



## Research paper

## Household income expectations: The role of unexpected income changes and aggregate conditions

Alessandro Bucciol<sup>a</sup> , Joshy Easaw<sup>b</sup> , Serena Trucchi<sup>b,c,d</sup> \*<sup>a</sup> University of Verona, Department of Economics, Via Cantarane 24, 37129 Verona, Italy<sup>b</sup> Cardiff University, Cardiff Business School, Colum Road, Cardiff, CF10 3EU, UK<sup>c</sup> Masaryk University, Faculty of Economics and Administration, Brno, Czech Republic<sup>d</sup> Netspar, Tilburg University, Netherlands

## ARTICLE INFO

## JEL classification:

D84

G50

## Keywords:

Income expectations

Expectation uncertainty

Expectation error

Unexpected income changes

Aggregate conditions

## ABSTRACT

We analyse how unexpected income changes and aggregate conditions influence income expectations, their uncertainty, and expectation errors. We use a uniquely rich longitudinal Dutch survey collecting detailed information on the distribution of household income expectations. Our results show that unexpected income changes, much more than aggregate conditions, induce a revision in income expectations across the entire spectrum of the expected income distribution, consistent with extrapolative behaviour. We also document that unexpected income changes increase the uncertainty about future income. Our results provide some evidence of over-reaction, particularly to negative unexpected income changes and among high-income individuals. These effects differ based on an individual's position in the income distribution, which may be attributed to differences in income dynamics, role of insurance mechanisms, and varying levels of awareness about how unexpected income changes and aggregate conditions impact household finances.

## 1. Introduction

Household expectations about future income and its uncertainty are key factors in economic decision making. Life cycle models of consumption behaviour predict that higher expected income leads to increased consumption, while greater uncertainty encourages precautionary savings and reduces current consumption (Coibion et al., 2024; Jappelli and Pistaferri, 2017). This, in turn, influences economic behaviour in other areas such as portfolio allocation (Fagereng et al., 2018), labour supply (Rossi and Trucchi, 2016) and human capital (Patnaik et al., 2022). Expectations and consumption dynamics have broader macroeconomic implications, influencing the effectiveness and consequences of fiscal and monetary policy interventions and shaping business cycle fluctuations (recent examples are Bordalo et al., 2022; D'Acunto et al., 2024).

Despite the crucial role of households' income expectations, empirical evidence on their determinants is rare, possibly due to the limited availability of surveys collecting precise information on expectations over extended periods. This study provides new evidence on the process of expectation formation, focusing on how several aspects of income expectations – the expected value of household income, its dispersion and the expectation error – respond to macroeconomic conditions and unexpected changes in household income. Moreover, we explore how the response to income expectations varies across the income distribution. This allows us to highlight potential heterogeneity in our results, which may arise from differences in income processes or the role of insurance

\* Corresponding author at: Cardiff University, Cardiff Business School, Colum Road, Cardiff, CF10 3EU, UK.

E-mail addresses: [alessandro.bucciol@univr.it](mailto:alessandro.bucciol@univr.it) (A. Bucciol), [easawj1@cardiff.ac.uk](mailto:easawj1@cardiff.ac.uk) (J. Easaw), [trucchis@cardiff.ac.uk](mailto:trucchis@cardiff.ac.uk) (S. Trucchi).

mechanisms, such as unemployment benefits. In addition, we can identify who is most exposed to the welfare consequences of expectation errors.

The response of income expectations to unexpected income changes depends on the degree of persistence of income over time. Future income is not affected by transitory income shocks, but reflects permanent or persistent income changes. However, individuals may have distorted expectations about the persistence of their income. In this case, income expectations may over-react to unexpected income changes, resulting in an expectation error (Massenot and Pettinicchi, 2019; Cocco et al., 2022; Rozsypal and Schlafmann, 2023; D'Acunto et al., 2024). After an improvement in their financial situation, individuals could overestimate future income, displaying overextrapolative expectations based on recent experience. According to the model of *diagnostic expectations* (Gennaioli and Shleifer, 2010; Bordalo et al., 2018, 2019), expectations respond to the news by overweighting future outcomes that become more likely in light of the current news. This leads to an overestimation of the likelihood of positive future scenarios following favourable news and a pessimistic bias in response to negative news. Our study investigates the relevance of diagnostic expectations in the context of household income expectations. The effect of aggregate conditions on income expectations reflects the individual assessment of these conditions, the awareness of their impact on household financial conditions, and the correlation of household income with the macroeconomy and the business cycle. These relationships may vary across the income distribution and can be influenced by private or public insurance mechanisms.

We use a uniquely rich dataset, the DNB Household Survey (DHS), collecting detailed data on household income expectations and realizations for a longitudinal sample of Dutch individuals. This enables us to precisely measure the magnitude of experienced unexpected income changes, defined as the deviation between actual household income and prior expectations. This represents a contribution to the literature that has largely examined the effects of income changes without distinguishing between anticipated and unexpected changes. We integrate this dataset with aggregate indicators on the unemployment rate and economic policy uncertainty to capture aggregate conditions.

A unique feature of our empirical analysis is the availability of precise measures that capture the full distribution of income expectations. Unlike previous literature (Brown and Taylor, 2006; Massenot and Pettinicchi, 2019; Cocco et al., 2022), we are able to quantify the *magnitude* of revision of income expectations and not only the expected direction of the income change (improvement or deterioration).<sup>1</sup> Furthermore, by analysing the lower and upper bounds of expected income, we can also detect potential changes in the distribution of income expectations. We examine whether an increase (or decrease) in the expected value of income results from a parallel shift in the distribution, affecting both the upper and lower bounds equally, or if it is driven by a relatively larger change in either the left or right tail of the distribution.

Perceived income uncertainty is measured using indicators that capture the dispersion of individual income expectations. This study is one of the first to explore the determinants of perceived income uncertainty of individuals.<sup>2</sup> The longitudinal structure of the dataset also allows to compare *ex-post* income realization with their expectations to precisely measure the expectation error. This comparison helps determine whether the response to income expectations reflects actual changes in individual circumstances or whether it results from an over-reaction or under-reaction to those changes.

Our findings indicate that unexpected changes in household income have a significant and relevant impact on expectations, while aggregate conditions play a minor and mostly insignificant role. On average, both positive and negative unexpected changes in household income, particularly relatively large ones, prompt a revision in income expectations. Individuals experiencing an unexpected positive income change revise their expectations upward, while they revise income expectations downwards when hit by unexpected negative income changes. Around 20% of the unexpected income change are perceived as persistent: a 10% increase in the positive (negative) unexpected income changes determine an upward (downward) revision in income by 2% (2.5%). We also detect heterogeneity across the income distribution, with unexpected positive income changes being more relevant at the bottom of the distribution and negative ones at the top. Perceived income uncertainty increases with unexpected income changes among bottom- and middle-income earners. In contrast, for high-income individuals, perceived uncertainty slightly increases with adverse aggregate conditions. Overall, this heterogeneity may arise from differences in income processes across the distribution, the varying relevance of insurance mechanisms, or different levels of awareness regarding how unexpected income changes and aggregate conditions impact household financial conditions.

Understanding whether expectations revision reflects an over-reaction to unexpected income changes and aggregate conditions has relevant implications for individual welfare and macroeconomic outcomes. According to the life-cycle model, an unexpected income change determines a revision in optimal consumption. If unexpected income changes trigger an over-reaction in income expectations, consumers may deviate from their optimal consumption path—spending less (or more) than optimal in response to negative (or positive) income shocks. This has a detrimental effect on the ability to smooth consumption and may amplify the contraction in aggregate consumption during recessions. By comparing income expectations and their future realizations we find that revision in expectations is partly due to an over-reaction to unexpected income changes, especially for unexpected negative income changes and among high-income individuals. Top-income individuals are characterized by a lower marginal propensity to consume and larger buffer stocks. Therefore, over-reaction to unexpected income changes is mostly concentrated in the group where the consequences of sub-optimal consumption path are less severe.

<sup>1</sup> The only study measuring the deviation between income expectations and realizations is the working paper by D'Acunto et al. (2024), which focuses on Chinese households in the post-Covid-19 period.

<sup>2</sup> A notable attempt is Cocco et al. (2022), though their analysis is constrained by data limitations, as it only captures the direction of expected income changes. Similarly, D'Acunto et al. (2024) examine the link between income shocks and uncertainty, but their study focuses specifically on the post-Covid-19 period in China and does not account for aggregate conditions.

This study contributes to the literature that investigates the role of individual experience (Malmendier and Nagel, 2011, 2016; Massenot and Pettinicchi, 2019; Kuchler and Zafar, 2019; Cocco et al., 2022; Rozsypal and Schlafmann, 2023; D'Acunto et al., 2024) and aggregate conditions (Bloom, 2009; Malmendier and Nagel, 2011; Coibion et al., 2021; Easaw and Grimme, 2024) in shaping individual behaviour and expectations. Most of these studies focus either on individual behaviour and attitudes or on expectations about macroeconomic factors. We contribute to this literature by evaluating how the distribution of *expectations* about *household income* and its uncertainty respond to unexpected income changes and aggregate conditions.

The remainder of the paper is organized as follows. Section 2 reviews the related literature; Section 3 illustrates the data; Section 4 discusses the empirical methods and results; finally, Section 5 concludes.

## 2. Theoretical framework and literature review

The general theoretical framework underpinning our analysis is based on the cognitive processes that drive expectation formation. Gennaioli and Shleifer (2010) and Bordalo et al. (2018, 2019) develop a model of diagnostic expectations, in which expectations overweight future outcomes that become more likely in light of the current news. Therefore, favourable news leads individuals to overestimate the probability of positive future outcomes, while negative events cause them to overestimate the likelihood of negative future outcomes. In our specific context, this implies that there is a link between current unexpected income changes and the revision of expectations and the expectation error. Diagnostic expectations embed extrapolation. However, unlike mechanical extrapolation based on adaptive expectations, diagnostic expectations are forward-looking. Distortions arise when news provides informative insights into future events.<sup>3</sup>

A revision in income expectation following an unexpected income change may be driven by truly persistent shocks. However, if unexpected income changes are significantly correlated with expectation errors, this can indicate distorted expectations. Massenot and Pettinicchi (2019) illustrate this aspect, building on the concepts of extrapolation and over-extrapolation. If individuals consider unexpected income changes to be persistent and extrapolate their recent experience, the relationship between current and expected income growth is positive. In contrast, if they expect transitory unexpected income changes and mean reversion, this relationship is negative. Individuals *over-extrapolate* when they consider their income growth to be more persistent than it actually is, thus generating an expectation error. Individuals overestimate their future income following an unexpected positive income change, and underestimate it following a negative one.

Similarly, Rozsypal and Schlafmann (2023) illustrate an expectation formation rule based on the over-persistence bias, where individuals overestimate the persistence of their income process.<sup>4</sup> The main difference between Rozsypal and Schlafmann (2023) and the diagnostic expectations approach of Gennaioli and Shleifer (2010) and Bordalo et al. (2018, 2019) is that in the latter the expectation error depends on the latest news, whereas in Rozsypal and Schlafmann (2023) it depends on the history of individual unexpected income changes. Studying the response of income expectations and expectation error to new information, specifically aggregate conditions and unexpected income changes, this paper contributes to this literature by empirically examining the relevance of diagnostic expectations and its heterogeneity across the income distribution. A critical aspect of our analysis is the inclusion of a measure of unexpected income changes, rather than just income changes. This is crucial as unexpected income changes represent an update to an individual's information set, providing a more nuanced understanding of the cognitive processes involved.

By analysing the effect of unexpected changes in household income and aggregate conditions on individual income expectations, this paper builds on the empirical literature studying the effect of experiences on economic outcomes. These studies consider either the role of *macroeconomic conditions* experienced during the life-cycle and in the recent past (Malmendier and Nagel, 2016; Kuchler and Zafar, 2019) or the role of *personal experience and individual events* (Bucciol and Zarri, 2015; Bucciol and Miniaci, 2018; Cocco et al., 2022; Rozsypal and Schlafmann, 2023; D'Acunto et al., 2024).

The first group of studies examine whether people living through different macroeconomic histories differ in their expectations, attitudes and behaviour. Risk attitudes, expectations and portfolio composition are influenced by experiences of stock market returns and economic depression (Malmendier and Nagel, 2011; Guiso et al., 2018; Angelini and Ferrari, 2021; Heiss et al., 2022) and high inflation (Malmendier and Nagel, 2016; Malmendier and Botsch, 2020; Malmendier and Wellsjo, 2024). These studies provide evidence that aggregate experience affects economic expectations, with a primary focus on expectations of macroeconomic variables, such as inflation or stock market trends. We add to this recent literature by linking aggregate experience with expectations of individual outcomes, namely future household income. In doing this, we also focus on Roth and Wohlfart (2020), who show how individuals' macroeconomic expectations affect their personal economic prospects.

Personal events have also been shown to have a relevant impact on individual attitudes, behaviour and expectations. For example, personal experience with portfolio risks and returns (Kautsia and Knapfer, 2008; Bucciol and Miniaci, 2018), life-course negative events (Bucciol and Zarri, 2015), and a natural disaster (Hanaoka et al., 2018) influence financial risk propensity and risk-taking. Our approach is related to these studies in that it relies on an individual-specific measure of unexpected income changes, namely the gap between individual income expectations and its realization.

<sup>3</sup> Another important factor influencing how individuals form their expectations is cognitive uncertainty. Enke and Graeber (2023) show that individuals who report higher levels of (subjective) cognitive uncertainty tend to compress their probabilistic distributions. Consequently, they overestimate the probability of unlikely events while underestimating the probability of likely ones.

<sup>4</sup> Rozsypal and Schlafmann (2023) model expectation formation in the context of a standard income process with permanent and transitory unexpected income changes, while Massenot and Pettinicchi (2019) do not explicitly model the income process but they assume an AR(1) process for income growth.

Most of these studies examine outcomes related to individual behaviour or attitudes. Notable exceptions are [Brown and Taylor \(2006\)](#), [Massenot and Pettinicchi \(2019\)](#), [Cocco et al. \(2022\)](#), [Rozsypal and Schlafmann \(2023\)](#), and [D'Acunto et al. \(2024\)](#) who focus on income expectations. [Cocco et al. \(2022\)](#) and [Massenot and Pettinicchi \(2019\)](#) investigate how a change in household financial conditions (improvement or deterioration) influences income expectations in, respectively, the U.K. and the Netherlands. They consistently find evidence of over-extrapolation following a financial improvement. [Cocco et al. \(2022\)](#) is the only study that focuses on the link between income changes and uncertainty. They show that deterioration in financial condition leads to increased dispersion in income expectations, with individuals assigning higher probabilities to both future deterioration and improvement. [Massenot and Pettinicchi \(2019\)](#) also examine the impact of expectation error on behaviour, showing a significant impact on consumption. [Brown and Taylor \(2006\)](#) rely on the same U.K. dataset used by [Cocco et al. \(2022\)](#) to investigate the determinants of individual financial expectations. Their results suggest that financial expectations are influenced by both life and business cycles.

