Evidence on expectations of household finances *

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Abstract

We use panel data on expected and realized changes in household finances to study the process of expectation formation. Households extrapolate from improvements in financial situation, but deteriorations are associated with an increased dispersion of forecasts, and higher probabilities of both negative and positive forecast errors. Individuals who expect earnings declines to revert too quickly save less and are more likely to be financially worse off again in the future. Learning from past errors reduces the likelihood that individuals are optimistic following a deterioration in their finances. The evidence shows how experiences, learning and life events matter for expectations formation.

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1 Introduction

How do the changes that individuals experience in their financial situation impact their expectations for the future and how are these expectations reflected in their saving and borrowing decisions? In this paper we provide evidence on the process of expectation formation regarding household finances using almost two decades of panel data.

Our data source, the British Household Panel Survey, provides information on both realized changes in household finances and expectations regarding future changes. More precisely, in each year, individuals are asked whether they are financially better off, about the same, or worse off than they were one year before, and their expectations for the following year. These questions are similar to those in the US Michigan Survey of Consumers, but unlike the Michigan Survey which is a rotating panel, our data is a full panel. It allows us to measure expectation errors over time, and to control for unobserved individual heterogeneity, including in the interpretation of the survey questions (Manski (2018)). Furthermore, the data has information on individual characteristics and decisions, including on saving and borrowing, that we relate to their expectations.

We first study how the realized changes in household finances shape future expectations. Controlling for individual fixed effects, we find that following an improvement in their finances households are more likely to expect a further improvement (and less likely to expect a deterioration). This result is consistent with evidence of extrapolative expectations in financial markets (Greenwood and Shleifer (2014), Gennaioli et al. (2015), Bordalo et al. (2019)) and with models of diagnostic expectations in which agents over-weight their recent experiences (Bordalo et al. (2018), Bordalo et al. (2020)).

However, following a deterioration in household finances, we find increases in both the subjective probability of a further deterioration (consistent with extrapolative expectations) and of a future improvement (consistent with mean reversion).[1] Thus, a first main finding of our paper is that, following negative events, there is an increase in the dispersion of forecasts, not predicted by a simple model of extrapolative expectations. A possible reason is that individuals face greater uncertainty about the future after bad events. This interpretation is consistent with

[1] With a compensating decline in the number of individuals who expect an unchanged financial situation.

Fermand et al. (2018) who show that individuals are more uncertain about their expectations in bad times, and behave accordingly by increasing their precautionary savings. While this channel may also be at work in our data, it cannot be the full explanation: those individuals in our sample who expect mean reversion reduce their savings and borrow more.

In the second part of the paper we study why following a deterioration in household finances individuals sometimes expect mean reversion while at other times they extrapolate. Our analysis shows that the differences are related to the reason for the worse financial situation: although there is an increase in the dispersion of forecasts following both lower earnings and higher expenditure, individuals are relatively more likely to expect mean reversion when the reason for the deterioration is lower earnings (as opposed to higher expenditure). Furthermore, the degrees of both mean reversion and extrapolation are excessive relative to the future realizations of the changes in household finances (which we observe due to the panel nature of the data).

Our second main contribution is to show that the expectation errors matter for expectation formation in a way that is consistent with a learning channel. We construct, for each year/individual, an ex-post expectation error which we classify into optimism, pessimism or correct forecast. An optimistic (pessimistic) observation corresponds to an individual i/year t for whom the expectation is better (worse) than his/her year $t+1$ realized change.[2] We include the number of past optimistic and pessimist expectation errors in the regressions, to find that individuals who in the past have frequently been too optimistic (pessimistic) are less (more) likely to expect to be better off in the future, and more (less) likely to expect to be worse off.

Furthermore, those individuals with a higher incidence of past optimistic (pessimistic) beliefs have a lower probability of being optimistic (pessimistic) again in the future. We show that this is not offset by a higher probability of mistakes in the other directions, but rather by a reduction in future expectation errors. These results are consistent with recent learning models, such as Farmer et al. (2023) and Li et al. (2023), where agents use past realizations of the shocks to learn about the underlying stochastic processes and improve their forecasts. Our analysis shows that the learning channel is particularly important in reducing the likelihood that individuals are too optimistic following a negative earnings shock.

[2] An observation with an expectation equal to the subsequent realization is classified as a correct forecast.

Even though we find empirical support for both the diagnostic expectations and learning models, the evidence of an increase in the dispersion of forecasts following negative changes in financial situation and, in particular, that individuals tend to over-estimate the expectation of mean-reversion following negative earnings shocks, is not implied by those theories. These results are therefore informative of potential directions for future theoretical research on expectation formation.

The expectation of too much mean reversion following lower earnings is particularly important since these are times when household finances tend to be stretched. If households are too optimistic about the future they may not cut back on consumption, and may instead reduce their savings and/or increase borrowing. This could prolong the impact of the initial event, and thus have significant negative implications for future household finances. We show that those individuals who expect the deterioration in their finances to mean revert are indeed more likely to cut back on savings and/or take on an extra loan than those who do not have such optimistic expectations. Importantly, we find that they are also more likely to be financially worse off again in the future for reasons other than a further decline in earnings, confirming that these expectation errors have a particularly negative impact on individual welfare.

Our paper is related to previously mentioned growing literature on financial expectations (e.g. Greenwood and Shleifer (2014), Gennaioli et al. (2015), Bordalo et al. (2019), Giglio et al. (2021)) and, in particular, to those papers that focus on the role of personal experiences in shaping expectations and individual decisions. Vissing-Jorgensen (2003), Greenwood and Nagel (2009), Malmendier and Nagel (2011), Malmendier et al. (2011), Kuchler and Zafar (2019), and Malmendier et al. (2021) emphasize the importance of accumulated personal lifetime experiences in shaping individual beliefs (see also the contributions of Kaustia and Knupfer (2008), Kuhnen (2015), Malmendier and Shen (2018), and Das et al. (2020)).

Most of these papers focus on the expectations of aggregate variables, such as stock returns or inflation, but Kaustia and Knupfer (2008) study expectations of the individual's own investment ability and Kuhnen (2015) presents experimental evidence on how individuals form expectations differently following gains and losses. Our paper differs from these in that we provide evidence on expectations of household finances using panel data.

With respect to expectations of household finances, our paper is closest to Rozsypal and

Schlafmann (2020) and Brown and Taylor (2006). Relative to these, our main contribution is to link the changes experienced in finances to expectations and to expectation errors in a panel setting, controlling for individual fixed effects. Rozsypal and Schlafmann (2020) are able to measure only one expectation error for each individual, so they cannot control for fixed effects. Brown and Taylor (2006) have a longer panel, but their focus is on average optimism and pessimism across individuals, and they do not study the links between the changes experienced in household finances and expectations.

Finally, our paper contributes to the literature on individual sentiment and financial decisions (Souleles (2004), Puri and Robinson (2007)), and the household finance literature more generally (see Campbell (2006), Guiso and Sodini (2013), and Guiso et al. (1997) for overviews).

The paper is organized as follows. In Section 2, we describe the data and the realized changes in financial situation. Section 3 focuses on expectations, and how they are affected by the changes experienced in financial situation. In Section 4, we construct measures of optimism and pessimism and show how they relate to both to the changes experienced in financial situation and past expectation errors. Section 5 studies the effects of life events on household finances. Section 6 provides evidence on the implications for the future financial situation. The final section concludes.

2 The data

2.1 Data description

Our main data source is the British Household Panel Survey (BHPS), which is a representative panel of U.K. households (of Essex, 2010). The sample starts in 1991 and there is annual data available up to (and including) 2008.[3]. The nature of the data, both in terms of the data collection process and the information available, is similar to that in the U.S. Panel Study of Income Dynamics (PSID). The first wave of the BHPS contains around 5,500 households, increasing over time to around 9,000. The per year average number of households is 6,793 and the median household appears 11 times in the sample. The panel nature of the data, and the

[3]After 2008 several of the questions that are crucial for our study were dropped from the survey.

information collected, allow us to study several interesting economic questions. It also means that we are able to control for individual fixed effects in the regressions.

Each year, individuals are asked about changes in their current financial situation. The exact question is: "Would you say that you yourself are better off or worse off financially than you were a year ago?". The possible answers are "better off", "about the same", or "worse off". Those who report being better or worse off are, from 1993 onward, asked about the reason for the change (higher/lower earnings, expenditures, etc,).[4]

Also in each year, the survey elicits individuals' expectations regarding their future financial situation. The exact question is: "Looking ahead, how do you think you will be financially a year from now, will you be:". The answers that are read out to the individual are: "better than now, worse than now, and about the same." Respondents are not asked the reason for their expectation (earnings, expenditure, etc.).

The University of Michigan Consumer Survey includes similar survey questions, in which respondents are asked about their expected change in financial situation in a year's time. However, the Michigan Consumer Survey is a rotating panel, whereas our data is a panel. We are thus able to compare previous year expectations and subsequent realizations for the same individual. We can also include individual fixed effects in the regressions that control, among other things, for the fact that different respondents may interpret verbal questions differently (Manski (2018)). This is particularly important in light of the evidence in Giglio et al. (2021), who show that beliefs are characterized by large and persistent individual heterogeneity.

In addition to the variables that measure expected and realized changes in household finances, we use data on income, age, educational attainment, employment status (retirement, unemployment), and household composition (marriage, divorce, number of children). It allows us to study the effects of retirement, unemployment and other life events on household finances and the extent to which they are expected. The data also has household level information on expenditure in necessities (food and energy) that we use to characterize the nature of the expenditure shocks. We think of the household as a unit and use household income and expenditure measures. The measure of income is broad, in that it includes not only labor income but also transfer and social security benefits. When studying the effects of age and educational

[4]The exact question is "Why is that? (financially better or worse off)."

attainment, we follow the literature in using the answers of the household head.

The data has some limitations. First, as the PSID, it is based on survey data which typically have measurement error. Second, some of the variables are available in some years but not others (for example wealth information is available but only every five years).[5] Another potential concern is that sample attrition might be correlated with the change in financial situation. We test this by calculating the fraction of individuals that exit the data set in any year t. The full sample attrition rate is 8.5%, and it is similar for all major reasons for changes in financial situation,[6] suggesting that selection due to attrition is not a particular concern for our analysis.

2.2 Qualitative assessments of changes in financial situation

The qualitative assessment of the changes in household finances represent the changes as perceived by individuals. An advantage is that they capture the state of the world as evaluated by them when making their consumption/saving decisions. In the first column of Panel A of Table 1 we report the proportion of responses for each category, for all years in the sample. Thus, the unit of observation is household/year. Roughly half of the responses are for about the same, and the remainder are equally split between better off and worse off.

The first column of Panel B tabulates the better off reasons. Unsurprisingly, the main reason is higher earnings (54%). The second highest category is lower expenditure, with a response rate of 15%. Panel C tabulates the reasons for being worse off. The main one is higher expenditure (53%), a reason that is given twice as often as lower earnings (24%).

In order to gain some initial insights into life-cycle effects, the next four columns of Table 1 show responses by age. There is a marked age decline in the proportion of individuals who are financially better off, from 0.39 for the 20 to 34 age group to 0.11 for those over 65. This decline is mirrored by an increase in the proportion of those who are about the same, while the fraction of those who are worse off remains stable over the life cycle.

[5]There also are other data limitations. For instance, the data on expenditures in leisure and meals outside of the home, when available, is provided in brackets instead of an amount.

[6]For those who report being significantly better off due to higher earnings (lower expenditure), the corresponding number is 8.4% (8.6%). For those who report being significantly worse off due to higher expenditure (lower earnings), the attrition rate is 8.2% (8.1%).

Early in life the main reason for being better off is higher earnings (Panel B), reflecting the upward sloping earnings profile at this stage of the life cycle. As individuals age and labor income profiles flatten, the proportion of those who report being better off declines, and so does the relevance of higher earnings as the reason for being better off. For the over 65 age group, the main reason is higher benefits. For the worse off events, higher expenditure is the main reason for all age groups, particularly so for those aged over 65 (Panel C). For those below retirement age, lower earnings is also an important reason, with a fraction of roughly 0.30.

In the last three columns of Table 1, we focus on the role of income. In each year $t-1$, we divide the households in our data into three groups based on their income (household income includes the income of household head and partner, if present). The low (high) income group includes those households in the bottom (top) third of the income distribution for that year. We then study the changes in year t financial situation. High (low) income households are more (less) likely to become significantly better off, an event which occurs with probability 0.29 (0.17). For those in the high-income group, an increase in earnings is the main reason for being better off. In contrast, among the low-income group, increases in benefits are as important as increases in earnings (Panel B). Higher expenditure is a more important reason for being worse off for the low income group, with a proportion of answers equal to 0.63, but it is also the most important category for the high income group, with 0.46 (Panel C).

2.3 Mapping qualitative assessments to quantitative outcomes

In this section we study the mapping between households' qualitative assessments of their financial situation and what the changes mean quantitatively.

2.3.1 Changes in financial situation due to earnings

In a first step, we use the panel dimension of the data to measure annual changes in log real household income. That is, we calculate $\Delta y_{it} = ln(Y_{it}) - ln(Y_{i.t-1})$, where Y_{it} is real income, i denotes the household and t year.[7] We then estimate:

$$\Delta y_{it} = \alpha + \beta_1 \mathbb{1}(\text{Earnings} \uparrow)_{it} + \beta_2 \mathbb{1}(\text{Earnings} \downarrow)_{it} + \delta_i + \epsilon_{it}, \tag{1}$$

[7]This naturally requires that we have consecutive year observations for the same household.

where $\mathbb{1}(\text{Earnings} \uparrow)_{it}$ ($\mathbb{1}(\text{Earnings}) \downarrow)_{it}$) is an indicator variable that takes the value of one if individual i reported higher (lower) earnings in year t (and zero otherwise), δ_i is an individual fixed effect, and ϵ_{it} is the residual.

In the above equation, $\alpha + \beta_1$ is the percentage change in income for those individuals who report higher earnings, α is the percentage change for those who report neither higher nor lower earnings, and $\alpha + \beta_2$ is the percentage change for those who report lower earnings. The estimated values, which we plot in the first three columns of Figure 1, are 7.3%, 3.4% and -6.3%, respectively. Therefore, the changes in household income that correspond to their qualitative assessment of those changes are meaningful and in line with the assessment.[8]

Next we explore heterogeneity across households by estimating the above regression for groups of individuals based on the age of the household head (20-34, 35-49 and 50-64 years old). Figure 1 shows that there are large age declines in the realized income changes that correspond to a given assessment. The income change among those who report higher (lower) earnings is 11.7% (-2.9%) for those in the 20-34 age group, compared to 4.1% (-9.1%) for those 50-64 years old. Early in life, income profiles are upward slopping leading to a higher (lower in absolute value) percentage increase (decrease) for those who assess to be better off (worse off) due to higher (lower) earnings.

The remaining columns of Figure 1 show results for individuals who differ in education attainment and permanent income. The education groups that we consider are no high school, a high school degree, and college or other higher education degree. Permanent income is a measure of lifetime income. More precisely, we first calculate the average income of each household across all years in which they appear in our data. We then assign households to deciles based on this average lifetime income. Permanent income group 1 includes those in the bottom decile of income. For education and permanent income groups, there are not as clear patterns as for age groups. These results provide a characterization of how the qualitative assessments translate into quantitative outcomes, and show that for earnings an important dimension of heterogeneity is age.

[8] We have estimated regressions with and without individual fixed effects. Although the exact estimates differ, the conclusions that we emphasize are similar. For example, when we do not include individual fixed effects in the regression, the estimated values are 8.9%, 3.0%, and -6.0%, respectively.

2.3.2 Changes in financial situation due to expenditures

Next we investigate the mapping between the higher/lower expenditures qualitative assessments and cost of living measures. The regression framework is similar to before:

$$\pi_t = \alpha + \beta_1 \mathbb{1}(\text{Expenditures} \uparrow)_{it} + \beta_2 \mathbb{1}(\text{Expenditures} \downarrow)_{it} + \delta_i + \eta_{it}. \tag{2}$$

where the dependent variable π_t is the year t realized inflation and η_{it} is the residual. The estimated $\alpha + \beta_1$ ($\alpha + \beta_2$) measures the realized inflation in the years in which individuals reported higher (lower) expenditures. The intercept measures the inflation for the remaining individuals/years. An important difference relative to the income regressions is that, for a given year, the inflation measure is the same for all individuals.[9] The inflation is on average 2.9% in observations corresponding to individuals who report higher expenditures in that year compared to 2.7% for lower expenditures. The difference is statistically significant, but economically small.

