Evidence on expectations of household finances*

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July 5, 2019

Abstract

We use a long panel with information on expected and realized changes in individual finances to study the process of expectation formation and expectation errors, controlling for individual fixed effects. We find that, following improvements in financial situation, individuals tend to form extrapolative expectations and are excessively optimistic about the future. However, following a deterioration in financial situation, there is an increase in the dispersion of forecasts: individuals increase both their subjective probability of a future deterioration (consistent with extrapolative behavior) and the probability of a future improvement (mean-reversion). On average the second effect dominates after an earnings decline, with individuals expecting too much mean-reversion. This optimism is reflected in lower savings and higher borrowing, with significant negative implications for future household finances.

*We would like to thank Andrei Shleifer and Rui Silva for comments.

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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 individual saving and borrowing decisions? We provide evidence on the process of expectation formation of household finances using almost two decades of panel data.

Our data, from the United Kingdom, has information, for each year and individual, on realized changes in finances and on expectations of changes for the year ahead. The 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. This allows us to measure expectation errors over time, and to control for unobserved individual heterogeneity, including in the interpretation of the survey questions (Manski (2017)). Another advantage of our data is that it includes detailed information on many other individual characteristics and decisions, including on saving and borrowing, that we relate to expectations.

There is a growing literature that studies the importance of personal experiences for expectations formation (e.g. Malmendier and Nagel (2011)). With this in mind, we first study how realized changes in financial situation shape future expectations. When doing so, we distinguish between the main reasons that led to the change in household finances: an increase/decrease in earnings or higher/lower expenditures. Consistent with the literature that finds evidence of extrapolative expectations in financial markets (e.g. Greenwood and Shleifer (2014), Gennaioli et al. (2015) and Bordalo et al. (2017)), we show that there is a strong positive relationship between current changes in financial situation and the expectations of future changes.

We then study whether the expectations depend on the nature of the realized changes in financial situation. We find that, following an improvement, the expectation of a further future improvement increases, again consistent with extrapolative expectations. Furthermore, this result holds both when the current improvement is due to an increase in earnings, or due to lower expenditures. However, following a deterioration in financial situation, the patterns are different. We find increases in both the subjective probability of being worse off again in the future (consistent with extrapolative expectations), and in the subjective probability of being better off in the future (mean-reversion).[1] Thus, following negative events, there is a

[1] With a compensating decline in the number of those who expect no future changes in their financial situation.

significant increase in the dispersion of individual expectations, regardless of the reason for the change in financial situation, i.e. whether it was due to a decrease in earnings or an increase in expenditures. This increase in the second moment of expectations following negative events is, as far as we know, a novel result.

We try to learn more about the sources of the increased dispersion. The fixed effects that we include in our regressions control for the average expectation, i.e. whether some individuals are on average more likely to expect to be better off or worse off. However, they do not control for whether some individuals are on average more likely to expect to be better off or worse off following negative changes in financial situation. Therefore, the increased dispersion could be due to: (i) *different* individuals changing their expectations in different ways following a negative change in financial situation; or (ii) the *same* individuals sometimes responding in one direction and sometimes in the other. We find that most of the action is in the second channel, i.e. the heterogeneity in responses is mostly occurring from an increase in the dispersion of the forecasts of the same individuals.

With these results in mind, we turn our attention to the expectation errors. Since we observe the same individuals over many years, and both their expectations and ex-post realizations, we can use year t expectations and year $t+1$ realizations to construct, for each year and each individual, an ex-post expectation error, and measures of optimism and pessimism. An optimistic observation is that of an individual who expects in year t a change in year $t+1$ financial situation that is better than his/her year $t+1$ realized change. On the other hand, a pessimistic observation is that of an individual who expects in year t a change in year $t+1$ financial situation that is worse than his/her year $t+1$ realized change. Therefore, we construct optimism and pessimism using expectation errors, and not raw expectations. An individual who in year t expects to be better off in year $t+1$, and who is indeed better off in year $t+1$, is not classified as being optimistic.

Obviously, the expectation errors could simply reflect the ex-post realization of ex-ante unpredictable shocks. However, we find that, following improvements in financial situation, individuals extrapolate excessively from these positive experiences. More precisely, they are more likely to become optimistic, and less likely to become pessimistic. Furthermore, this result holds regardless of whether the change in financial situation was the result of higher earnings or of lower expenditures.

As previously explained, the pattern for expectations following negative changes in financial situation is more complex, with increases in both extrapolation and mean-reversion. Our analysis of the corresponding expectation errors shows that the degrees of extrapolation and of mean-reversion are both excessive relative to the future realizations. When individuals extrapolate from their current experience, they expect more persistence than there actually is in the data. Similarly, when they expect mean-reversion, they are too optimistic: their financial situation is not as likely to recover as they anticipate. On average, the first effect dominates when the deterioration in finances is due to higher expenditures, while the second effect dominates following a decrease in earnings. In spite of their expectation of mean reversion, in the year after an earnings decline, only 24% of the individuals report being financially better off, while 37% state that their financial situation has not changed, and 39% are in fact even worse off again.

The expectation of too much mean reversion following a decline in earnings is particularly important because at these times household finances tend to be stretched. If households are too optimistic about the future, they may not cut back on their consumption, and may instead reduce their savings and/or increase their borrowing. This could prolong the impact of the initial event and thus have significant negative implications for future household welfare. We explore this possibility using the information on income, savings and debt in the our data. We first document that individuals who experience an earnings decline are more likely to cut back on savings and/or take on an extra loan. This pattern is consistent with optimal consumption smoothing, in response to a negative event. But interestingly we also show that, in our sample, the reduction in savings and the increase in borrowing are larger for the more optimistic individuals, i.e. those who expect a reversal of their fortune in the following year, but for whom this reversal eventually fails to materialize. We further document that these individuals are indeed more likely to be financially worse-off in the future, and that this result remains after controlling for the persistence of the underlying shock.

A final contribution of our paper is to link our results on the experienced change in financial situation and optimism/pessimism for the year ahead to the literature that studies the importance of accumulated personal lifetime experiences in shaping individual beliefs (early contributions include Vissing-Jorgensen (2003), Greenwood and Nagel (2009), Malmendier and

Nagel (2011).[2] We follow Malmendier and Nagel (2011) in constructing a cohort variable that measures past large negative experiences (economic recessions and wars). We find that individuals who have experienced a greater incidence of such events tend to be more pessimist (less optimist) about their future finances. In other words, their subjective probability distribution is shifted towards pessimism. These results, for individual outcomes, are consistent with the previous literature that has focused on expectations of aggregate variables (e.g. expected returns or inflation). They are about the (subjective) estimates of the unconditional distribution of outcomes, whereas the previous results on optimism for the year ahead are about the (subjective) estimates of the serial correlation of the shocks.

Our paper is related to the growing literature on financial expectations (e.g. Greenwood and Shleifer (2014)) and, in particular, to the previously mentioned literatures on role of personal experiences in shaping expectations and household decisions (see also the contributions of Kaustia and Knupfer (2008); Kuhnen (2015); Rozsypal and Schlafmann (2017); Malmendier and Shen (2018); Das et al. (2018)) and on extrapolative expectations (Gennaioli et al. (2015) and Bordalo et al. (2017)). Most of these papers focus on expectations of aggregate variables, such as stock returns or inflation.[3] It is also related to the literature on motivated beliefs and optimal expectations (Bénabou and Tirole (2002), Bénabou and Tirole (2011), Brunnermeier and Parker (2005)). Since our paper studies expectations of changes in household finances, it contributes to the literature on individual sentiment and financial decisions (Souleles (2004); Brown and Taylor (2006); Puri and Robinson (2007)).[4]

The paper is organized as follows. In Section 2 we describe the data, and the realized changes in financial situation. In Section 3 we focus on expectations, and how they are affected by the experienced changes in financial situation. In Section 4 we construct the optimism and pessimism measures, provide summary statistics, and use regression analysis to relate the experienced changes in financial situation to optimism/pessimism. In Section 5 we provide evidence on individual saving and borrowing responses to earnings declines. The final section concludes.

[2] See Malmendier et al. (2011), Kuchler and Zafar (2018), Malmendier et al. (2018).

[3] Kaustia and Knupfer (2008) also consider expectations of own investment ability.

[4] Our paper is also related to the household finance literature, see Campbell (2006), Guiso and Sodini (2013), and Guiso and Jappelli (1997) for overviews.

2 The data

2.1 Data sources

Our main data source is the British Household Panel Survey (BHPS), which is a representative panel of U.K. households (University of Essex, 2010). The sample starts in 1991 and there is annual data available until (and including) 2008. After 2008 the BHPS became part of a new survey entitled Understanding Society, but at this time several of the questions that are crucial for our study were dropped from the survey, so that we focus on the data contained in waves 1 through 18. 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 panel nature of the data allows us to control for individual fixed effects in the regressions.

Each year individuals are asked a wide range of questions about their circumstances including income, demographics, financial situation, and expectations about their future financial situation, among others. The first wave contains information for around 5,500 households. In subsequent years more households were added to the survey, bringing the total number to around 9,000. We use the answers of the household head. Not all households appear in each of the eighteen waves, so that we use an unbalanced panel. The data lacks detailed yearly information on household wealth. However, it is fairly rich in terms of income, both labor and asset income (interest, dividends, etc.), and other demographic information. We use retail price indices from the U.K. Office of National Statistics to construct real variables.

2.2 Financial situation and reasons for change

The data has information on significant changes in household finances. In each year, individuals are asked whether they are financially better off, about the same, or worse off than they were one year ago. The exact question is: "Would you say that you yourself are better off or worse off financially than you were a year ago?" This question, and the possible answers, are similar to the question in the University of Michigan Consumer Survey, that asks respondents to compare their current financial situation with that of a year ago.