Compared to these studies, our paper has the advantage of estimating the effect of unexpected income changes, measured as the deviation of income realizations from their expectations, rather than focusing on changes in financial conditions, either unexpected or predicted. Furthermore, instead of categorically assessing whether individuals expect an improvement or a deterioration in their financial conditions, our study precisely measures expectation revisions, including upper and lower boundaries, expectation errors, and income uncertainty. [Rozsypal and Schlafmann \(2023\)](#) focus on income expectation errors and document their correlation with income levels in the U.S. This evidence is consistent with over-persistence bias in expectation formation, namely overestimation of the income process persistence. The closest study to ours is [D'Acunto et al. \(2024\)](#), which examines Chinese consumers' income expectations post-Covid-19 (2020–23). Similarly, they find evidence of extrapolative behaviour after income shocks, with larger expectation errors among low-income and younger individuals. They also link inaccurate expectations to spending and debt. Our study extends this by analysing the distribution of income expectation and the role of aggregate conditions.

Finally, our study is related to the growing literature using subjective probabilities to elicit individual expectations (see, for instance, [Dominitz and Manski, 1997, 2004](#); [Manski, 2004](#); [Hurd et al., 2011](#); [Attanasio and Augsburg, 2016](#); [Attanasio et al., 2020](#)). Empirical studies show a significant role for expectations in individual and household choices in several domains, such as consumption and savings ([Brown and Taylor, 2006](#); [Vellekoop and Wiederholt, 2019](#); [Christelis et al., 2020](#); [Kovacs et al., 2021](#)), mortgage choices ([Brown et al., 2008](#)), investment decisions ([Armona et al., 2019](#)), human capital investments ([Patnaik et al., 2022](#)) and firm profits ([Massenot and Pettinicchi, 2018](#)).

### 3. Data

We use data from the DNB Household Survey (DHS), a longitudinal annual survey representing the Dutch-speaking population. The survey collects, among others, information on income, income expectations, and socio-economic characteristics. We focus on the 2008–2018 period (11 waves) as this ensures consistency in the wording of questions related to income expectations. In particular, we exclude successive waves, where changes in the probabilities elicitation method limit information on income expectations.

Our sample is restricted to household heads aged 26–80, observed at least three times, to construct the unexpected income change variables and exploit the panel dimension of the dataset. In the baseline sample, individuals without a precise household income value or providing inconsistent responses on income realization probabilities are excluded.<sup>5</sup> The final dataset includes 3767 observations from 1064 respondents (on average, 3.54 observations per respondent). In the following, we report the definition of our key variables that are described in more detail in [Appendix A](#).

#### 3.1. Income measures

**Income Realizations.** The measure of household income that we use in the empirical analysis is gathered through the following question:

*“What is the total net income for your household in [year]? The total net income for your household is the net income of all household members combined. Net income means the income after deduction of taxes and social security benefits.”*

This question is particularly well-suited to our purpose, since it refers to the same income measure that is used to elicit income expectations, namely total net household income.

**Income Expectations.** Income expectations are collected through two sets of questions. Respondents start reporting the lower and upper bounds for expected income, respectively:

*“We would like to know a little bit more about what you expect will happen to the net income of your household in the next 12 months. What do you expect to be the lowest (highest) total net yearly income your household may realize in the next 12 months?”*

<sup>5</sup> Selection bias based on consistent answers to income realization probabilities is further discussed in [Appendix A](#). In the same [Appendix](#), we assess robustness in two alternative samples: (i) including partners alongside heads of households, and (ii) incorporating respondents reporting income bands for household income in addition to respondents reporting precise income values.

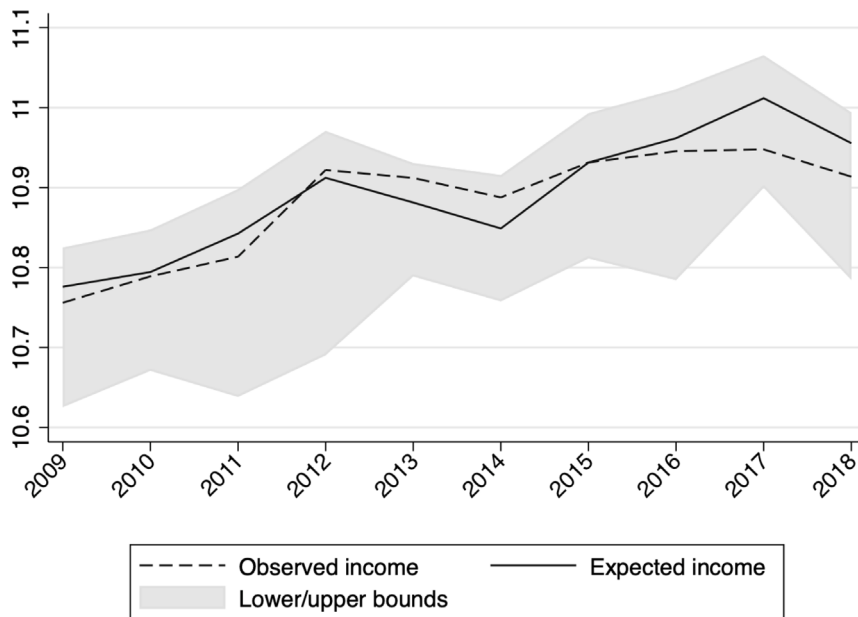


Fig. 1. Time pattern of income and expected income.

Notes: The graph shows the average values of (inverse hyperbolic sine of) the observed and expected incomes. The grey area represents the range between the lower and upper bounds of income expectations.

The interval between the lower ( $l$ ) and upper ( $h$ ) bounds is divided into equal intervals:

$$l + (h - l)x, \text{ with } x = \frac{2}{10}, \frac{4}{10}, \frac{6}{10}, \frac{8}{10}.$$

Respondents then declare the probability that future income will be lower than the threshold  $l + (h - l)x$ . More precisely, for each threshold, they are asked:

“What do you think is the probability (in percent) that the net yearly income of your household will be less than euro [threshold] in the next 12 months?”

Observed and expected income measures are comparable and refer to the total net income of the household. Kovacs et al. (2021) illustrate that labour income is the main source of total household income in the DHS dataset.<sup>6</sup>

### 3.2. Dependent variables: Income expectations, expectation uncertainty and errors

The outcomes of the analysis relate to different aspects of income expectations, including expected income level, expectation uncertainty, and expectation error. Our first outcome of interest is the mean expected household income for the upcoming year (variable *Exp. inc.*), calculated as a weighted average using probabilities and associated amounts.<sup>7</sup> Expected income variations may arise from adjustments in the income distribution's top and/or bottom spectrum. To assess the significance of these channels, we also explore the lower and upper expectation boundaries, respectively denoted as variables *LB* and *UB*.

Fig. 1 illustrates the average values of observed and expected incomes over the years, and the area between the lower and upper expectation boundaries. Observed and expected incomes generally exhibit parallel movements, with expected income falling slightly behind observed income from 2012 to 2015. The average gap between the lower and upper expectation boundaries fluctuates throughout the sample period, peaking during the Sovereign Debt Crisis (2012–13).

To measure expectation uncertainty, we use two variables that capture the dispersion in the distribution of future income ( $t + 1$ ) as reported in the current period ( $t$ ). The first variable, *UB-LB*, represents the difference between the upper and lower boundaries of expectations. The second, *SD exp.*, is the standard deviation of income expectations, constructed using the probabilities and

<sup>6</sup> We also exploit job related expectations collected by DHS to examine their link with income expectations. These findings, reported in Appendix A, support the primary role of labour income in shaping household income expectations.

<sup>7</sup> We otherwise take the simple average between the lower and upper bound when they differ by less than 5 euros. Income values below the lower bound and above the upper bound have zero probability.

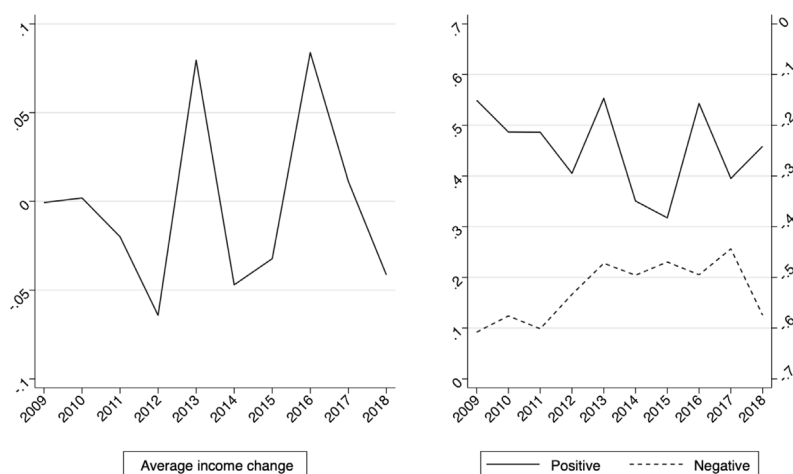


Fig. 2. Time pattern of unexpected income changes.

Notes: The first graph displays the average values of unexpected income changes. The second graph presents the average values separately for positive and negative income changes.

corresponding income amounts from the survey questions described above. The standard deviation is set to zero if the lower and upper bounds differ by less than 5 euros.<sup>8</sup>

Finally, we investigate whether the revision in expectations results from updating new relevant information or is driven by an over-reaction to unexpected income changes and aggregate conditions. To explore this, we consider the expectation error (variable *Exp. err.*) and its absolute value (variable *Exp. err. (abs)*). Expectation error at time  $t$  is defined as the difference between the income observed at time  $t+1$  and the income expectation made at time  $t$ :  $Exp.err_t = y_{t+1} - E_t[y_{t+1}]$ , where  $y$  is household income. A positive expectation error indicates that the individual underforecasts their income (i.e., observed income is higher than its expectation in the previous period). In contrast, a negative expectation error indicates overforecasting (i.e., observed income is lower than income expectation). A positive marginal effect on the expectation error denotes an increase in the difference between future income realization and its expected value. This effect can be driven by either an increase in underforecasting (i.e., a rise in the size of the expectation error when positive) or a decrease in overforecasting (i.e., a fall in the size of the expectation error when negative). Examining the absolute value of the expectation error provides information on its size. Therefore, a positive marginal effect on the absolute value of the expectation error indicates an increase in the distance between income expectations and its realization (no matter the direction).

### 3.3. Key regressors: Unexpected income changes and aggregate conditions

Turning to the independent variables, we define an unexpected income change as the difference between the actual income realized in the current period ( $y_t$ ) and the expected income based on predictions from the previous year ( $E_{t-1}[y_t]$ ). Specifically, the formula for the unexpected income change is:  $Unexpected\Delta y_t = y_t - E_{t-1}[y_t]$ . These unexpected income changes are classified into positive and negative errors based on whether the difference between observed and expected income is greater than zero. Fig. 2 illustrates the dynamics of unexpected income changes during the analysis period. On average, unexpected income changes are negative during the Sovereign Debt Crisis (2012–13) and fluctuate around zero in subsequent years. The negative average is primarily driven by relatively large unexpected negative income changes until 2012. To ease interpretation, we use the absolute value of (inverse hyperbolic sine of) unexpected negative income changes as a regressor.<sup>9</sup> One further variable we consider for personal experience is a dummy equal to one if the respondent is unemployed (variable *Unemployed*).

Aggregate conditions are measured along two dimensions.<sup>10</sup> Economic policy uncertainty (EPU) is proxied by the index for the Netherlands developed by Kroese and Parlevliet (2015). It measures domestic policy uncertainty based on the frequency counts of articles in the leading Dutch newspapers. To ease the interpretation of the results, and consistently with the income measures, we use the inverse hyperbolic sine transformation of the monthly value of the EPU index (variable *Uncertainty in NL*).

<sup>8</sup> It is worth noting that the first variable, *UB-LB*, is less sensitive to the effect of cognitive uncertainty on the compression of probability judgments toward 50:50, as shown in Enke and Graeber (2023).

<sup>9</sup> In the regressions, the variable *Unexp. positive  $\Delta y$*  (*Unexp. negative  $\Delta y$  (abs.)*) reports the size of the unexpected income change when it is positive (negative) and is otherwise set to zero.

<sup>10</sup> We test the robustness of our findings by incorporating additional macroeconomic indicators—GDP and inflation rate—and by replacing aggregate conditions with time dummies. The results, presented in Appendix C, confirm our baseline findings.



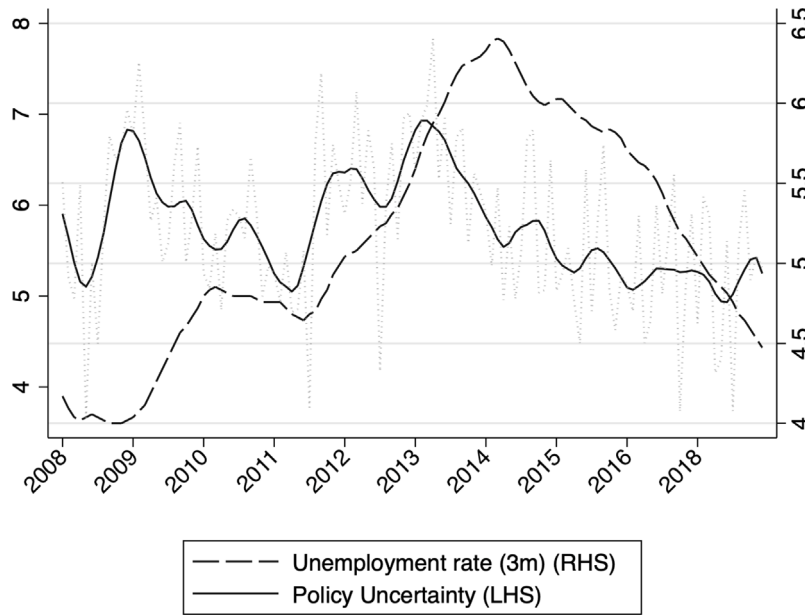


Fig. 3. Time pattern of unemployment rate and macroeconomic uncertainty.

**Notes:** The graph shows the (3-months average) unemployment rate and the Policy Uncertainty Index (monthly values, ihs). For the latter, it plots both the original data points (dotted line) and those obtained by applying a smoothness filter (local OLS regression implemented through the `lowess` command in Stata; solid line).

We employ the percentage Dutch unemployment rate from the Federal Reserve Economic Data (FRED) to measure labour market conditions (variable *Unempl. rate*); we use the average value over the 3 months before the interview. To enhance precision, each DHS observation is associated with a specific value based on the month and year of the interview. Therefore, not only do the variables change over the years, but they also vary within the same year, depending on the interview date. Fig. 3 depicts the dynamics of the EPU index and the unemployment rate over the sample period. In particular, the trend shows that policy uncertainty does not necessarily reflect labour market conditions, and the dynamics of the two indices can diverge.

### 3.4. Further variables and summary statistics

Control variables include age, living arrangement (with or without a partner and children), employment status (working, retired, or unemployed), and home-ownership. Further time-invariant control variables (e.g., gender, education) are absorbed in the fixed effects of the regression models. Descriptive statistics of the sample are reported in Table 1. The average respondent is 60 years old, resides with a partner but does not have children, and owns a home. On average, expected income is higher than income realization. This leads to an average negative expectation error.

## 4. Analysis

We study the link between income expectations, expectation uncertainty and expectation errors with unexpected income changes and aggregate conditions. For this purpose, we estimate Eq. (1) for individual  $i$  in year  $t$ ,

$$y_{it} = \beta_0 + \beta_1 s_{it} + \beta_2 a_{it} + \beta_3 c_{it} + \phi_i + \varepsilon_{it} \quad (1)$$

where  $(\beta_0, \beta_1, \beta_2, \beta_3)$  are the parameters to estimate,  $\phi_i$  is the individual fixed effect and  $\varepsilon_{it}$  the idiosyncratic error term. The dependent variables  $y_{it}$  are seven and, alternatively, include different dimensions of income expectations: Expected income level, expectation uncertainty and error. The vector of the key regressors  $s_{it}$  includes positive and negative unexpected income changes and a dummy for being unemployed. The aggregate conditions ( $a_{it}$ ) include economic policy uncertainty and the unemployment rate in the Netherlands, which are constant between the individuals interviewed in the same month and year. Finally, we include a set of time-varying control variables  $c_{it}$ . The dependent and explanatory variables in the specification are illustrated in Section 3.