In addition to an overall inflation measure, we analyze food (π_t^{Food}) and energy (π_t^{Energy}) price inflation. They are both necessities and households may be less able to adjust their consumption in response to price changes. The values for food and energy inflation corresponding to higher/lower expenditures are 2.8%/1.9% and 6.4%/4.1%, respectively. Therefore, for necessities, for which households have less flexibility in adjusting their consumption, there is a larger spread between the high and low values, suggesting that food and energy price inflation are a more important determinant of the higher/lower expenditure responses.

Figure 2 plots the values for different sub-groups, obtained by estimating equation (2) separately for each. Panel A (Panel B) shows the estimates for food (energy) price inflation. Several patterns are visible. First, the inflation measure tends to be much higher for higher expenditure responses, followed by no expenditure change, and lowest for individual/year observations with lower expenditure responses. Second, there is interesting heterogeneity across groups. For lower permanent income groups, lower values of food and energy price inflation are associated with higher expenditures responses. For instance for food (energy) it is equal to 2.3% (3.8%) for those in permanent income group 1 compared to 3.2% (6.9%) in permanent income group 10. Therefore, lower values of food and energy price inflation have a more significant impact

[9] We do not observe individuals' consumption basket so that we cannot compute an individual specific inflation measure, but below we partly explore inflation variation across individuals and categories of goods.

in the finances of lower permanent income households. This is also the case for those in lower education groups, as education is related to permanent income.

Our data has information on the amount spent on food and energy by each household, which is useful for understanding the previous results. Respondents are asked their total weekly food and grocery and energy bills, values that we multiply by 52 to obtain annual figures, and divide by household income to construct household specific expenditure shares. In Appendix A we plot these average expenditure shares. Those in lower permanent income groups, over 65 years old, and less educated spend a larger proportion of their income in food and energy (and they are also more likely be worse off due to higher expenditures than other groups). In the same appendix, we show that in those years in which food/energy price inflation is high households are more (less) likely to report higher (lower) expenditures. Furthermore, households who have higher (lagged) expenditure shares in years in which food/energy price inflation is higher are significantly less likely to report lower expenditures.

The results in this section shed light on what the qualitative assessments of better/worse off mean for different groups of households in terms of income and price changes. They also shed light on the channels through which household finances are impacted.[10]

2.4 A first look at expectations

Table 2 shows the proportions of individual/year observations for which respondents expect to be better off, the same, or worse off. The second column reports the unconditional distribution. The majority of responses (almost two thirds) are for the expectation of an unchanged financial situation. One in four expect to be significantly better off, and only one in ten expect to be significantly worse off.

If we compare these proportions with the unconditional distribution of the realized changes shown in Panel A of Table 1, it seems that individuals are remarkably good at anticipating

[10]The results in this section are for real household income. We have tried to investigate whether qualitative assessments are based on real or nominal income. Since most of the variability in our data is cross-sectional, the correlation between changes in real and nominal household income is as high as 0.9996 which, together with the expenditures channel of inflation, makes it difficult to draw conclusions. Similar difficulties arise assessing whether individuals respond to gross or net of taxes income (the correlation between the two is 0.9984).

improvements in their finances: the average expectation and realization are both equal to 24%. On the other hand, individuals appear to under-estimate the probability of becoming worse-off, which is 12% in expectation compared to 24% in realization. However, it is important to be careful when making these comparisons. First, the expectations and realizations are averages, and may not correspond to the same individuals.[11] Second, the higher proportion of worse off realizations compared with expectations could be the result of our sample including a significant proportion of unexpected negative events, such as economic recessions, which we control for with year fixed effects.

The remaining columns of Table 2 report expectations by age and income. The patterns are similar to those for the realizations (Table 1). The proportion of individuals who expect to be better off is higher early in life, likely reflecting the fact that earnings profiles are steeper at this stage of the life-cycle.[12] The proportion of individuals who expect to be worse off increases from 0.08 for the 20-34 age group, to 0.16 for those over 65 years of age. These patterns show the importance of age and life-cycle effects in the process of expectation formation.

One potential shortcoming of expectation surveys is that the responses may be affected by framing and/or by some individuals not actually meaning what they say. As discussed in Greenwood and Shleifer (2014), this concern can be addressed by showing that individuals behave in line with the expectations that they report. This approach has been followed by several papers in the literature. Giglio et al. (2021) show that beliefs influence both portfolio allocations and trading behavior. Fermand et al. (2018) show that individuals with more uncertain expectations exhibit more precautionary behavior.[13] In Appendix B we show that in our data, expectations are related to savings behavior in an economically meaningful manner.

[11] In Section 4, we construct expectation errors using the expectations and subsequent realizations for the same individual.

[12] Unfortunately, individuals are not asked for the reason for their better/worse off expectation.

[13] See also Makridis (2019) who finds that investors self-reported expectations of future economic activity have a causal impact on their consumption and Vellekoop and Wiederholt (2019) who show that households with higher inflation expectations save less.

3 Expectations

In this section, we study the determinants of expectations, namely how they relate to the experienced changes in financial situation.

3.1 Changes experienced and expectations

We first use the individual i/year t change in financial situation to construct a variable (ΔFS_t^i) that takes one of three possible values:

$$\Delta FS_t^i = \begin{cases} 1 & \text{if individual } i \text{ is financially better off at } t \\ 0 & \text{if individual } i \text{ is financially about the same at } t \\ \text{-1} & \text{if individual } i \text{ is financially worse off at } t \end{cases}$$

Similarly, we construct another variable ($E_t^i[\Delta FS_{t+1}^i]$) that measures the individual i's year t expectations of future changes in financial situation:

$$E_t^i[\Delta FS_{t+1}^i] = \begin{cases} 1 & \text{if individual } i \text{ expects to be better off at } t+1 \\ 0 & \text{if individual } i \text{ expects to be about the same at } t+1 \\ \text{-1} & \text{if individual } i \text{ expects to be worse off at } t+1 \end{cases}$$

In order to study the relationship between changes experienced and expectations, we first estimate:

$$E_t^i[\Delta FS_{t+1}^i] = \alpha + \beta \Delta FS_t^i + f^i + \epsilon_t^i, \tag{3}$$

where f^i are the individual fixed effects and ϵ_t^i is the residual. The fixed effects control for unobserved individual heterogeneity, including in the way that different individuals interpret the survey questions. We estimate the equation using ordinary least squares, but the main conclusions are similar when we estimate a multinomial logit model.

The first two columns of Table 3 show the results for regressions with a different set of controls. The estimated β coefficients are positive and highly statistically significant, so that individuals who have experienced an improvement (a deterioration) in their financial situation are more likely to expect, for the following year, another improvement (deterioration). This is evidence of extrapolative expectations, a pattern that is consistent with the literature that finds evidence of extrapolative expectations in financial variables (e.g. Greenwood and Shleifer

(2014), Gennaioli et al. (2015) and Bordalo et al. (2019)). Naturally, in our household finances setting, the extrapolative expectations could reflect the persistence of the reasons driving the change in financial situation, a question that we address when studying expectation errors.

In column (3) of Table 3, we report the results for a more flexible specification, in which we allow the degree of extrapolative expectations to depend on the nature of the change experienced in financial situation. We do so by decomposing the ΔFS_t^i variable into two different dummies: one that takes the value of one for positive changes ($\Delta FS_t^i = 1$) and zero otherwise, and another that takes the value of one for negative changes ($\Delta FS_t^i = -1$) and zero otherwise.[14]

We estimate a positive (negative) coefficient following an improvement (deterioration) in household finances. Therefore, after an improvement (deterioration), $E_t^i[\Delta FS_{t+1}^i]$ is more likely to be positive (negative), consistent with extrapolative behavior. However, the absolute value of the estimated coefficient for positive changes is almost five times larger than that for negative changes (0.09 versus 0.02), which shows that on average the extrapolative behavior is stronger after an improvement than a deterioration in household finances. In order to investigate this further, we move from studying average expectations to the distribution of expectations.

3.2 Changes experienced and the distribution of expectations

In order to characterize the distribution of expectations and how it relates to the realized changes in financial situation, we construct three dummy variables. Expect Better$_{it}$ is equal to one if the individual expects an improvement in his/her t+1 finances ($E_t^i[\Delta FS_{t+1}^i] = 1$), and zero otherwise. Expect Same$_{it}$ is equal to one if the expectation is of an unchanged financial situation ($E_t^i[\Delta FS_{t+1}^i] = 0$), and zero otherwise. Finally, Expect Worse$_{it}$ takes a value of one when individuals expect a deterioration ($E_t^i[\Delta FS_{t+1}^i] = -1$), and zero otherwise.[15] In our baseline specification we estimate separate regressions where the outcome variables y_{it} are the these expectations dummy variables.

[14] The no change in financial situation is captured by the (unreported) constant in the regression.

[15] The null set for each of these dummy variables combines two alternative outcomes. For instance, the expect better dummy takes the value of zero for those who expect no change and for those who expect to be worse off. In Appendix C we define and estimate alternative specifications where the expect better and expect worse responses are only compared to the expectation of no change. The main conclusions are similar.

We estimate a standard binary choice model:

$$Prob(y_{it} = 1|\mathbf{x}_{it}, u_i) = F(\mathbf{x}_{it}, u_i) \tag{4}$$

where $\mathbf{x}_{it}$ is a vector of observable covariates and u_i is an unobserved individual specific effect. One common approach to modeling the unobserved individual heterogeneity (u_i) is the random effects model. An alternative approach, which does not require us to make assumptions on how the individual effects are related to the covariates $\mathbf{x}_{it}$, is the fixed effects model. This model cannot generally be estimated due to the incidental parameters problem. One important exception is the logit distribution. Under this specification, the fixed effects are removed from the estimation to avoid the incidental parameters problem, and the analysis is thus conditional on the unobserved u_i which are not estimated.

Because we control for individual fixed effects, the regressions capture variation over time for the same individual. We also control throughout for year fixed effects, since aggregate economic conditions will naturally influence individuals' expectations of their future financial situation. Finally, even though we focus on the conditional fixed effects logit model, the results are similar when we estimate a linear probability model.

3.2.1 Results

Table 4 shows the estimation results. In columns (1) to (3), we regress the above expectations variables on the dummy variables that measure the change experienced in financial situation. The positive coefficient in the first row of column (1) shows that, following a time t improvement in financial situation, individuals increase their subjective probability of a subsequent (time $t + 1$) improvement. The negative coefficients in the first row of columns (2) and (3) reveal that the increase in the probability of a further improvement is counterbalanced by declines in the probabilities of a t+1 deterioration and, particularly, of no change. The values of the estimated coefficients are economically meaningful: the log-odds ratio for the increase in the subjective probability of being better off the following year is 0.64, and those for the subjective probability of being worse off and no change are -0.08 and -0.52, respectively.

These estimates show that the extrapolative pattern is not the outcome of a parallel shift in the subjective probability distribution of future changes, but is driven by an increase in the

mass in the right tail offset largely by a reduction of the mass in the middle of the distribution. Interestingly, the expectation responses to a deterioration in financial situation, shown in the second row of Table 4, reveal a different pattern. The estimated coefficient on the worse off dummy is positive in the regression for the expectations of a future improvement (column (1)), and in the regression for the expectations of a future deterioration (column (2)).

In the previous section, we showed that, on average, following a deterioration, individuals increased their expectation of a further deterioration (extrapolative behavior). However, by separately studying the revisions in the subjective probabilities of the three different categories, we uncover a more complex pattern. Following a worse off event, there are increases in the subjective probability of being worse off again (consistent with extrapolative expectations), and in the subjective probability of being better off (mean reversion).[16] Therefore, there is an increase in the dispersion of expectations following negative events.[17]

One possible explanation for the increase in the dispersion of forecasts is that individuals are more uncertain about what negative events mean for their future finances. Such an explanation would be consistent with the results of Fermand et al. (2018), who show that, in bad times, agents are more uncertain about the future, and they behave more conservatively by saving more (higher precautionary savings) and by making more cautious investment decisions. Although this effect could also be present in our data, the evidence on savings behavior included in Appendix B reveals that in our sample a different mechanism is at work. Appendix C reports results for regressions without individual fixed effects. The qualitative conclusions are similar. We observe extrapolative behavior following improvements in financial situation, and an increase in the dispersion of expectations following deteriorations.[18]

[16]These increases are offset by a decline in the number of those who expect no changes (column (3)).

[17]The results in the previous section show an extrapolative pattern in average expectations that is much weaker following a deterioration than following an improvement in financial situation. This can be understood from the results in the second row of Table 4. After a negative change, there is an increase in both the left and the right tail of the distribution of future expectations. The increase is slightly larger in the left than in the right tail (0.99 versus 0.74), giving rise to a small average negative change.

[18]The inclusion of individual fixed effects makes a substantial difference to the qualitative conclusions for regressions in which the dependent variables measure expectation errors, as shown later in the paper.

3.2.2 Disaggregating by reason for the change in financial situation

In order to investigate the channel behind the increase in the dispersion of forecasts following a deterioration, we disaggregate the dependent variables by reason for the change in financial situation. We focus on the main categories: higher/lower earnings/expenditure.

Table 4 shows that the effects of an improvement in financial situation on expectations are similar for higher earnings and lower expenditure. The log-odds ratios for the increase in the subjective probability of being better off next year are economically meaningful and equal to 0.65 and 0.55 for an earnings increase and an expenditure decline, respectively (column (4)). As before, the improvements in financial situation do not have an impact on the expectations of a future deterioration (column (5)), and the increase in the expectation of future improvements is offset by a decline in the expectation of an unchanged financial situation (column (6)).

As before, expectation responses to deteriorations in financial situation reflect a different pattern. Following either lower earnings or higher expenditure at time t, there are increases in both the number of individuals who expect to be better off at time t+1 (column (4)), and in the number of individuals who expect to be worse off at time t+1 (column (5)). Thus, following either of these negative events, there is a significant increase in the dispersion of expectations.

The increase in the probability that individuals expect to be better off following a negative event could arise from some agents having motivated beliefs (Bénabou and Tirole (2002), Bénabou and Tirole (2011), Brunnermeier and Parker (2005)). In bad times, those with agents believe that in the future they will be better off, as this increases their current utility, allowing them to cope with the negative event. This could explain the positive coefficient on the lower earnings and higher expenditure dummies in column (4), while other individuals being extrapolative would give rise to the positive estimated coefficient on the same variables in column (5).[19] The individual fixed effects that we include in the regression do not necessarily control for this heterogeneity that arises during bad times, and which we explore in the next section.

[19]The extrapolative behavior can also arise from motivated beliefs in the presence of self-control problems. The individual expects to be worse off in the future to incentivize himself/herself to save more today.

3.3 Age and past expectation errors

In the baseline specification, we control for individual and year fixed effects, which are co-linear with age. However, it is interesting to study how age relates to expectations and in particular to the dispersion in forecasts following a worse off event. Therefore, in the first two columns of Table 5, we replace year with age fixed effects. The estimated coefficients capture the difference relative to the base group (20-34 years old). They show that older individuals are both less likely to expect an improvement in their finances (column (1)), consistent with the fact that their earnings profile is flatter, and less likely to expect a significant deterioration in their finances (Column (2)). For a deterioration the age effects are smaller (in absolute value), and are flat after age 50.

Age might impact expectations through different channels. Older individuals might have more precise priors and be less influenced by the (one) current event. Their expectations are also likely to reflect their lifetime experiences and the accuracy of their previous forecasts. For example, individuals might be gradually learning from their mistakes and updating their beliefs accordingly. Motivated by this, we study the role of past expectation errors.