The answers naturally represent changes in financial situation as perceived by the individuals themselves. An advantage is that they capture the state of the world as evaluated by the agents

when they are making their consumption/saving decisions. We will also provide evidence that the individual answers are highly correlated with objective measures of changes in financial situation (e.g. realized changes in earnings). In Panel A of Table 1 we report the number and 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.

[Table 1 here]

Our data allows us to quantify the importance of the different channels that drive changes in household finances. From 1993 onward, those participants who responded that they were better off or worse off than in the previous year were also asked to provide the main reason for the change. The exact question is "Why is that? (financially better or worse off)." In Panel B.1 of Table 1 we tabulate the answers to the reason for being (significantly) better off question. Unsurprisingly, the main reason is higher earnings (54%). The second highest category is lower expenditures, with a response rate of 15%. In Panel B.2 we tabulate the answers for those individuals who report being significantly worse off than a year ago. The main reason is higher expenditures (52%), a reason that is given twice as often as lower earnings (24%).[5]

In order to gain some initial insights into life-cycle effects, in columns two to five of Panel A of Table 2 we report 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 above 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.

[Table 2 here]

In Panel B we report the reasons given for better off, as a fraction of the total of better off. Early in life, the main reason why individuals are better off is higher earnings. During this part of the life-cycle earnings profiles are upward sloping, and this is naturally reflected

[5]The number of observations for the reasons why individuals are better off and worse off in Panel A add to 58,585 whereas in Panel B they add to 51,838. The main reason is that, as previously mentioned, the question on "why the change in financial situation" is only available from 1993 onwards.

in the answers given. As individuals age, and labor income profiles flatten, the proportion of those who report being better off declines, and so does the relevance of earnings increases as the reason for being better off. For the above 65 age group the main reason is higher benefits.

In Panel C we tabulate the worse off answers. Higher expenditures is the main reason for all age groups, and particularly so for those aged over 65. For those below retirement age, lower earnings is also an important reason why individuals are financially worse off, with a fraction of roughly 0.30.

In the last three columns of Table 2 we report the responses by income group. In each year $t-1$, we divide individuals in our data into three groups based on their household income. The low (high) income group refers to individuals in the bottom (top) one-third of the distribution of household income for that year. We then tabulate their answers one year after (in year t). Higher (lower) income individuals are more (less) likely to become significantly better off, an event which occurs with probability 0.30 (0.17). For those in the high income group, an increase in earnings is the main reason for better off. In contrast, among the low income group, increases in benefits are as important as increases in earnings (Panel B). Higher expenditures is a more important reason for being worse off for the low income group, with a proportion of answers equal to 0.64, but it still is the most important category for the high income group, with 0.46 (Panel C).

2.3 Cross validation and sample attrition

Our dataset includes information on earnings, which we use to gain some insights on the quantitative magnitudes behind the qualitative answers. More precisely, we have computed the average percentage change in the income of individuals who report a change in financial situation due to earnings. Those who report being better off (worse off) due to an earnings increase (decrease) had an average 8.7% (-7.4%) change in income during the year.[6] The BHPS also contains information on income in the month prior to the interview, which could arguably provide a better measure of the household's financial situation at the time that the survey was carried out. In fact, those who state that they are better off (worse off) due to an earnings increase (decrease) report an average 12.7% (-13.8%) change in their last-month's income, rela-

[6]Those who report no significant change in financial situation had an average earnings increase of 2.4%.

tive to the one obtained thirteen months prior. These numbers speak to the importance of the self-reported changes in financial situation as reflecting important events for household finances.

The BHPS sample was chosen to be representative of the overall population. Nevertheless, one potential concern is that sample attrition may not be random. For example, those individuals who become financially worse off may be more or less likely to drop out from the sample. We test this hypothesis by calculating the probability that an individual is no longer in the data set in year t, conditional on being there in year $t-1$. Across the full sample this probability is 8.5%. For all four of our major categories the attrition rates are very similar. For those who report being significantly better off due to an increase in earnings (decrease in expenditures), the corresponding number is 8.4% (8.6%). For those who report being significantly worse off due to an increase in expenditures (decrease in earnings), the attrition rate is 8.2% (8.1%). This shows that selection due to attrition is not a particular concern for our analysis.

3 Expectations of future changes in financial situation

In this section, we study individual expectations, and how they are influenced by the experienced changes in financial situation.

3.1 Variables construction and summary statistics

In each year, individuals are asked about their expectations of their future (one year ahead) 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."[7]

Table 3 reports summary statistics for these expectations. The second column reports the unconditional distribution of expectations in our sample. The majority of individuals (almost two thirds) expect their financial situation to remain unchanged. 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 distribution of realized changes in financial situation reported in Panel A of Table 1, they suggest that on average individuals are remarkably good at anticipating

[7]Individuals are not asked to report on the reason for the expectation (earnings, expenditure, etc.).

improvements in financial situation: the average expectation and the average realization are both 24%. On the other hand, individuals appear to under-estimate the probability of becoming worse-off: 11% in expectation versus 24% in realization. This could be the result of our sample including a significant realization of unexpected negative events, but is also consistent with theories of over-confidence and motivated beliefs.

[Table 3 here]

The remaining columns of Table 3 report expectations by age and income. There is some similarity in the patterns to those for the realizations shown in Table 2: the proportion of those who expect to be better off declines with age, and it is larger for higher income groups. The proportion of those who expect to be worse off is relatively more stable over the life-cycle, although there is an economically significant increase from 0.08 for the 20-34 age group, to 0.16 for those over 65 years of age.

There is a similar expectations question in the University of Michigan Consumer Survey, that asks respondents to report on their expected change in financial situation in a year time. But there is a fundamental difference between the Michigan Consumer Survey and the BHPS data that we use. The former is a rotating panel, whereas the latter is a panel. This means that we can include individual fixed effects in the regressions, that control, among other, for the fact that different respondents may interpret verbal questions in a different way (Manski (2017)).

In order to investigate the determinants of expectations of changes in financial situation, we use the time t expectations of individual i, denoted $E_t^i[\Delta FS_{t+1}^i]$,[8] to construct three dummy variables. The first is equal to one if the individual expects an improvement in her t+1 financial situation, and zero otherwise:

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

[8] Where

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

The second is equal to one if the expectation is of an unchanged financial situation, and zero otherwise:

$$\text{Expect no change}_{it} = \begin{cases} 1 & \text{if } E_t^i[\Delta FS_{t+1}^i] = 0, \\ 0 & \text{Otherwise.} \end{cases} \tag{2}$$

Finally. the third dummy variable takes a value of one when individuals expect their financial situation to deteriorate, and zero otherwise:

$$\text{Expect deterioration}_{it} = \begin{cases} 1 & \text{if } E_t^i[\Delta FS_{t+1}^i] = -1, \\ 0 & \text{Otherwise.} \end{cases} \tag{3}$$

3.2 Econometric approach

For our econometric analysis, we use a standard binary choice model. The outcome variables y_{it} are the three dummy variables that measure expectations. We 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 in general 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.

The fixed effects logit estimator of the regression parameters (β) gives us the effect of each element of $\mathbf{x}_i$ on the log-odds ratio:

$$Ln\left[\frac{Prob(y_{it} = 1|\mathbf{x}_{it} = x^{''})}{Prob(y_{it} = 0|\mathbf{x}_{it} = x^{''})} \Big/ \frac{Prob(y_{it} = 1|\mathbf{x}_{it} = x')}{Prob(y_{it} = 0|\mathbf{x}_{it} = x^{'})}\right] = \beta(x'' - x^{'}) \tag{5}$$

We are mainly interested in evaluating the extent to which the changes in financial situation that individuals experience affect their expectations going forward. But we also investigate the extent to which other variables (such as income) are related to these expectations. Because

we control for individual fixed effects, the regressions capture variation over time for each individual. We also control throughout for year fixed effects. Finally, even though we focus on the conditional fixed effects logit model, the results are unchanged when we estimate a linear probability model.

3.3 Regression results

We use the fixed effect logit regressions to study how expectations of future changes in financial situation are affected by current changes in financial situation. The estimation results are shown in Table 4. In columns (1) and (2) we regress the financial expectations dummy variables on dummy variables for whether the individual has currently experienced an improvement or a deterioration in her financial situation. In the remaining columns, we further decompose these into the reasons for the change in financial situation. For simplicity, we restrict the analysis to the two main reasons for each: change in earnings (up or down) and changes in expenditures (also up or down), as described in Table 1.

[Table 4 here]

The estimated 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. On other hand, the improvements in financial situation do not have an impact on the expectations of a future deterioration, as shown by the estimated zero coefficient for the better off dummy in column (2).[9] These results show that there is an increase in the expectation of a future improvement in financial situation following a current improvement, that is not driven by a parallel shift of the subjective probability distribution of future changes, but rather by an increase of the mass in the right tail.

The next two rows of Table 4 show that the effects of an improvement in financial situation on expectations are similar, whether the improvement was due to higher earnings or to lower expenditures. The values of the estimated coefficients are also economically important. The log-odds ratios for the increase in the subjective probability of being better off next year are

[9] Naturally, this is explained by a reduction in the subjective probability of no future change in financial situation, as discussed below.

0.65 and 0.55 for an earnings increase and an expenditures decline, respectively (column (3)). As before, the improvements in financial situation do not have an impact on the expectations of a future deterioration (column (4)). Finally, the results in column (5) show that the increase in the expectations of future improvements are offset by declines in the expectations of an unchanged financial situation. We say offset since naturally the dummies for the expectations of being better off, worse off, and the same add up to one.

