	17,500.00	35,000.00	67,500.00	31,242
Nondurable Spending	17,690.49	7,800.00	17,340.00	27,900.00	10,822
Spent on Durables (0-1)	0.19	0.00	0.00	1.00	7,820
Precautionary Savings	5,833.45	300.00	3,600.00	16,000.00	9,790
E(Economic Growth)	-1.17	-7.00	0.00	3.50	31,242
E(Inflation Rate)	3.80	0.00	3.00	8.10	31,235
E(Inflation Rate 3Y)	2.86	0.00	2.30	6.20	30,814
E(House Price Growth)	2.97	0.00	2.50	8.00	31,242
E(Unemployment Rate)	8.29	2.90	6.00	18.00	31,242
E(Interest Rate on Mortgages)	3.07	1.20	2.80	5.10	26,280
E(Own Income Growth)	0.44	-3.20	0.00	3.80	31,242
E(Own Spending Growth)	2.62	0.00	2.00	7.00	26,938
E(Own Durable Spending)	0.30	0.00	0.00	1.00	31,138
E(Own Credit Access)	2.64	1.00	3.00	3.00	30,286
E(Own Financial Situation)	2.72	2.00	3.00	4.00	31,242

Note: "Age" is provided in four brackets ([18-34], [35-49], [50-64], 65+), and we assign the median value to each household. "Disposable Income" refers to the 12 months preceding the interview and it is PPP-adjusted. "Nondurable Spending" is asked at a quarterly frequency, it refers to spending on nondurable goods and services in the month preceding the interview, and it is annualized and PPP-adjusted. "Spent on Durables (0-1)" is asked at a quarterly frequency, and is a dummy variable capturing whether households have spent on durable goods in the month preceding the interview. "Precautionary Savings" is asked at a quarterly frequency, it refers to the amount households think they need to put aside in total savings to deal with unexpected events, and it is PPP-adjusted. All expectations are asked on a monthly basis and are based on a 12 months horizon except for "E(Inflation Rate 3Y)", which instead refers to a 3 years horizon. All expectations are provided as numerical values, except for own durable spending (where a dummy variable indicates whether the household plans to buy durables), own credit access (measured on a 1 to 5 qualitative scale), and own financial situation (measured on a 1 to 5 qualitative scale). The sample for all variables in the table covers the period from April 2020 to November 2022, except for the expectation concerning the interest rate, which starts in September 2020.

Table A.4: Results from the PCA using individual fixed-effect residuals

	Component 1	Component 2
E(Economic Growth)	0.26	0.33
E(Inflation Rate)	-0.55	0.22
E(Inflation Rate 3Y)	-0.52	0.30
E(House Price Growth)	-0.31	0.37
E(Unemployment Rate)	-0.27	-0.08
E(Interest Rate on Mortgages)	-0.14	0.04
E(Own Income Growth)	0.13	0.55
E(Own Financial Situation)	0.33	0.44
E(Own Credit Access)	0.24	0.31
E(Own Durable Spending)	0.02	0.13
% Variance Explained	17.25	14.10

Note: All expectations are residualized using regression (1) instead than regression (1). The analysis pools together data from all time periods and all countries, and the sample covers the period from September 2020 to November 2022. All expectations are asked on a monthly basis and are based on a 12 months horizon except for "E(Inflation Rate 3Y)", which instead refers to a 3 years horizon. All expectations are provided as numerical values, except for own durable spending (where a dummy variable indicates whether the household plans to buy durables), own credit access (measured on a 1 to 5 qualitative scale), and own financial situation (measured on a 1 to 5 qualitative scale). All expectations are residualized using regression (1).

Table A.5: OLS and FE Regression Estimates for Realized Spending, Controlling for Covid-19 Concerns

	Nondurable Spending$_{t-1}$		Spent on Durables$_{t-1}$ (0-1)	
	Pooled	FE	Pooled	FE
PC1 Scores$_{t-2}$	-0.0174***	-0.0040*	-0.0028***	0.0020
	(0.0013)	(0.0021)	(0.0009)	(0.0017)
PC2 Scores$_{t-2}$	0.0281***	0.0064**	0.0173***	0.0047**
	(0.0023)	(0.0025)	(0.0016)	(0.0021)
Has Liquidity$_{t-2}$	0.0378***	0.0022	0.0208***	-0.0038
	(0.0095)	(0.0103)	(0.0057)	(0.0075)
Has Liquidity$_{t-1}$	0.0549***	0.0081	0.0336***	0.0215***
	(0.0094)	(0.0106)	(0.0056)	(0.0073)
Demographic Controls	Yes	No	Yes	No
Household FE	No	Yes	No	Yes
Wave FE	Yes	Yes	Yes	Yes
Country x Wave FE	Yes	Yes	Yes	Yes
Covid-19 Concerns	Yes	Yes	Yes	Yes
Observations	80,200	80,193	80,200	80,193
R^2	0.2106	0.0114	0.0295	0.0141

Note: The table presents results from estimating equation (5) and the OLS pooled counterpart. The first dependent variable measures the log of spending on nondurable goods and services undergone in the previous month; the second dependent variable measures whether the household bought any durable goods in the previous month. "PC1 Scores" and "PC2 Scores" refer to first and second principal components which we standardize to have zero mean and unitary variance. In the pooled specifications, the scores are identified from the baseline PCA of Section 4.2. In the fixed-effect specifications, the scores are identified from the PCA run separately in each month of Section 4.3. "Has Liquidity" measures whether the household has enough liquidity to pay for an unexpected event equal to 1 month of her income. "Covid-19 Concern" is measured on a 1 to 10 qualitative scale and quantifies the households' degree of concern about her financial situation due to the pandemic.

Table A.6: OLS and FE Regression Estimates for Planned Spending and Savings, Controlling for Covid-19 Concerns

	Precautionary Savings		$\mathbb{E}$(Spending Growth)	
	Pooled	FE	Pooled	FE
PC1 Scores$_t$	0.0026	0.0235***	-0.5356***	-0.3327***
	(0.0027)	(0.0041)	(0.0061)	(0.0142)
PC2 Scores$_t$	0.0313***	-0.0039	0.6798***	0.4256***
	(0.0047)	(0.0056)	(0.0106)	(0.0182)
Has Liquidity$_t$	0.7032***	0.2270***	0.5054***	0.2980***
	(0.0138)	(0.0239)	(0.0241)	(0.0408)
Demographic Controls	Yes	No	Yes	No
Household FE	No	Yes	No	Yes
Wave FE	Yes	Yes	Yes	Yes
Country x Wave FE	Yes	Yes	Yes	Yes
Covid-19 Concerns	Yes	Yes	Yes	Yes
Observations	93,118	93,110	262,104	262,091
R^2	0.166	0.048	0.1942	0.0884

Note: The table presents results from estimating equation (5) and the OLS pooled counterpart. The first dependent variable measures how much households think they need to put aside in total savings to deal with unexpected events, it is PPP-adjusted and transformed in logs. The second dependent variable measures the growth in expected spending within the following 12 months. "PC1 Scores" and "PC2 Scores" refer to first and second principal components which we standardize to have zero mean and unitary variance. In the pooled specifications, the scores are identified from the baseline PCA of Section 4.2. In the fixed-effect specifications, the scores are identified from the PCA run separately in each month of Section 4.3. "Has Liquidity" measures whether the household has enough liquidity to pay for an unexpected event equal to 1 month of her income. "Covid-19 Concern" is measured on a 1 to 10 qualitative scale and quantifies the households' degree of concern about her financial situation due to the pandemic.