First, for each individual/year observation, we compute the ex-post expectation error. More precisely we classify an individual i as optimistic (pessimistic) in year t if the year $t+1$ realization of her financial situation is worse (better) than the year t expectation of the same individual.[20] Importantly, these are not necessarily evidence of biased beliefs since, naturally, individuals might not be able to rationally anticipate all future shocks. We then construct variables that measure the number of past instances in which the individual was optimistic (Past # optimist$_{it}$) and pessimistic (Past # pessimist$_{it}$).[21]

The results in columns (3) and (4) of Table 5 show that past errors influence expectations in an economically meaningful manner. Individuals who in the past have often been optimistic are less likely to expect to be better off going forward, and are instead more likely to expect to

[20] We provide additional details in the next section, where we formally study these expectation errors.

[21] For the first year in which the individual appears in our sample, we set the variables equal to zero. Since there are very few observations with a number of past optimistic or pessimistic events greater than five, we truncate these two variables at this level. This corresponds to percentile 95 for the number of past optimistic occurrences and percentile 99 for the number of past pessimistic occurrences distributions, respectively.

be worse off. On the other hand, individuals who in the past have often been pessimistic are more likely to expect to be better off going forward, and less likely to expect worse off. This suggests a role for learning in the process of expectations formation, with individuals updating their expectations in response to past errors, an issue that we investigate in the next section.

Interestingly, when we include the number of past optimist/pessimist events in the regressions, the estimated coefficients on the age dummies become less significant. This is consistent with our previous hypothesis, that the role of age in the expectation formation process is related to the updating that takes place in response to past errors. In columns (3) and (4), the past number of optimist/pessimist occurrences enter linearly in the regressions. In Appendix F we use a more flexible specification with dummy variables for the number of past occurrences.[22]

4 Expectation errors

In this section we move from expectations to the study of forecast errors.

4.1 Measures of optimism and pessimism

In order to study forecast errors, we construct individual specific measures of optimism and pessimism that require us to observe the same individual in each two consecutive years. For all years in the sample, Panel A of Table 6 compares the year t expectations ($E_t^i[\Delta FS_{t+1}^i]$) with the subsequent realizations (ΔFS_{t+1}^i) for the same individual i. For example, the first row shows that 45% of the individuals who at t expected to be financially better off at $t+1$ had their expectation confirmed by the realization. On the other hand, also at $t+1$, 35% of them were in the same financial situation, and 20% were actually worse off.

A first conclusion from Table 6 is that agents tend to form correct expectations, as shown by the fact that, in each row, the main diagonal values are always the highest. The second important conclusion is that, in spite of the fact that the majority have the correct expectations, there is a significant number of individuals who fail to make accurate forecasts. Naturally, this could be due to either incorrect expectations or realizations of unforecastable shocks.

[22] Results with year fixed effects instead of the age dummies yield the same conclusions.

The last three columns of Panel A present a graphical representation of the construction of the optimism and pessimism measures. An individual i is, at time t, optimistic if his/her expectation of the time $t+1$ change in financial situation is better than the realized time change:

$$\text{Optimist}_{it} = \begin{cases} 1 & \text{if } E_t^i[\Delta FS_{t+1}^i] > \Delta FS_{t+1}^i, \\ 0 & \text{Otherwise.} \end{cases} \tag{5}$$

As Table 6 makes clear, an optimist: (i) expects to be better off but the realized change is the same or worse off; or (ii) expects an unchanged financial situation but the realization is worse off. Similarly, an individual i is, at time t, pessimistic if he/she expects a change in financial situation that is worse than the subsequent realization. This happens when: (i) the individual expects to be worse off but the realized change is the same or better off; or (ii) the individual expects the same, but the realization is better off. The pessimist dummy:

$$\text{Pessimist}_{it} = \begin{cases} 1 & \text{if } E_t^i[\Delta FS_{t+1}^i] < \Delta FS_{t+1}^i, \\ 0 & \text{Otherwise.} \end{cases} \tag{6}$$

It is important to note that the optimist and pessimist variables are based on the realized forecasting error, and not simply on the expectation. An individual i who at time t expects to be better off at time $t+1$, and who indeed is better off when time $t+1$ arrives has the correct time t expectations (the individual is not optimistic).

Panel B of Table 6 reports the means of the optimist and pessimist dummies, and of the residual neither category (corresponding to correct expectations). The second column shows the overall averages. There are more individual/year observations with optimism than with pessimism: 0.26 and 0.17 of the total number of observations, respectively.

The remaining columns report the values by age and income. There is a significant decline with age in the average level of optimism, from 0.32 for individuals in the 20-34 age group, to 0.16 for those over 65 years of age. This decline is offset by an increase in the proportion of individuals who had the correct expectations. On the other hand, the proportion of pessimist observations is relatively stable over the life cycle. The last three columns show that the proportion of optimist observations tends to be higher for individuals in higher income groups. Recall that individuals are assigned to income groups based on the time $t-1$ labor income, one year prior to the time t expectations that we use to construct the expectation errors.

4.2 Lifelong optimists and pessimists

The summary statistics in the previous section suggest that there is variation over time for the same individual in optimism and pessimism. In this section, we investigate whether this is indeed the case, by assigning individuals into three groups: "Lifelong" optimists, "Lifelong" pessimists and alternate. "Lifelong" optimists (pessimists) are those whose expectation errors, when they make them, are always characterized by optimism (pessimism). Alternate are individuals who during the sample period make both optimistic and pessimistic expectation errors. We have an unbalanced panel and not all individuals appear in the data for the full length of the panel. Therefore, we have performed calculations when restricting the sample to individuals who appear at least 7 times and at least 11 times in the sample.[23]

Table 7 shows the number and fraction of individuals in each group and the means of several variables of interest. Below the means, in parenthesis, we report the p-value of a test of equality of means relative to the alternate group. The first two rows of the table show that most individuals alternate. For those individuals for which we have at least 11 observations, the fractions of lifelong optimists and pessimists are only 14% and 7%, respectively.

The largest differences, in both statistical and economic significance are between pessimists and the other two groups. Lifelong pessimists are much more likely not to have a high school degree (0.56 compared to 0.37 and 0.31 for optimists and alternate), to have lower permanent income (average permanent income group of 4.63 compared to 5.44 and 6.04 for optimists and alternate), less likely to be married, and more likely to have fewer children. It is important to note that permanent income is calculated as the average of income of all the years in which the individual appears in the sample. If lower permanent income individuals are those who are systematically hit by unexpected negative income shocks, we would expect individuals in low permanent groups to be optimistic more often, which is not the case.

Interestingly, individuals who alternate tend to be those in higher permanent income groups and to be better educated.[24] These results suggest a role for education in the understanding of

[23] Naturally, if we include individuals for whom we only have a few observations, they are more likely to make only one forecasting error during our sample, and be mechanically classified as "lifelong" optimists or pessimists.

[24] Higher permanent income is likely to be associated with positive income shocks, which if unexpected would imply that the individuals were more often optimistic, but which does not necessarily explain the alternate.

the random nature of some of the shocks that individuals face. In the next section we explore the important question of what explains why sometimes individuals underreact while at other times they overreact.

4.3 Changes experienced and optimism/pessimism

In this section we estimate fixed effects logit regressions similar to the ones for the expectations variables, but in which the left-hand side variables are the optimist and pessimist dummies.

4.3.1 Baseline results

Table 8 shows the regression results. Column (1) shows the results for the regression with the optimist dummy as dependent variable (pessimist in column (2)), on the dummy variables that measure the change experienced in financial situation. Previously, in Table 4, we showed that individuals tend to expect improvements in financial situation to be persistent. The statistically significant positive coefficient on the better off dummy in column (1) of Table 8 shows that individuals extrapolate too much and are thus more likely to be optimistic. The estimated coefficient, a log-odds ratio of 0.13, is economically meaningful. This increased optimism is accompanied by a reduction in pessimism, as shown by the statistically significant estimated -0.10 coefficient on the better off dummy in column (2).

The second row shows the estimated coefficients for the worse off dummy. Recall that for the expectations regressions there was, after these worse off events, an increase in the dispersion of forecasts, i.e. there were increases in the likelihood of better off expectations (mean reversion) and in the likelihood of worse off expectations (extrapolation). The estimated positive coefficient for the worse off dummy in regression (1) of Table 8 shows that agents are being too optimistic when forming their mean reversion expectations, i.e. they expect more mean-reversion than there is in the data. On the other hand, the estimated positive coefficient in column (2) shows that those who extrapolate are over-extrapolating from their current experience, i.e. the future is (on average) not as bad as they expect it to be.[25]

[25]Note that, by definition, individuals who expect to be worse off can only be pessimistic or correct in their expectations. Individuals who expect to be better off can only be optimistic or correct in their expectations.

In summary, the results in the first two columns of Table 8 show that individuals tend to react too strongly, relative to the true data generating process, both when they expect mean reversion and when they expect persistence.[26]

These results are not implied by those in the previous section. For example, it could have been the case that following an improvement in their financial situation agents increase their expectation of a further improvement, but this: (i) is perfectly consistent with the actual persistence in the underlying variable; or (ii) actually under-estimates the true persistence. In the first case, the estimated coefficients on the better off dummy in columns (1) and (2) would be (statistically) zero, and in the second case they would be negative and positive, respectively.[27]

In columns (3) and (4), we report the results for a logit model without individual fixed effects. When studying the expectation formation process, we concluded that controlling for individual fixed effects only led to moderate changes in the quantitative estimates, and did not affect the qualitative conclusions. However, in the optimism/pessimism regressions, the failure to control for individual fixed effects leads to significantly larger estimated coefficients, and some sign changes. For instance, the estimated coefficient on the better off dummy is negative in the pessimist regression with fixed effects (column (2)), but positive in the corresponding regression without fixed effects. Therefore, the failure to control for individual fixed effects would lead us to conclude that after a better off event individuals become more pessimistic, when in fact their pessimism is reduced.

In Internet Appendix E we show that our results are robust to alternative definitions of "optimism" and "pessimism." Our survey data only provide a discrete range of answers for both realizations and expectations, and the classification of an underlying continuous variable (change in financial situation) into three discrete categories (better off, the same, or worse off) may introduce predictable patterns in the expectation errors. The fact that the results are

[26] In Appendix Table A5, we report the estimates for a linear probability model. Naturally, the interpretation of the fixed effects OLS estimates is different from the one in columns (1) and (2) (they are no longer log-odds ratios), but the estimated signs, economic and statistical significance are similar.

[27] In Internet Appendix D we show that the (qualitative) results obtained in the previous section, i.e. the expectations regressions, can be replicated in simulated data generated from an income process estimated from our panel data. However, neither of the two different income process that we have considered (with and without a separate unemployment state), can replicate the results for the optimist/pessimist regressions in this section.

robust to different methods of group construction is reassuring.

4.3.2 Disaggregating by reason for the change in financial situation

In the remaining columns (5) to (8) of Table 8 we report the results of regressions where we disaggregate better off/worse off into the reasons for the change in financial situation. Consistent with the estimated coefficients for the better off dummy in the previous regressions, we find that both higher earnings and lower expenditure lead individuals to become more optimistic and less pessimistic going forward. The estimated economic magnitudes are similar to those for the better off dummy, although the estimated coefficient on the lower expenditures variable in the pessimist equation is not significant.

There are however interesting differences in the results for lower earnings and higher expenditure variables. Individuals who are worse off due to an increase in expenditures are less likely to be optimistic and more likely to be pessimistic going forward. On the other hand, individuals who are worse off due to lower earnings are more likely to be optimistic and less likely to be pessimistic going forward. In other words, individuals who are worse off due to higher expenditure are, in relative terms, more likely to extrapolate too much, whereas those who are worse off due to lower earnings expect, again in relative terms, too much mean reversion.

It may be the case that there are differences in agents' ability to predict different types of shocks (positive/negative and earnings/expenditures). In order to investigate this, we calculate, the proportion of individuals who correctly anticipated being better off, in a given year. The percentage is 0.52 and 0.44, for those who reported being better off due to higher earnings and due to lower expenditures, respectively.[28] We perform similar calculations for worse off events. Among those individuals who are worse off at t due to lower earnings (higher expenditures), only 0.22 (0.27) expected to be worse off at time $t-1$. Therefore, agents are significantly better at predicting improvements than deteriorations in their finances.

This asymmetry could be partially explained by unemployment shocks being particularly hard to predict. In order to study this, we use the information in the survey on employment status and focus on those who report lower earnings and are unemployed at time t. We then

[28] A caveat is that the better off expectation variable does not distinguish among the reasons for the expectation, namely higher earnings, lower expenditures or something else.

calculate the proportion of these individuals who at time $t-1$ expected to be worse off at time t. This proportion is only 0.16, significantly lower than the 0.22 proportion for the lower earnings event (not conditional on unemployment). This shows that among the lower earnings realizations, unemployment events are particularly hard to anticipate or expect. These results raise the question of whether individuals update their expectations in response to past errors, a question which we investigate next.

4.4 Age and past expectation errors

Table 9 shows the results for regressions with optimism/pessimism/neither as the dependent variables, in which we include age and the number of past expectation errors of the individual (calculated using the panel dimension of the data) among the explanatory variables.

Individuals with a larger number of past # of optimist occurrences are less likely to be optimistic (column (3)) and more likely to be pessimistic going forward (column (4)). This raises the possibility that the updating from past errors might be characterized by over-reaction. However, column (5) shows that the net effect is a higher likelihood that individuals do not make errors going forward (higher likelihood of neither optimism nor pessimism). A similar conclusion holds for the estimated coefficients on the past number of pessimist occurrences variable.

Once we control for the updating that takes place through past # of optimist/pessimist occurrences, it no longer is the case that individuals are both more likely to be optimist and pessimist following a worse off event. The estimated coefficient on the worse off variable is negative (positive) in column (3) (column (4)). Therefore, once we control for past errors, individuals tend to extrapolate too much from their recent experiences, whether these are better off or worse off. This is particularly interesting since the results for expectations in Table 5 showed that there still is an increase in the dispersion following a worse off event. However, the results in Table 9 reveal that, once we control for the learning channel, the residual revisions in expectations of a future better off event following a worse off realization actually appear to under-estimate the future likelihood of such an event.

When controlling for the learning that takes place through past optimist/pessimist events,

the estimated coefficients on the age group dummies in columns (3) and (4) are positive and increase with age. Older individuals are at times more optimistic and at other times more pessimistic. In the next section, we show that this may be partially due to life events such as retirement, marriage or divorce, and birth of children. In Internet Appendix G, we further study the role of past experiences as in Malmendier and Nagel (2011).[29]

5 Life events

We exploit the panel nature of our data to study the links between life events (retirement, marriage, among others), changes in financial situation, and expectations.

5.1 Retirement

We first identify 2,859 observations corresponding to newly retired individuals, which requires that we have consecutive year observations for the same individual. Table 10 shows that these individuals are much more likely to report a worse financial situation due to lower earnings (0.19) than those who are not newly retired (0.06). They are also much less likely to report being better off due to higher earnings. Newly retired individuals are also less likely to report both higher and lower expenditures, but the differences relative to the not newly retired group are economically small. This may in part result from the large drop in earnings which is the most significant event and given as an answer by survey respondents.[30]

In a second step, we study the extent to which the earnings drop experienced by newly retired individuals was anticipated. The proportion of individuals who, in the year immediately prior to retirement, expected to be financially worse off in the following year is 0.45. This is significantly larger than the value of 0.20 for the group of non-newly retired individuals (the p-value for a test of the equality of means is 0.00). Interestingly, even though newly retired

[29]The importance of lifetime experiences in shaping individual expectations has also been studied by Vissing-Jorgensen (2003); Greenwood and Nagel (2009), Malmendier et al. (2011), Malmendier and Nagel (2011), Malmendier and Nagel (2016), Kuchler and Zafar (2019) and Malmendier et al. (2021), among others.

[30]Although not reported in the table, for the group of retired but not newly retired individuals, a worse financial situation due to higher expenditures is the most common response with proportion 0.168.

individuals are not more likely to report higher expenditures, the fraction of those who do so, and in the previous year expected to be financially worse off the following year, is significantly larger than among the non-newly retired individuals (0.40 versus 0.26, respectively). Therefore, both earnings and expenditure changes in household finances that come with retirement are more likely to be anticipated than similar changes that occur for other reasons.