Interestingly, the expectation responses to deteriorations in financial situation reflect a different pattern. Following either lower earnings or higher expenditures at time t, there are increases in both the number of individuals who expect to be better off at time t+1 (column (3)), and in the number of individuals who expect to be worse off at time t+1 (column (4)). These increases are compensated by a decline in the number of those who expect no future changes in their financial situation (column (5)). Thus, following these negative events, there is a significant increase in the dispersion of individual expectations.

Overall, our results are largely consistent with the previous literature that finds evidence of extrapolative expectations in financial variables (e.g. Greenwood and Shleifer (2014), Gennaioli et al. (2015) and Bordalo et al. (2017)). In fact, when we regress expectations ($E_t^i[\Delta FS_{t+1}^i]$) on current changes (ΔFS_t^i) in a univariate setting, controlling for individual fixed effects (f^i):

$$E_t^i[\Delta FS_{t+1}^i] = \alpha + \beta \Delta FS_t^i + f^i + \epsilon_t^i, \tag{6}$$

we estimate a coefficient β equal to 0.068 with a t-statistic of 27.6. Recall that in this regression, the dependent variable is equal to 1 when the individual expects to be better off in the following year, equal to zero when she expects her financial situation to remain unchanged, and equal to -1 when she expects to be worse off in the following year. The independent variable follows the same structure.[10]

The positive statistically significant β coefficient shows that the previous evidence for extrapolative expectations also holds in the context of household finances. We have, however, uncovered a more complex pattern. Following positive changes in financial situation, there is a clear pattern of extrapolative expectations. But following negative changes in financial situation, there is both an increase in the subjective probability of being worse off again in the future (also consistent with extrapolative expectations), and an increase in the subjective prob-

[10]The results for a multinomial logit model lead to the same conclusions

ability of being better off in the future (mean reversion). This increase in the second moment of expectations following negative events is, as far as we know, a novel result.

This mean-reversion pattern in expectations could arise from motivated beliefs. Agents want to believe that in the future they will be better off as this increases their current utility. So one possible explanation for the results is that some individuals are being extrapolative, hence the positive coefficient on the worse off dummy in column (2), while the others expect mean-reversion due to motivated beliefs. The positive expectation increases their current utility, hence the positive coefficient on the better off dummy in column (1).[11]. We investigate this possibility in the next section.

The magnitudes of the estimated coefficients in Table 4 will be important for understanding the patterns of the expectation errors analyzed in the next section. Following an earnings decline, the estimated log odds ratio is 1.08 in the expect better regression and 0.43 in the expect worse regression. On the other hand, following higher expenditures, the estimated log odds ratio is 0.48 in the expect better regression and 1.21 in the expect worse regression. Therefore, even though there is an increase in the dispersion of individual expectations following both a decline in earnings and an increase in expenditures, the decline in earnings has a larger impact on individuals' expectations of being better off whereas the increase in expenditures has a larger impact on individuals' expectations of being worse off. We will come back to these results in the next section.

Most of the estimated coefficients on the dummies that control for the income group of the individual are not statistically significant, with a perhaps surprising exception. We estimate a negative and statistically coefficient in the expect better regression for individuals in the highest income group. It is important to note, however, that in these regressions we are also controlling for individual fixed effects, so that the income group variables capture variation over time in income group for the same individual.

[11]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 herself to save more today

3.4 Heterogeneity in expectations after negative changes

We have documented that following a negative change, there are increases in the expectations of both positive and negative changes in future financial situation. This could be due to: (i) households in general being more prone to adjust their expectations in either direction following a negative change in financial situation, or (ii) some households being significantly more likely to always expect to be better off, while others being significantly more likely to always expect to be worse off, again following a negative change in financial situation. The previous regressions included individual fixed effects that control for the average expectation, i.e. whether some individuals are on average more likely to expect to be better off or worse off, however they do not control for whether some individuals are on average more more likely to expect to be better off or worse off *following* a deterioration in household finances.

In order to address this question, we first compute, for individuals in our sample who have been financially worse off in at least one year, the proportions of those who always expected to be financially better off or worse off in the following year. Therefore, the unit of observation of analysis is the individual, and the sample is restricted to those individuals who faced at least one worse off event. The results in the second column of of Table 5 show that, among those individuals who have been worse off in at least one year, only 9% (17%) *always* expected to be financially worse off (better off) in the following year. These proportions are halved (to 4% and 10%, respectively), when we restrict the sample to individuals who were financially worse off at least twice during the sample, so that they could actually be giving different expectation answers each time the worse off event took place. By contrast 86% of the individuals who were worse off at least twice during our sample, had some variation in the expectations about their future finances following the negative events. These results show that the heterogeneity in responses is not primarily an individual fixed effect, but an increase in the dispersion of forecasts by the same individuals.

These results cast doubt on the hypothesis that the divergence in expectations following negative events is the result of some agents being extrapolative and others expecting mean-reversion due to motivated beliefs. If that were the case we would expect the same individuals to revise the expectations in the same manner after every negative event. Of course this does not rule out the possibility that the same agents sometimes are extrapolative and at other times are more influenced by motivated beliefs.

[Table 5 here]

For the sample of individuals who were worse off at least twice during the sample, we calculate their average age, the average of the income group to which they belong, and the proportion of males. The results are shown in the last three columns of Table 5. Individuals who always expect to be worse off at t+1 off following a worse off event at t are on average older, they tend to have lower income, and they are disproportionately male. In contrast, those who always expect to be better off are on average younger and have higher income. Thus, older individuals are more likely to expect negative events to persist and younger individuals to expect them to revert. Naturally, these are expectations, that do not tell us whether the individuals were correct or not in their expectations.

4 Optimism and pessimism

In the previous section, we have studied how expectations respond to changes in financial situation. We now exploit the panel dimension of our data further, to study the forecast errors.

4.1 Variables construction

In Table 6 we compare the expectations of each individual i at time t of the change in her financial situation at time $t+1$ ($E_t^i[\Delta FS_{t+1}^i]$), with the subsequent realization, i.e. the actual change in her financial situation at time $t+1$ (ΔFS_{t+1}^i). For example, in the first row, we see that 46% of the individuals who at time t expected to be financially better off at time $t+1$ had their expectations confirmed by the future realization. On the other hand, also at $t+1$, 35% of them were in the same financial situation, and 19% were actually worse off.

[Table 6 here]

A first conclusion from Table 6 is that agents tend to have correct expectations, as demonstrated by the diagonal values being the highest for each row: of those who expect to be financially about the same the following year, 63% get it right; of those who expect to be financially worse off, 53% have correct expectations. The second important conclusion from the

table is that, despite the previous result, there is also a significant number of individuals who fail to correctly forecast the future changes. Naturally, this could be the result of incorrect expectations or of realizations of unforecastable shocks. We explore this further in the remainder of this section.

We construct individual specific measures of optimism and pessimism, that require that we observe the same individual in each two consecutive years. An individual i is at time t optimistic, if her expectation of the time $t+1$ change in financial situation ($E_t^i[\Delta FS_{t+1}^i]$) is better than the realized time $t+1$ change in financial situation (ΔFS_{t+1}^i). This may happen because: (i) the individual expected to be better off and the realized change is the same or worse off; or (ii) the individual expected no change in financial situation but the realized $t+1$ change is worse off. We construct a dummy variable (optimist) that takes the value of one for individual/year observations in which the individual is optimistic and zero otherwise:

$$\text{Optimist}_{it} = \begin{cases} 1 & \text{if } E_t^i[\Delta FS_{t+1}^i] > \Delta FS_{t+1}^i, \\ 0 & \text{Otherwise.} \end{cases} \tag{7}$$

Similarly, an individual i is at time t pessimistic if her expectation of her time $t+1$ financial situation is worse than the time $t+1$ realized change. This may happen because: (i) the individual expected to be worse off and the realized change is the same or better off; or (ii) the individual expected no change in financial situation, but the realized $t+1$ change is better off. We construct a dummy variable (pessimist) that takes the value of one for individual/year observations in which the individual is pessimistic and zero otherwise:

$$\text{Pessimist}_{it} = \begin{cases} 1 & \text{if } E_t^i[\Delta FS_{t+1}^i] < \Delta FS_{t+1}^i, \\ 0 & \text{Otherwise.} \end{cases} \tag{8}$$

It is important to note that our optimist and pessimist variables are based on the realized forecasting error, and not simply on the expectation. If an individual i at time t expected to be better off at time $t+1$, and if when time $t+1$ arrives she is indeed better off, then the individual had the correct time t expectations (she was not optimistic).

4.2 Summary statistics

The second column of Table 7 reports the averages of the optimist and pessimist dummies, and the residual neither category (corresponding to correct expectations) in the last row. There are more individual/year observations for optimist than for pessimist, 0.26 and 0.17 of the total number of observations, respectively. For roughly 57% of the observations individuals correctly anticipate the change in their financial situation.

[Table 7 here]

The optimist and pessimist variables measure the fact that individuals did not have perfect foresight a time t. An unforecastable improvement (deterioration) in the time $t+1$ financial situation of individual i implies the time t pessimist (optimist) dummy will take the value of one.

The remaining columns of Table 7 report the average values for the optimist and pessimist dummies by age and income. There is a very significant age decline 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 compensated by an increase in the proportion of individuals who had the correct expectations. On the other hand, the proportions of pessimist observations are relatively stable over the life-cycle. Finally, the last three columns of Table 7 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 distribution of labor income, one year prior to the time $t+1$ realizations that we use to construct the expectation errors.