We exploit the longitudinal dimension of the dataset and estimate the model with fixed-effect regressions. This method, which makes use of the within-individual variability to identify coefficients, is robust to the omission from the specification of time-invariant variables that in principle could affect interpretation of questions or income expectations (e.g., pessimistic or optimistic attitudes). However, we are aware that time-varying omitted variables could still be present (e.g., mood at the time of the interview)

**Table 1**  
Summary statistics.

Variable	Label	Mean	Std. Dev.
<i>Income variables</i>			
Income realization	y	10.884	1.034
Expected income	Exp. y	10.896	1.159
Lower bound exp. inc.	LB	10.749	1.367
Upper bound exp. inc.	UB	10.95	1.169
Upper - Lower bound	UB-LB	.201	.831
SD expected income	SD exp.	.031	.056
Expectation error	Exp. err.	-.039	1.291
Expectation error (abs.)	Exp. err. (abs)	.503	1.19
<i>Key explanatory variables</i>			
Unexpected positive income change	Unexp. positive $\Delta y$	.243	.919
Unexpected negative income change (abs.)	Unexp. negative $\Delta y$ (abs)	.246	.783
Unemployed		.025	.158
Uncertainty in NL		4.99	.612
Unempl. rate		5.604	1.267
<i>Control variables</i>			
Age		59.93	12.17
Partner in the hh		.684	.465
Children in the hh		.208	.406
Working		.455	.498
Retired		.421	.494
Homeowner		.779	.415
Observations			3767

and have an impact on the answers, this way generating inconsistent estimates of the coefficients. A test developed by [Oster \(2019\)](#) suggests that the omitted variables should not alter our main findings; see [Appendix B](#) for details.<sup>11</sup>

For each dependent variable, standard statistical tests find the fixed-effect model to describe the data better than the pooled model (without individual fixed effects) and random-effect model (where individual effects are absorbed in the error term); results are available upon request. In what follows, we adopt the convention to comment on coefficients significant at least at the 5% level.

#### 4.1. Benchmark results

[Table 2](#) outlines the results of the benchmark analysis. In general, unexpected changes in household income play a more relevant role compared to aggregate conditions, which only marginally affect all the measures of income expectations we analyse. Looking at income expectations, results in Column 1 show a significant effect of both positive and negative unexpected income changes. Positive (negative) unexpected changes increase (decrease) expected income, consistent with extrapolative behaviour, as in [Massenot and Pettinicchi \(2019\)](#), [D'Acunto et al. \(2024\)](#) and [Cocco et al. \(2022\)](#). The effects are similar in magnitude: a 10% unexpected income change leads to a revision of 2% for positive changes and 2.5% for negative ones. This suggests that individuals perceive 20%–25% of unexpected income changes as persistent.

These revisions impact the entire distribution of expectations, as shown in Columns 2 and 3. Positive unexpected income changes increase both the minimum and the maximum expected income, and negative unexpected income changes decrease both bounds. The effects of positive and negative changes are symmetric, with unexpected positive income change having a greater impact on the upper bound of income expectations and unexpected negative income changes on the lower bound.

By widening the spread between upper and lower bounds, both positive and negative unexpected income changes affect the perception of income uncertainty (Column 4). A 10% unexpected income change leads to an increase in perceived uncertainty of 0.5–0.6%. This result is in contrast to evidence in [Cocco et al. \(2022\)](#), showing an increase in expectation dispersion only following a deterioration in financial conditions. This difference could be attributed to the explanatory variables used: we identify unexpected income changes, while [Cocco et al. \(2022\)](#) focus on changes in financial conditions, which can be either unexpected or anticipated. The effect of unexpected income changes on the standard deviation of expectations (Column 5) is less significant and smaller in magnitude. Focusing on aggregate conditions, unemployment significantly increases uncertainty, but its effect is small, consistent with firms uncertainty measures ([Easaw and Grimme, 2024](#)). Hence, an increase of 1 percentage point in the unemployment rate results in an increase in the standard deviation by 0.2%. On average, economic policy uncertainty does not significantly affect the perception of income uncertainty.<sup>12</sup>

<sup>11</sup> The key explanatory variables are already determined at the time of the interview (unexpected income changes) or they are outside of individual control (aggregate conditions). This makes us believe that there should be no endogeneity problems due to reverse causality with the specification.

<sup>12</sup> These findings confirm the results reported by [Piccillo and Poonpakdee \(2021\)](#). When examining a similar time frame, they find a statistically insignificant relationship between economic policy uncertainty and subjective income uncertainty.



**Table 2**  
Benchmark analysis.

Dep. var.	(1) Exp. y	(2) LB	(3) UB	(4) UB-LB	(5) SD exp.	(6) Exp. err.	(7) Exp. err. (abs)
Unexp. positive $\Delta y$	0.201*** (0.021)	0.144*** (0.026)	0.207*** (0.022)	0.063*** (0.017)	0.004*** (0.001)	-0.164*** (0.030)	-0.119*** (0.026)
Unexp. negative $\Delta y$ (abs)	-0.248*** (0.023)	-0.296*** (0.028)	-0.247*** (0.024)	0.049*** (0.019)	0.001 (0.001)	0.395*** (0.032)	0.038 (0.029)
Unemployed	-0.156 (0.181)	-0.011 (0.217)	-0.166 (0.184)	-0.155 (0.146)	-0.001 (0.009)	0.371 (0.250)	-0.083 (0.221)
Uncertainty in NL	0.032 (0.056)	0.047 (0.068)	0.026 (0.057)	-0.021 (0.046)	0.001 (0.003)	-0.066 (0.078)	-0.065 (0.069)
Unempl. rate	-0.024 (0.015)	-0.006 (0.018)	-0.017 (0.015)	-0.011 (0.012)	0.002** (0.001)	0.031 (0.021)	0.011 (0.018)
Age	0.027** (0.013)	0.026* (0.015)	0.024* (0.013)	-0.002 (0.010)	-0.001 (0.001)	-0.022 (0.017)	-0.017 (0.015)
Partner in the hh	0.090 (0.159)	0.137 (0.190)	0.085 (0.162)	-0.053 (0.128)	-0.008 (0.008)	0.187 (0.220)	-0.018 (0.194)
Children in the hh	-0.006 (0.114)	0.187 (0.136)	-0.031 (0.116)	-0.219** (0.092)	-0.017*** (0.006)	-0.040 (0.157)	0.229 (0.139)
Working	0.142 (0.145)	0.245 (0.173)	0.124 (0.147)	-0.121 (0.117)	-0.003 (0.007)	0.263 (0.200)	-0.239 (0.177)
Retired	-0.069 (0.141)	0.064 (0.168)	-0.091 (0.143)	-0.155 (0.113)	-0.009 (0.007)	0.295 (0.194)	-0.063 (0.172)
Homeowner	0.232 (0.192)	0.199 (0.230)	0.233 (0.195)	0.034 (0.155)	-0.002 (0.010)	-0.258 (0.266)	-0.128 (0.235)
Constant	9.016*** (0.988)	8.619*** (1.181)	9.261*** (1.003)	0.642 (0.797)	0.076 (0.051)	1.202 (1.363)	1.999* (1.207)
R-squared	0.084	0.060	0.083	0.010	0.015	0.072	0.012
Number of observations	1064	1064	1064	1064	1064	1064	1064
Observations	3767	3767	3767	3767	3767	3767	3767

**Notes:** Standard errors in parentheses. \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$ .

We examine expectation errors (Column 6) and their magnitude (Column 7) to assess whether expectations reflect actual income realization or if they overreact to unexpected income changes, in line with over-extrapolation (Massenot and Pettinicchi, 2019; Cocco et al., 2022; D'Acunto et al., 2024) and diagnostic expectations (Bordalo et al., 2018, 2019). Expectation errors, defined as the difference between the ex-post income realization and its expected value in the previous period ( $Exp.err_t = y_{t+1} - E_t[y_{t+1}]$ ), are unbiased, as indicated by the non-significant constant in Column 6. Unexpected income changes significantly alter expectation errors, with unexpected negative income changes having more than twice the impact of positive ones. Specifically, a 10% increase in unexpected positive income change reduces errors by 1.6%, while the same increase in unexpected negative income changes increase errors by 4%.<sup>13</sup>

The reduction in the expectation error following an increase in the unexpected positive income change (Column 6) may depend on either an increase in overforecasting, namely an increase in the size of the error when positive, or a reduction in underforecasting, namely a reduction in the error when negative. Similar argument applies to the effect of unexpected negative income changes. To disentangle these two mechanisms, we examine the absolute value of the expectation error (Column 7). The negative and statistically significant impact of an unexpected positive income change indicates an average reduction in its size, suggesting that the predominant channel is the weakening of underforecasting. On average, unexpected negative income changes increase expectation errors (Column 6), but do not significantly affect the size of the expectation error (Column 7). This indicates that unexpected negative income changes trigger both mechanisms, with some individuals decreasing overforecasting and others increasing underforecasting. These findings partly confirm the role of over-extrapolation and diagnostic expectations in explaining the response of income expectations to unexpected income changes. On average, individuals tend to reduce the size of the expectation error following unexpected positive income changes, denoting improved accuracy and the absence of over-extrapolation. However, we find evidence of over-extrapolation following unexpected negative income changes, this increasing underforecasting. The analysis of heterogeneity across the income distribution illustrated in Section 4.3 will provide further insights into these results.

#### 4.2. Sensitivity and robustness checks

In the [Appendices](#), we check the sensitivity and robustness of our results using alternative sample restrictions and specifications. In [Appendix A](#) we show results on alternative samples. We enlarge the sample and include partners and respondents who report income bands for household income. Our results are also robust to omitted variables according to the [Oster \(2019\)](#) test; see [Appendix B](#).

<sup>13</sup> The heterogeneity in the impact of unexpected negative income changes on expectation errors is primarily driven by top-income earners, as shown in [Table 3](#) and discussed below.

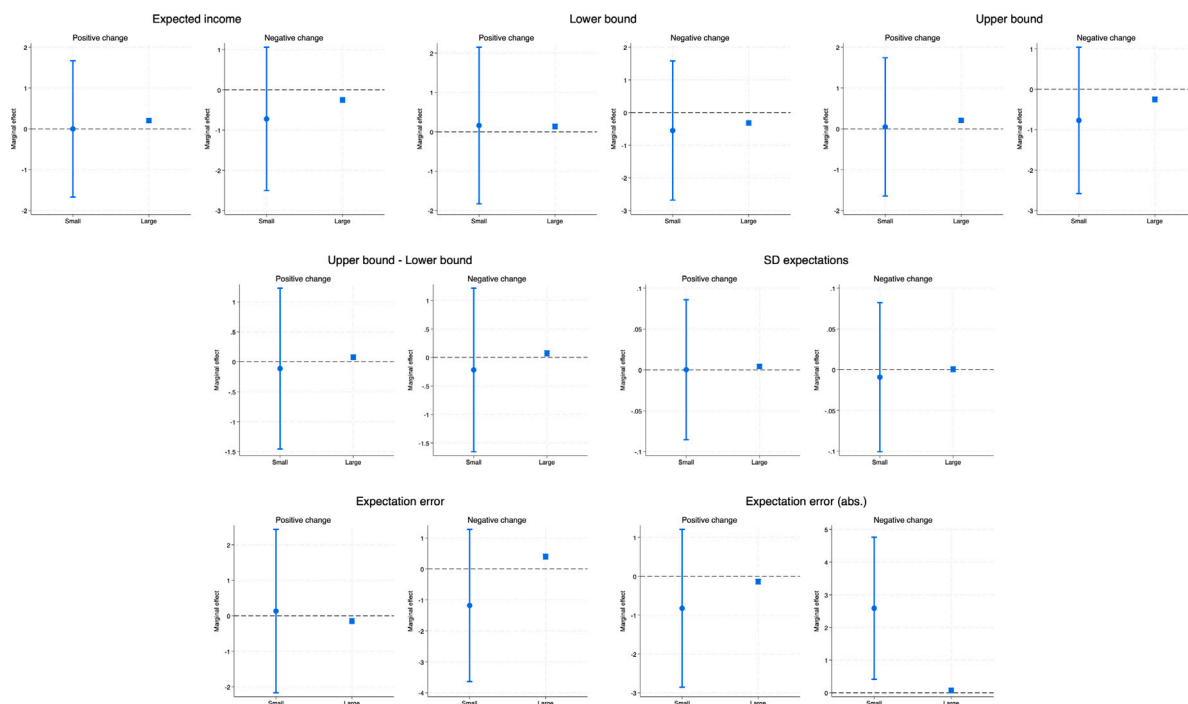


Fig. 4. Marginal effects of small and large unexpected income changes.

Notes: Estimated coefficients and 95% standard errors. Complete estimate results are reported in Table C.5.

In Appendix C, we study the robustness of our findings to changes in the specification. We consider six cases. In Table C.1 we replace unexpected income changes with an “objective” measure of unexpected income changes obtained following D’Acunto et al. (2024). The objective measure is obtained as the residual from a regression of realized income on its lagged value, plus socio-demographic controls and time fixed effects. The regression is estimated separately for four groups defined according to two dimensions: gender (male/female) and education (college degree/lower degree). We do this because unexpected income changes and subjective expectation errors might be mechanically correlated due to serial correlation in expectation errors. The estimation results largely confirm our findings, reinforcing the robustness of our analysis. In particular, similar to D’Acunto et al. (2024), we find an over-reaction to income changes.

In Table C.2 we add to the specification two additional macroeconomic indicators, namely the inflation rate (based on the consumer price index) and quarterly GDP (in real terms, seasonally adjusted, and transformed using the inverse hyperbolic sine). In Table C.3 we replace our macroeconomic measures with year dummies to capture business cycle effects. The estimation results reinforce the limited role of aggregate economic conditions while confirming the significant impact of unexpected income changes.

In Table C.4 we include in the specification a dummy equal to one for positive unexpected income changes and equal to zero otherwise. In Table C.5 we add the same dummy as in the previous exercise and dummy variables for large positive and negative unexpected income changes, alone and interacted with the size of income changes. We define “large” unexpected income changes as changes larger than the median. In this way, we investigate the heterogeneity of the effect of unexpected income changes due to their size. A graphical representation of the marginal effect of the four types of unexpected income changes on the outcome variables is shown in Fig. 4. As a general result, our findings are driven primarily by large unexpected income changes.

In Table C.6 we include in the specification the lagged value of the positive and negative unexpected income changes. The purpose is to assess whether the information from the most recent period is the main driver of households’ current expectations. Even if we experience a drop in the sample size due to the inclusion of a lagged variable, the estimated effect of unexpected income changes remains largely significant. We find a significant impact of previous unexpected income changes on the level of income expectations (including lower and upper bounds) and the forecast error, while their effect on perceived uncertainty is not significant at standard levels. However, the effect of lagged unexpected income changes is smaller in magnitude, indicating that more recent information is more important. This finding is in line with Rozsypal and Schlafmann (2023), which shows that the entire history of unexpected income changes contributes to the formation of expectations.