5.2 Household composition

The data has information on household composition, including on the number of children in the household. We identify 3,577 new child events in our data. The last three columns of Table 10 compare the finances of new child households to the others. A new child event tends to be associated with a deteriorating financial situation due to both lower earnings and higher expenditures. It is important to note that the two groups, new child and not, are different along other dimensions, most notably their average ages, of 34.3 and 50.9 years, respectively. However, these differences in average age are unlikely to explain the differences in Earnings $\downarrow$ since early in life income profiles tend to steeper.

The bottom rows shows that the lower earnings event was much more likely to be anticipated than the same event among those who did not have a new child (0.39 versus 0.20, respectively). This suggests that the source of the earnings decline is a planned time off from work. For Expenditures $\uparrow$, there are no statistically significant differences in the anticipated fractions.

In the bottom panels of Table 10 we study two other household composition events: marriage and separation. Newly married individuals are more likely to be financially better off due to both higher earnings and lower expenditures. The former may be due to individuals marrying in anticipation of earnings increases and the latter due to economies of scale in household expenses. Both the higher earnings and the lower expenditure events are more likely to be anticipated than the same events among those who are not newly married. Newly married individuals are on average significantly younger, which could also explain the higher incidence of Earnings $\uparrow$.

Some of the changes in household finances when individuals marry are reversed when there is a separation, which is linked to lower earnings and higher expenditures. There may of course be reverse causality, as lower earnings may be the cause of the separation. The proportions of

individuals who anticipate the events are not significantly different across the two groups.

6 Implications for future financial situation

We have shown that individuals who have not had the opportunity to learn from past errors have beliefs that are too optimistic after an earnings decline.[31] We have also found that individuals become more optimistic after positive changes in financial situation. However, at these times they tend to have more financial resources, due to the events that triggered the improvement in financial situation. By contrast, being too optimistic at times when the financial situation has deteriorated may be more problematic, if it leads individuals to adjust their savings and/or borrowing behavior in the expectation that their financial situation will recover faster than it actually will. In this section, we explore this possibility.

6.1 Income dynamics

We first provide further evidence on the economic significance of the earnings decline event. Exploiting the panel dimension of the data, we calculate average log income over time for individuals who in a given year report being in a worse financial situation due to an earnings decline. Year t is the time at which they report the earnings decline, years $t-1$ and $t+1$ refer to one year before and one year after this event, and so on. Panel A of Table 11 reports average log income conditional on whether individuals are optimistic or pessimistic at time t.

The event corresponds to an economically (and statistically) meaningful a significant decline in average log income in year t compared to year $t-1$. The average levels of log income between these two groups in each of the years from $t-2$ to t are not significantly different from each other, confirming the assumption of parallel trends between the two groups. Table 11 also shows that, going forward, the log real income of the time t pessimistic group is slightly higher than that of the time t optimistic group (although the differences are still not statistically significant). This happens, to some extent, by construction since the individuals who are pessimistic at time t are those who at time $t+1$ experienced an unexpected improvement in their financial situation.

[31] Furthermore, this is more likely to be the case for those individuals who have not in the past had the opportunity to learn from similar errors and for those hit by this negative shock.

6.2 Savings and borrowing responses

We now turn our attention to the individuals' savings and borrowing actions following an earnings decline. Again, we distinguish between those individuals who are optimistic and those who are pessimistic at time t.

The second panel of Table 11 reports that the differences in the proportions of savers are not statistically significant prior to year t, but become statistically significant at time t (and in subsequent years). Furthermore, these differences are economically meaningful. Thus individuals' expectations and their degree of optimism influence their decision to save in an economically significant manner.

The average saving rates are equal to roughly 0.05 before year t, and they decline at this time to 0.029 (0.025) for pessimistic (optimistic) individuals (Table 11). The year t differences are economically meaningful but not statistically significant. In subsequent years, the differences are statistically significant, confirming the result that individuals who become more optimistic save less following an income decline. These average differences in saving rate also reflect the extensive margin of the saving decisions.

In the last panel of Table 11 we report the results for the decision to take an extra loan. The proportion of individuals doing so is around 0.10 prior to t. The average differences between optimists and pessimists are not statistically significant. At time t there is a decline for both groups, but this may be due to a loan supply side effect: the ability of individuals to take out an additional loan on their house may be restricted at times of income declines. Interestingly, however, the decline is larger for those individuals who are pessimistic going forward (from 0.104 to 0.041) than for those who are optimistic going forward (from 0.108 to 0.082). The average time t difference between optimists and pessimists is statistically significant at the five percent level. We cannot rule out the possibility that this differential decline is also due to a supply side channel affecting pessimists and optimists differently (what we observe are equilibrium outcomes). However, we note that the average year t incomes of optimists and pessimists are almost identical, so it is unlikely that they would be treated in a significantly different manner by lenders in their credit decisions (Panel A of Table 11).

The fact that optimistic individuals are more likely to take a loan in response to an income

decline may have implications for their future household finances, as they are not likely to have the higher future earnings on which they may be relying to repay the debt. This is most problematic in the case of loans that carry a high interest rate, such as payday loans (Bhutta et al., 2015; Melzer, 2011; Morse, 2011).

6.3 Future financial situation

The previous section showed that the savings and debt responses to an earnings decline depend on whether individuals are optimistic or pessimistic. In Table 12 we study whether there is a relationship between this potentially suboptimal savings and borrowing behavior, and the subsequent changes in financial situation. More precisely, we again take the sample of individuals who are in a worse financial situation due to an earnings decline at time t, and calculate the proportion of these individuals who are better off (Panel A) and worse off (Panel B) in each year from $t-2$ to $t+2$. As before, we distinguish between those individuals who are optimistic and pessimistic at time t.

Prior to the event time t, there are no significant statistical or economic differences in the proportions of optimists and pessimists who are better/worse off. At event time t, by construction, all individuals are worse off, hence the 1 in the bottom panel. The results for year $t+1$ are also, to a large extent, due to the way we construct the variables: pessimists (optimists) are those for whom the year $t+1$ realized financial situation is better (worse) than the year t expectation. This explains the large proportion of pessimists who are better off in Panel A (equal to 0.696), and the fact that none of them are worse off (as shown in Panel B).

The interesting results are those for year t+2. The classification of individuals into pessimists and optimists at time t does not use the year $t+2$ realized change in financial situation. The penultimate column in Panel B of Table 12, shows that those individuals who are more optimistic at time t are much more likely to find themselves in a worse financial situation in year $t+2$ than those individuals who are pessimistic at time t. This is consistent with the interpretation that their savings/borrowing behavior at time t was suboptimal. The differences are economically significant. Those who were pessimistic in year t have a 0.266 probability of being worse off at $t+2$, compared with 0.356 for those who were optimistic. The 0.09 difference

corresponds to 38% of the unconditional probability of being worse off (0.24).

It may also be the case that the differences in year $t+2$ could simply be due to the persistence of the underlying shocks and not the individual saving responses to those shocks. We investigate this hypothesis in the last column of Table 12. In this column, we report the proportions of individuals who are better off and worse off in year $t+2$, but excluding those who are better off in year $t+2$ due to an earnings increase at this time (in Panel A) and those who are worse off in year $t+2$ due to an earnings decline (in Panel B).[32] Crucially, we still find a large difference in the proportion of worse off between pessimists and optimists, showing that the effects are at least in part due to their differential responses to the original shock and do not arise solely from the persistence of the original earnings shock.

7 Conclusion

We have used almost two decades of panel data to study household finances, and to examine how changes experienced in these finances affect the way in which households form expectations.

We have uncovered evidence consistent with models of diagnostic expectations, both unconditionally and following an improvement in household finances. However, following a deterioration we observe a higher dispersion of forecasts, with increases in both the expectation of a further deterioration (consistent with extrapolative behavior) and of a future improvement (mean reversion). The analysis of the expectation errors showed that when individuals expect mean reversion they tend to be too optimistic, more so when the deterioration in household finances is due to lower earnings. In other words, individuals tend to underestimate the persistence of the lower earnings events and their effects on household finances.

Importantly, we also find that individuals adjust their expectations in response to their previous expectation errors in a way that is consistent with learning models. Those who in the past have more frequently been optimistic (pessimistic) are less (more) likely to expect to be better off (worse off) in the future. This means that going forward they make fewer

[32] Recall, that the original year t shock that we are conditioning upon is a decline in earnings, so by excluding those with earnings changes in year $t+2$ we are removing observations that could be potentially due to the persistence of the year t shock.

forecasting errors. The learning channel is particularly important in reducing the likelihood that individuals are optimistic following a deterioration in household finances. Finally, our paper has provided novel evidence on the links between life events (retirement, marriage, new child, among others), changes in financial situation, and expectations.

The evidence that we present is important for two main reasons. First, and although we also find support for both diagnostic expectations and learning models, the evidence shows that the process of expectations formation about household finances is more complex, and it depends on the nature of the shocks experienced. Our results are thus informative on potential directions for further theoretical work in this area. Second, household finances tend to be stretched following negative shocks, including following earnings declines. We have shown that those who are too optimistic at such times save less and borrow more, and they are more likely to subsequently find themselves in a worse financial situation again in the future. Therefore, our analysis uncovered a set of events after which too optimistic expectations can be the source of persistent negative effects in household finances.

References

Bénabou, R. and J. Tirole (2002). Self-confidence and personal motivation. *Quarterly Journal of Economics 117*(3), 871–915.

Bénabou, R. and J. Tirole (2011). Identity, morals and taboos: Beliefs as assets. *Quarterly Journal of Economics 126*(2), 805–855.

Bhutta, N., P. M. Skiba, and J. Tobacman (2015). Payday loan choices and consequences. *Journal of Money, Credit and Banking 47*, 223–261.

Bordalo, P., N. Gennaioli, Y. Ma, and A. Shleifer (2020). Overreaction in macroeconomic expectations. *American Economic Review 110*(9), 2748–2782.

Bordalo, P., N. Gennaioli, R. L. Porta, and A. Shleifer (2019). Diagnostic expectations and stock returns. *Journal of Finance 74*(6), 2839–2874.

Bordalo, P., N. Gennaioli, and A. Shleifer (2018). Diagnostic expectations and credit cycles. *The Journal of Finance 73*(1), 199–227.

Brown, S. and K. Taylor (2006). Financial expectations, consumption and saving: A microeconomic analysis. *Financial Studies 27*, 313–338.

Brunnermeier, M. and J. Parker (2005). Optimal expectations. *American Economic Review 95*(4), 55–80.

Campbell, J. Y. (2006). Household finance. *Journal of Finance 61*(4), 1553–1604.

Das, S., C. Kuhnen, and S. Nagel (2020). Socioeconomic status and macroeconomic expectations. *Review of Financial Studies 33*(1), 395–432.

Farmer, L. E., E. Nakamura, and J. Steinsson (2023). Learning about the long run. *Journal of Political Economy, Forthcoming*.

Fermand, E., C. M. Kuhnen, G. Li, and I. Ben-David (2018). Expectations uncertainty and household economic behavior. *Working Paper*.

Gennaioli, N., Y. Ma, and A. Shleifer (2015). Expectations and investment. *NBER Macroeconomics Annual 30*, 379–442.

Giglio, S., M. Maggiori, J. Stroebel, and S. Utkus (2021). Five facts about beliefs and portfolios. *American Economic Review 111*(5), 1481–1522.

Greenwood, R. and S. Nagel (2009). Inexperienced investors and bubbles. *Journal of Financial Economics 93*(2), 239 – 258.

Greenwood, R. and A. Shleifer (2014). Expectations of returns and expected returns. *Review of Financial Studies 27*(3), 714–746.

Guiso, L., M. Haliassos, and T. Jappelli (1997). *Household Portfolios*. MIT Press.

Guiso, L. and P. Sodini (2013). Household finance: an emerging field. *Handbook of the Economics of Finance, Constandinides, G., M. Harris and R. Stulz, Elsevier*, 1397–1532.

Kaustia, M. and S. Knupfer (2008). Do investors overweight personal experience? Evidence from IPO subscriptions. *Journal of Finance 63*(6), 2679–2702.

Kuchler, T. and B. Zafar (2019). Personal experiences and expectations about aggregate outcomes. *Journal of Finance 74*(5), 2491–2542.

Kuhnen, C. M. (2015). Asymmetric learning from financial information. *Journal of Finance 70*, 2029–2062.

Li, Z., S. Van Nieuwerburgh, and W. Renxuan (2023). Understanding rationality and disagreement in house price expectations. Technical report, National Bureau of Economic Research.

Makridis, C. (2019). Sentimental business cycles and the protracted great recession. *Working Paper*.

Malmendier, U. and S. Nagel (2011). Depression babies: Do macroeconomic experiences affect risk-taking. *Quarterly Journal of Economics 126*(1), 373–416.

Malmendier, U. and S. Nagel (2016). Learning from inflation experiences. *Quarterly Journal of Economics 131*(1), 53–87.

Malmendier, U., S. Nagel, and Z. Yan (2021). The making of hawks and doves. *The Journal of Monetary Economics 117*, 19–42.

Malmendier, U. and L. S. Shen (2018). Scarred consumption. *NBER Working Paper 24696*.

Malmendier, U., G. Tate, and J. Yan (2011). Overconfidence and early-life experiences: The effect of managerial traits on corporate financial policies. *Journal of Finance 66*(5), 1687–1733.

Manski, C. F. (2018). Survey measurement of probabilistic macroeconomic expectations: Progress and promise. *NBER Macroeconomics Annual 32*(1), 411–471.

Melzer, B. (2011). The real costs of credit access: Evidence from the payday lending market. *Quarterly Journal of Economics 126*(1), 517–555.

Morse, A. (2011). Payday lenders: Heroes or villains? *Journal of Financial Economics 102*(1), 28–44.

of Essex, U. (July 2010). Institute for social and economic research, British household panel survey: Waves 1-18, 1991-2009. *7th Edition. Colchester, Essex: UK Data Archive*, SN: 5151.

Puri, M. and D. T. Robinson (2007). Optimism and economic choice. *Journal of Financial Economics 86*, 71–99.

Rozsypal, F. and K. Schlafmann (2020). Overpersistence bias in individual income expectations and its aggregate implications. *American Economic Journal: Macroeconomics, conditionally accepted*.

Souleles, N. S. (2004). Expectations, heterogeneous forecast errors, and consumption: Micro evidence from the Michigan consumer sentiment surveys. *Journal of Money, Credit and Banking 36*(1), 39–72.

Vellekoop, N. and M. Wiederholt (2019). Inflation expectations and choices of households. *Working Paper*.

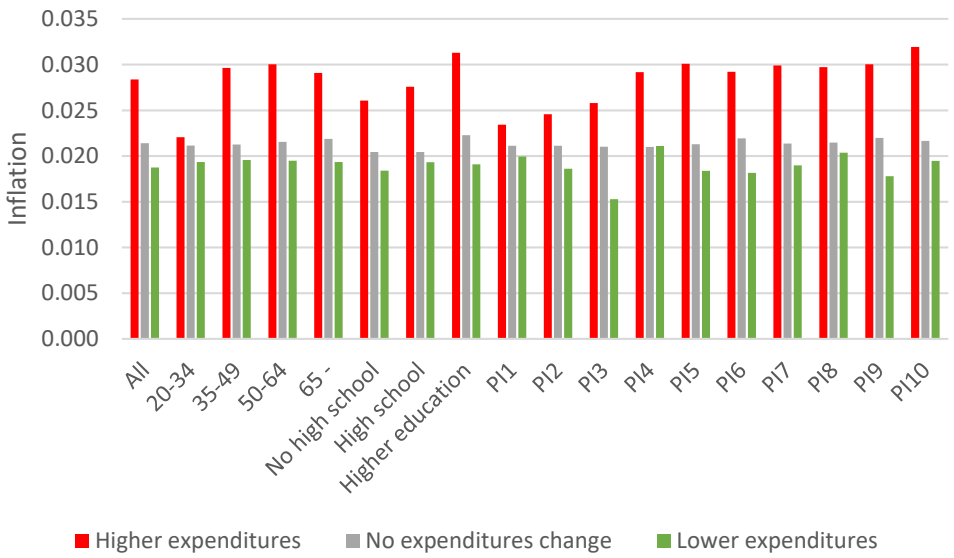
Vissing-Jorgensen, A. (2003). Perspectives on behavioral finance: Does irrationality disappear with wealth? Evidence from expectations and actions. *NBER Macroeconomics Annual*, 139–194.