Table 8 shows summary statistics for several variables of interest, for individual/year observations corresponding to optimism, pessimism, and neither. The average age is 46 years for observations for which the optimist dummy is equal to one, compared to 49 years for observations for which the pessimist dummy is equal to one. Positive values for the optimist dummy are associated with a higher average number of children than positive values for the pessimist dummy, although this could be related to the differences in average age across the two groups.

[Table 8 here]

The last three rows of Table 8 report the proportion of individuals who are better off, no change in financial situation, and worse off at t, conditional on the optimist and pessimist dummies taking the value of one at time t. For those observations for which individuals are optimist at time t, a larger proportion of them have experienced a deterioration than an improvement in financial situation (0.33 compared to 0.24, respectively). On the other hand, for those observations for which individuals are pessimist at time t, a smaller proportion of them have experienced a deterioration than an improvement in financial situation (0.22 compared to 0.32, respectively). This suggests that individuals may incorrectly expect some form of mean reversion in changes in financial situation. However, these unconditional means might reflect both differences across individuals and changes over time for the same individual. Therefore we turn our attention to regression analysis.

4.3 Experienced financial situation and optimism/pessimism

For a more comprehensive analysis of the determinants of optimism and pessimism, we estimate logit regressions similar to the ones in previous section, but where the left-hand side variables are now the optimist and pessimist dummies (defined in (7) and (8), respectively), instead of the expectation dummies. As before, we control for both individual fixed effects and year fixed effects. An unexpected negative aggregate economic shock in a given year $t+1$ (e.g. a recession) will naturally lead to a large proportion of individuals being classified as optimist at time t. This, and other aggregate time series variation, are captured by the year fixed effects.

Table 9 shows the regression results. The variation in the number of observations in columns (1) through (4) is explained by the fact that the fixed effects Logit estimator drops those observations for which there is no variation over time for the same individual (instead of estimating the fixed effects) and that we only have information for the reason in changes in financial situation (needed in columns (3) and (4)) from 1993 onward. In parenthesis, below each of the estimated coefficients, we report t-statistics.

[Table 9 here]

4.3.1 Positive versus negative changes in financial situation

Column (1) of Table 9 shows the results for the regression with the optimist variable as dependent variable (pessimist in column (2)), on the dummy variables for better off and worse off. The first row of (1) shows that individuals who at time t experienced an improvement in their financial situation (better off equal to one) are more likely to, at this time, be optimistic about future changes in their financial situation.

In the previous section (Table 4) we documented that individuals tend to expect improvements in financial situation to be persistent, i.e. they are more likely to expect to be better off following improvements in their financial situation. The statistically significant positive coefficient on the better off dummy in the first regression in Table 9, further shows that individuals extrapolate more than they should, and thus tend to be irrationally optimistic. The estimated coefficient is also economically meaningful: log-odds ratio of 0.13. This increased optimism is also matched by a lower probability of pessimism, as shown by the statistically significant -0.10 coefficient in the second regression.[12]

The fourth row shows the estimated coefficients for the worse off dummy. The statistically significant positive coefficient in column (2) shows that individuals who at time t experience a deterioration in their financial situation are more likely to be pessimistic about future changes. In the previous section, in Table 4, we found that these individuals increase their probability of a (repeated) negative financial change. This coefficient in Table 9 reveals that they are over-extrapolating from their current experience, i.e. the future is (on average) not as bad as they expect it to be.[13]

So far, we have established that the previously documented extrapolative expectations behavior is excessive, and that this is the case both after positive and negative changes in financial situation. However, in the previous section we had also documented that, following deteriorations in financial situation, individuals are also more likely to expect mean-reversion, i.e. an

[12] In the previous section, we concluded that the change in expectations following an improvement in financial situation was not a parallel shift of the subjective probability distribution of future changes, but rather an increase of the mass in the right tail. The coefficient on better off in the second regression shows that there is in fact a reduction in the objective probability of a deterioration in financial situation, and since that it is not anticipated by individuals, i.e. it is not reflected in their expectations, it leads to a decrease in pessimism.

[13] Note that, by definition, individuals who expect to be worse off can only be pessimist or correct in their expectations.

improvement in their finances in the following year. The statistically significant positive coefficient for the worse off dummy in the regression (1) shows that agents are being too optimistic when forming these expectations, i.e. they expect more mean-reversion than there is in the data.[14]

In summary, the results in the first two columns of Table 9 show that individuals tend to react too much, relative to the true data generating process, both when they expect persistence and when they expect mean-reversion. It is important to emphasize that these results are by no means implied by the ones 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 next year, but that this was either perfectly consistent with the actual persistence in the underlying variable, or that they would actually be under-estimating the true persistence. In the first case the estimated coefficient for the better off dummy in column (1) would be (statistically) zero, and in the second case it would be negative.

4.3.2 Disaggregating the reasons for the change in financial situation

In columns (3) and (4) of Table 9 we disaggregate the worse off and better off dummies into the underlying reasons for the change in financial situation. As before, we restrict the analysis to the two main reasons for each, changes in earnings (up or down) and in expenditures (also up or down).

Consistent with the estimated coefficients for the better off dummy in the previous regressions, we find that both higher earnings and lower expenditures 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 only marginally significant. The results in Table 4 had shown that expectations are extrapolative following both earnings increases and decreases in expenditures, so we again conclude that, following positive changes in their financial situation, individuals tend to extrapolate too much from their recent experiences.

The results for the lower earnings and higher expenditures variables are less straightforward. 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

[14]By definition, individuals who expect to be better off can only be optimist or correct in their expectations.

off due to lower earnings are more likely to be optimistic and less likely to be pessimistic going forward. To understand these results, we return to Table 4, which characterizes the changes in expectations following each of these events. In both cases, we observe increases in the subjective probability mass in the right and left tails of the distribution. However, following an increase in expenditures, the revision in the left tail (i.e. the probability of being worse off in the future) is larger (1.21 versus 0.48), whereas following a decrease in earnings the revision in the right tail (i.e. the probability of being better off in the future) is the one that is larger (1.08 versus 0.43).

Let us consider first the case of higher expenditures. Individuals respond with a large increase in the probability of a future deterioration in financial situation (1.21 in Table 4). We now find that the future negative realizations do not increase as much as expected, as shown by the higher probability of them being pessimistic (coefficient of 0.25 in row 6 of column (4)). Once again agents are extrapolating excessively from the current event. However, the coefficient in the optimist regression (column (3)) is negative (-0.11), showing that the increase in probability on the right tail of the distribution, which was smaller, is under-estimating the actual likelihood of mean-reversion.

In the case of lower earnings, the larger increase in subjective probability occurs on the right tail of the distribution, and again it is higher than what is justified by future realizations, as reflected in a higher probability of optimism (coefficient of 0.33 in row 5 of column (3)). On the other hand, the smaller increase in the subjective probability occurs on the left tail of the distribution and it is under-estimating the true change in probability leading a reduction in the probability of being pessimist (coefficient of -0.31 in the fifth row of column (4)).

4.3.3 The role of income and linear probability model

With the evidence in Rozsypal and Schlafmann (2017) and Das et al. (2018) in mind, we include in the regressions dummy variables for the income group that the individual belongs to. We define these groups using the distribution of year $t-1$ earnings (before the year t change in financial situation), so that there may be variation over time for the same individual, and we are able to estimate the coefficients in spite of the individual fixed effects. The base group are those in the bottom one third of the income distribution. We find that higher income individuals are more likely to be optimist. This effect is consistent with the results in Rozsypal and Schlafmann

(2017) and with the effects of the Earnings ↑ variable on the optimism. Individuals in higher income groups at time $t-1$ are more likely to have in the past (prior to $t-1$) experienced earnings increases. These may contribute to them being more optimistic going forward (similarly to the effect of an earnings increase at t). We have also estimated regressions where we control for log real time $t-1$ income (instead of using dummies for income group), and the conclusions are similar.

The final two columns of Table 9 report results for the linear probability model. Naturally the interpretation of the estimated coefficients is different (they are no longer log-odds ratios), but the estimated signs, economic and statistical significance are similar. For example, the estimated coefficient on the Earnings ↑ variable in the optimist equation is 0.026. This is an economically significant effect, equal to 10% of the unconditional mean of 0.26 of the optimist variable (shown in Table 7).

4.3.4 Robustness

A natural question is the extent to which the relation between the experienced changes in financial situation and optimism/pessimism that we have documented in our sample happened by chance. In order to address this question, we divide the sample period in two, in such a way that we have roughly the same number of observations in each subsample, and estimate the regressions separately in each of the subsamples. As before, in all of the regressions we control for individual and year fixed effects. Table 10 shows the results.

[Table 10 here]

As it can be seen from Table 10, the results are consistent across the two subsamples. In general, an improvement (deterioration) in financial situation is associated with an increase (decline) in optimism and a decline (increase) in pessimism. The exception is once again earnings declines: individuals are more likely to be optimistic, and less likely to be pessimistic, for the year ahead.

4.4 Cumulative experiences and cohort effects

The previous literature has documented the importance of accumulated personal experiences for learning and for the shaping of individual beliefs, and how the updating of beliefs that takes place may not necessarily be optimal/rational (e.g. Vissing-Jorgensen (2003); Greenwood and Nagel (2009); Malmendier et al. (2011); Malmendier and Nagel (2016, 2011); Kuchler and Zafar (2018); Malmendier et al. (2018)). In order to capture these lifetime experiences, some of which may have happened before the beginning of our sample period, we follow Malmendier and Nagel (2011) and construct a cohort variable that measures 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 more, experienced a large 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.