**Table 3**  
Heterogeneity by income.

Dep. var.	(1) Exp. y	(2) LB	(3) UB	(4) UB-LB	(5) SD exp.	(6) Exp. err.	(7) Exp. err. (abs)
Panel A - Bottom							
Unexp. positive $\Delta y$	0.265*** (0.038)	0.241*** (0.044)	0.269*** (0.039)	0.028 (0.030)	0.002 (0.002)	-0.201*** (0.054)	-0.110** (0.045)
Unexp. negative $\Delta y$ (abs)	-0.098** (0.038)	-0.173*** (0.044)	-0.099** (0.039)	0.074** (0.030)	0.001 (0.002)	0.263*** (0.054)	-0.129*** (0.045)
Unemployed	-0.196 (0.342)	0.024 (0.397)	-0.281 (0.348)	-0.304 (0.264)	-0.033* (0.017)	0.547 (0.480)	-0.216 (0.405)
Uncertainty in NL	-0.035 (0.134)	0.019 (0.155)	-0.047 (0.136)	-0.066 (0.103)	-0.003 (0.007)	-0.149 (0.188)	-0.082 (0.158)
Unempl. rate	-0.043 (0.035)	-0.026 (0.041)	-0.038 (0.036)	-0.012 (0.027)	0.000 (0.002)	0.044 (0.049)	0.011 (0.042)
Constant	8.189*** (2.379)	7.125** (2.763)	8.795*** (2.422)	1.670 (1.840)	0.203* (0.121)	1.502 (3.342)	5.330* (2.824)
R-squared	0.096	0.079	0.093	0.015	0.028	0.063	0.031
Number of individuals	390	390	390	390	390	390	390
Observations	1197	1197	1197	1197	1197	1197	1197
Panel B - Middle							
Unexp. positive $\Delta y$	0.245*** (0.034)	0.071 (0.043)	0.254*** (0.034)	0.183*** (0.033)	0.010*** (0.002)	-0.265*** (0.050)	-0.220*** (0.045)
Unexp. negative $\Delta y$ (abs)	-0.239*** (0.045)	-0.263*** (0.059)	-0.236*** (0.047)	0.028 (0.045)	0.003 (0.003)	0.371*** (0.067)	0.099 (0.060)
Unemployed	-0.045 (0.235)	0.062 (0.303)	0.020 (0.241)	-0.042 (0.231)	0.028* (0.015)	-0.158 (0.348)	0.135 (0.312)
Uncertainty in NL	0.082 (0.077)	0.064 (0.099)	0.066 (0.078)	0.002 (0.075)	-0.007 (0.005)	-0.059 (0.113)	-0.076 (0.102)
Unempl. rate	-0.033 (0.021)	-0.005 (0.027)	-0.027 (0.021)	-0.022 (0.020)	0.002 (0.001)	0.027 (0.030)	0.041 (0.027)
Constant	8.681*** (1.333)	8.306*** (1.717)	8.905*** (1.365)	0.600 (1.311)	0.168** (0.084)	1.826 (1.975)	1.085 (1.771)
R-squared	0.102	0.040	0.099	0.041	0.040	0.074	0.037
Number of individuals	343	343	343	343	343	343	343
Observations	1266	1266	1266	1266	1266	1266	1266
Panel C - Top							
Unexp. positive $\Delta y$	0.010 (0.039)	0.005 (0.047)	0.015 (0.039)	0.010 (0.029)	0.004** (0.002)	0.030 (0.050)	-0.010 (0.047)
Unexp. negative $\Delta y$ (abs)	-0.649*** (0.044)	-0.632*** (0.053)	-0.650*** (0.044)	-0.017 (0.033)	-0.000 (0.002)	0.787*** (0.057)	0.423*** (0.054)
Unemployed	-0.552 (0.432)	-0.533 (0.526)	-0.555 (0.434)	-0.022 (0.327)	0.003 (0.019)	1.269** (0.562)	-0.067 (0.529)
Uncertainty in NL	0.007 (0.081)	0.019 (0.099)	0.014 (0.081)	-0.006 (0.061)	0.009*** (0.004)	0.017 (0.106)	-0.016 (0.099)
Unempl. rate	-0.003 (0.022)	0.003 (0.026)	0.004 (0.022)	0.002 (0.016)	0.002** (0.001)	0.022 (0.028)	-0.007 (0.027)
Constant	10.732*** (1.438)	11.217*** (1.750)	10.759*** (1.443)	-0.458 (1.087)	-0.116* (0.063)	-0.589 (1.870)	0.310 (1.761)
R-squared	0.191	0.132	0.191	0.006	0.051	0.172	0.066
Number of individuals	331	331	331	331	331	331	331
Observations	1304	1304	1304	1304	1304	1304	1304

**Notes:** Standard errors in parentheses. \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$ . The three panels refer to, respectively, respondents with average income in the bottom, middle and top 33% of the distribution. Descriptive statistics for the bottom- and top-income samples are reported in [Table D.1](#).

#### 4.3. Heterogeneity by income group

In this section we investigate how baseline results are heterogeneous between income subgroups, identified using average household income during the observed period.<sup>14</sup> This may contribute to understanding the drivers behind the results in [Table 2](#) and gauge their implications. There may be several factors contributing to heterogeneity. Income processes may vary across income

<sup>14</sup> This measure ensures constant groups and avoids allocating families differently in exceptional years with large unexpected income changes. The average income in the 3 groups is 18,000, 32,000 and 53,000 euros.

groups, exhibiting different degrees of persistence and uncertainty, and income for top earners potentially being highly correlated with the business cycle. In addition, the availability and relevance of public (unemployment) and private (within-family) insurance mechanisms against income fluctuations can vary throughout the income distribution.<sup>15</sup> Finally, due to the positive correlation between income and education, top-income individuals may be better aware of current macroeconomic conditions and how they can affect household income. This analysis also allows us to examine the heterogeneity in the welfare consequences of expectation revisions, particularly expectation errors and income uncertainty, which may be more severe for lower-income groups due to limited financial buffers.

The three panels in Table 3 outline the key estimate results of the bottom-, middle- and top-income groups, respectively, with the full set of estimated coefficients shown in Appendix D. First, we detect heterogeneity in the effect of unexpected income changes on the expected value of income (Column 1), possibly reflecting different income processes for the three groups. Approximately 25% of unexpected positive income changes are considered persistent for the bottom- and middle-income groups, while top-income individuals perceive them as transitory (insignificant coefficient in Panel C). In contrast, unexpected negative income changes are significant for all groups but are perceived to be more persistent at the top of the distribution. For top-income earners, a 10% increase in unexpected negative income changes resulting in a 6.5% increase in expected income. We interpret this heterogeneity as arising from differences in labour income dynamics, exposure to the business cycle, and the role of safety nets. A significant fraction of high-income earners, often in managerial roles, come from volatile sources, such as business profits and bonuses, which are tied to business cycle fluctuations. Therefore, they may perceive unexpected negative income changes as more persistent, anticipating a slower recovery after downturns. In addition, their specialized job roles make reemployment more difficult and increase their exposure to business cycle fluctuations. However, Columns 6 and 7 show that this downward revision in expectation is excessive, indicating an over-reaction to unexpected income drops in this group. In contrast, they view unexpected income increases as temporary, integrating volatility into their expectations and avoiding expectation errors.

For low- and middle-income individuals, unexpected positive and negative income changes have significant and comparable effects on income expectations (Column 1, Panels A and B), and the magnitude is less than half that of the top-income group. Expectation revisions in these groups reflect higher persistence in their income process, which primarily rely on wages and, in some cases, government transfers. Among low-income respondents, unexpected negative income changes have a relatively smaller effect on income expectations, emphasizing the stabilizing role of insurance mechanisms, such as unemployment benefits and transfers, in mitigating the impact of income drops.

The determinants of perceived uncertainty (Columns 4–5) also exhibit heterogeneity across the income distribution. First, uncertainty responds to unexpected income changes for low- and middle-income individuals, whereas for top earners, it is primarily driven by aggregate economic conditions. Unexpected positive income changes are the main drivers of perceived income risk for middle-income individuals (Panel B). They revise upward expectations about the future income upper bound but not for the lower bound. This reflects uncertainty about the persistence of the income change. Although they anticipate the possibility of higher future earnings, they do not adjust the lower bound because of concerns about its permanence. As a result, this increases income dispersion and may weaken the consumption response to unexpected positive income changes. At the bottom of the income distribution, perceived uncertainty (Column 4, Panel A) increases only after a negative unexpected income change. However, the magnitude of this effect is roughly one-third of that observed among middle-income individuals, possibly related to a greater role of unemployment benefits and other income support measures among this group.

Aggregate conditions significantly affect the dispersion of expectations only among the top-income group, albeit with a relatively modest magnitude.<sup>16</sup> The effect of aggregate conditions on top-income earners' expectations can be related to two main factors. First, high-income earners are often in managerial roles and more exposed to the financial markets, which are more affected by business cycles and macroeconomic fluctuations. This is consistent with the findings of Roth and Wohlfart (2020), suggesting that individuals highly exposed to aggregate risk are more likely to update their personal expectations in response to broader economic conditions. Second, the significant role of aggregate conditions among top-earners may arise from differences in attentiveness and perception of macroeconomic trends, along with the awareness of their impact on household economic conditions. This, in turn, shapes their expectations. This process unfolds in three key stages of expectation formation (Fuster et al., 2022): information selection, information acquisition, and information processing. As shown in Table D.1, income is positively correlated with education, financial literacy, and the tendency to consult financial sources for decision-making. These factors likely lower the cost of acquiring and processing economic information, making high-income earners more responsive to aggregate conditions.<sup>17</sup>

Unexpected income changes have different effects on expectation errors across the three subgroups. For the bottom- and middle-income groups, the impact of unexpected positive and negative income changes on expectation error is of similar magnitude (Column 6). The reduction in expectation error due to unexpected positive income changes is primarily driven by a weakening of underforecasting, as indicated by the negative coefficients in Column 7. In contrast, unexpected negative income changes lead to both a decrease in overforecasting and an increase in underforecasting.<sup>18</sup> Among the top-income group, however, only unexpected

<sup>15</sup> It is worth noting that income refers to net household income.

<sup>16</sup> The effect of positive unexpected income changes on the standard deviation reported in Column 5 is also statistically significant, albeit with a very small magnitude.

<sup>17</sup> This finding is consistent with Easaw and Grimme (2024), which highlights that top executives are particularly aware of aggregate uncertainty's impact on firms, that is likely extends to their household income expectations as well.

<sup>18</sup> The mixed effect of unexpected negative income changes on over-extrapolation is evident in the reduced estimated effect from Column 6 to Column 7 in Panel A and the statistically insignificant coefficient in Column 7 in Panel B.

negative income changes significantly and substantially increase expectation error. The pronounced downward revision across the entire distribution of income expectations following a negative change suggests an over-reaction in expectations and a shift toward underforecasting in this group, as reflected in the positive coefficients in Columns 6 and 7. In other words, our results suggest that top income respondents underforecast future income, resulting in a large estimated persistence of income changes. This result is in line with the over-persistence bias mechanism in Rozsypal and Schlafmann (2023) and with empirical findings of over-extrapolation of expectations in Cocco et al. (2022), Massenot and Pettinicchi (2019) and D'Acunto and Weber (2024). Unexpected positive changes, on the other hand, are perceived as temporary and do not significantly affect expectation errors. This asymmetry may be attributed to specific features of the income process of top-earners who rely heavily on variable income sources, which are more volatile and correlate with business cycle fluctuations. This distinctive pattern among top-income individuals accounts for the greater average impact of negative income changes compared to positive ones, as shown in Table 2. Overall, our results suggest that after an unexpected positive income change, individuals tend to either not to revise their expectations or to improve their accuracy. However, a significant number of individuals overreact to unexpected negative income changes, excessively revising downward their expectations, particularly at the top of the income distribution. This suggests that the diagnostic expectation mechanism proposed by Bordalo et al. (2018, 2019) is especially relevant for high-income individuals.

## 5. Conclusions

We study how unexpected income changes and aggregate conditions affect income expectations, notably their uncertainty and expectation errors. We find that unexpected changes in household income have a significant and relevant impact on expectations revision and their uncertainty, while aggregate conditions play a minor and mostly insignificant role. Results are heterogeneous across the income distribution, possibly due to differences in income processes, the varying relevance of insurance mechanisms, or different levels of awareness regarding how unexpected income changes and aggregate conditions impact household financial conditions. By comparing income expectations and their future realizations we find that revision in expectations is partly due to an over-reaction to unexpected income changes, especially for unexpected negative income changes and among high-income individuals.

Our findings help to understand household expectations and, consequently, their behaviour in response to unexpected income changes and throughout the business cycle. This, in turn, informs the development of policy interventions, including fiscal and labour market policies.

From a welfare perspective, individuals revise their income expectations downward after an unexpected negative income change and upward following an unexpected positive income change, with around 20% of unexpected income changes perceived as persistent. According to the permanent income hypothesis, this induces a change in consumption. If these unexpected income changes are accompanied by an over-reaction of income expectations, consumers make a sub-optimal consumption, which is lower (higher) than its optimum after negative (positive) unexpected income changes. In this line, D'Acunto et al. (2024) report that household spending and debt decisions reflect (inaccurate) subjective income expectations. Our results show that over-reaction to unexpected positive income changes is limited and that the relevance of underforecasts following unexpected negative income changes increases with income. The welfare consequences of suboptimal consumption plans due to expectation errors are less severe for the top income group, characterized by lower marginal utility of consumption and possibly larger buffer stocks. Thus, the ex-ante consumption pattern is closer to the optimal one in the group where consequences of sub-optimality are most pronounced.

Prudent individuals also increase their precautionary savings when income uncertainty increases, thereby reducing current consumption. Consumption contraction following an unexpected negative income change is more severe if it is accompanied by an upward revision in income uncertainty. We show evidence of this channel, particularly among low income respondents. This may amplify the consumption contraction after an unexpected income reduction in this group. Unexpected positive income changes are associated with an increase in income dispersion, which weakens the effect of unexpected positive income changes on consumption growth.

Evidence of limited responsiveness of household income expectations to aggregate conditions, beyond their individual circumstances, raises concerns about the accurate assessment of future scenarios related to the business cycle. Failure to adequately consider these factors can have detrimental consequences for consumers, particularly in recession periods.

Our empirical study has some limitations, which presents opportunities for future research. First, it would be interesting to directly assess how consumption and savings respond to income expectations, uncertainty and expectation error. Unfortunately, the DHS dataset records savings amounts in bands, making this analysis challenging without access to a more detailed dataset. Moreover, we attribute the heterogeneity across the income distribution mainly to differences in the earning process. However, income, education, financial knowledge and portfolio composition are intertwined. Consequently, isolating the specific role of each factor warrants further investigation. Finally, although we observe the correlation between unexpected income changes and expectations, we do not explore the specific channels through which this connection operates. For example, psychological characteristics such as personality traits, or past experiences such as encountering recessions during one's life cycle, could influence how individuals perceive unexpected income changes. The analysis of underlying mechanisms is left for future research.