FIGURES AND TABLES

Figure 1: Qualitative earnings changes responses and quantitative outcomes.
This figure plots the average changes in real income between years $t-1$ and t for individuals who at time t report being better off due to higher earnings, who report being worse off at t due to lower earnings, and the remainder (i.e. those who report neither higher nor lower earnings, who constitute the base case). The figure plots the average changes for all observations, for households in different age and education groups (based on the age and education of the head), and for households in one of ten different permanent income groups. The estimates are obtained from least square regressions with individuals fixed effects, estimated separately for each of the groups considered.

Figure 2: Qualitative expenditure changes responses and inflation.
This figure plots the realized food (Panel A) and energy (Panel B) price inflation for years in which individuals report being worse off due to higher expenditures, for years in which they report being better off due to lower expenditures, and the remainder (i.e. those who report neither higher nor lower expenditures). The inflation measures are obtained from the Office of National Statistics. The figure plots the average inflation for all observations, for households in different age and education groups (based on the age and education of the household head), and for households in one of ten different permanent income groups. The estimates are obtained from least square regressions with individuals fixed effects, estimated separately for each of the groups.

Panel A: Food price inflation



Panel B: Energy price inflation

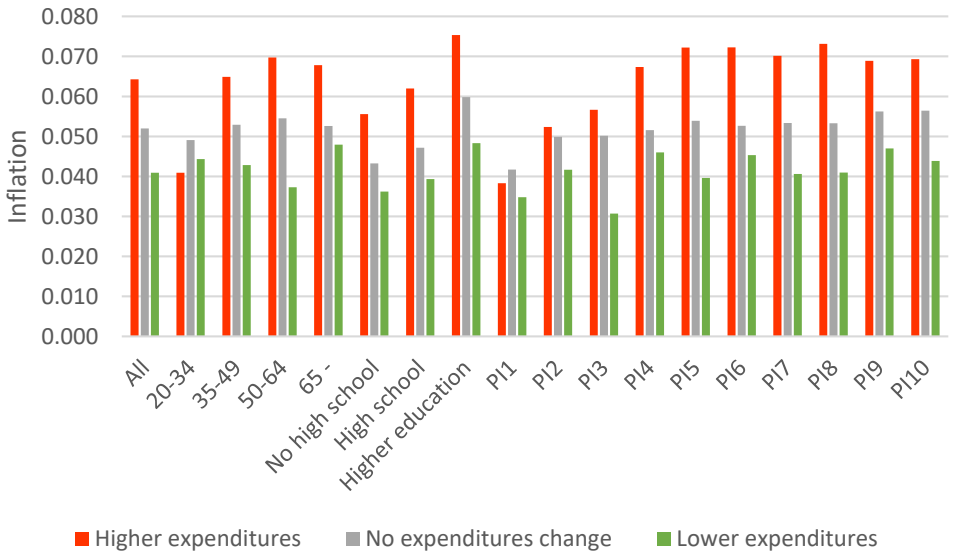


Table 1: Financial situation

This table reports the proportion of better off/same/worse off observations and the reason for the change in financial situation, for the whole sample, by the age of the household head and by income group. Low (high) income are those in the bottom (top) third of the distribution of household incomes for that year. We divide the sample into income groups using the previous year income.

	Overall	Age group				Income group		
		20-34	35-49	50-64	≥65	Low	Medium	High
Panel A: Change in financial situation, fraction of total								
Better off	0.24	0.39	0.28	0.18	0.11	0.17	0.23	0.29
Same	0.52	0.37	0.47	0.56	0.67	0.60	0.53	0.47
Worse off	0.24	0.24	0.25	0.26	0.22	0.23	0.24	0.24
Panel B: Reason for better off, as a fraction of better off								
Earnings ↑	0.54	0.66	0.63	0.45	0.06	0.35	0.56	0.62
Expenditure ↓	0.15	0.13	0.14	0.19	0.17	0.14	0.15	0.16
Benefits ↑	0.10	0.02	0.03	0.13	0.55	0.30	0.08	0.02
Inv Income ↑	0.03	0.02	0.02	0.04	0.07	0.03	0.03	0.03
Windfall payment	0.03	0.02	0.03	0.06	0.04	0.03	0.03	0.03
Good management	0.05	0.06	0.05	0.04	0.04	0.05	0.05	0.05
Other reasons	0.10	0.09	0.10	0.09	0.07	0.10	0.10	0.12
Panel C: Reason for worse off, as a fraction of worse off								
Earnings ↓	0.24	0.30	0.28	0.31	0.07	0.12	0.26	0.33
Expenditure ↑	0.53	0.50	0.48	0.46	0.67	0.63	0.50	0.46
Benefits ↓	0.04	0.03	0.05	0.04	0.03	0.06	0.04	0.02
Inv Income ↓	0.03	0.00	0.01	0.04	0.10	0.04	0.04	0.03
One-off expenditure	0.02	0.04	0.02	0.01	0.01	0.01	0.02	0.03
Other reasons	0.14	0.14	0.16	0.14	0.13	0.14	0.14	0.13

Table 2: Expectations by age and income

This table reports the proportion of observations for which individuals expect their financial situation in one year's time to be better off, about the same, and worse off. The table also shows the proportions by age of the household head and by income group. The unit of observation is individual/year.

	Overall	Age group				Income group		
		20-34	35-49	50-64	≥65	Low	Medium	High
Better off	0.24	0.46	0.30	0.17	0.05	0.16	0.25	0.29
Same	0.64	0.46	0.60	0.70	0.79	0.71	0.64	0.60
Worse off	0.12	0.08	0.10	0.13	0.16	0.13	0.11	0.11

Table 3: Financial expectations: fixed effects regressions

This table reports the results of ordinary least squares panel fixed effects regressions in which the dependent variable is the time t expectation of future changes in financial situation, $E_t^i[\Delta FS_{t+1}^i]$. The independent variable in specifications (1) and (2) is the change experienced in financial situation at time t, ΔFS_{t+1}^i. In specification (3) we measure the change experienced in financial situation at time t using two dummy variables: (i) one that takes the value of one for positive changes in financial situation, i.e. for $\Delta FS_{t+1}^i > 0$, and zero otherwise, and (ii) another that takes the value of one for negative changes in financial situation, i.e. for $\Delta FS_{t+1}^i < 0$, and zero otherwise.

	(1)	(2)	(3)
	$E_t^i[\Delta FS_{t+1}^i]$	$E_t^i[\Delta FS_{t+1}^i]$	$E_t^i[\Delta FS_{t+1}^i]$
Change in Fin. Sit. (ΔFS_t^i)	0.07***	0.06***	
	(27.63)	(23.13)	
Dummy for pos. change ($\Delta FS_t^i > 0$)			0.09***
			(20.90)
Dummy for neg. change ($\Delta FS_t^i < 0$)			-0.02***
			(-5.68)
Control variables			
Income group 2		0.01	0.01
		(1.06)	(1.14)
Income group 3		-0.02***	-0.02***
		(-3.66)	(-3.53)
Year FE	No	Yes	Yes
Ind. FE	Yes	Yes	Yes
Number of obs.	116,895	115,543	115,543

Table 4: Expectations

This table shows the estimated coefficients of Logit regressions that explain expectations using the changes experienced in financial situation and the reasons for the change. The dependent variables are dummy variables for expect better off, expect worse off, and expect the same. The independent variables are dummy variables that capture the change experienced in financial situation at time t (columns (1) to (3)) and the reason for the change (columns (4) to (6)). The unit of observation is individual/year. All regressions include individual and year fixed effects.

	(1)	(2)	(3)	(4)	(5)	(6)
	Expect	Expect	Expect	Expect	Expect	Expect
	Better$_{it}$	Worse$_{it}$	Same$_{it}$	Better$_{it}$	Worse$_{it}$	Same$_{it}$
Better off$_{it}$	0.64***	-0.08*	-0.52***			
	(28.27)	(-2.29)	(-25.49)			
Worse off$_{it}$	0.74***	0.99***	-1.09***			
	(30.23)	(37.17)	(-54.44)			
Earnings ↑				0.65***	-0.02	-0.61***
				(22.70)	(-0.32)	(-22.59)
Expenditure ↓				0.55***	-0.12	-0.46***
				(11.82)	(-1.46)	(-10.53)
Earnings ↓				1.08***	0.43***	-1.04***
				(27.27)	(8.35)	(-29.37)
Expenditure ↑				0.47***	1.22***	-1.12***
				(13.78)	(35.93)	(-41.40)
Income group 2	0.03	-0.10**	0.04	-0.02	-0.08*	0.08**
	(0.94)	(-2.48)	(1.64)	(-0.56)	(-1.81)	(2.48)
Income group 3	-0.05	0.05	0.06	-0.11**	0.06	0.11***
	(-1.45)	(1.04)	(1.90)	(-2.54)	(1.06)	(2.97)
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Ind. FE	Yes	Yes	Yes	Yes	Yes	Yes
Number of obs.	74,723	59,674	93,591	57,038	44,800	73,782

Table 5: Expectations: Age effects and past expectation errors

This table shows the estimated coefficients of fixed effects logit regressions that explain expectations using the changes experienced in financial situation, age, and past expectation errors. The dependent variables are dummy variables for expect better and expect worse. The independent variables are dummy variables that capture the change in financial situation at time t, the age group of the household head (the base group is age 20-34), and the number of past (prior to the year t event) observations for which the same individual has been optimistic (Past # optimist$_{it}$) and pessimistic (Past # pessimist$_{it}$). The unit of observation is individual year. All regressions include individual fixed effects. The t-statistics are reported below the estimated coefficients. $***$, $**$ and $*$ denotes statistical significance at the 1%, 5% and 10% levels, respectively.

	(1)	(2)	(3)	(4)
	Expect	Expect	Expect	Expect
	Better$_{it}$	Worse$_{it}$	Better$_{it}$	Worse$_{it}$
Better off$_{it}$	0.67***	-0.09***	0.75***	-0.24***
	(29.60)	(-2.63)	(29.16)	(-5.73)
Worse off$_{it}$	0.74***	1.10***	0.67***	1.20***
	(30.45)	(41.89)	(24.13)	(39.84)
Age 35 - 49	-0.37***	-0.17***	-0.07	-0.14*
	(-10.56)	(-3.02)	(-1.60)	(-1.94)
Age 50 - 64	-0.74***	-0.40***	-0.13*	-0.23**
	(-13.70)	(-5.26)	(-1.67)	(-2.15)
Age $\geq$ 65	-1.71***	-0.39***	-0.84***	0.01
	(-19.39)	(-4.13)	(-7.09)	(0.04)
Past # optimist$_{it}$			-0.29***	0.29***
			(-26.52)	(19.53)
Past # pessimist$_{it}$			0.23***	-0.45***
			(15.90)	(-26.95)
Inc. group FE	Yes	Yes	Yes	Yes
Year FE	No	No	No	No
Ind. FE	Yes	Yes	Yes	Yes
Past # opt/pess FE	No	No	No	No
Number of obs.	73,717	59,019	58,190	46,945

Table 6: Expectations compared to realizations

Panel A reports the proportion of observations for individual/years with a given time $t+1$ realized change in financial situation (ΔFS^i_{t+1}) as a function of the time t expectation of that financial situation ($E^i_t[\Delta FS^i_{t+1}]$). The last three columns present a graphical representation of the definition of the optimist and pessimist dummies, based on the time t expectations of individual i ($E^i_t[\Delta FS^i_{t+1}]$) and on his/her time $t+1$ realizations (ΔFS^i_{t+1}). Panel B reports the proportion of observations for which individuals are optimistic and pessimistic. An individual is optimistic at time t if at this time he/she expects a change in financial situation that is better than the realized time $t+1$ change. An individual is pessimistic at time t if at this time he/she expects a change in financial situation that is worse than the realized time $t+1$ change. The table reports the proportion of observations that were neither optimistic nor pessimistic, corresponding to correct expectations. The table also reports the proportions by age and by income group. The unit of observation is individual/year.

Panel A: Optimism and pessimism measures

	Realization at t+1			Realization at t+1		
Expectation at t	Better off	Same	Worse off	Better off	Same	Worse off
Better off	0.45	0.35	0.20	—	Optimist	Optimist
Same	0.17	0.63	0.20	Pessimist	—	Optimist
Worse off	0.12	0.35	0.53	Pessimist	Pessimist	—

Panel B: Optimism and pessimism by age and income

	Overall	Age group				Income group		
		20-34	35-49	50-64	≥65	Low	Medium	High
Optimist	0.26	0.32	0.31	0.25	0.16	0.21	0.27	0.28
Pessimist	0.17	0.18	0.18	0.16	0.15	0.16	0.16	0.18
Neither	0.57	0.50	0.51	0.59	0.69	0.63	0.57	0.54

Table 7: Lifelong optimists, pessimists and alternate

The table shows the proportion of individuals and the mean of several variables for three different groups. Optimist (pessimist) includes those individuals whose expectation errors are always optimistic (pessimistic). Alternate includes those individuals for whom we observe both optimistic and pessimistic expectation errors. The table shows results when we include individuals who appear at least 7 and at least 11 times in the sample. Male (married) are indicator variables for male (married). Number of children is the number of children in the household. PI group is the permanent income group determined by how the average income of the individual over the whole sample period compares to the average income of all the individuals. The PI group variable takes one of ten possible values that correspond to the decile of the distribution (one is the lowest). No high school, high school and higher education are dummy variables for educational attainment. Below the means we show in parenthesis the p-value of a test of equality of means relative to the alternate group.

	Number of obs.$\geq$ 7			Number of obs. $\geq$ 11		
	Optimist	Pessimist	Alternate	Optimist	Pessimist	Alternate
Number of individuals	1,797	922	5,156	544	257	3,134
Fraction of individuals	0.23	0.12	0.66	0.14	0.07	0.80
Male	0.55	0.48	0.55	0.57	0.42	0.57
	(0.55)	(0.00)		(0.98)	(0.00)	
Married	0.60	0.50	0.65	0.65	0.51	0.68
	(0.00)	(0.00)		(0.13)	(0.00)	
Number of children	0.62	0.33	0.61	0.60	0.33	0.58
	(0.52)	(0.00)		(0.59)	(0.00)	
PI group	5.40	5.01	5.92	5.44	4.63	6.04
	(0.00)	(0.00)		(0.00)	(0.00)	
No high school	0.35	0.49	0.31	0.37	0.56	0.31
	(0.00)	(0.00)		(0.00)	(0.00)	
High school	0.29	0.20	0.28	0.28	0.16	0.28
	(0.19)	(0.00)		(0.94)	(0.00)	
Higher education	0.36	0.31	0.42	0.35	0.29	0.42
	(0.00)	(0.00)		(0.00)	(0.00)	

Table 8: Optimism and pessimism: regressions

Columns (1) and (2) report the estimated coefficients of fixed effects Logit regressions that explain optimism/pessimism using the changes experienced in financial situation. Columns (3) and (4) report the results of Logit regressions. In the remaining columns of the table we use the reason for the change in financial situation to estimate fixed effects Logit regressions (columns (5) and (6)) and Logit regressions (columns (7) and (8)). The unit of observation is individual/year. All the regressions include year fixed effects.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Optimist_{it}	Pessimist_{it}	Optimist_{it}	Pessimist_{it}	Optimist_{it}	Pessimist_{it}	Optimist_{it}	Pessimist_{it}
Better off_{it}	0.13***	-0.10***	0.24***	0.51***				
	(5.95)	(-3.96)	(13.20)	(25.12)				
Worse off_{it}	0.09***	0.05**	0.77***	0.10***				
	(4.24)	(1.98)	(43.31)	(4.33)				
Earnings ↑					0.14***	-0.12***	0.28***	0.47***
					(4.62)	(-3.67)	(11.59)	(17.72)
Expenditure ↓					0.12**	-0.07	0.25***	0.54***
					(2.38)	(-1.46)	(5.94)	(12.19)
Earnings ↓					0.34***	-0.31***	1.03***	-0.18***
					(9.30)	(-6.05)	(32.80)	(-4.02)
Expenditure ↑					-0.10***	0.25***	0.66***	0.24***
					(-3.46)	(6.93)	(27.32)	(8.20)
Income group 2	0.13***	-0.08**	0.30***	-0.06***	0.11***	-0.09**	0.27***	0.01
	(4.49)	(-2.29)	(16.06)	(-2.58)	(3.16)	(-2.29)	(12.90)	(0.56)
Income group 3	0.19***	-0.04	0.31***	0.10***	0.15***	-0.04	0.26***	0.20***
	(5.59)	(-0.91)	(16.69)	(4.93)	(3.78)	(-0.84)	(12.56)	(8.48)
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Ind. FE	Yes	Yes	No	No	Yes	Yes	No	No
Number of obs.	79,204	70,941	98,095	98,095	62,618	54,935	81,744	81,744
Estimation	FE Logit	FE Logit	Logit	Logit	FE Logit	FE Logit	Logit	Logit

Table 9: Optimism/Pessimism: Age effects and past expectation errors

This table shows the estimated coefficients of fixed effects logit regressions that explain optimism, pessimism and neither using the changes experienced in financial situation, age, and past expectation errors. The dependent variables are dummy variables for optimist, pessimist and neither. The independent variables are dummy variables that capture the change in financial situation at time t, the age group of the household head (the base group is age 20-34), and the number of past (prior to the year t event) observations for which the same individual has been optimistic (Past # optimist$_{it}$) and pessimistic (Past # pessimist$_{it}$). The unit of observation is individual year. All regressions include individual fixed effects. The t-statistics are reported below the estimated coefficients. $***$, $**$ and $*$ denotes statistical significance at the 1%, 5% and 10% levels, respectively.