We do not observe individual experiences prior to the BHPS sample period, therefore the events that we consider are years with large negative aggregate economic conditions.[15] The specific list of 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.

The results are shown in Table 11. With the introduction of the cohort variable the significance of the estimated coefficients on the previous variables remains essentially unchanged, and the point estimates are almost exactly identical. Turning to the cohort variable itself, we see that it has a statistically significant effect on either optimism or pessimism, depending on whether we include year fixed effects among the explanatory variables of the regression. The results reveal that individuals who have experienced a series of past negative events are

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

"traumatized" by such events. The regressions with time fixed effects indicate that they are less (more) likely to overestimate the mass on the right (left) tail of the distribution. The regressions without year dummies show that individuals tend to overestimate the left tail of the distribution, i.e. they overweight the probability of future negative shocks. In both cases, relative to agents who have not experienced such events, or who have experienced them to a lower degree, the subjective probability distribution is shifted to the left.

[Table 11 here]

We would like to note that in all of our regressions we include individual fixed effects among the explanatory variables. Since the value of the cohort variable changes only slowly over time, 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 always statistically significant in the regressions shown in Table 11. In fact, we have estimated regressions excluding the individual fixed effects, and the statistical and economic significance of the cohort variable was increased.

4.5 Discussion of the results and implications

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, increase (decrease) pessimism (optimism), on average. On the other hand, and as previously discussed, the coefficients on the dummy for an earnings decrease reveal that individuals who face such an event are less (more) likely to become pessimistic (optimistic) for the following year. We interpret these, and provide further evidence in the next section, as individuals under-estimating the persistence of negative income shocks. In fact, as confirmed again in Table 11, for increases in expenditures we find the opposite: bad experiences increase the likelihood of being pessimistic for the following year. Therefore our results for the effects of an earnings decline are not about bad experiences in general. They are about how agents perceive the persistence of the underlying shocks.

The results for the cohort variable show that there is also a second channel at work: the cumulative realization of a series of bad experiences leads individuals to shift the unconditional

distribution of future shocks to the left (consistent with Malmendier and Nagel (2011, 2016) and Kuchler and Zafar (2018)). In summary, while the result for earnings declines is about the (subjective) estimates of the serial correlation of the shocks, the result for the cohort variable is about the (subjective) estimates of their unconditional distribution.

We have also found that individuals tend to under-estimate the persistence of earnings declines, or at least the persistence of the effects of the earnings declines in their financial situation. This finding is particularly important, since it shows individuals becoming optimistic at times when they also have lower financial resources (due to the decline in earnings). Putting it differently, individuals become optimistic after increases in earnings and declines in expenditures, but at these times they tend to have more financial resources (due to the events that triggered the improvement in financial situation). Being optimistic at times when earnings are lower may be more problematic, if individuals increase their debt in the expectation that their financial situation will improve faster than it actually will. We explore this in the next section.

5 Saving and borrowing responses to earnings declines

If individuals are mistakenly optimistic at times when they experience an earnings decline, and they do not cutback on consumption and increase borrowing instead, this may lead them into an even worse future financial situation. In this section we investigate this possibility.

5.1 Income dynamics

In a first step we evaluate the economic significance of the earnings decline event. We take advantage of the panel dimension of the data, and use the information on household income to calculate average income over time for individuals who in a given year report being in a worse financial situation due to an earnings decline. Year 0 is the time at which they report the earnings decline, years -1 and +1 refer to one year before and one year after this event, and so on. Figure 1 plots average earnings, conditional on whether individuals are optimistic or pessimistic at time 0.

The survey does capture an event that is economically meaningful: there is a decline in average real household income of between ten and fourteen percent in year 0 compared to year

-1, depending on whether the calculation is done for the time 0 pessimist or optimist group. The average levels of income between these two groups in each of the years from -2 to 0 are not significantly different from each other. Figure 1 also shows that, going forward, the average levels of year +1 and +2 income of the time 0 pessimistic group are larger than those of the time 0 optimistic group. This happens, to some extent, by construction: the individuals who are pessimist at time 0 are those who experienced at time 1 an unexpected improvement in their financial situation.

[Figure 1 here]

In order to better understand the mistakes that individuals make following an earnings decline, we have looked into the subsequent realizations of their financial situation. More precisely, we took all the individual/year observations for which there was an earnings decline, and calculated the distribution of year $t+1$ realizations. Roughly 0.24 of the observations are for better off, 0.37 for the same, and 0.39 for worse off. Therefore, in the year following an earnings decline, the majority of observations are for no change and even worse financial situation (first column of Table 12).

[Table 12 here]

The distribution of the expectations of individuals who at time t reported an earnings decline but who are optimistic is such that 0.61 expect to be better off and 0.39 expect to be the same at time $t+1$ (by construction there are no observations for expect to be worse off, the n/a entry in Table 12). Thus, following an earnings decline, optimistic individuals expect a significant degree of mean reversion in their finances, not present in the underlying distribution of the $t+1$ realizations. On the other hand, the distribution of the expectations of individuals who at time t reported an earnings decline but who are pessimistic, is such that 0.52 expect to be in the same situation and 0.48 expect to be worse off at time $t+1$ (by construction there are no observations for expect to be better off).

5.2 Savings responses

We turn our attention to the individuals' actions, and focus primarily on their saving decisions.

5.2.1 Variables

Our data has 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 in which the response is Yes and zero for those in which it is No.

Individuals in the survey are also asked about the amount of savings. The exact question is: "About how much on average do you personally manage to save a month?" We multiply the amount stated by 12 to obtain an annual figure 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. And to reduce the influence of outliers we winsorize the variable at the one percent level.

5.2.2 Results

In Figure 2 we plot the mean of the saver dummy variable for different years and for different groups of individuals. The structure is similar to the previous figure. We focus on those individuals who at time 0 reported that they were worse off due to an earnings decline, and calculate the means of the save dummy variable in this year, and in the years before and after the event. As before we distinguish between those individuals who are optimistic and those who are pessimistic at time 0.

[Figure 2 here]

Figure 2 shows that there is a large decline, of roughly one third, in the proportion of individuals who save in year 0 compared to year -1. Interestingly, this decline is larger for those individuals who are optimistic than for those who are pessimistic at time 0. The second panel of Table 13 reports the mean values for the save dummy variable for each of these groups, and the p-values for tests of the equality of means. The differences in the proportions of savers are not statistically different prior to year 0, but they become statistically significant at time 0 (and

in subsequent years). Thus individuals' expectations, and their degree of optimism, influences their decision to save in an economically significant manner.

[Table 13 here]

Focusing now on average saving rates, we see that they are equal to roughly 0.03 before year 0, and they decline at this time to 0.019 (0.015) for pessimist (optimist) individuals (Table 13 and Figure 3). The year 0 (and subsequent) 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 naturally also reflect the extensive margin of the saving decisions.

[Figure 3 here]

5.3 Borrowing responses

The last variable that we consider captures the borrowing decisions of individuals. 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 case of an affirmative answer, and zero otherwise. Naturally, we are only able to do so for the sample of homeowners. Figure 4 plots the average values for this dummy.

[Figure 4 here]

The proportion of individuals taking an extra loan varies between 0.09 and 0.10 for years -2 and and -1. The average differences between optimists and pessimists are not statistically significant (bottom panel of Table 13). At time 0 there is a decline for both groups. 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. But interestingly the decline is larger for those individuals who are pessimistic going forward (from 0.09 to 0.04) than those

who are optimistic going forward (from 0.10 to 0.08). The average time 0 difference between optimists and pessimists is statistically significant at the one percent level. We cannot rule out that this differential decline is also due to a supply side channel affecting differently pessimists and optimists (what we observe are equilibrium outcomes). However, we note that the average year 0 incomes of optimists and pessimists are almost identical, so that it is unlikely that they would be treated in a significantly different manner by lenders in their credit decisions (top panel of Table 13).

The fact that optimist individuals are more likely to take a loan in response to an income decline may have implications for their future household finances. Their underestimation of the degree of persistence of the earnings decline means that they are not likely to have the higher future earnings on which they may be relying for repaying the debt. This is likely to be most problematic in case of loans that carry a high interest rate, such as for payday loans (Bhutta et al., 2015; Melzer, 2011; Morse, 2011).

5.4 Future financial situation

The previous section showed that the savings and debt responses of individuals to an earnings decline at time 0 differs depending on whether the individuals are optimistic or pessimistic at this time. An interesting question is whether there is a relation between this potentially suboptimal savings and borrowing behavior, and the subsequent changes in financial situation. This is a question on which we provide evidence in Table 14. More precisely, in this table we again take the sample of individuals who are in a worse financial situation due to an earnings decline at time 0, and calculate the proportion of individuals who are better off (Panel A) and worse off (Panel B) in each year from -2 to +2. As before, we separate between those individuals who are optimist and pessimist at time 0.

[Table 14 here]

The results in the Table show that, prior to the event time 0, there are no significant statistical or economic differences between optimists and pessimists in the proportions of those who are better or worse off. At event time 0, by construction, all individuals are worse off: thus the 1 in the bottom panel. The results for Year +1 are also, to a large extent, due to the

way we construct the data: individuals are classified into pessimist and optimist based on their year 0 expectations and their subsequent Year +1 realizations. Pessimist individuals are those for whom the year 1 realized financial situation is better than the year 0 expectation. This explains the large proportion of those who are better off in Panel A (equal to 0.688), and the fact that none of them are worse off (as shown in Panel B). Similarly, optimist individuals are those for whom the year +1 realized financial situation is worse than the year 0 expectation.