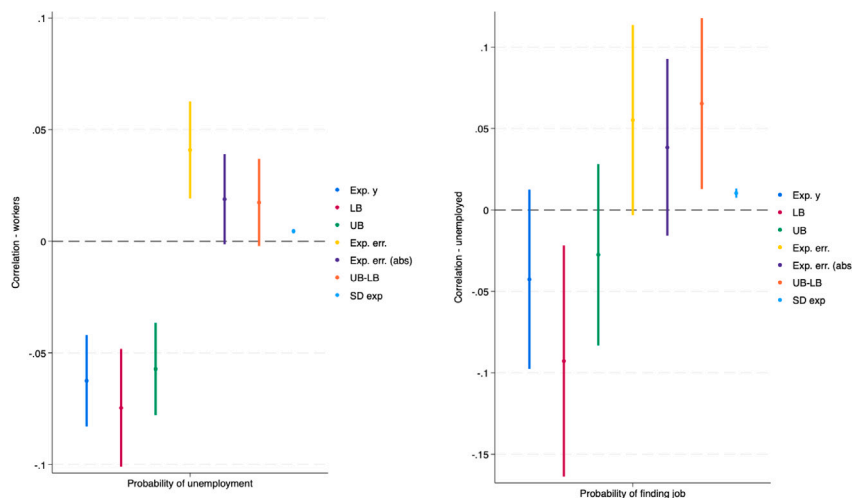


Fig. A.1. Correlation between outcome variables and job-related expectations.

**Notes:** Conditional correlation between outcome variables and job-related expectations. The graph plots OLS estimated coefficients and 90% level confidence intervals. The dependent variables are the same as in Table 2, and the key independent variable is the probability of losing/finding a job for workers or unemployed, respectively. Control variables are the same as in Table 2.

## Declaration of competing interest

This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

## Acknowledgements

We thank Tommaso Reggiani, the participants of the 2024 Household Finance Workshop in Turin, the 2023 Sheffield Household Finance Workshop, the ICEEE 2023 conference in Cagliari, the 2021 Anglo-French-Italian Macro Workshop in Venice, and seminar at Cardiff University for useful comments. The usual disclaimers apply.

## Appendix A. Variable definition and sensitivity checks

### A.1. Income expectations

We derive income expectation (variable *Exp. y* in the analysis) as a weighted average using the probabilities *PRO1*, *PRO2*, *PRO3* and *PRO4* and the associated amounts. We otherwise take the simple average between *LAAG* and *HOOG* in case *LAAG* and *HOOG* differ by less than 5 euros. We also focus on the lower and upper bounds of income expectation as an outcome of the analysis. They are, respectively, variables *LB* and *UB* in the analysis.

To further explore the relationship between income expectations and job-related expectations, we use additional information collected by the DHS. Respondents, categorized according to their employment status, are asked about the probability of losing or finding a job in the next 12 months. We estimate conditional correlations through OLS regressions of income on the probability of job loss or job finding while controlling for working status and a set of covariates. Results for working and unemployed individuals are graphically summarized in Fig. A.1. The perceived probability of job loss is significantly correlated with most outcome variables, displaying the expected sign. The results for the unemployed subgroup are less precise, partly due to the smaller sample size. However, the upper bound of expected income and income uncertainty are significantly correlated with the likelihood of finding a job. These findings support the primary role of labour income in shaping total household income expectations.

### A.2. Expectation uncertainty

We consider two main measures for income uncertainty. The first is the difference between the upper and lower bounds of the income expectations (variable *UB-LB* in the analysis). We also create a measure of standard deviation by exploiting the nature of the data. The standard deviation of expected income (variable *SD exp.* in the analysis) is derived from the probabilities and the associated amounts in questions *PRO1-PRO4*. The standard deviation is otherwise set to zero if *LAAG* and *HOOG* differ by less than 5 euros.



**Table A.1**  
Sample selection: Probability of giving a consistent probability distribution.

Dep. var.	(1) Consistent answer
Age	0.002** (0.001)
Partner in the hh	−0.006 (0.015)
Children in the hh	0.011 (0.016)
Working	0.006 (0.020)
Retired	0.012 (0.020)
Homeowner	0.010 (0.014)
Female	0.053*** (0.016)
Primary	−0.008 (0.036)
High school	0.026 (0.035)
Vocational training	0.016 (0.037)
University	0.032 (0.037)
Income realization	−0.006 (0.006)
Financial assets	−0.000 (0.000)
Year FE	Yes
Constant	0.760*** (0.083)
Observations	4620
R-squared	0.021

**Notes:** Standard errors in parentheses. \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$ .

### A.3. Expectation error

We define the expectation error (variable *Exp. err.* in the analysis) as the difference between the income realization reported in year  $t + 1$  and the income expectation for year  $t + 1$  reported in year  $t$ . We also consider its absolute value (variable *Exp. err. (abs)*) to focus on the magnitude of the expectation error.

The baseline sample includes respondents who give “consistent” responses on the probability distribution of expected income, namely those who are either i) certain about their future income (the difference between upper and lower bounds is smaller than 5 euros) or ii) reporting increasing probabilities with expected income thresholds. Hence, 83.18% of the respondents give consistent probabilities (or are certain about future income). Even if less than 17% of the respondents report inconsistent probabilities, this may raise concerns about sample selection. To address this issue, we first examine the factors associated with the probability of giving a consistent probability distribution. OLS regression results are reported in Table A.1. We only find a significant correlation with gender and age.

Second, we select the outcome variables that are not affected by reported probabilities (lower bound, upper bound and their difference), and we run the same regressions shown in Table 2. Results reported in Table A.2 are consistent with the benchmark results.

### A.4. Sensitivity analysis

We assess robustness of results in Table 2 in two alternative samples. Table A.3 reports estimate results for the sample that includes partners in addition to heads. Table A.4 also incorporates respondents reporting income bands for household income in addition to respondents reporting precise income values.<sup>19</sup> Our key results are confirmed in both alternative samples.

<sup>19</sup> In particular, we rely on the answer to question: “Please indicate about how much the total net income of your household was over the period 1 January [year] through 31 December [year]”. In this case, possible answers are a set of thresholds ranging from 1 (less than 8000 euros) to 11 (more than 75,000 euros). For instance, threshold 5 indicates incomes between 13,000 and 16,000 euros. We use for observed income the intermediate threshold value; extreme thresholds are set at their boundaries (i.e. 8000 euros for threshold 1 and 75,000 euros for threshold 11).

**Table A.2**

Sample including respondents with inconsistent probabilities (comparable outcomes).

Dep. var.	(1) LB	(2) UB	(3) UB-LB
Unexp. positive $\Delta y$	0.129*** (0.021)	0.185*** (0.018)	0.056*** (0.015)
Unexp. negative $\Delta y$ (abs)	-0.265*** (0.024)	-0.221*** (0.020)	0.045*** (0.016)
Unemployed	0.054 (0.185)	-0.157 (0.153)	-0.211* (0.126)
Uncertainty in NL	0.059 (0.057)	0.042 (0.048)	-0.018 (0.039)
Unempl. rate	-0.016 (0.016)	-0.020 (0.013)	-0.004 (0.011)
Age	0.030** (0.013)	0.027** (0.011)	-0.003 (0.009)
Partner in the hh	0.147 (0.157)	0.100 (0.130)	-0.048 (0.107)
Children in the hh	0.130 (0.118)	-0.027 (0.098)	-0.157* (0.080)
Working	0.266* (0.151)	0.083 (0.125)	-0.183* (0.103)
Retired	0.126 (0.143)	-0.064 (0.119)	-0.190* (0.098)
Homeowner	0.158 (0.201)	0.197 (0.167)	0.039 (0.137)
Constant	8.380*** (0.996)	9.071*** (0.828)	0.691 (0.679)
R-squared	0.055	0.078	0.008
Number of individuals	1190	1190	1190
Observations	4620	4620	4620

Notes: Standard errors in parentheses. \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$ .**Table A.3**

Sample including partners.

Dep. Var	(1) Exp. y	(2) LB	(3) UB	(4) UB-LB	(5) SD exp.	(6) Exp. err.	(7) Exp. err. (abs)
Unexp. positive $\Delta y$	0.157*** (0.017)	0.126*** (0.021)	0.161*** (0.018)	0.035** (0.015)	0.004*** (0.001)	-0.120*** (0.025)	-0.114*** (0.022)
Unexp. negative $\Delta y$ (abs)	-0.212*** (0.018)	-0.250*** (0.022)	-0.208*** (0.018)	0.043*** (0.015)	0.004*** (0.001)	0.335*** (0.026)	-0.002 (0.023)
Unemployed	-0.124 (0.151)	0.115 (0.186)	-0.145 (0.153)	-0.260** (0.128)	-0.011 (0.009)	0.308 (0.221)	-0.044 (0.195)
Uncertainty in NL	0.014 (0.046)	0.022 (0.057)	0.008 (0.047)	-0.015 (0.039)	0.002 (0.003)	-0.069 (0.068)	-0.036 (0.060)
Unempl. rate	-0.028** (0.012)	-0.020 (0.015)	-0.020 (0.013)	-0.001 (0.011)	0.003*** (0.001)	0.028 (0.018)	0.020 (0.016)
Age	0.021** (0.010)	0.020 (0.013)	0.018* (0.011)	-0.002 (0.009)	-0.000 (0.001)	-0.013 (0.015)	-0.018 (0.014)
Partner in the hh	0.185 (0.138)	0.443*** (0.170)	0.175 (0.140)	-0.267** (0.117)	-0.012 (0.008)	0.156 (0.202)	-0.059 (0.179)
Children in the hh	0.078 (0.096)	0.142 (0.118)	0.062 (0.097)	-0.080 (0.081)	-0.009* (0.005)	-0.005 (0.140)	0.165 (0.124)
Working	0.139 (0.113)	0.070 (0.139)	0.134 (0.115)	0.063 (0.096)	0.005 (0.006)	0.296* (0.165)	-0.201 (0.146)
Retired	-0.050 (0.110)	-0.050 (0.136)	-0.065 (0.112)	-0.015 (0.094)	-0.006 (0.006)	0.345** (0.161)	-0.093 (0.142)
Homeowner	0.370* (0.153)	0.341* (0.188)	0.360** (0.155)	0.019 (0.130)	-0.008 (0.009)	-0.395* (0.224)	-0.129 (0.198)
Constant	9.308*** (0.810)	8.970*** (0.999)	9.531*** (0.823)	0.561 (0.689)	0.045 (0.046)	0.790 (1.185)	1.905* (1.048)
R-squared	0.074	0.054	0.070	0.008	0.019	0.058	0.010
Number of individuals	1447	1447	1447	1447	1447	1447	1447
Observations	4917	4917	4917	4917	4917	4917	4917

Notes: Standard errors in parentheses. \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$ .

**Table A.4**  
Sample including income in brackets.

Dep. var.	(1) Exp. y	(2) LB	(3) UB	(4) UB-LB	(5) SD exp.	(6) Exp. err.	(7) Exp. err. (abs)
Unexp. positive $\Delta y$	0.112*** (0.014)	0.103*** (0.016)	0.112*** (0.015)	0.009 (0.010)	0.001 (0.001)	-0.074*** (0.019)	-0.087*** (0.016)
Unexp. negative $\Delta y$ (abs)	-0.202*** (0.023)	-0.219*** (0.027)	-0.204*** (0.024)	0.015 (0.017)	-0.002 (0.002)	0.340*** (0.029)	0.027 (0.025)
Unemployed	0.167 (0.204)	0.069 (0.233)	0.202 (0.207)	0.132 (0.147)	0.037** (0.016)	0.459* (0.250)	0.044 (0.218)
Uncertainty in NL	-0.047 (0.057)	-0.031 (0.066)	-0.050 (0.058)	-0.019 (0.041)	0.002 (0.005)	0.009 (0.072)	-0.061 (0.062)
Unempl. rate	-0.043*** (0.016)	-0.029 (0.018)	-0.039** (0.016)	-0.010 (0.012)	0.000 (0.001)	0.044** (0.020)	0.010 (0.017)
Age	0.005 (0.013)	0.010 (0.015)	0.003 (0.013)	-0.008 (0.009)	-0.001 (0.001)	0.003 (0.016)	-0.008 (0.014)
Partner in the hh	0.042 (0.159)	0.019 (0.182)	0.023 (0.161)	0.004 (0.115)	0.002 (0.012)	0.135 (0.196)	-0.085 (0.171)
Children in the hh	0.144 (0.118)	0.357*** (0.135)	0.111 (0.120)	-0.245*** (0.085)	-0.043*** (0.009)	0.008 (0.145)	0.166 (0.127)
Working	0.290* (0.164)	0.344* (0.188)	0.277* (0.167)	-0.067 (0.119)	-0.004 (0.013)	0.272 (0.198)	-0.247 (0.173)
Retired	0.153 (0.161)	0.202 (0.184)	0.143 (0.163)	-0.059 (0.116)	-0.005 (0.013)	0.219 (0.193)	-0.270 (0.168)
Homeowner	-0.313* (0.182)	0.284 (0.208)	-0.364** (0.185)	-0.648*** (0.132)	-0.095*** (0.014)	0.078 (0.229)	0.290 (0.199)
Constant	10.706*** (0.972)	9.515*** (1.110)	10.985*** (0.986)	1.471** (0.702)	0.158** (0.076)	-0.692 (1.225)	1.440 (1.066)
R-squared	0.031	0.025	0.031	0.008	0.016	0.036	0.009
Number of individuals	2114	2114	2114	2114	2114	1779	1779
Observations	7637	7637	7637	7637	7637	6527	6527

Notes: Standard errors in parentheses. \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$ .

## Appendix B. Omitted variable test

We use the method developed by [Oster \(2019\)](#) to evaluate the possible degree of omitted variable bias under the assumption that the selection on the observed controls is correlated with the selection of the observables. The method in [Oster \(2019\)](#) allows us to address selection bias for one critical variable only. For this reason, we do not distinguish between positive and negative unexpected income changes, but we include a single regressor for the inverse hyperbolic sine of the unexpected income change.<sup>20</sup>

Results are reported in [Table B.1](#). Following the parametrization suggested by [Oster \(2019\)](#), we assume that the degree of variation which both observed and unobserved variables can account for is proportional to the variance explained by the covariates.<sup>21</sup> The bottom line in [Table B.1](#) reports the degree of selection on unobservables relative to observables (the parameter  $\delta$ ) that would be necessary to explain away the results. The absolute value of  $\delta$  always exceeds the rule of thumb cut-off of 1 indicated by [Oster \(2019\)](#). These findings strongly support the robustness of our findings to the omitted variable bias.

## Appendix C. Robustness checks

This appendix checks the robustness of our findings to alternative specifications.

First, we follow [D'Acunto et al. \(2024\)](#) and admit that expectation errors and unexpected income changes, defined as  $y_t - E_{t-1}[y_t]$ , might be mechanically correlated due to serial correlation in expectation errors. To address this issue, we perform an alternative analysis replacing our subjective income changes with objective income changes. The latter are obtained as the residuals from a regression of realized income on its lagged value, plus socio-demographic control variables and time fixed effects. The regression is estimated separately for four groups defined according to two dimensions: gender (male/female) and education (college degree/lower degree). In our sample, objective and subjective income changes are clearly positively related; see [Fig. C.1](#). Their correlation is 0.53. In [Table C.1](#) we then replicate the benchmark model of [Table 2](#), substituting (subjective) unexpected income changes with objective income changes.

<sup>20</sup> We also include, alternatively, the positive and negative unexpected income changes. The main findings are confirmed.

<sup>21</sup> More precisely, we assume that  $R_{max} = 1.3\bar{R}$ , where  $R_{max}$  is the  $R^2$  obtained in the hypothetical regression of the dependent variable on both observed and unobserved regressors;  $\bar{R}$  is the  $R^2$  of the regression of the dependent variable on observables.