	(1)	(2)	(3)	(4)	(5)
	Optimist$_{it}$	Pessimist$_{it}$	Optimist$_{it}$	Pessimist$_{it}$	Neither$_{it}$
Better off$_{it}$	0.13***	-0.08***	0.32***	-0.43***	0.05**
	(5.71)	(-3.50)	(12.03)	(-14.97)	(2.28)
Worse off$_{it}$	0.10***	0.06***	-0.13***	0.17***	0.04*
	(4.63)	(2.18)	(-5.43)	(5.54)	(1.72)
Age 35 - 49	0.03	-0.13***	0.66***	0.28***	-0.64***
	(0.96)	(-3.01)	(13.75)	(4.80)	(-15.10)
Age 50 - 64	0.04	-0.33***	1.27***	0.58***	-1.28***
	(0.76)	(-5.34)	(16.81)	(6.54)	(-19.46)
Age $\geq$ 65	0.02	-0.54***	1.77***	0.89***	-1.80***
	(0.21)	(-6.41)	(17.06)	(7.35)	(-20.08)
Past # optimist$_{it}$			-0.54***	0.49***	0.22***
			(-49.31)	(32.68)	(23.41)
Past # pessimist$_{it}$			0.48***	-0.77***	0.26***
			(31.81)	(-51.59)	(22.43)
Inc. group FE	Yes	Yes	Yes	Yes	Yes
Year FE	No	No	No	No	No
Ind. FE	Yes	Yes	Yes	Yes	Yes
Past # opt/pess FE	No	No	No	No	No
Number of obs.	78,524	70,353	63,460	56,264	71,397

Table 10: Life events: retirement and household composition

Newly retired observations are those corresponding to individual/years in which a given individual reported being retired, while not being retired in the previous year. The not newly retired are the remaining observations. For each of the groups, the table reports the number of observations, average age, proportion of individuals who report a given change in their finances (Earnings/Expenditures ↑/↓). The final four rows show, for individuals who reported a given change in their year t finances, the proportion who had anticipated the change in year $t-1$. The table reports the p-value of a test of equality of means. The new child indicator variable takes the value of one if the number of children in household i and in year t is higher than the number of children in the same household in year $t-1$, and zero otherwise. Newly married observations are those corresponding to individual/years in which a given individual reported being married, while not being married in the previous year. The newly separated indicator variable takes the value of one for observations in which the individual reported being separated, while not being separated the previous year.

	Newly retired		p-value of	New child		p-value of
	Yes	No	difference	Yes	No	difference
Number of observations	2,859	104,790		3,577	122,960	
Age (years)	65.7	51.1		34.3	50.9	
Earnings ↑	0.01	0.14	0.00	0.16	0.14	0.00
Expenditures ↓	0.02	0.04	0.00	0.04	0.04	0.21
Earnings ↓	0.19	0.06	0.00	0.16	0.06	0.00
Expenditures ↑	0.11	0.13	0.00	0.18	0.13	0.00
Earnings ↑, better off anticipated	0.36	0.52	0.13	0.55	0.52	0.23
Expenditures ↓, better off anticipated	0.36	0.44	0.27	0.52	0.43	0.08
Earnings ↓, worse off anticipated	0.45	0.20	0.00	0.39	0.20	0.00
Expenditures ↑, worse off anticipated	0.40	0.26	0.00	0.28	0.26	0.40
	Newly married		p-value of	Newly separated		p-value of
	Yes	No	difference	Yes	No	difference
Number of observations	2,375	124,100		1,275	125,264	
Age (years)	36.5	50.7		47.4	50.5	
Earnings ↑	0.27	0.14	0.00	0.10	0.14	0.00
Expenditures ↓	0.10	0.04	0.00	0.07	0.04	0.00
Earnings ↓	0.06	0.06	0.89	0.10	0.06	0.00
Expenditures ↑	0.13	0.13	0.47	0.19	0.13	0.00
Earnings ↑, better off anticipated	0.60	0.52	0.00	0.57	0.52	0.41
Expenditures ↓, better off anticipated	0.53	0.43	0.01	0.46	0.44	0.73
Earnings ↓, worse off anticipated	0.12	0.22	0.01	0.16	0.22	0.22
Expenditures ↑, worse off anticipated	0.21	0.27	0.05	0.23	0.27	0.26

Table 11: Test of the equality of the means

This table reports the t-test of the equality of the means for several variables of interest for individuals who, at time t, were worse off due to an earnings decline and are optimistic, and those who were worse off due to the same earnings decline but are pessimistic. The sample of individuals is restricted to those who did not report an earnings decline in years $t-2$ and $t-1$.

	$(t-2)$	$(t-1)$	(t)	$(t+1)$	$(t+2)$
		Panel A: Log income			
Pessimist	10.12	10.11	10.01	9.97	10.03
Optimist	10.13	10.15	10.02	9.92	9.97
Difference	-0.01	-0.03	-0.01	0.05	0.06
p-value	0.77	0.43	0.83	0.18	0.12
		Panel B: Proportion savers			
Pessimist	0.457	0.467	0.332	0.410	0.431
Optimist	0.449	0.454	0.288	0.293	0.340
Difference	0.008	0.012	0.044	0.118	0.091
p-value	0.77	0.65	0.06	0.00	0.00
		Panel C: Saving rate			
Pessimist	0.051	0.054	0.029	0.054	0.055
Optimist	0.050	0.051	0.025	0.025	0.032
Difference	0.002	0.003	0.004	0.029	0.022
p-value	0.79	0.59	0.18	0.00	0.00
		Panel D: Proportion extra loan			
Pessimist	0.102	0.104	0.041	0.072	0.096
Optimist	0.107	0.108	0.082	0.080	0.097
Difference	-0.005	-0.004	-0.041	-0.008	-0.001
p-value	0.84	0.84	0.03	0.66	0.97

Table 12: Worse off and better off, conditional on worse off due to earnings decline at t

This table reports the difference between the proportions of optimistic and pessimistic individuals who are better off (worse off in Panel B) in each year, conditional on them being worse off at time t due to an earnings decline. Individuals are classified into optimists and pessimists based on year t expectations and year $t+1$ realizations. The last column reports the difference in the proportions of those who are better off and worse off, but excluding those who are better off due to an earnings increase in year $t+2$ (Panel A) and excluding those who are worse off due to an earnings decline in year $t+2$ (Panel B). The sample of individuals is restricted to those who did not report an earnings decline in years $t-2$ and $t-1$.

	$(t-2)$	$(t-1)$	(t)	$(t+1)$	$(t+2)$	$(t+2)$ (excl. earn.)
			Panel A: Better off			
Pessimist	0.304	0.298	0.000	0.696	0.279	0.134
Optimist	0.321	0.302	0.000	0.000	0.249	0.096
Difference	-0.017	-0.004	0.000	0.696	0.030	0.038
p-value	0.524	0.8643		0.000	0.199	0.037
			Panel B: Worse off			
Pessimist	0.237	0.235	1.000	0.000	0.266	0.190
Optimist	0.234	0.238	1.000	0.697	0.356	0.270
Difference	0.004	-0.003	0.000	-0.697	-0.090	-0.080
p-value	0.880	0.893		0.000	0.000	0.001

Internet Appendix to
"Evidence on expectations of household finances"

A Expenditure shares

The data contains information on the amount spent on food and energy by the household. More precisely, respondents are asked about their total weekly food and grocery bill. We multiply this number by 52 to obtain an annual figure, and divide by total household income. We construct a similar expenditure share (as a fraction of household income) for energy.

Figure A1 plots the average expenditure shares for different groups of individuals. It shows that those in lower permanent income groups spend a much larger proportion of their income in food and energy than than those in higher permanent income groups. The less educated and those over the age of 65 also spend a higher proportion of their income in these categories (and they are more likely be worse off due to higher expenditures than other age groups).

We study the links between the reported changes in household finances, inflation and expenditure shares using fixed effects logit regressions. To facilitate the exposition, for each household/year, we add the shares of food and energy (and obtain $\text{Share}_{it}^{F/E}$) and calculate an household specific measure of food and energy price inflation (using the realized food and energy price inflation in year t and the household specific expenditure shares in each of the goods in year $t-1$ as weights, and obtain $\pi_{it}^{F/E}$). The equation that we estimate:

$$\mathbb{1}(\text{Expenditures} \uparrow)_{it} = \alpha + \beta_1 \pi_{it}^{F/E} + \beta_2 \text{Share}_{i,t-1}^{F/E} + \beta_3 \pi_{it}^{F/E} \text{Share}_{i,t-1}^{F/E} + \delta_i + \varepsilon_{it}, \tag{7}$$

where δ_i is an individual fixed effect and ε_{it} is the residual. We use lagged variables for the expenditure shares to try to isolate the effects arising from food and energy price inflation. Higher food and energy price inflation is likely to lead to higher expenditure shares in food and energy. The lagged expenditure share is pre-determined.

Table A1 shows the results. The first row shows that a higher food/energy expenditure share makes it more (less) likely that households report being worse off (better off) due to higher (lower) expenditures. It is important to note that this does not necessarily mean that households are worse off (better off) due to higher (lower) spending in these categories of goods. However, the second row shows that in years in which food/energy price inflation is higher households are more (less) likely to report that they are worse off (better off) due to higher (lower) expenditures. Finally, households who have higher (lagged) expenditure shares in years in which food/energy price inflation is higher are more likely to report higher expenditures

and less likely to report lower expenditures, although the former estimate is not statistically significant.

B Expectations and actions

One potential shortcoming of expectation surveys is that the responses may be affected by framing and/or by some individuals not actually meaning what they say. As discussed in Greenwood and Shleifer (2014), this concern can be addressed by showing that individuals behave in line with the expectations that they report. In this section, we show that, in our data, expectations are related to savings behavior.

B.1 Savings and borrowing variables

The BHPS data provide information on whether individuals are currently saving. The question is: "Do you save any amount of your income for example by putting something away now and then in a bank, building society, or Post Office account other than to meet regular bills?" The possible answers are: "Yes, No, or Refused" (only a very small proportion, of less than one percent, refuse to answer). We construct a dummy variable that takes the value of one for individual/years who respond Yes, and zero for those who respond No.

Individuals in the survey are also asked about the amount they save. The exact question is: "About how much on average do you personally manage to save a month?" We multiply the amount stated by twelve to obtain an annual figure,[33] and divide by gross household income to calculate a saving rate. For those who report that they do not currently save, we set the saving rate to zero. To reduce the influence of outliers we winsorize at the one percent level.

The last variable that we consider captures borrowing decisions. The homeowners in the data are, in each year, asked whether they have taken out an additional mortgage on their home. The question is: "Have you taken out any additional mortgage or loan on this house/flat since (date of the previous interview)?". We use the answers to this question to construct a dummy variable that takes the value of one in the case of an affirmative answer, and zero otherwise. Naturally, we are only able to do this for the sample of homeowners.

[33] For couples, we multiply this amount by two.

B.2 Results

We regress the savings variables on the expectation dummies, controlling for the current change in financial situation, since the decision to save is likely to also depend on whether individuals experienced an improvement or a deterioration in their financial situation. As before, we include individual and year fixed effects in the regressions.

Column (1) of Table A2 shows the results of an FE logit regression with the dummy for current saver as the dependent variable. The statistically significant and positive (negative) coefficient on the better off (worse off) dummy shows that individuals who experience an improvement (deterioration) in their financial situation are more (less) likely to be active savers. Turning our attention to the expectation variables, we estimate a statistically significant and negative (positive) coefficient on the dummy variable for expect to be better off (worse off). This shows that individuals who expect an improvement (deterioration) in their financial situation are less (more) likely to be savers today, and do indeed act in line with their reported expectations.

In columns (2) and (3) of Table A2, we report the results of regressions with the savings rate as the dependent variable. In column (2) we include all available observations, while in column (3) we restrict the sample to observations with a strictly positive savings rate. In both cases, the results confirm that individuals' savings behavior is consistent with their reported expectations: those who expect to be better off (worse off) decrease (increase) their saving rate.

Finally, in column (4), we report the results of a regression with the new home loan dummy as the dependent variable. We do not find any statistically significant results for either expectations or realizations. As explained before, this variable is only defined for homeowners. Furthermore, even among these, only a small number of individuals actually take a new home loan in a given year (the variable takes the value of one for only 3.6% of the observations).

C Additional results on expectations

In the main body of the paper, the null set of the expect better and expect worse dummy variables combines two alternative outcomes. For example, those who do not expect to be better off can expect to be either the same or worse off. We consider an alternative specification

where the expect better and expect worse responses are only compared to the expectation of no change:

$$\text{Expect Better vs Same}_{it} = \begin{cases} 1 & \text{if } E_t^i[\Delta FS_{t+1}^i] = 1, \\ 0 & \text{if } E_t^i[\Delta FS_{t+1}^i] = 0, \end{cases} \tag{8}$$

and

$$\text{Expect Worse vs Same}_{it} = \begin{cases} 1 & \text{if } E_t^i[\Delta FS_{t+1}^i] = -1, \\ 0 & \text{if } E_t^i[\Delta FS_{t+1}^i] = 0. \end{cases} \tag{9}$$

Table A3 shows the results. They deliver the same conclusions as their counterparts shown in the main body of the paper. The estimated coefficient on the better off dummy in the expect worse versus same regression is not statistically different from zero, but this leads to a similar overall conclusion: following an improvement in financial situation, individuals form on average extrapolative expectations, due to an increase of the mass in the right tail of the distribution and a decrease of the mass in the center of the distribution.

In Table A4, we report the results for the expectation dummies, for regressions without individual fixed effects. Although the magnitudes of the estimated coefficients are significantly different from those obtained in the main paper, the qualitative conclusions are the same.

D Income process simulations

We have simulated an income process and estimated regressions similar to those that we estimate on the true data using the simulated data. We have done so for two different income processes. In the first, log labor income Y_t (with $y_t \equiv log(Y_t)$) is equal to the sum of a deterministic function (f_t), that captures age effects and other individual characteristics (Z_t), and a stochastic first-order auto-regressive component (ε_t^y):

$$y_t = f_t(Z_t) + \varepsilon_t^y \tag{10}$$

$$\varepsilon_t^y = \phi \varepsilon_{t-1}^y + \eta_t. \tag{11}$$

For the purposes of mapping this stochastic process to our data, it is useful to think of income in first differences:

$$\Delta y_t = y_t - y_{t-1} = f_t - f_{t-1} + \varepsilon_t^y - \varepsilon_{t-1}^y. \tag{12}$$

We model these income changes (Δy_t) using a three-state Markov chain with low (L), intermediate (S), and high (H) income growth. In other words, Δy_t can take one of three possible values: g_t^L, g_t^S and g_t^H. The values for the growth rates of income are age-dependent allowing us to capture life-cycle variation. A transition probability matrix Θ_t governs the changes between $t-1$ and t states:

$$\Theta_t = \begin{bmatrix} \theta_t^{LL} & \theta_t^{LS} & \theta_t^{LH} \\ \theta_t^{SL} & \theta_t^{SS} & \theta_t^{SH} \\ \theta_t^{HL} & \theta_t^{HS} & \theta_t^{HH} \end{bmatrix} \tag{13}$$

where θ_t^{ij} denotes the probability of a transition from g_{t-1}^i to g_t^j for $i, j = L, S, H$. As the notation above makes clear, we let the transition probabilities be age dependent.