The interesting results are those for year +2. The classification of individuals into pessimist and optimist at time 0 does not use the year +2 realized change in financial situation. The penultimate column of Panel B of Table 14, shows that those individuals who are more optimist at time 0 are much more likely to find themselves in a worse financial situation in year +2 than those individuals who are pessimist at time 0. This is consistent with the interpretation that their savings and/or borrowing behaviors at the time 0 were suboptimal. The differences are economically significant. Those who were pessimist in year 0 have a 0.266 probability of being worse off at year +2, compared with 0.369 for those who were optimist. The 0.103 difference corresponds to 43% of the unconditional probability of being worse off (0.24).

One alternative explanation is that those individuals who are optimist at 0 are more likely to underestimate the persistence of the shocks, and that the higher persistence of the original shock explains why they are again more likely to be worse off in year +2. In other words, the differences in year +2 could simply be due to the persistence of the underlying shocks and not the individual responses to those shocks. We rule out this hypothesis in the last column of Table 14. In this column we report the proportions of individuals who are better off and worse off in year +2, but excluding those who are better off in year +2 due to an earnings increase at this time (in Panel A) and those who are worse off in year +2 due to an earnings decline (in Panel B).[16] Interestingly, we find similarly large differences in the proportion of worse off individuals between pessimist and optimist individuals, showing that the effects are likely to come from their differential response to the original shock rather than the persistence of the original earnings shock.

[16]Recall, that the original year 0 shock that we are conditioning upon is a decline in earnings, so that by excluding those with earnings changes in year +2 we are removing observations that could be potentially due to the persistence of the year 0 shock.

6 Conclusion

We have used almost two decades of panel data to study household finances, and how experienced changes in such finances affect the way in which households form expectations. The main reasons for an improvement (deterioration) in household finances are earnings increases (declines) and lower (higher) expenditures. We have shown evidence consistent with extrapolative expectations: individuals become optimistic after an improvement in their finances, due either to an earnings increase or to lower expenditures. Similarly, individuals become pessimistic when they experience a deterioration in their finances due to higher expenditures. There is however an important exception to extrapolative expectations: individuals are more likely to become optimistic after a deterioration in their finances that arises from a decline in earnings. In other words, they tend to underestimate the degree of persistence or over-estimate the degree of mean reversion of the effects of an earnings decline on their finances. We show this evidence using fixed effects panel regressions, so that our results are explained by variation over time for a given individual, and not by variation across individuals.

The exception that we find is important for two reasons. First, and although we also provide evidence in support of extrapolative expectations, it shows that the process of expectations formation is perhaps more complex than a simple extrapolative model. Second, times of earning declines are also times of stretched household finances. If households are optimistic at such times, and borrow more as a result, they may subsequently find themselves in an even worse financial situation, effects for which we found supportive evidence.

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TABLES AND FIGURES

Table 1: Financial situation.

Panel A reports the number of observations for which individuals in year t reported that they were financially significantly better off, no significant change, and significantly worse off than in year t-1, for t=1991,...,2008. Panel B reports the reasons given by individuals for why they were financially better off (worse off) in year t than in year t-1.

Panel A: Changes in financial situation.

	Financial situation in year t			
	Better off at t	No change at t	Worse off at t	Total
Number of obs.	28,830	63,695	29,755	122,280
Fraction of total	0.24	0.52	0.24	1.00

Panel B: Reasons for change in financial situation.

Panel B.1	Better off		Panel B.2	Worse off	
Reason better off	# obs.	Fraction	Reason worse off	# obs.	Fraction
Earnings ↑	14,080	0.54	Earnings ↓	6,206	0.24
Expenditures ↓	3,883	0.15	Expenditures ↑	13,530	0.52
Benefits ↑	2,739	0.11	Benefits ↓	990	0.04
Inv income ↑	749	0.03	Inv income ↓	878	0.03
Windfall payment	781	0.03	One-off expend.	513	0.02
Good management	1,310	0.05			
Other reasons	2,507	0.10	Other reasons	3,672	0.14
Total better off	26,049	1.00	Total worse off	25,789	1.00

Table 2: Reasons for change in financial situation by age and income.

This table reports the reasons given by individuals for why they were financially better off (worse off) in year t than in year t-1, by age of the household head and by income group. Low (high) income are those in the bottom (top) one third of the distribution of year t-1 household income.

	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	0.39	0.28	0.18	0.11	0.17	0.23	0.30
Same	0.37	0.47	0.56	0.67	0.60	0.53	0.46
Worse off	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 ↑	0.66	0.62	0.41	0.05	0.34	0.54	0.63
Expenditures ↓	0.13	0.15	0.18	0.18	0.14	0.15	0.15
Benefits ↑	0.02	0.03	0.17	0.54	0.31	0.09	0.02
Inv Income ↑	0.02	0.02	0.04	0.07	0.03	0.03	0.03
Windfall payment	0.02	0.03	0.06	0.04	0.03	0.05	0.03
Good management	0.06	0.05	0.04	0.04	0.05	0.09	0.05
Other reasons	0.10	0.09	0.10	0.08	0.10	0.04	0.09
Panel C: Reason for worse off, as a fraction of worse off							
Earnings ↓	0.30	0.28	0.31	0.05	0.11	0.25	0.35
Expenditures ↑	0.49	0.48	0.45	0.69	0.64	0.50	0.46
Benefits ↓	0.03	0.05	0.04	0.02	0.06	0.04	0.01
Inv Income ↓	0.00	0.01	0.04	0.10	0.04	0.05	0.02
One-off expenditure	0.04	0.02	0.01	0.01	0.01	0.02	0.03
Other reasons	0.14	0.16	0.14	0.13	0.14	0.14	0.13

Table 3: Expectations by age and income.

The table reports the proportion of observations for individuals who at time t expect to be significantly better off, about the same, and significantly worse off at time $t+1$, for t=1991,...,2007. The table also shows the proportions by age and income.

	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	0.15	0.24	0.29
Same	0.65	0.46	0.60	0.70	0.79	0.71	0.65	0.60
Worse off	0.11	0.08	0.10	0.13	0.16	0.14	0.11	0.11

Table 4: Expectations.

This table shows the estimated coefficients of fixed effects Logit regressions that explain time t expectations using the time t changes in financial situation (columns 1 and 2) and the reasons for the change (columns 3 to 5). The dependent variabes are dummy variables for expect better off, expect worse off, and expect the same. The unit of observation is individual/year.

	(1)	(2)	(3)	(4)	(5)
	Better	Worse	Better	Worse	Same
Better off	0.62***	0.00			
	(23.44)	(-0.01)			
Earnings ↑			0.65***	-0.01	-0.61***
			(22.53)	(-0.26)	(-22.36)
Expenditures ↓			0.55***	-0.11	-0.46**
			(11.76)	(-1.36)	(-10.50)
Worse off	0.72***	1.01***			
	(25.24)	(32.72)			
Earnings ↓			1.08***	0.43***	-1.04***
			(27.22)	(8.31)	(-29.27)
Expenditures ↑			0.48***	1.21***	-1.11***
			(13.75)	(35.29)	(-49.91)
Control variables					
Income group 2	0.03	-0.05	0.02	-0.02	0.03
	(0.84)	(-1.13)	(0.51)	(-0.46)	(1.06)
Income group 3	-0.06	-0.05	-0.08*	0.08	0.10***
	(-1.52)	(0.93)	(-1.87)	(1.47)	(2.60)
Year FE	Yes	Yes	Yes	Yes	Yes
Ind. FE	Yes	Yes	Yes	Yes	Yes
Number of obs.	57,037	44,800	54,113	41,407	69,687

Table 5: Heterogeneity in financial expectations, conditional on worse off event.
The unit of observation is the individual. The table shows in the different rows the number (and proportion) of individuals who, after being worse off: (i) always expect to be better off; (ii) sometimes expect to be better off and other times expect to be worse off; (iii) always expect to be worse off. The second column reports individuals who were worse off at least once in the sample, while the other columns consider individuals who were worse off at least twice in the sample. The last three columns report the average age, income group, and the average value for the male dummy for individuals who are worse off at least twice during the sample, for the different expectations.

	Individuals who are worse off				
	At least once	At least twice			
Individuals who:	Number	Number	Age	Inc. group	Male
always expect worse off	859 (0.09)	272 (0.04)	62.3	1.56	0.61
expect same or alternate	7423 (0.74)	5583 (0.86)	49.1	2.01	0.54
always expect better off	1742 (0.17)	610 (0.10)	34.2	2.15	0.53
	10024 (1.00)	6465 (1.00)			

Table 6: Expectations compared to realizations.

The table reports the proportion of observations for individuals who at time $t+1$ had a given realized change in financial situation conditional on their time t expectation of that change in financial situation.

	Realization at t+1		
Expectation at t	Better off	Same	Worse off
Better off	0.46	0.35	0.19
Same	0.18	0.63	0.19
Worse off	0.12	0.35	0.53

Table 7: Optimism and pessimism.

This table reports the proportion of observations for which individuals are optimistic and pessimistic. An individual is optimistic at time t if at this time she expected 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 she expected a change in financial situation that is is worse than the realized time $t+1$ change. The table also reports the proportions by age groups and by income. Data for t=1991,...,2007. The unit of observation is individual/year.

	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	0.19	0.18	0.16	0.15	0.16	0.15	0.19
Neither	0.57	0.49	0.51	0.59	0.69	0.63	0.58	0.53

Table 8: Optimism and pessimism: summary statistics.

This table reports summary statistics for several variables of interest for individual/year observations in which individuals are optimistic, pessimistic, and neither optimistic nor pessimistic. All the variables are measured at t with t=1991,...,2007. The unit of observation is individual/year.