**Table B.1**

Oster test on omitted variable bias.

Dep. var.	(1) Exp. y	(2) LB	(3) UB	(4) UB-LB	(5) SD exp.	(6) Exp. err.	(7) Exp. err. (abs)
Unexp. $\Delta y$	0.222*** (0.015)	0.214*** (0.018)	0.225*** (0.015)	0.011 (0.012)	0.002** (0.001)	−0.270*** (0.020)	−0.082*** (0.018)
Uncertainty in NL	0.031 (0.057)	0.048 (0.068)	0.026 (0.057)	−0.022 (0.046)	0.001 (0.003)	−0.067 (0.078)	−0.064 (0.069)
Unempl. rate	−0.024 (0.015)	−0.006 (0.018)	−0.017 (0.015)	−0.012 (0.012)	0.002** (0.001)	0.031 (0.021)	0.011 (0.018)
Age	0.027** (0.013)	0.027* (0.015)	0.024* (0.013)	−0.003 (0.010)	−0.001 (0.001)	−0.025 (0.017)	−0.016 (0.015)
Partner in the hh	0.084 (0.159)	0.105 (0.190)	0.080 (0.161)	−0.025 (0.129)	−0.007 (0.008)	0.226 (0.220)	−0.032 (0.194)
Children in the hh	−0.002 (0.114)	0.195 (0.137)	−0.027 (0.116)	−0.222** (0.092)	−0.017*** (0.006)	−0.055 (0.158)	0.234* (0.139)
Working	0.219** (0.111)	0.245* (0.133)	0.207* (0.113)	−0.037 (0.090)	−0.003 (0.006)	0.082 (0.154)	−0.199 (0.136)
Retired	−0.013 (0.117)	0.035 (0.140)	−0.029 (0.119)	−0.064 (0.095)	−0.008 (0.006)	0.188 (0.162)	−0.045 (0.143)
Homeowner	0.224 (0.192)	0.178 (0.230)	0.226 (0.195)	0.048 (0.156)	−0.001 (0.010)	−0.223 (0.267)	−0.140 (0.235)
Constant	8.905*** (0.983)	8.539*** (1.177)	9.148*** (0.997)	0.609 (0.794)	0.077 (0.051)	1.523 (1.362)	1.913 (1.201)
Oster delta	89.241	−59.883	44.5152	37.177	33.654	−15.262	19.125
R-squared	0.083	0.055	0.082	0.004	0.012	0.062	0.010
Number of individuals	1064	1064	1064	1064	1064	1064	1064
Observations	3767	3767	3767	3767	3767	3767	3767

Notes: Standard errors in parentheses. \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$ .

Second, we check the sensitivity of results to the effect of macroeconomic conditions by (i) introducing additional macroeconomic indicators and ii) adopting a more general specification that replaces macroeconomic indicators with year dummies to account for business cycle effects. Table C.2 includes additional regressors such as the inflation rate (based on the consumer price index) and the quarterly GDP (expressed in real terms, seasonally adjusted, and transformed using the inverse hyperbolic sine). Table C.3 replaces macroeconomic indicators with year dummies.

Third, we enrich the benchmark model specification and i) add a dummy variable making a distinction between positive and unexpected income changes (see Table C.4); ii) distinguish between large/small and positive/negative unexpected income changes, alone and interacted with the size of income change (see Table C.5).

Finally, we augment the baseline specification in Table 2 by including the lagged values of the positive and negative unexpected income changes. Results are shown in Table C.6.

#### Appendix D. Additional tables on heterogeneity

This Appendix presents the full set of estimated coefficients corresponding to the results in Table 3, along with descriptive statistics of the three subsamples. More precisely, we report the characteristics of the bottom and top 33% income groups (see Table D.1) and the benchmark analysis split by sample group: Bottom 33% (see Table D.2), middle 33% (see Table D.3) and top 33% (see Table D.4).

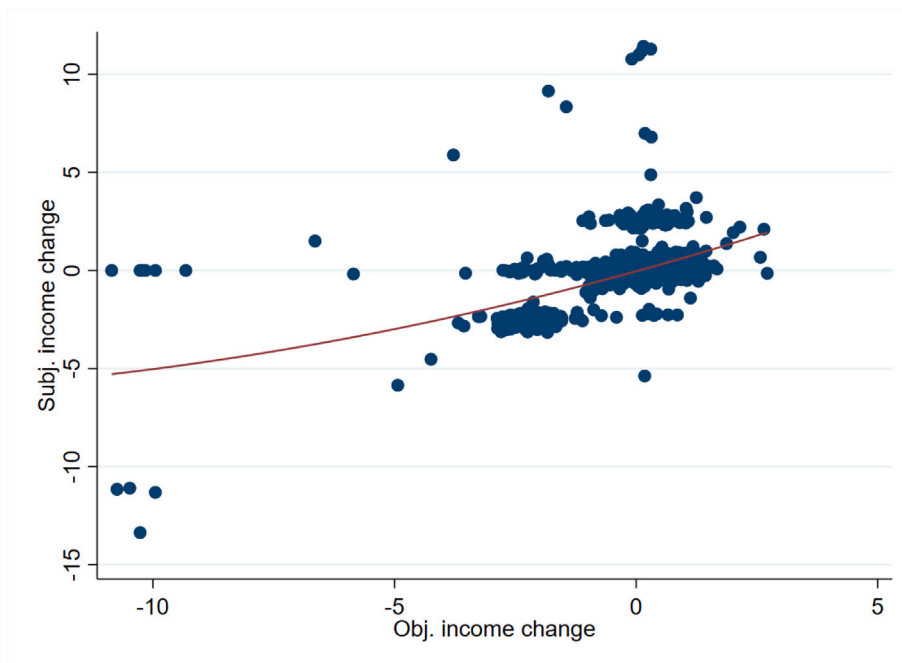


Fig. C.1. Subjective and objective income changes.

**Notes:** “Objective income changes” are obtained as residuals from a regression of realized income on its lagged value, socio-demographic control and time fixed effects, run separately for four groups differing in gender (male/female) and education (college/lower degree). The figure reports residuals from all the four groups.

Table C.1

Benchmark analysis using objective measures of unexpected income changes.

Dep. var.	(1) Exp. y	(2) LB	(3) UB	(4) UB-LB	(5) SD exp.	(6) Exp. err.	(7) Exp. err. (abs)
Objective positive $\Delta y$	0.323*** (0.096)	0.391*** (0.112)	0.315*** (0.097)	-0.076 (0.073)	0.000 (0.005)	-0.559*** (0.132)	0.208* (0.112)
Objective negative $\Delta y$	-0.217*** (0.030)	-0.241*** (0.035)	-0.217*** (0.030)	0.024 (0.023)	0.002 (0.002)	0.364*** (0.041)	0.094*** (0.034)
Unemployed	-0.120 (0.203)	-0.133 (0.238)	-0.125 (0.207)	0.008 (0.155)	0.001 (0.011)	0.531* (0.280)	-0.361 (0.237)
Uncertainty in NL	-0.058 (0.064)	-0.036 (0.075)	-0.068 (0.065)	-0.032 (0.049)	-0.002 (0.004)	0.076 (0.088)	-0.046 (0.075)
Unempl. rate	0.024 (0.018)	0.025 (0.021)	0.030* (0.018)	0.005 (0.013)	0.002* (0.001)	-0.022 (0.024)	-0.006 (0.020)
Age	0.002 (0.015)	0.003 (0.017)	-0.002 (0.015)	-0.004 (0.011)	-0.001 (0.001)	0.009 (0.020)	-0.009 (0.017)
Partner in the hh	0.211 (0.197)	0.190 (0.231)	0.228 (0.201)	0.038 (0.151)	0.008 (0.011)	0.014 (0.272)	-0.154 (0.230)
Children in the hh	-0.144 (0.136)	-0.109 (0.159)	-0.158 (0.138)	-0.049 (0.104)	-0.012* (0.008)	0.238 (0.187)	0.106 (0.158)
Working	0.106 (0.165)	0.085 (0.194)	0.107 (0.168)	0.022 (0.126)	0.009 (0.009)	0.359 (0.228)	-0.300 (0.192)
Retired	0.086 (0.161)	0.096 (0.188)	0.075 (0.163)	-0.021 (0.123)	-0.003 (0.009)	0.210 (0.222)	-0.312* (0.187)
Homeowner	0.389* (0.227)	0.413 (0.266)	0.388* (0.231)	-0.025 (0.173)	0.001 (0.013)	-0.570* (0.314)	-0.114 (0.265)
Constant	10.446*** (1.138)	10.116*** (1.333)	10.712*** (1.156)	0.596 (0.868)	0.086 (0.063)	-0.670 (1.570)	1.636 (1.325)
R-squared	0.058	0.053	0.056	0.003	0.010	0.085	0.008
Number of individuals	922	922	922	922	922	922	922
Observations	2660	2660	2660	2660	2660	2660	2660

**Notes:** Standard errors in parentheses. \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$ . “Objective positive  $\Delta y$ ” and “Objective negative  $\Delta y$ ” are obtained as residuals from a regression of realized income on its lagged value, socio-demographic control and time fixed effects, run separately for four groups differing in gender (male/female) and education (college/lower degree).

**Table C.2**  
Benchmark analysis including additional macroeconomic indicators.

Dep. var.	(1) Exp. y	(2) LB	(3) UB	(4) UB-LB	(5) SD exp.	(6) Exp. err.	(7) Exp. err. (abs)
Unexp. positive $\Delta y$	0.201*** (0.021)	0.144*** (0.026)	0.207*** (0.022)	0.063*** (0.017)	0.004*** (0.001)	-0.165*** (0.030)	-0.118*** (0.026)
Unexp. negative $\Delta y$ (abs)	-0.248*** (0.023)	-0.296*** (0.028)	-0.247*** (0.024)	0.048** (0.019)	0.001 (0.001)	0.394*** (0.032)	0.039 (0.029)
Unemployed	-0.156 (0.181)	-0.008 (0.217)	-0.166 (0.184)	-0.159 (0.146)	-0.001 (0.009)	0.370 (0.250)	-0.080 (0.221)
Uncertainty in NL	0.026 (0.075)	0.083 (0.089)	0.025 (0.076)	-0.058 (0.060)	0.006* (0.004)	-0.089 (0.103)	-0.023 (0.091)
Unempl. rate	-0.024 (0.035)	0.011 (0.042)	-0.017 (0.035)	-0.028 (0.028)	0.006*** (0.002)	-0.001 (0.048)	0.056 (0.043)
Inflation rate (CPI)	0.003 (0.026)	-0.005 (0.032)	0.001 (0.027)	0.006 (0.021)	0.000 (0.001)	-0.022 (0.037)	0.024 (0.032)
GDP	-0.171 (3.376)	2.165 (4.033)	0.016 (3.426)	-2.149 (2.721)	0.419** (0.173)	-2.993 (4.656)	4.467 (4.121)
Age	0.028 (0.044)	-0.000 (0.053)	0.023 (0.045)	0.024 (0.036)	-0.006*** (0.002)	0.018 (0.061)	-0.075 (0.054)
Partner in the hh	0.091 (0.159)	0.136 (0.190)	0.085 (0.162)	-0.051 (0.128)	-0.008 (0.008)	0.186 (0.220)	-0.017 (0.195)
Children in the hh	-0.005 (0.114)	0.188 (0.136)	-0.031 (0.116)	-0.219** (0.092)	-0.017*** (0.006)	-0.043 (0.157)	0.232* (0.139)
Working	0.142 (0.145)	0.246 (0.173)	0.124 (0.147)	-0.121 (0.117)	-0.004 (0.007)	0.264 (0.200)	-0.241 (0.177)
Retired	-0.070 (0.141)	0.068 (0.168)	-0.091 (0.143)	-0.159 (0.113)	-0.009 (0.007)	0.294 (0.194)	-0.060 (0.172)
Homeowner	0.230 (0.193)	0.207 (0.231)	0.233 (0.196)	0.025 (0.155)	-0.001 (0.010)	-0.258 (0.266)	-0.125 (0.236)
Constant	11.117 (40.816)	-17.636 (48.765)	9.075 (41.427)	26.711 (32.896)	-4.990** (2.093)	37.228 (56.297)	-51.845 (49.830)
R-squared	0.084	0.060	0.083	0.010	0.017	0.072	0.012
Number of individuals	1064	1064	1064	1064	1064	1064	1064
Observations	3767	3767	3767	3767	3767	3767	3767

Notes: Standard errors in parentheses. \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$ .



**Table C.3**  
Benchmark analysis using year fixed-effects.

Dep. var.	(1) Exp. y	(2) LB	(3) UB	(4) UB-LB	(5) SD exp.	(6) Exp. err.	(7) Exp. err. (abs)
Unexp. positive $\Delta y$	0.202*** (0.021)	0.144*** (0.026)	0.207*** (0.022)	0.063*** (0.017)	0.004*** (0.001)	-0.164*** (0.030)	-0.119*** (0.026)
Unexp. negative $\Delta y$ (abs)	-0.248*** (0.023)	-0.296*** (0.028)	-0.247*** (0.024)	0.049*** (0.019)	0.001 (0.001)	0.394*** (0.032)	0.038 (0.029)
Unemployed	-0.161 (0.182)	-0.019 (0.217)	-0.172 (0.184)	-0.153 (0.146)	-0.001 (0.009)	0.381 (0.250)	-0.084 (0.222)
Year 2010	-0.064 (0.072)	-0.050 (0.087)	-0.064 (0.074)	-0.014 (0.058)	-0.000 (0.004)	0.067 (0.100)	0.096 (0.089)
Year 2011	-0.014 (0.074)	-0.016 (0.089)	-0.011 (0.075)	0.005 (0.060)	0.006 (0.004)	0.101 (0.103)	0.037 (0.091)
Year 2012	0.025 (0.076)	-0.035 (0.091)	0.031 (0.077)	0.067 (0.061)	0.004 (0.004)	0.026 (0.105)	-0.034 (0.093)
Year 2013	0.013 (0.075)	0.049 (0.090)	0.012 (0.076)	-0.037 (0.061)	0.001 (0.004)	0.001 (0.104)	0.040 (0.092)
Year 2014	-0.005 (0.076)	0.040 (0.090)	0.010 (0.077)	-0.031 (0.061)	0.002 (0.004)	0.062 (0.104)	0.039 (0.092)
Year 2015	0.045 (0.078)	0.103 (0.094)	0.049 (0.080)	-0.054 (0.063)	0.001 (0.004)	0.136 (0.108)	-0.055 (0.096)
Year 2016	0.057 (0.079)	0.019 (0.094)	0.062 (0.080)	0.042 (0.063)	0.003 (0.004)	0.039 (0.108)	0.007 (0.096)
Year 2017	0.164** (0.079)	0.162* (0.094)	0.158** (0.080)	-0.004 (0.064)	0.002 (0.004)	-0.095 (0.109)	0.004 (0.096)
Year 2018	0.135* (0.079)	0.085 (0.094)	0.112 (0.080)	0.027 (0.064)	-0.011*** (0.004)	-0.028 (0.109)	0.001 (0.096)
Partner in the hh	0.083 (0.159)	0.132 (0.190)	0.076 (0.162)	-0.056 (0.128)	-0.009 (0.008)	0.188 (0.220)	-0.010 (0.195)
Children in the hh	-0.002 (0.114)	0.192 (0.136)	-0.027 (0.116)	-0.219** (0.092)	-0.016*** (0.006)	-0.049 (0.157)	0.229 (0.139)
Working	0.138 (0.145)	0.235 (0.173)	0.120 (0.147)	-0.115 (0.117)	-0.004 (0.007)	0.267 (0.200)	-0.236 (0.177)
Retired	-0.075 (0.141)	0.056 (0.168)	-0.096 (0.143)	-0.152 (0.113)	-0.010 (0.007)	0.304 (0.194)	-0.056 (0.172)
Homeowner	0.235 (0.193)	0.213 (0.230)	0.237 (0.196)	0.025 (0.155)	-0.001 (0.010)	-0.254 (0.266)	-0.130 (0.236)
Constant	10.600*** (0.218)	10.321*** (0.260)	10.679*** (0.221)	0.357** (0.175)	0.045*** (0.011)	-0.302 (0.300)	0.702*** (0.266)
R-squared	0.085	0.061	0.084	0.012	0.021	0.073	0.013
Number of individuals	1064	1064	1064	1064	1064	1064	1064
Observations	3767	3767	3767	3767	3767	3767	3767

Notes: Standard errors in parentheses. \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$ .