From the stochastic process for income, we can simulate both income realizations and (rational) expectations, and from these calculate the ex-post forecasting errors. In order to map these continuous values into categorical outcomes (better off, same and worse off) we use the age-specific income values reported in the main paper. We then use these three sets of time series (realizations, expectations and expectation errors) to replicate the different regressions that we have estimated in our empirical analysis.

Table A6 reports the results. The first four columns report the results based on our empirical data, while the last four report results for the same regressions with the simulated data.[34] In each case, the dependent variables are the expectations in the first two columns, and expectation errors in the other two.

When we consider the regressions with expectations as the endogenous variables (columns (5) and (6) of Table A6), we obtain the same conclusions as in our empirical regressions (columns (1) and (2) of the same table), except for one case, where the coefficient is not significant in the empirical regressions. More precisely, following increases in income individuals are more (less)

[34]Note that, since we are only simulating income shocks, the corresponding regressions in the data are those where the right hand side variables are "better off due to an earnings increase" and "worse off due to an earnings decrease".

likely to expect another increase (a decrease). By contrast, following decreases in income they are more likely to expect either an increase or a decrease (with a reduction in the probability of expecting "no change").

However, when we consider the regressions with optimist and pessimist as left-hand side variables, we find that the estimated coefficients in the simulated data are very small and none of them are statistically significant (columns (7) and (8)), in contrast with our empirical results (columns (3) and (4)). In other words, under this income process, rational expectations agents should not be more likely to become optimist or pessimist, following either better off or worse off events.

Next we consider an augmented income process, with a separate unemployment state. More precisely we now model changes in income (Δy_t) using a four-state Markov chain. We have high (H) and intermediate (S) growth states as before, but separate the previous low income growth state (L), into a low income growth with no unemployment (Lnu) and a low income growth with unemployment (Lu) states. The results are reported in Table A7, which follows the same structure as the previous table.

With this income process, for the expectations regressions (columns (5) and (6) of Table A7), we obtain the same conclusions as before, and as in our empirical analysis (columns (1) and (2)). However, in the regressions with optimist and pessimist as left-hand side variables, for the simulated data (columns (7) and (8)), we now obtain statistically significant coefficients in all cases. Individuals who are better (worse) off are less (more) likely to be both optimists and pessimists.

Therefore, an augmented income process with a separate unemployment state is able to replicate the finding that individuals are more likely to exaggerate the probability of being better off in the future following a negative income shock. However, it yields other implications that are not consistent with our empirical results. Namely, following a negative income shock individuals are also more likely to exaggerate the probability of being worse off again in the future and, following a positive income shock, they are less likely to exaggerate the probability of being better off in the future. In our empirical regressions both of those patterns are reversed.

E Categorical answers and expectation errors

A prediction of the rational expectations hypothesis is that the future expectation errors are uncorrelated with any information available today. Therefore, the relationships between expectation errors and the changes experienced in financial situation that we have estimated seem to be at odds with the hypothesis. We say "seem," because our survey data only provide a discrete range of answers for both realizations and expectations, and the classification of an underlying continuous variable (change in financial situation) into three discrete categories (better off, same, or worse off) may introduce predictable patterns in the expectation errors. We explore several ways to address this particular concern.

If the results are biased by the group formation process, then one might expect different methods of group construction to lead to different results. We exploit this logic and construct two alternative measures of "optimism" and "pessimism." These alternative classification methods are illustrated in the bottom two panels of Table A8.

In the first alternative classification, shown in Panel B, we only classify observations as optimist (pessimist) if at time t the individual expects an improvement (deterioration) in financial situation that fails to materialize. In other words, relative to the previous classification, we now assign a value of zero to observations with an expectation of an unchanged financial situation. We denote these alternative dummy variables optimist2 and pessimist2.

In the third classification, shown in Panel C, and denoted optimist3 and pessimist3, we also exclude observations for which the realized $t+1$ financial situation is unchanged. In other words, optimist3 (pessimist3) is only equal to one when individuals expect to be better off (worse off), but they are actually worse off (better off) in the following year. It is important to note that the three classification methods differ along two dimensions: in how they treat the time t expectations, and in how they treat the time $t+1$ realizations.

We repeat the FE logit estimations, but with these alternative measures of optimism/pessimism as dependent variables. Table A9 shows the results. To facilitate the comparison, in columns (1) and (2) we again report the estimates for the original optimist/pessimist dummies. Before discussing the results, it is important to point out that the number of observations differs significantly across the columns. In the FE logit estimation only those observations referring

to individuals for whom there is variation in the endogenous variable over the sample are included. The variation in the number of observations across the columns therefore confirms that the alternative classification methods make a difference for the sample and provide different definitions of optimism/pessimism.

In spite of the differences in sample size, for both alternative definitions the estimated coefficients on the better off and worse off dummies show that our previous conclusions are not affected. First, following an improvement in financial situation, there is an increase in the likelihood of optimism and a reduction in the likelihood of pessimism. Second, following a deterioration the likelihoods of both optimism and pessimism increase. The economic magnitudes of the estimated coefficients differ across specifications because of the differences in the mean of the left hand side variables.

Additional evidence against our findings being driven by the qualitative nature of the data has already been presented in Table 8. There, we have shown that the estimated coefficients in the regressions without individual fixed effects (columns (5) and (6)) are very different from those in the baseline specification (columns (1) and (2)). The inclusion/exclusion of individual fixed effects does not change the qualitative classification of the data. If the baseline results were solely due to a bias implied by the classification, then we would not expect the estimated coefficients to change sign when we remove the fixed effects from the regression.

Another possible way to evaluate the hypothetical bias that may be created by the use of discrete data is to estimate the underlying stochastic process for the true (continuous) variable (for example, expenditure), then estimate the cut-offs for the different groups, use the cut-offs to classify the observations into groups, and finally perform the estimation. In our setting, this approach is not feasible for two main reasons.

First, the individuals are not forecasting a single variable, such as inflation or aggregate stock returns. They are forecasting their future financial situation which, as shown in Section 2, is affected by multiple factors: income, expenditure, transfers, etc. The estimation of stochastic processes for all of these represents a significant statistical challenge.[35] A second difficulty lies

[35]This would be the case even if we restricted ourselves to the two largest categories, namely earnings and expenditure. While we could follow previous literature and assume the same income growth process for individuals with the same education and occupation, the stochastic process for expenditure is likely to be more complex.

in the estimation of the cut-offs for the better off/worse off categories. These cut-offs will almost certainly vary across individuals (see Manski (2018)), and may also vary over time for the same individual, as macroeconomic conditions or other relevant circumstances change. Therefore, it is not feasible to estimate individual thresholds.

F Past expectation errors and expectations: robustness

We have shown that past expectation errors influence expectations in an economically meaningful manner. Individuals who in the past have often been optimistic (pessimistic) are less likely to expect to be better off (worse off) going forward, and are instead more likely to expect to be worse off (better off). In our previous results we controlled for the past number of optimist/pessimist occurrences linearly in the regressions. In this appendix we consider a more flexible specification where we include separate dummy variables for different number of past occurrences.[36]

Figure A2 plots the estimated coefficients on these dummy variables. All past optimist (pessimist) dummies have a positive coefficient in the expect worse (better) regression, and a negative coefficient in the expect better (worse) regression, consistent with our previous results. Interestingly, the estimated coefficients tend to be larger (in absolute value) the larger the number of past occurrences (the base case is zero past occurrences).

G Cumulative experiences and cohort effects

We have studied the impact of *current* changes in financial situation on expectations and expectation errors. Interestingly, we have found that, after a deterioration in financial situation due to lower earnings, individuals tend to expect too much mean reversion and are too optimistic for the following year. A natural question is how this result relates to the literature that has documented the importance of *accumulated* personal experiences for the shaping of individual beliefs (e.g. Vissing-Jorgensen (2003); Greenwood and Nagel (2009); Malmendier et al. (2011); Malmendier and Nagel (2016, 2011); Kuchler and Zafar (2019); Malmendier et al. (2021)). We investigate the importance of accumulated experiences in our data.

[36] As before, we cap the maximum number of ocurrences at 5.

G.1 Measure of cumulative experiences

In order to capture lifetime experiences, which may have happened before the start of our sample period, we follow Malmendier and Nagel (2011) and construct a cohort variable measuring cumulative past experiences. More precisely, we construct a variable equal to the ratio of the number of years in which the individual, aged 18 or over, experienced a major negative economic event, divided by the individual's current age minus 18. This variable therefore measures the percentage of (adult) years during which the individual experienced such an event.[37]

The events that we consider are years with negative aggregate economic conditions (as mentioned above, some of these events are not included in the BHPS sample period).[38] The years that we include are: (i) the UK recession years of 1973-1975, 1980-1981 and 1990-1991; and (ii) the years corresponding to World War I (1914-1918) and World War II (1939-1945). The cohort variable has a mean of 0.15 and a median of 0.14, with a standard deviation of 0.07. It takes a value of zero for 10% of the observations and it reaches a value of 0.24 (0.30) at the 95th (99th) percentile. We add this variable to the explanatory variables that we have previously used to explain optimism and pessimism, and estimate fixed effects logit regressions.

G.2 Results

Table A10 shows the results. With the inclusion of the cohort variable, the significance of the estimated coefficients on the better off/worse off dummies remains essentially unchanged, and the point estimates are almost identical. Turning to the cohort variable itself, we find that it has a statistically negative coefficient in the optimist regression. This is consistent with the hypothesis that individuals who have experienced a higher fraction of major negative events during their adult life have been "traumatized" by such events, and are less likely to be optimistic about the future.

It is important to remember that we include individual fixed effects among the explanatory variables in our regressions. Since the value of the cohort variable changes only slowly over time,

[37] We obtain similar results if we consider a "starting age" of 16.

[38] In addition, one can also conjecture that individuals may learn about the frequency of the events by observing the realizations for other individuals, i.e. if the frequency of negative events is particularly high in a given year, that might still lead those individuals who have not been significantly affected by the events to increase their subjective unconditional expectation of their occurrence.

especially for those individuals who are older, its effects are partly captured by the individual fixed effects. This helps to explain why the cohort variable is not statistically significant in the pessimist regression (column (2)). The same result holds when the reported reasons for financial change are included as explanatory variables (column (4)).

As an alternative approach, we estimate cross-sectional regressions in which we regress the average of the optimist and pessimist dummy variables for each individual on the average of their cohort variable. Thus, each observation corresponds to one individual. The results are reported in columns (5) and (6) of Table A10. The cohort variable is now statistically significant in both regressions, and it has the predicted signs: individuals who have experienced a higher frequency of negative events throughout their adult lives are both less likely to be optimistic and more likely to be pessimistic about the future. These regressions also confirm that the individual fixed effects included in the optimist and pessimist regressions (1) and (2) capture, at least in part, the cohort effects.

It is interesting to contrast the results for the cohort variable with those for the current change in financial situation. Accumulated bad experiences, as measured by the cohort variable, decrease optimism. On the other hand, the estimated coefficient on the worse off dummy in column (1) shows that some of the individuals who face a negative event are more likely to become optimistic for the following year. We interpret these as individuals under-estimating the short-term persistence of earnings declines, and provide further evidence in the next section.

H Other life events: health status

Table A11 shows the household finance implications of bad health. Survey respondents are asked to rate their wealth in a five point scale from very poor to very good. We construct an indicator variable variable for new bad health if individual i responded poor or very poor in a given year t, having responded fair, good, or very good in the previous year.

New bad health means a deterioration of household finances due to higher expenditures, but interestingly there also are significant earnings differences. Those in bad health are much less likely to be better off due to higher earnings (and are more likely to be worse off due to lower earnings). The literature has focused on the medical expenditure implications of negative health

shocks, but these results show that a second important channel is earnings. It is important to note that older individuals are more likely to have new bad health status, and that at this stage of the life-cycle income profiles tend to flatter. This might drive the lower proportion of better earnings response, but not necessarily the higher proportion of lower earnings responses. These results shed new light on the channels through which life events impact household finances.

Figure A1: Expenditure shares in food and energy among different groups.
This figure plots expenditure shares in food and energy as a fraction of household income for households in different age, education and permanent income groups. We use the age and education of the household head. The figure plots the average shares across all individuals in the group.

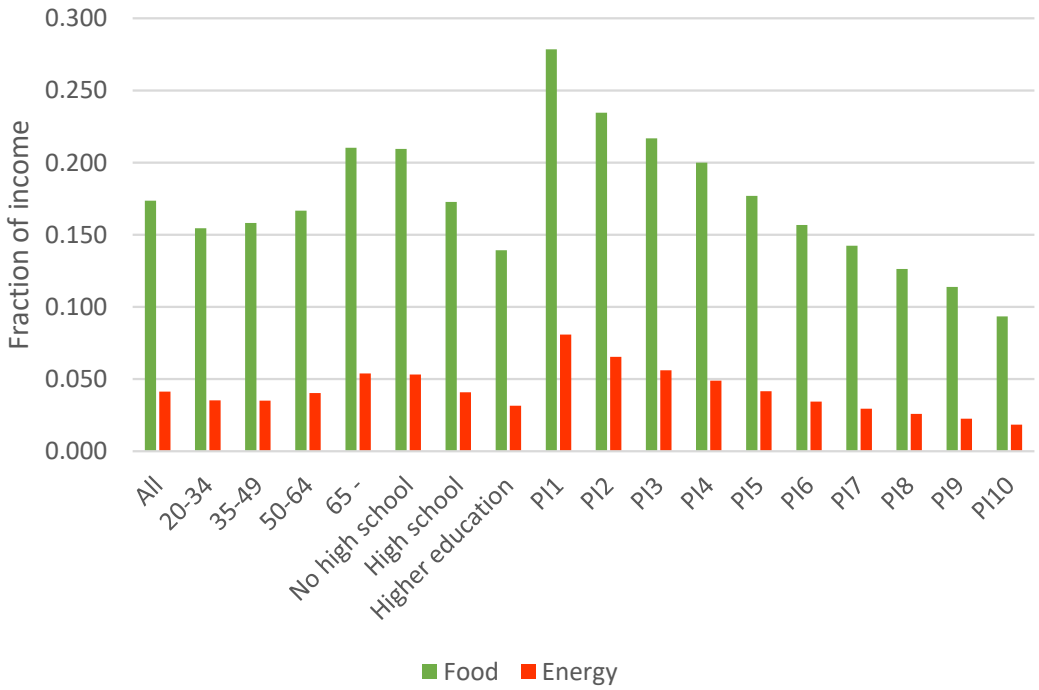


Figure A2: Estimated coefficients on Past # optimist/pessimist dummies
This figure plots the estimated coefficients on the Past # optimist and Past # pessimist dummy variables in regressions similar to those shown in columns (3) and (4) of Table 5 but with dummies for the number of past optimist and pessimist events and year fixed effects. The base case is zero past realizations. The regressions are estimated using FE logit.

