

Can Households See into the Future? Survey Evidence from the Netherlands*

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Abstract

The paper studies the expectation formation process of households and documents new stylized facts using a survey of Dutch households. Expectation errors about future income are positively correlated with past realized income. This is consistent with households overextrapolating their individual experience. This behavior might increase consumption volatility and thus entail welfare losses. More overoptimistic households indeed intend to consume more, but they also subsequently report larger downward adjustments to their consumption plans. While this adjustment could lead households to fall back on their optimal consumption path, they might still suffer from consuming less than they expected if they have reference-dependent preferences. More overoptimistic households indeed report worse feelings. Finally, older individuals have a larger extrapolation bias, suggesting that they did not learn over time to form more accurate expectations.

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1 Introduction

The paper documents new facts on the expectation formation process of households. It focuses on the expectation concerning the evolution of their personal financial situation, a variable that enters the widely followed consumer confidence index and that is an important determinant of their spending decisions. We are more specifically interested in how accurate these expectations are. Do households make errors when predicting their future income? If yes, are these mistakes predictable? Are they influenced by their personal experience? The answer to these questions have broad implications. Overoptimistic consumers might consume too much, thus reducing their welfare. If households tend to over-extrapolate their recent experience, they might all become too pessimistic during a crisis, thus delaying a recovery.

To study these questions, the paper presents evidence from the TILCOM business survey data in which more than a thousand Dutch individuals have reported every quarter from 2009 to 2014, among other variables, how they expected their financial situation to evolve over the next year and how their financial situation evolved in the past year. Figure 1 shows the evolution of the average of these two variables. A striking observation in our view is that these two variables closely follow each other. This is already suggestive that households make predictable forecast errors. When their income increases, they become too optimistic. Furthermore, this stands in contrast to a model in which households would have some ability to predict the future, for example, because they observe some signals about their future income. In this case, we should observe that expected income lags realized income by the forecasting horizon.

To assess the accuracy of households' forecasts, we then compute for each household a measure of expectation error by taking the difference between its expected financial situation and its realized financial situation one year later. The evolution of the average expectation error is plotted on Figure 2. It shows that households make expectation errors, they are sometimes overoptimistic and sometimes overpessimistic and that on average their expectation error is close to

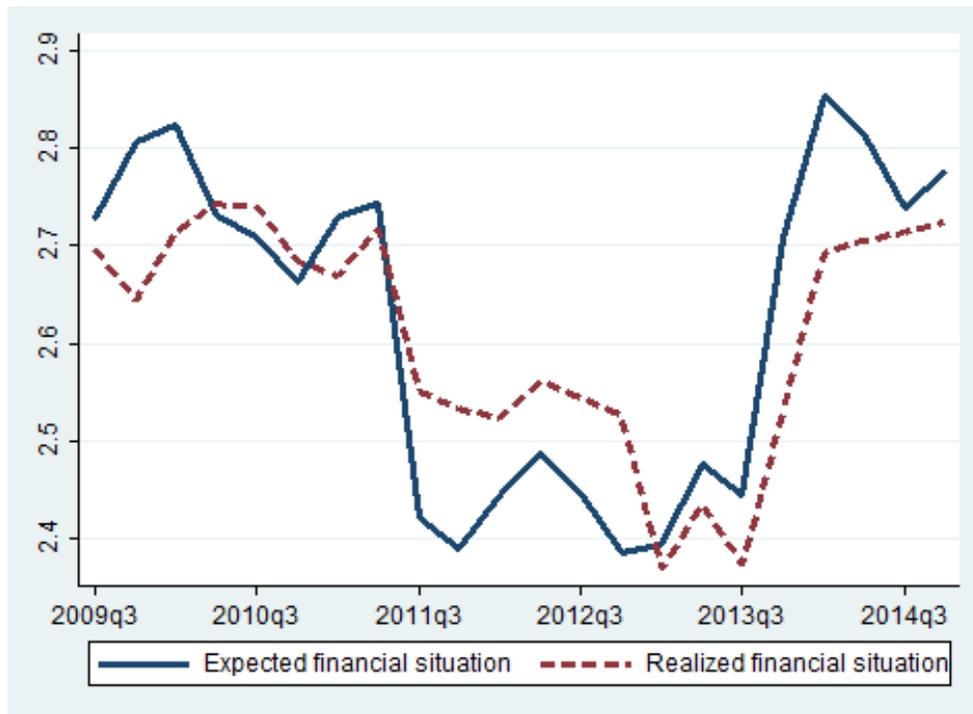


Figure 1: Evolution of expected financial situation over the next year and realized financial situation over the past year. Both variables range from 1 to 5, where a higher value indicates a larger improvement in the financial situation. See section 2 for further details.