**Table C.4**  
Benchmark analysis including unexpected income change intercepts.

Dep. var.	(1) Exp. y	(2) LB	(3) UB	(4) UB-LB	(5) SD exp.	(6) Exp. err.	(7) Exp. err. (abs)
If unexp. positive $\Delta y$	-0.014 (0.037)	0.018 (0.044)	-0.021 (0.037)	-0.040 (0.030)	-0.003* (0.002)	-0.014 (0.051)	0.091** (0.045)
Unexp. positive $\Delta y$	0.203*** (0.022)	0.141*** (0.027)	0.210*** (0.023)	0.069*** (0.018)	0.005*** (0.001)	-0.162*** (0.031)	-0.133*** (0.027)
Unexp. negative $\Delta y$ (abs)	-0.251*** (0.025)	-0.292*** (0.029)	-0.252*** (0.025)	0.041** (0.020)	0.000 (0.001)	0.392*** (0.034)	0.057* (0.030)
Unemployed	-0.158 (0.181)	-0.008 (0.217)	-0.170 (0.184)	-0.162 (0.146)	-0.002 (0.009)	0.369 (0.250)	-0.068 (0.221)
Uncertainty in NL	0.031 (0.057)	0.048 (0.068)	0.025 (0.057)	-0.022 (0.046)	0.001 (0.003)	-0.067 (0.078)	-0.061 (0.069)
Unempl. rate	-0.024 (0.015)	-0.006 (0.018)	-0.017 (0.015)	-0.011 (0.012)	0.002** (0.001)	0.031 (0.021)	0.011 (0.018)
Age	0.027** (0.013)	0.026* (0.015)	0.024* (0.013)	-0.002 (0.010)	-0.001 (0.001)	-0.022 (0.017)	-0.016 (0.015)
Partner in the hh	0.090 (0.159)	0.137 (0.190)	0.085 (0.162)	-0.052 (0.128)	-0.008 (0.008)	0.187 (0.220)	-0.018 (0.194)
Children in the hh	-0.005 (0.114)	0.186 (0.136)	-0.030 (0.116)	-0.216** (0.092)	-0.017*** (0.006)	-0.039 (0.157)	0.224 (0.139)
Working	0.139 (0.145)	0.248 (0.173)	0.121 (0.147)	-0.128 (0.117)	-0.004 (0.007)	0.261 (0.200)	-0.223 (0.177)
Retired	-0.071 (0.141)	0.067 (0.168)	-0.093 (0.143)	-0.160 (0.113)	-0.010 (0.007)	0.293 (0.194)	-0.052 (0.172)
Homeowner	0.230 (0.193)	0.201 (0.230)	0.231 (0.195)	0.029 (0.155)	-0.002 (0.010)	-0.259 (0.266)	-0.118 (0.235)
Constant	9.034*** (0.989)	8.597*** (1.182)	9.288*** (1.004)	0.691 (0.797)	0.080 (0.051)	1.219 (1.365)	1.886 (1.207)
R-squared	0.084	0.060	0.083	0.011	0.016	0.072	0.013
Number of individuals	1064	1064	1064	1064	1064	1064	1064
Observations	3767	3767	3767	3767	3767	3767	3767

**Notes:** Standard errors in parentheses. \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$ . “If unexp. positive  $\Delta y$ ” is a dummy variable equal to one if the unexpected income change is positive and equal to zero if the unexpected income change is negative.

**Table C.5**  
Benchmark analysis using unexpected income change size.

Variables	(1) Exp. y	(2) LB	(3) UB	(4) UB-LB	(5) SD exp	(6) For. err.	(7) For. err. (abs)
If unexp. pos. $\Delta y$	-0.032 (0.083)	0.036 (0.099)	-0.044 (0.084)	-0.080 (0.066)	-0.005 (0.004)	-0.082 (0.114)	0.226** (0.101)
If large pos. $\Delta y$	0.006 (0.072)	0.057 (0.085)	0.008 (0.073)	-0.048 (0.058)	0.002 (0.004)	-0.074 (0.099)	-0.019 (0.087)
If large neg. $\Delta y$	-0.015 (0.076)	0.138 (0.091)	-0.019 (0.078)	-0.157** (0.061)	-0.002 (0.004)	-0.101 (0.105)	0.052 (0.093)
Unexp. positive $\Delta y$	-0.000 (0.851)	0.160 (1.016)	0.047 (0.864)	-0.114 (0.685)	0.000 (0.044)	0.132 (1.174)	-0.825 (1.037)
Unexp. negative $\Delta y$ (abs)	-0.721 (0.910)	-0.552 (1.086)	-0.771 (0.924)	-0.219 (0.732)	-0.009 (0.047)	-1.182 (1.255)	2.586** (1.109)
Unexp. positive $\Delta y$ *If large pos. $\Delta y$	0.201 (0.852)	-0.027 (1.017)	0.161 (0.865)	0.188 (0.685)	0.004 (0.044)	-0.280 (1.174)	0.688 (1.038)
Unexp. negative $\Delta y$ (abs)*If large neg. $\Delta y$	0.468 (0.910)	0.229 (1.087)	0.518 (0.924)	0.289 (0.732)	0.010 (0.047)	1.577 (1.255)	-2.513** (1.110)
Unemployed	-0.154 (0.182)	0.018 (0.217)	-0.166 (0.185)	-0.184 (0.146)	-0.002 (0.009)	0.360 (0.251)	-0.077 (0.222)
Uncertainty in NL	0.032 (0.057)	0.046 (0.068)	0.026 (0.057)	-0.020 (0.046)	0.001 (0.003)	-0.067 (0.078)	-0.061 (0.069)
Unempl. rate	-0.024 (0.015)	-0.007 (0.018)	-0.017 (0.015)	-0.010 (0.012)	0.002** (0.001)	0.031 (0.021)	0.012 (0.018)
Age	0.027** (0.013)	0.026* (0.015)	0.024* (0.013)	-0.002 (0.010)	-0.001 (0.001)	-0.022 (0.017)	-0.017 (0.015)
Partner in the hh	0.094 (0.160)	0.155 (0.191)	0.089 (0.162)	-0.067 (0.128)	-0.008 (0.008)	0.199 (0.220)	-0.045 (0.195)
Children in the hh	-0.006 (0.114)	0.185 (0.136)	-0.031 (0.116)	-0.216** (0.092)	-0.017*** (0.006)	-0.044 (0.157)	0.231* (0.139)
Working	0.140 (0.145)	0.264 (0.173)	0.121 (0.147)	-0.143 (0.117)	-0.004 (0.007)	0.250 (0.200)	-0.221 (0.177)
Retired	-0.070 (0.141)	0.074 (0.168)	-0.093 (0.143)	-0.167 (0.113)	-0.010 (0.007)	0.296 (0.194)	-0.055 (0.172)
Homeowner	0.228 (0.193)	0.192 (0.230)	0.229 (0.196)	0.036 (0.155)	-0.002 (0.010)	-0.263 (0.266)	-0.105 (0.235)
Constant	9.045*** (0.991)	8.555*** (1.183)	9.302*** (1.006)	0.746 (0.797)	0.080 (0.051)	1.298 (1.366)	1.812 (1.207)
R-squared	0.084	0.062	0.083	0.015	0.016	0.073	0.016
Number of individuals	1064	1064	1064	1064	1064	1064	1064
Observations	3767	3767	3767	3767	3767	3767	3767

**Notes:** Standard errors in parentheses. \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$ . Large positive and negative unexpected income changes are defined as unexpected income change larger than their respective median.

**Table C.6**  
Benchmark analysis including lagged unexpected income changes.

Dep. var	(1) Exp. y	(2) LB	(3) UB	(4) UB-LB	(5) SD exp.	(6) Exp. err.	(7) Exp. err. (abs)
Unexp. positive $\Delta y$	0.211*** (0.030)	0.117*** (0.037)	0.215*** (0.031)	0.098*** (0.026)	0.004** (0.002)	-0.205*** (0.042)	-0.140*** (0.037)
Unexp. negative $\Delta y$ (abs)	-0.356*** (0.028)	-0.383*** (0.034)	-0.351*** (0.029)	0.031 (0.024)	0.003* (0.002)	0.505*** (0.039)	0.144*** (0.034)
Unexp. positive $\Delta y$ (lag)	0.094*** (0.027)	0.133*** (0.033)	0.094*** (0.028)	-0.039 (0.024)	-0.001 (0.002)	-0.017 (0.038)	-0.167*** (0.033)
Unexp. negative $\Delta y$ (abs, lag)	-0.153*** (0.032)	-0.118*** (0.039)	-0.154*** (0.032)	-0.036 (0.027)	-0.001 (0.002)	0.259*** (0.044)	0.041 (0.038)
Unemployed	-0.155 (0.221)	-0.181 (0.270)	-0.130 (0.226)	0.051 (0.193)	0.012 (0.013)	0.565* (0.309)	-0.278 (0.269)
Uncertainty in NL	-0.085 (0.071)	-0.082 (0.086)	-0.093 (0.072)	-0.011 (0.062)	-0.001 (0.004)	0.092 (0.099)	-0.001 (0.086)
Unempl. rate	0.031 (0.021)	0.035 (0.025)	0.036* (0.021)	0.000 (0.018)	0.001 (0.001)	-0.023 (0.029)	-0.012 (0.025)
Age	-0.002 (0.016)	-0.000 (0.020)	-0.005 (0.016)	-0.005 (0.014)	-0.001 (0.001)	0.013 (0.022)	-0.004 (0.019)
Partner in the hh	0.161 (0.234)	0.122 (0.285)	0.183 (0.239)	0.061 (0.203)	0.011 (0.014)	-0.030 (0.327)	-0.349 (0.284)
Children in the hh	0.055 (0.175)	0.147 (0.214)	0.009 (0.179)	-0.138 (0.153)	-0.020* (0.011)	-0.081 (0.245)	0.028 (0.213)
Working	-0.096 (0.189)	-0.133 (0.231)	-0.075 (0.193)	0.058 (0.165)	0.018 (0.012)	0.524** (0.265)	-0.090 (0.230)
Retired	0.047 (0.177)	0.046 (0.216)	0.048 (0.181)	0.002 (0.154)	0.002 (0.011)	0.240 (0.247)	-0.218 (0.215)
Homeowner	0.108 (0.256)	0.085 (0.313)	0.114 (0.262)	0.029 (0.223)	0.005 (0.016)	-0.122 (0.358)	-0.022 (0.311)
Constant	11.171*** (1.247)	10.958*** (1.525)	11.402*** (1.275)	0.444 (1.087)	0.072 (0.076)	-1.520 (1.744)	1.233 (1.517)
R-squared	0.162	0.112	0.155	0.019	0.020	0.148	0.042
Number of individuals	706	706	706	706	706	706	706
Observations	2032	2032	2032	2032	2032	2032	2032

Notes: Standard errors in parentheses. \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$ .

**Table D.1**  
 Characteristics in the bottom and top 33% income groups.

Variable	Label	Bottom	Top	t-test
<i>Income variables</i>				
Expected income	Exp. y	10.301	11.364	-22.098***
Lower bound exp. inc.	LB	10.139	11.222	-19.365 ***
Upper bound exp. inc.	UB	10.355	11.420	-21.910***
Upper - Lower bound	UB-LB	0.216	0.198	0.524
SD expected income	SD exp.	0.028	0.034	-2.826***
Expectation error	Exp. err.	-0.130	0.045	-3.163***
Expectation error (abs.)	Exp. err. (abs)	0.716	0.360	7.018***
<i>Key explanatory variables</i>				
Unexpected positive income change	Unexp. positive $\Delta$ y	0.178	0.169	0.571
Unexpected negative income change (abs.)	Unexp. negative $\Delta$ y (abs)	0.283	0.103	9.854***
Unemployed		0.039	0.005	5.864***
Uncertainty in NL		5.002	4.973	1.200
Unempl. rate		5.570	5.639	-1.347
<i>Control variables</i>				
Age		61.545	58.073	7.136***
Partner in the hh		0.449	0.885	-26.315***
Children in the hh		0.149	0.275	-7.792***
Working		0.298	0.576	-14.537***
Retired		0.434	0.396	1.922*
Homeowner		0.567	0.931	-23.376***
<i>Further variables</i>				
Female		0.360	0.116	15.078***
College educ.		0.052	0.301	-17.030***
Vocational training educ.		0.219	0.097	8.491 ***
High School educ.		0.323	0.470	-7.568***
Low educ.		0.364	0.112	15.620***
No educ.		0.035	0.013	3.638***
Financial literate		0.287	0.527	-12.456***
Media financial source		0.423	0.589	-8.336***
Income (thousands)		18.273	52.181	-43.111***
Financial assets (thousands)		38.236	93.518	-10.605***
Observations		1197	1304	

**Notes:** The last column reports the value of a t-test comparing the mean of the bottom and top 33% of the income distribution. \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$ .

**Table D.2**

Subsample of bottom 33% income earners (full output).

Dep. var.	(1) Exp. y	(2) LB	(3) UB	(4) UB-LB	(5) SD exp.	(6) Exp. err.	(7) Exp. err. (abs)
Unexp. positive $\Delta y$	0.265*** (0.038)	0.241*** (0.044)	0.269*** (0.039)	0.028 (0.030)	0.002 (0.002)	-0.201*** (0.054)	-0.110** (0.045)
Unexp. negative $\Delta y$ (abs)	-0.098** (0.038)	-0.173*** (0.044)	-0.099** (0.039)	0.074** (0.030)	0.001 (0.002)	0.263*** (0.054)	-0.129*** (0.045)
Unemployed	-0.196 (0.342)	0.024 (0.397)	-0.281 (0.348)	-0.304 (0.264)	-0.033* (0.017)	0.547 (0.480)	-0.216 (0.405)
Uncertainty in NL	-0.035 (0.134)	0.019 (0.155)	-0.047 (0.136)	-0.066 (0.103)	-0.003 (0.007)	-0.149 (0.188)	-0.082 (0.158)
Unempl. rate	-0.043 (0.035)	-0.026 (0.041)	-0.038 (0.036)	-0.012 (0.027)	0.000 (0.002)	0.044 (0.049)	0.011 (0.042)
Age	0.040 (0.030)	0.047 (0.035)	0.032 (0.031)	-0.014 (0.023)	-0.002 (0.002)	-0.020 (0.042)	-0.064* (0.036)
Partner in the hh	-0.428 (0.391)	-0.251 (0.454)	-0.466 (0.398)	-0.214 (0.303)	-0.050** (0.020)	0.740 (0.549)	-0.352 (0.464)
Children in the hh	-0.219 (0.312)	-0.016 (0.362)	-0.293 (0.317)	-0.277 (0.241)	-0.051*** (0.016)	0.096 (0.438)	0.469 (0.370)
Working	0.547* (0.282)	0.813** (0.328)	0.494* (0.287)	-0.319 (0.218)	-0.018 (0.014)	-0.154 (0.396)	-0.763** (0.335)
Retired	-0.173 (0.262)	0.039 (0.304)	-0.184 (0.267)	-0.223 (0.203)	-0.011 (0.013)	0.310 (0.368)	0.062 (0.311)
Homeowner	0.301 (0.602)	0.100 (0.699)	0.294 (0.613)	0.195 (0.466)	0.004 (0.031)	-0.702 (0.846)	0.097 (0.714)
Constant	8.189*** (2.379)	7.125** (2.763)	8.795*** (2.422)	1.670 (1.840)	0.203* (0.121)	1.502 (3.342)	5.330* (2.824)
R-squared	0.096	0.079	0.093	0.015	0.028	0.063	0.031
Number of individuals	390	390	390	390	390	390	390
Observations	1197	1197	1197	1197	1197	1197	1197

**Notes:** Standard errors in parentheses. The sample includes respondents with average income in the bottom 33% of the distribution. \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$ .