	Optimist		Pessimist		Neither	
	Mean	Stdev	Mean	Stdev	Mean	Stdev
	Demographic variables					
Age	45.83	15.97	49.10	17.59	52.68	18.19
Male	0.55	0.50	0.54	0.50	0.55	0.50
Married	0.64	0.48	0.62	0.49	0.59	0.49
Number of children	0.67	1.01	0.55	0.95	0.49	0.91
Log real income	9.79	1.02	9.76	1.07	9.67	1.04
	Education					
No High School	0.29	0.45	0.33	0.47	0.39	0.49
High School	0.30	0.46	0.27	0.44	0.26	0.44
Other Higher Education	0.25	0.43	0.22	0.41	0.20	0.40
College Degree	0.16	0.36	0.18	0.38	0.15	0.36
	Financial change					
Better off at t	0.24	0.43	0.32	0.47	0.22	0.41
No change at t	0.43	0.50	0.45	0.50	0.59	0.49
Worse off at t	0.33	0.47	0.22	0.42	0.19	0.39

Table 9: Optimism and pessimism: fixed effects regressions.

Columns (1) to (4) report the estimated coefficients of fixed effects Logit regressions that explain optimism/pessimism at time t using the changes in financial situation (columns (1) and (2)) and the reasons for the change at time t (columns (3) to (4)). The unit of observation is individual/year. The last two columns report the results for ordinary least squares regressions. All the regressions include individual and year fixed effects.

	(1)	(2)	(3)	(4)	(5)	(6)
	Optimist	Pessimist	Optimist	Pessimist	Optimist	Pessimist
Better off	0.13***	-0.10***				
	(5.93)	(-3.97)				
Earnings ↑			0.14***	-0.13***	0.026***	-0.021***
			(4.59)	(-4.20)	(4.90)	(-4.62)
Expenditures ↓			0.12**	-0.09*	0.021**	-0.014*
			(2.35)	(-1.67)	(2.45)	(-1.93)
Worse off	0.09***	0.05**				
	(4.20)	(2.02)				
Earnings ↓			0.33***	-0.31***	0.071***	-0.037***
			(9.05)	(-6.11)	(10.16)	(-6.11)
Expenditures ↑			-0.11***	0.25***	-0.024***	0.033***
			(-3.58)	(6.73)	(-4.36)	(6.93)
Control variables						
Income group 2	0.13***	-0.04	0.10***	-0.03	0.017***	-0.004
	(4.60)	(-1.27)	(2.95)	(-0.69)	(2.92)	(-0.77)
Income group 3	0.18***	-0.003	0.14***	0.01	0.023***	-0.000
	(5.35)	(-0.07)	(3.32)	(0.22)	(3.38)	(-0.02)
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Ind. FE	Yes	Yes	Yes	Yes	Yes	Yes
Number of obs.	79,204	70,941	58,825	51,330	77,726	77,726
Estimation	FE Logit	FE Logit	FE Logit	FE Logit	FE OLS	FE OLS

Table 10: Robustness: subsamples.

This table reports the estimated coefficients of fixed effects Logit regressions that explain optimism/pessimism at time t using the reasons for the change in financial situation at time t. The unit of observation is individual/year. We divide the sample in period by two, so that we have roughly a similar number of observations in each subsamples. All the regressions include individual and year fixed effects.

	Optimist	Pessimist	Optimist	Pessimist
Earnings ↑	0.24***	-0.31***	0.30***	-0.39***
	(5.40)	(-6.49)	(6.03)	(-7.25)
Expenditures ↓	0.23***	-0.37***	0.25**	-0.29*
	(3.14)	(-4.99)	(3.05)	(-3.47)
Earnings ↓	0.09*	-0.21***	0.20***	-0.31***
	(1.65)	(-3.07)	(3.23)	(-3.40)
Expenditures ↑	-0.31***	0.32***	-0.35***	0.43***
	(-7.14)	(6.19)	(-7.31)	(6.73)
Control variables				
Income group 2	0.11*	-0.03	0.16***	-0.06
	(1.93)	(-0.69)	(2.84)	(-0.88)
Income group 3	0.14**	0.01	0.223***	-0.19**
	(2.05)	(0.22)	(3.14)	(-2.11)
Year FE	Yes	Yes	Yes	Yes
Ind. FE	Yes	Yes	Yes	Yes
Years included	Year $\leq$ 2001	Year $\leq$ 2001	Year $>$ 2001	Year $>$ 2001
Number of obs.	25,165	22,166	22,785	16,697

Table 11: Cohort effects.

This table reports the estimated coefficients of fixed effects logit regressions of optimism and pessimism on changes in financial situation and on the cohort variable. The cohort variable is equal to the ratio of the number of years in which the individual, aged 16 or more, experienced a large negative economic event, divided by the individual's current age minus 16. The specific list of 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).

	Optimist	Pessimist	Optimist	Pessimist
Earnings ↑	0.14***	-0.13***	0.13***	-0.13***
	(4.61)	(-4.03)	(4.28)	(-3.84)
Expenditures ↓	0.12**	-0.09*	0.10**	-0.08
	(2.36)	(-1.68)	(2.09)	(-1.46)
Earnings ↓	0.33***	-0.31***	0.33***	-0.31***
	(9.03)	(-6.08)	(8.86)	(-5.97)
Expenditures ↑	-0.11***	0.25***	-0.10***	0.25***
	(-3.61)	(6.79)	(-3.30)	(6.84)
Cohort variable	-2.39**	2.62**	-0.49	4.27***
	(-2.44)	(2.35)	(-1.07)	(8.17)
Control variables				
Income group 2	0.10***	-0.02	0.10***	-0.01
	(2.81)	(-0.55)	(2.83)	(-0.24)
Income group 3	0.13***	0.02	0.13***	0.04
	(3.06)	(0.48)	(3.15)	(0.83)
Year FE	Yes	Yes	No	No
Ind. FE	Yes	Yes	Yes	Yes
Number of obs.	58,825	51,330	58,825	51,330
Estimation	FE Logit	FE Logit	FE Logit	FE Logit

Table 12: Realizations at t+1 and expectations at t conditional on an earnings decline at t.

This table reports realizations of the financial situation at t+1 conditional on an earnings decline at t. The last two columns report the Year t expectations of the Year t+1 financial situation conditional on an earnings decline at t, and for individuals who are optimist and pessimist at time t.

Year t+1 realization		Year t expectation	Optimist	Pessimist
Better	0.24	Better	0.61	n/a
Same	0.37	Same	0.39	0.52
Worse	0.39	Worse	n/a	0.48

Table 13: Tests of the equality of means.

This table reports the reports the t-test of the equality of means for several variables of interest for individuals who were worse off due to a decline in income and are optimist and those who were worse off due to the same income decline but are pessimist.

	Year -2	Year -1	Year 0	Year +1	Year +2
			Panel A: Income		
Pessimist	10.06	9.99	9.89	9.82	9.92
Optimist	10.02	10.03	9.89	9.74	9.80
Difference	0.04	-0.03	0.00	0.08	0.12
p-value	0.42	0.46	0.98	0.11	0.01
			Panel B: Proportion savers		
Pessimist	0.435	0.423	0.325	0.411	0.423
Optimist	0.443	0.427	0.283	0.281	0.335
Difference	-0.008	-0.004	0.042	0.130	0.088
p-value	0.76	0.86	0.04	0.00	0.00
			Panel C: Saving rate		
Pessimist	0.033	0.029	0.019	0.035	0.035
Optimist	0.031	0.029	0.015	0.016	0.020
Difference	0.002	0.000	0.004	0.020	0.015
p-value	0.45	0.95	0.07	0.00	0.00
			Panel D: Proportion extra loan		
Pessimist	0.089	0.088	0.042	0.071	0.096
Optimist	0.098	0.101	0.083	0.081	0.100
Difference	-0.009	-0.014	-0.040	-0.010	-0.004
p-value	0.63	0.47	0.01	0.58	0.85

Table 14: Worse off and better off, conditional on worse off due to earnings decline at 0.

This table reports the difference between the proportions of optimist and pessimist individuals who are better off (worse off in Panel B) in each year, conditional on them being worse off at time 0 due to an earnings decline. Individuals are classified into optimist and pessimist based on the Year 0 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 +2 (in Panel A) and excluding those who are worse off due to an earnings decline in year +2 (in Panel B).

	Year -2	Year -1	Year 0	Year +1	Year +2	Year +2 (excl. earn.)
			Panel A: Better off			
Pessimist	0.269	0.258	0.000	0.688	0.272	0.130
Optimist	0.283	0.248	0.000	0.000	0.242	0.096
Difference	-0.014	0.009	0.000	0.688	0.030	0.034
p-value	0.538	0.6539		0.000	0.155	0.035
			Panel B: Worse off			
Pessimist	0.323	0.355	1.000	0.000	0.266	0.179
Optimist	0.325	0.377	1.000	0.709	0.369	0.280
Difference	-0.002	-0.023	0.000	-0.709	-0.103	-0.101
p-value	0.941	0.335		0.000	0.000	0.000

Figure 1: Income path

The figure plots the average income for individuals who at time 0 reported that they were significantly worse off due to lower earnings. It distinguishes between those individuals who at time 0 were optimistic and those who were pessimistic. Optimistic individuals are those who at time 0 expected a change in financial situation at time 1 that is better than the realized change. Pessimistic individuals are those who at time 0 expected a change in financial situation at time 1 that is worse than the realized change. The figure plots the income profile for these individuals in the two years before and the two years after the deterioration in financial situation due to an earnings decline.