Panel A: Past # optimist

Panel B: Past # pessimist

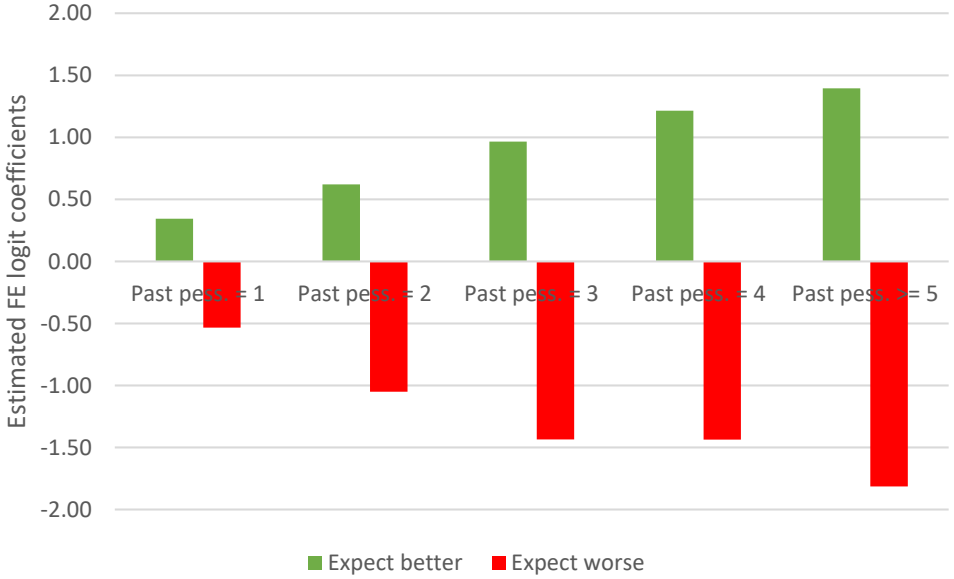


Table A1: Higher/lower expenditures responses, inflation and expenditure shares. The dependent variables are the dummy variables for high/low expenditure response by household i in year t. The independent variables are the household i/year t-1 expenditure shares in food and energy (as a fraction of household income), the year t food and energy price inflation (calculated using the realized food and energy price inflation in year t and the household specific expenditure shares in each of the goods in year $t-1$ as weights), and the interaction between these two variables. The table reports results for FE logit regressions. The t-statistics are reported below the estimated coefficients. $***$, $**$ and $*$ denotes statistical significance at the 1%, 5% and 10% levels, respectively.

	(1)	(2)	(3)	(4)
	Expenditures ↑	Expenditures ↑	Expenditures ↓	Expenditures ↓
$\text{Share}_{i,t-1}^{F/E}$	1.10***	0.98***	-1.35***	-1.02***
	(6.40)	(4.81)	(-4.31)	(-2.80)
$\pi_{it}^{F/E}$	12.92***	12.13***	-6.24***	-3.86**
	(33.03)	(15.50)	(-8.04)	(-2.53)
$\text{Share}_{i,t-1}^{F/E} \times \pi_{it}^{F/E}$		3.91		-14.49*
		(1.17)		(-1.78)
Ind FE	Yes	Yes	Yes	Yes
Number of obs.	31,713	31,713	14,087	14,087

Table A2: Expectations and actions

The dependent variable is a dummy variable that measures whether the individual is currently saving (in (1)), the saving rate calculated as a proportion of income (in (2) and (3)), and a dummy variable that takes the value of one if the individual took out a new home equity loan (in (4)). The independent variables are the dummy variables that measure the time t expectations and the dummy variables that measure the time t realized change in financial situation. In column (2) we include observations for which the saving rate is zero, but in (3) we restrict the sample to those observations for which the saving rate is strictly positive. All the regressions include year and individual fixed effects.

	(1)	(2)	(3)	(4)
	Current Saver$_{it}$	Saving Rate$_{it}$	Saving Rate$_{it}$	New Home Loan$_{it}$
Expect Better$_{it}$	-0.15***	-0.24***	-0.11	-0.02
	(-6.20)	(-3.68)	(-0.82)	(-0.49)
Expect Worse$_{it}$	0.07**	0.48***	0.82***	-0.02
	(2.33)	(6.02)	(4.73)	(-0.21)
Better off$_{it}$	0.47***	1.73***	1.83***	-0.01
	(20.69)	(27.53)	(14.89)	(-0.28)
Worse off$_{it}$	-0.53***	-1.00***	-1.20***	0.02
	(-22.21)	(-15.93)	(-8.26)	(0.36)
Year FE	Yes	Yes	Yes	Yes
Ind. FE	Yes	Yes	Yes	Yes
Number of obs.	83,181	109,300	39,953	23,766
Estimation	FE Logit	FE OLS	FE OLS	FE Logit

Table A3: Expectations: alternative definitions of the better off and worse off dummies

This table shows the estimated coefficients of Logit regressions that explain expectations using the changes experienced in financial situation. The dependent variables are the dummy variables for expect better off and expect worse off that take the value of zero only when individuals expect the same. The independent variables are dummy variables that capture the change experienced in financial situation at time t. The unit of observation is individual/year. The regressions also differ in the set of fixed effects included (individual and year or year only in the last two columns).

	(1)	(2)
	Expect Better	Expect Worse
	vs Same$_{it}$	vs Same$_{it}$
Better off$_{it}$	0.64***	-0.01
	(27.71)	(-0.37)
Worse off$_{it}$	0.91***	1.17***
	(35.26)	(41.68)
Income group 2	-0.02	-0.07*
	(-0.67)	(-1.71)
Income group 3	-0.08**	0.04
	(-2.15)	(0.75)
Year FE	Yes	Yes
Ind. FE	Yes	Yes
Number of obs.	66,598	48,131

Table A4: Expectations: no individual fixed effects

This table shows the estimated coefficients of Logit regressions that explain expectations using the changes experienced in financial situation and the reasons for the change. The dependent variables are dummy variables for expect better off and expect worse off. The independent variables are dummy variables that capture the change experienced in financial situation at time t (columns (1) and (2)) and the reason for the change (columns (3) to (4)). The unit of observation is individual/year. The regressions include year fixed effects.

	(1)	(2)	(3)	(4)
	Expect	Expect	Expect	Expect
	Better$_{it}$	Worse$_{it}$	Better$_{it}$	Worse$_{it}$
Better off$_{it}$	1.43***	-0.18***		
	(67.94)	(-5.51)		
Worse off$_{it}$	0.91***	1.51***		
	(41.47)	(57.75)		
Earnings ↑			1.66***	-0.16***
			(62.91)	(-3.65)
Expenditure ↓			1.33***	-0.14*
			(33.89)	(-1.92)
Earnings ↓			1.45***	0.79***
			(43.06)	(17.09)
Expenditure ↑			0.61***	1.83***
			(21.31)	(58.23)
Income group 2	0.47***	-0.25***	0.38***	-0.16***
	(18.65)	(-8.17)	(13.77)	(-4.73)
Income group 3	0.60***	-0.16***	0.46***	-0.04
	(21.97)	(-5.16)	(15.55)	(-1.16)
Year FE	Yes	Yes	Yes	Yes
Ind. FE	No	No	No	No
Number of obs.	115,543	115,543	96,527	96,527

Table A5: Optimism and pessimism: fixed effects OLS regressions

Columns (1) and (2) report the estimated coefficients of fixed effects OLS regressions that explain optimism/pessimism using the changes experienced in financial situation. Columns (3) and (4) use the reason for the change in financial situation. The unit of observation is individual/year. All the regressions include year fixed effects.

	(1)	(2)	(3)	(4)
	$\underline{\text{Optimist}_{it}}$	$\underline{\text{Pessimist}_{it}}$	$\underline{\text{Optimist}_{it}}$	$\underline{\text{Pessimist}_{it}}$
Better off$_{it}$	0.024***	-0.016***		
	(6.04)	(-4.65)		
Worse off$_{it}$	0.016***	0.007*		
	(4.10)	(1.94)		
Earnings ↑			0.03***	-0.02***
			(4.80)	(-4.25)
Expenditure ↓			0.02*	-0.01*
			(2.41)	(-1.69)
Earnings ↓			0.07***	-0.04***
			(10.32)	(-6.05)
Expenditure ↑			-0.02***	0.03***
			(-4.42)	(7.12)
Income group 2	0.02***	-0.010**	0.02***	-0.01**
	(4.51)	(-2.29)	(3.17)	(-2.29)
Income group 3	0.03***	-0.006	0.03***	-0.01
	(5.72)	(-1.06)	(3.84)	(-1.01)
Year FE	Yes	Yes	Yes	Yes
Ind. FE	Yes	Yes	Yes	Yes
Number of obs.	98,095	98,095	81,744	81,744
Estimation	FE OLS	FE OLS	FE OLS	FE OLS

Table A6: Expectations regressions on simulated data generated using the baseline income process

This table compares the results of regressions on the actual data (columns (1) to (4)) and on simulated data generated using the baseline income process. It reports the estimated coefficients of ordinary least squares regressions of expect better off, expect worse off, optimist and pessimist on the current change in financial situation, while controlling for individual fixed effects. p-values are reported below each coefficient. $***$, $**$ and $*$ denotes statistical significance at the 1%, 5% and 10% levels, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Empirical Results				Simulated Data			
	Expect Better$_{it}$	Expect Worse$_{it}$	Optimist$_{it}$	Pessimist$_{it}$	Expect Better$_{it}$	Expect$_{it}$ Worse$_{it}$	Optimist$_{it}$	Pessimist$_{it}$
Better off$_{it}$	0.09***	0.00	0.03***	-0.02***	0.12***	-0.03***	0.00	0.00
	(0.00)	(0.36)	(0.00)	(0.00)	(0.00)	(0.00)	(0.88)	(0.92)
Worse off$_{it}$	0.09***	0.12***	0.07***	-0.04*	0.02***	0.01***	0.00	0.00
	(0.00)	(0.00)	(0.00)	(0.05)	(0.00)	(0.00)	(0.72)	(0.75)
Ind. FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Table A7: Expectations regressions on simulated data generated using the extended income process

This table compares the results of regressions on the actual data (columns (1) to (4)) and on simulated data generated using the extended income process. It reports the estimated coefficients of ordinary least squares regressions of expect better off, expect worse off, optimist and pessimist on the current change in financial situation, while controlling for individual fixed effects. p-values are reported below each coefficient. $***$, $**$ and $*$ denotes statistical significance at the 1%, 5% and 10% levels, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Empirical Results				Simulated Data			
	Expect Better$_{it}$	Expect Worse$_{it}$	Optimist$_{it}$	Pessimist$_{it}$	Expect Better$_{it}$	Expect$_{it}$ Worse$_{it}$	Optimist$_{it}$	Pessimist$_{it}$
Better off$_{it}$	0.09***	0.00	0.03***	-0.02***	0.24***	-0.04***	-0.19***	-0.17***
	(0.00)	(0.36)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Worse off$_{it}$	0.09***	0.12***	0.02***	-0.04*	0.01***	0.11***	0.62***	0.49***
	(0.00)	(0.00)	(0.00)	(0.05)	(0.01)	(0.00)	(0.00)	(0.00)
Ind. FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Table A8: Optimism and pessimism: definitions

Panel A presents a graphical representation of the definition of the optimist and pessimist dummies used in the main body of the paper, based on the time t expectations of individual i ($E_t^i[\Delta FS_{t+1}^i]$) and on his/her time $t+1$ realizations (ΔFS_{t+1}^i). Panels B and C show alternative definitions of the optimist and pessimist dummies.

Panel A:	Realization at t+1		
Expectation at t	Better off	Same	Worse off
Better off	—	Optimist	Optimist
Same	Pessimist	—	Optimist
Worse off	Pessimist	Pessimist	—
Panel B:	**Realization at t+1**		
Expectation at t	Better off	Same	Worse off
Better off	—	Optimist2	Optimist2
Same	—	—	—
Worse off	Pessimist2	Pessimist2	—
Panel C:	**Realization at t+1**		
Expectation at t	Better off	Same	Worse off
Better off	—	—	Optimist3
Same	—	—	—
Worse off	Pessimist3	—	—

Table A9: Optimism and pessimism: regressions with alternative definitions

This table reports the estimated coefficients of fixed effects Logit regressions that explain optimism/pessimism using the changes experienced in financial situation. The unit of observation is individual/year. The regressions differ in the definition of optimism and pessimism that is used for the dependent variable, described in Table A8. All the regressions include individual and year fixed effects.

	(1)	(2)	(3)	(4)	(5)	(6)
	$\underline{\text{Optimist}_{it}}$	$\underline{\text{Pessimist}_{it}}$	$\underline{\text{Opt2}_{it}}$	$\underline{\text{Pess2}_{it}}$	$\underline{\text{Opt3}_{it}}$	$\underline{\text{Pess3}_{it}}$
Better off$_{it}$	0.13***	-0.10***	0.56***	-0.12**	0.20***	-0.27***
	(5.95)	(-3.96)	(19.95)	(-2.36)	(4.17)	(-3.28)
Worse off$_{it}$	0.09***	0.05**	0.68***	0.83**	0.43***	0.54***
	(4.24)	(1.98)	(23.22)	(21.70)	(9.96)	(7.09)
Income group 2	0.13***	-0.08*	0.10***	-0.17**	0.13**	-0.29***
	(4.49)	(-2.29)	(2.70)	(-3.02)	(2.35)	(-2.68)
Income group 3	0.19***	-0.04	0.17***	-0.07	0.23***	-0.20
	(5.59)	(-0.91)	(3.78)	(-1.05)	(3.35)	(-1.60)
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Ind. FE	Yes	Yes	Yes	Yes	Yes	Yes
Number of obs.	79,204	70,941	56,298	35,652	29,858	12,859
Estimation	FE Logit	FE Logit	FE Logit	FE Logit	FE Logit	FE Logit

Table A10: Cohort effects

Columns (1) and (2) report the estimated coefficients of FE logit regressions of optimism and pessimism on changes in financial situation and on the cohort variable. Columns (3) and (4) report the estimated coefficients of FE logit regressions of optimism and pessimism on the reported reasons for change in financial situation and on the cohort variable. The unit of observation is individual/year. In columns (5) and (6) we regress the average of the optimist and pessimist dummy variables for each individual on the average of their cohort variable. The unit of observation is the individual.

	(1)	(2)	(3)	(4)	(5)	(6)
	Opt.$_{it}$	Pess.$_{it}$	Opt.$_{it}$	Pess.$_{it}$	Avg. Opt.$_{i}$	Avg. Pess.$_{i}$
Better off$_{it}$	0.13***	-0.10***				
	(5.97)	(-3.96)				
Worse off$_{it}$	0.09***	0.05**				
	(4.23)	(1.99)				
Earnings ↑			0.14***	-0.12***		
			(4.57)	(-3.64)		
Expenditure ↓			0.12**	-0.07		
			(2.37)	(-1.46)		
Earnings ↓			0.34***	-0.31***		
			(9.23)	(-6.03)		
Expenditure ↑			-0.10***	0.25***		
			(-3.50)	(6.96)		
Cohort variable$_{it}$	-1.34**	0.18	-2.67***	1.12		
	(-2.34)	(0.26)	(-3.19)	(1.18)		
Avg. cohort var$_{i}$					-0.61***	0.17***
					(-12.79)	(3.81)
Income group 2	0.13***	-0.08**	0.10***	-0.09**		
	(4.34)	(-2.27)	(2.98)	(-2.23)		
Income group 3	0.18***	-0.04	0.13***	-0.03		
	(5.29)	(-0.87)	(3.41)	(-0.71)		
Year FE	Yes	Yes	Yes	Yes		
Ind. FE	Yes	Yes	Yes	Yes		
Number of obs.	79,204	70,941	62,618	54,935	13,369	13,369
Estimation	FE Logit	FE Logit	FE Logit	FE Logit	Tobit	Tobit

Table A11: Life events: bad health

The new bad health takes the value of one for observations in which individuals reported very poor or poor health, while having reported fair, good or very good health the previous year. For each of the two groups, the table reports the number of observations, average age, proportion of individuals who report a given change in their finances (Earnings/Expenditures ↑/↓). The final four rows show, for individuals who reported a given change in their year t finances, the proportion who had anticipated the change in year $t-1$. The table reports the p-value of a test of equality of means.

	Newly bad health		p-value of
	Yes	No	difference
Number of observations	5,740	120,568	
Age (years)	56.6	50.1	
Earnings ↑	0.08	0.14	0.00
Expenditures ↓	0.03	0.04	0.04
Earnings ↓	0.09	0.06	0.00
Expenditures ↑	0.17	0.13	0.00
Earnings ↑, better off anticipated	0.51	0.52	0.66
Expenditures ↓, better off anticipated	0.37	0.44	0.07
Earnings ↓, worse off anticipated	0.16	0.22	0.01
Expenditures ↑, worse off anticipated	0.30	0.26	0.03