**Table D.3**

Subsample of middle 33% income earners (full output).

Dep. var.	(1) Exp. y	(2) LB	(3) UB	(4) UB-LB	(5) SD exp.	(6) Exp. err.	(7) Exp. err. (abs)
Unexp. positive $\Delta y$	0.245*** (0.034)	0.071 (0.043)	0.254*** (0.034)	0.183*** (0.033)	0.010*** (0.002)	-0.265*** (0.050)	-0.220*** (0.045)
Unexp. negative $\Delta y$ (abs)	-0.239*** (0.045)	-0.263*** (0.059)	-0.236*** (0.047)	0.028 (0.045)	0.003 (0.003)	0.371*** (0.067)	0.099 (0.060)
Unemployed	-0.045 (0.235)	0.062 (0.303)	0.020 (0.241)	-0.042 (0.231)	0.028* (0.015)	-0.158 (0.348)	0.135 (0.312)
Uncertainty in NL	0.082 (0.077)	0.064 (0.099)	0.066 (0.078)	0.002 (0.075)	-0.007 (0.005)	-0.059 (0.113)	-0.076 (0.102)
Unempl. rate	-0.033 (0.021)	-0.005 (0.027)	-0.027 (0.021)	-0.022 (0.020)	0.002 (0.001)	0.027 (0.030)	0.041 (0.027)
Age	0.029* (0.017)	0.030 (0.022)	0.027 (0.017)	-0.003 (0.017)	-0.002* (0.001)	-0.028 (0.025)	-0.011 (0.022)
Partner in the hh	0.282 (0.191)	0.279 (0.246)	0.271 (0.196)	-0.008 (0.188)	0.003 (0.012)	-0.112 (0.283)	0.033 (0.254)
Children in the hh	0.056 (0.158)	0.429** (0.204)	0.048 (0.162)	-0.382** (0.156)	-0.009 (0.010)	-0.063 (0.234)	0.257 (0.210)
Working	-0.057 (0.198)	-0.075 (0.255)	-0.025 (0.203)	0.050 (0.195)	0.008 (0.012)	0.063 (0.293)	0.295 (0.263)
Retired	-0.123 (0.196)	-0.092 (0.252)	-0.119 (0.201)	-0.028 (0.193)	0.003 (0.012)	0.071 (0.290)	0.311 (0.260)
Homeowner	0.228 (0.212)	0.287 (0.273)	0.212 (0.217)	-0.075 (0.208)	-0.021 (0.013)	-0.007 (0.314)	-0.202 (0.281)
Constant	8.681*** (1.333)	8.306*** (1.717)	8.905*** (1.365)	0.600 (1.311)	0.168** (0.084)	1.826 (1.975)	1.085 (1.771)
R-squared	0.102	0.040	0.099	0.041	0.040	0.074	0.037
Number of individuals	343	343	343	343	343	343	343
Observations	1266	1266	1266	1266	1266	1266	1266

**Notes:** Standard errors in parentheses. The sample includes respondents with average income in the middle 33% of the distribution. \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$ .



**Table D.4**  
Subsample of top 33% income earners (full output).

Dep. var.	(1) Exp. y	(2) LB	(3) UB	(4) UB-LB	(5) SD exp.	(6) Exp. err.	(7) Exp. err. (abs)
Unexp. positive $\Delta y$	0.010 (0.039)	0.005 (0.047)	0.015 (0.039)	0.010 (0.029)	0.004** (0.002)	0.030 (0.050)	-0.010 (0.047)
Unexp. negative $\Delta y$ (abs)	-0.649*** (0.044)	-0.632*** (0.053)	-0.650*** (0.044)	-0.017 (0.033)	-0.000 (0.002)	0.787*** (0.057)	0.423*** (0.054)
Unemployed	-0.552 (0.432)	-0.533 (0.526)	-0.555 (0.434)	-0.022 (0.327)	0.003 (0.019)	1.269** (0.562)	-0.067 (0.529)
Uncertainty in NL	0.007 (0.081)	0.019 (0.099)	0.014 (0.081)	-0.006 (0.061)	0.009*** (0.004)	0.017 (0.106)	-0.016 (0.099)
Unempl. rate	-0.003 (0.022)	0.003 (0.026)	0.004 (0.022)	0.002 (0.016)	0.002** (0.001)	0.022 (0.028)	-0.007 (0.027)
Age	0.013 (0.018)	0.001 (0.022)	0.012 (0.018)	0.011 (0.014)	0.001 (0.001)	-0.015 (0.024)	0.007 (0.023)
Partner in the hh	0.358 (0.266)	0.287 (0.324)	0.389 (0.267)	0.102 (0.201)	0.025** (0.012)	0.082 (0.346)	0.051 (0.326)
Children in the hh	0.043 (0.148)	0.147 (0.180)	0.025 (0.149)	-0.122 (0.112)	-0.008 (0.006)	-0.117 (0.193)	0.132 (0.182)
Working	-0.412 (0.312)	-0.400 (0.379)	-0.460 (0.313)	-0.060 (0.236)	-0.001 (0.014)	1.380*** (0.406)	-0.160 (0.382)
Retired	-0.448 (0.307)	-0.360 (0.374)	-0.500 (0.308)	-0.140 (0.232)	-0.011 (0.013)	1.180*** (0.399)	-0.166 (0.376)
Homeowner	0.019 (0.309)	0.006 (0.377)	0.051 (0.311)	0.046 (0.234)	0.023* (0.014)	-0.166 (0.402)	-0.212 (0.379)
Constant	10.732*** (1.438)	11.217*** (1.750)	10.759*** (1.443)	-0.458 (1.087)	-0.116* (0.063)	-0.589 (1.870)	0.310 (1.761)
R-squared	0.191	0.132	0.191	0.006	0.051	0.172	0.066
Number of individuals	331	331	331	331	331	331	331
Observations	1304	1304	1304	1304	1304	1304	1304

**Notes:** Standard errors in parentheses. The sample includes respondents with average income in the top 33% of the distribution. \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$ .

## Data availability

The authors do not have permission to share data.

## References

- Angelini, V., Ferrari, I., 2021. The Long-Term Effects of Experienced Macroeconomic Shocks on Wealth. Working Papers 2021:23, Department of Economics, University of Venice "Ca' Foscari".
- Armona, L., Fuster, A., Zafar, B., 2019. Home price expectations and behaviour: Evidence from a randomized information experiment. *Rev. Econ. Stud.* 86 (4 (309)), pp. 1371–1410.
- Attanasio, O., Augsburg, B., 2016. Subjective expectations and income processes in rural India. *Economica* 83 (331), 416–442.
- Attanasio, O., Kovacs, A., Molnar, K., 2020. Euler equations, subjective expectations and income shocks. *Economica* 87 (346), 406–441.
- Bloom, N., 2009. The impact of uncertainty shocks. *Econometrica* 77 (3), 623–685.
- Bordalo, P., Gennaioli, N., La Porta, R., Shleifer, A., 2019. Diagnostic expectations and stock returns. *J. Financ.* 74 (6), 2839–2874.
- Bordalo, P., Gennaioli, N., Shleifer, A., 2018. Diagnostic expectations and credit cycles. *J. Financ.* 73 (1), 199–227.
- Bordalo, P., Gennaioli, N., Shleifer, A., 2022. Overreaction and diagnostic expectations in macroeconomics. *J. Econ. Perspect.* 36 (3), 223–244.
- Brown, S., Garino, G., Taylor, K., 2008. Mortgages and financial expectations: A household-level analysis. *South. Econ. J.* 74 (3), 857–878.
- Brown, S., Taylor, K., 2006. Financial expectations, consumption and saving: A microeconomic analysis. *Fisc. Stud.* 27 (3), 313–338.
- Bucciol, A., Miniaci, R., 2018. Financial risk propensity, business cycles and perceived risk exposure. *Oxf. Bull. Econ. Stat.* 80 (1), 160–183.
- Bucciol, A., Zarri, L., 2015. The shadow of the past: Financial risk taking and negative life events. *J. Econ. Psychol.* 48, 1–16.
- Christelis, D., Georgarakos, D., Jappelli, T., van Rooij, M., 2020. Consumption uncertainty and precautionary saving. *Rev. Econ. Stat.* 102 (1), 148–161.
- Cocco, J., Gomes, F., Lopes-Cocco, P., 2022. Evidence on Expectations of Household Finances. CEPR Discussion Paper 17447, Center for Economic Policy Research.
- Coibion, O., Georgarakos, D., Gorodnichenko, Y., Kenny, G., Weber, M., 2024. The effect of macroeconomic uncertainty on household spending. *Am. Econ. Rev.* 114 (3), 645–677.
- Coibion, O., Gorodnichenko, Y., Weber, M., 2021. Fiscal Policy and Households' Inflation Expectations: Evidence from a Randomized Control Trial. NBER Working Paper 28485, National Bureau of Economic Research.
- D'Acunto, F., Weber, M., 2024. Why survey-based subjective expectations are meaningful and important. *Annu. Rev. Econ.* 16.
- D'Acunto, F., Weber, M., Yin, X., 2024. Subjective Income Expectations and Household Debt Cycles. Working Paper Series 32715, National Bureau of Economic Research.
- Dominitz, J., Manski, C.F., 1997. Using expectations data to study subjective income expectations. *J. Amer. Statist. Assoc.* 92 (439), 855–867.
- Dominitz, J., Manski, C.F., 2004. How should we measure consumer confidence? *J. Econ. Perspect.* 18 (2), 51–66.
- Easaw, J., Grimme, C., 2024. The relationship between aggregate uncertainty and firm-level uncertainty. *Oxf. Econ. Pap.* gpa004, 1108–1127.
- Enke, B., Graeber, T., 2023. Cognitive uncertainty. *Q. J. Econ.* 138 (4), 2021–2067.
- Fagereng, A., Guiso, L., Pistaferri, L., 2018. Portfolio choices, firm shocks, and uninsurable wage risk. *Rev. Econ. Stud.* 85 (1), 437–474.
- Fuster, A., Perez-Truglia, R., Wiederholt, M., Zafar, B., 2022. Expectations with endogenous information acquisition: An experimental investigation. *Rev. Econ. Stat.* 104 (5), 1059–1078.
- Gennaioli, N., Shleifer, A., 2010. What comes to mind. *Q. J. Econ.* 125 (4), 1399–1433.
- Guiso, L., Sapienza, P., Zingales, L., 2018. Time varying risk aversion. *J. Financ. Econ.* 128 (3), 403–421.
- Hanaoka, C., Shigeoka, H., Watanabe, Y., 2018. Do risk preferences change? Evidence from the Great East Japan Earthquake. *Am. Econ. J.: Appl. Econ.* 10 (2), 298–330.
- Heiss, F., Hurd, M., van Rooij, M., Rossmann, T., Winter, J., 2022. Dynamics and heterogeneity of subjective stock market expectations. *J. Econometrics* 231 (1), 213–231.
- Hurd, M., Van Rooij, M., Winter, J., 2011. Stock market expectations of Dutch households. *J. Appl. Econometrics* 26 (3), 416–436.
- Jappelli, T., Pistaferri, L., 2017. *The Economics of Consumption: Theory and Evidence*. Oxford University Press.
- Kautsia, M., Knupfer, S., 2008. Do investors overweight personal experience? Evidence from IPO subscriptions. *J. Financ.* 63 (6), 2679–2702.
- Kovacs, A., Rondinelli, C., Trucchi, S., 2021. Permanent versus transitory income shocks over the business cycle. *Eur. Econ. Rev.* 139 (103873), 1–19.
- Kroese, S.K., Parlevliet, J., 2015. Beleidszekerheid in Nederland. No. 4715, Economisch Statistische Berichten.
- Kuchler, T., Zafar, B., 2019. Personal experiences and expectations about aggregate outcomes. *J. Financ.* 74 (5), 2491–2542.
- Malmendier, U.M., Botsch, M.J., 2020. The Long Shadows of the Great Inflation: evidence from Residential Mortgages. CEPR Discussion Papers 14934, C.E.P.R. Discussion Papers.
- Malmendier, U., Nagel, S., 2011. Depression babies: Do macroeconomic experiences affect risk taking? *Q. J. Econ.* 126 (1), 373–416.
- Malmendier, U., Nagel, S., 2016. Learning from inflation experiences. *Q. J. Econ.* 131 (1), 53–87.
- Malmendier, U., Wellsjo, S., 2024. Rent or buy? Inflation experiences and homeownership within and across countries. *J. Financ.* 79 (3), 1977–2023.
- Manski, C.F., 2004. Measuring expectations. *Econometrica* 72 (5), 1329–1376.
- Massenot, B., Pettinicchi, Y., 2018. Can firms see into the future? Survey evidence from Germany. *J. Econ. Behav. Organ.* 145, 66–79.
- Massenot, B., Pettinicchi, Y., 2019. Can households see into the future? Survey evidence from the Netherlands. *J. Econ. Behav. Organ.* 164, 77–90.
- Oster, E., 2019. Unobservable selection and coefficient stability: Theory and evidence. *J. Bus. Econom. Statist.* 37 (2), 187–204.
- Patnaik, A., Venator, J., Wiswall, M., Zafar, B., 2022. The role of heterogeneous risk preferences, discount rates, and earnings expectations in college major choice. *J. Econometrics* 231 (1), 98–122.
- Picillo, G., Poonpakdee, P., 2021. Effects of Macro Uncertainty on Mean Expectation and Subjective Uncertainty: Evidence from Households and Professional Forecasters. CESifo Working Paper Series 9486, CESifo.
- Rossi, M., Trucchi, S., 2016. Liquidity constraints and labor supply. *Eur. Econ. Rev.* 87, 176–193.
- Roth, C., Wohlfart, J., 2020. How do expectations about the macroeconomy affect personal expectations and behavior? *Rev. Econ. Stat.* 102 (4), 731–748.
- Rozsyppal, F., Schlafmann, K., 2023. Overpersistence bias in individual income expectations and its aggregate implications. *Am. Econ. J.: Macroecon.* 15 (4), 331–371.
- Vellekoop, N., Wiederholt, M., 2019. Inflation Expectations and Choices of Households. Working Paper No. 250, SAFE.