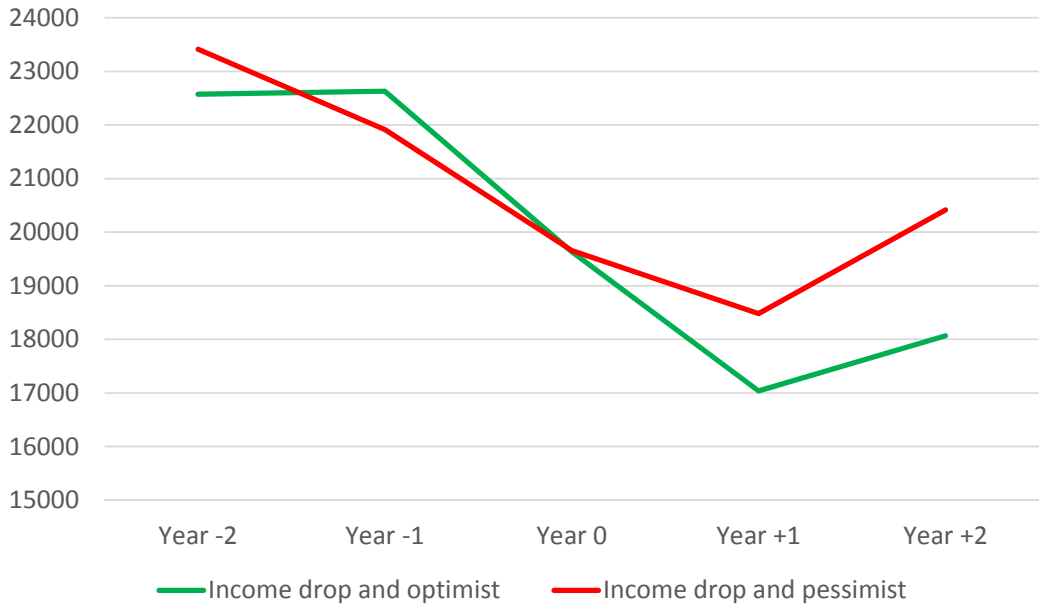


Figure 2: Proportion of individuals who save

The figure plots the proportion of individuals who save, for individuals who at time 0 reported that they were significantly worse off due to lower earnings. It distinguishes between those individuals who at time 0 were optimistic and those who were pessimistic. Optimistic individuals are those who at time 0 expected a change in financial situation at time 1 that is better than the realized change. Pessimistic individuals are those who at time 0 expected a change in financial situation at time 1 that is worse than the realized change.

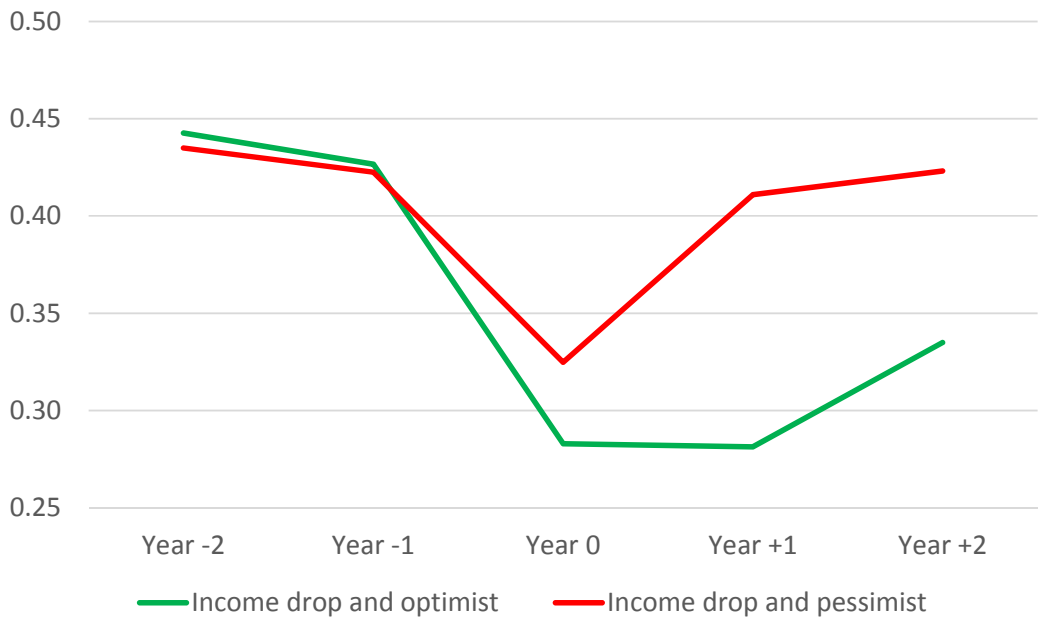


Figure 3: Saving rate

The figure plots the average saving rate among individuals who at time 0 were significantly worse off due to lower earnings. It distinguishes between those individuals who at time 0 were optimistic and those who were pessimistic. Optimistic individuals are those who at time 0 expected a change in financial situation at time 1 that is better than the realized change. Pessimistic individuals are those who at time 0 expected a change in financial situation at time 1 that is worse than the realized change.

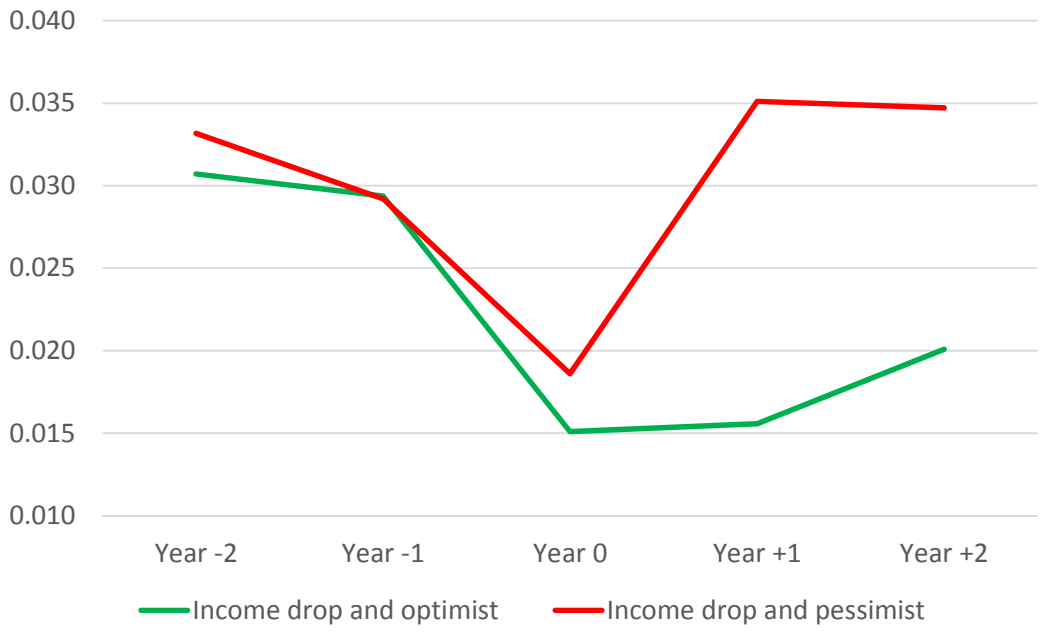
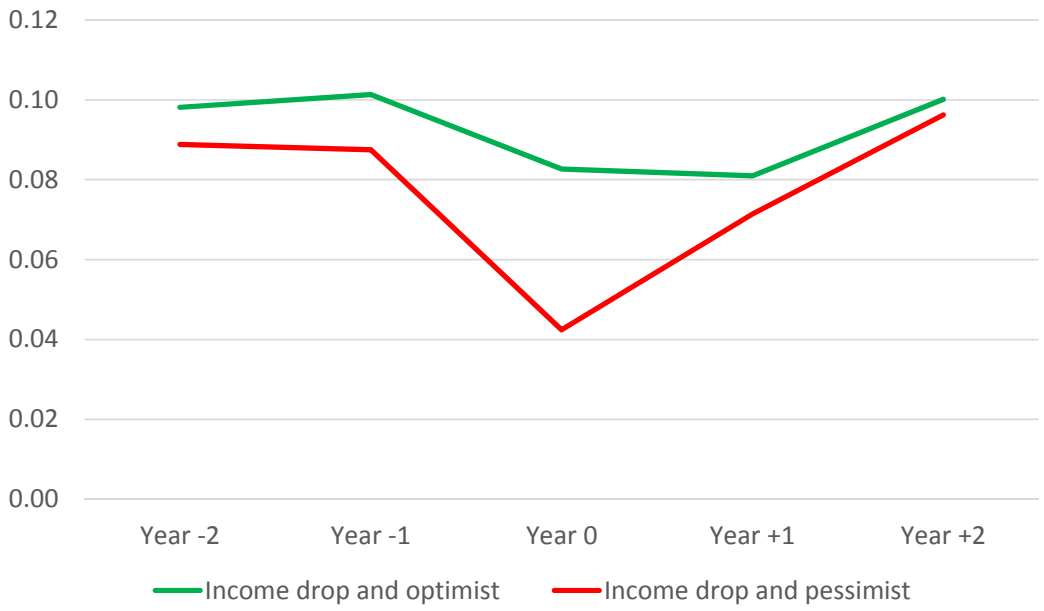


Figure 4: Extra loan

The figure plots the proportion of individuals who at time 0, when they were significantly worse off due to lower earnings, took an additional loan. It distinguishes between those individuals who at time 0 were optimistic and those who were pessimistic. Optimistic individuals are those who at time 0 expected a change in financial situation at time 1 that is better than the realized change. Pessimistic individuals are those who at time 0 expected a change in financial situation at time 1 that is worse than the realized change.