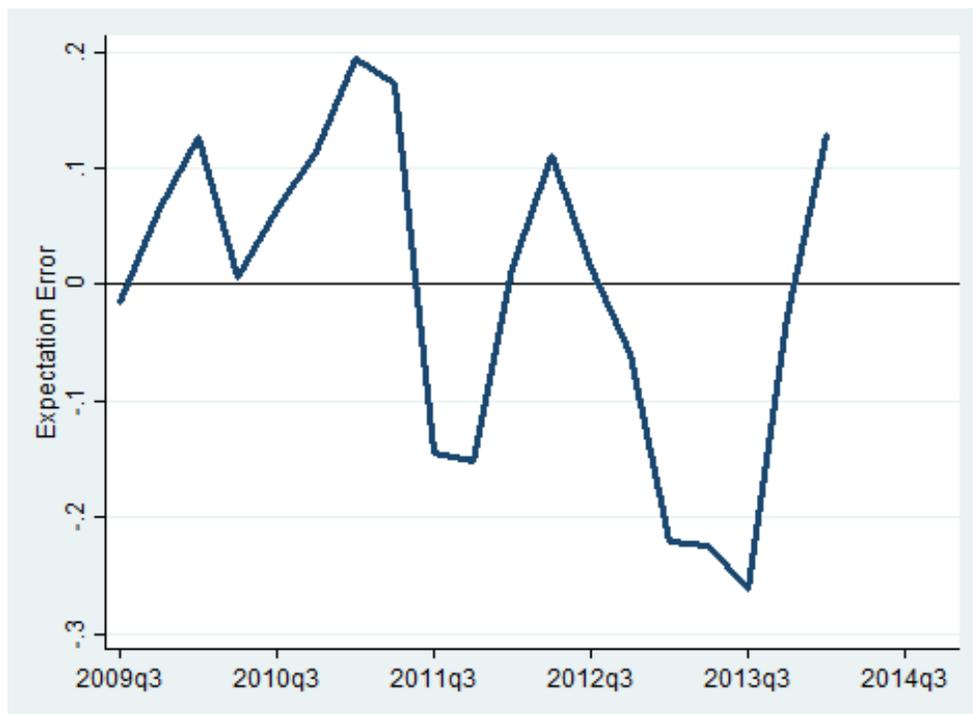


Figure 2: Evolution of expectation errors, computed as the difference between expected financial situation and future realized financial situation. See section 2 for further details.

zero.

Are these errors predictable? We first ask whether households over- or under-extrapolate their experience. Using individual data, we find that expectation errors are positively correlated with past income realization. This not only suggests that households extrapolate their experience but also that they extrapolate it too much and end up making predictable errors. This result is robust to a variety of specifications. It also holds for income experienced further in the past and after controlling for time fixed effects. Finally, households also extrapolate negative past income more than positive one.

Are these errors costly? Here, we are particularly interested in whether wrong expectations prevent households from properly smoothing their consumption, which would come at the expense of their welfare. We find that overoptimistic households also *intend* to increase the consumption of different goods. Since their income expectations are too optimistic, this implies that they should not increase their consumption as much as they intend to.

Next we look at the relationship between expectation errors and reported consumption. We find that while overoptimistic households intend to consume more many of them subsequently renounce on their initial plan. Expectation errors might then be detrimental to welfare for two reasons. First, some households might fail to change their plan, for example, because they realized too late that they were too optimistic. These households will probably over consume and thus derive lower utility because of inadequate smoothing. Households who renounce on their consumption plans might fall back on what would have been an efficient consumption level in the first place. Those households, though, might still feel unhappy if they are disappointed by the fact that they did not consume as much as they expected. Such a behavior would be in line with households having expectation-based reference-dependent preferences (Kőszegi and Rabin, 2009; Pagel, 2013).

These results indirectly suggest that expectation errors entail welfare losses. As a last check, we use more direct measures of welfare. The survey asks households how nervous, exhausted,

or gloomy they feel. We find that more overoptimistic households subsequently report more negative feelings. While overpessimistic households might feel worse because they failed to smooth consumption, we find that the positive surprise instead makes them feel better. The main implication here is that households make expectation errors that affect their utility in a way more consistent with reference-dependent preferences than with a failure to smooth consumption.

If expectation errors are costly, we might expect households to learn over time to reduce their extrapolation bias. This would imply, for example, that older households have a smaller extrapolation bias. More educated households might as well have a smaller extrapolation bias. Finally, we also investigate whether the extrapolation bias depends on income and on gender, though we do not have a clear prior hypothesis. We find that older households have a larger extrapolation bias. This runs against the idea that households learn over time how to form more accurate expectations. A 50 year-old has an extrapolation bias that is about 50% larger than the one of a 30-year old. As predicted, we find that more educated households have a smaller extrapolation bias. Households with a college education have a bias that is about one third the one of a household with primary education. Finally, gender and income do not have a significant impact on the bias.

Over-extrapolation can also have more aggregate consequences if the experience of households is correlated. This is likely since many households will lose their job at the same time during a recession and will obtain a bigger bonus or work extra hours during a boom. Over-extrapolation could in turn have consequences on business cycles. If households are unusually optimistic just before a downturn and unusually pessimistic just before the recovery, this will imply that they will not anticipate the upcoming reversals and that cycles might be amplified if expectations are followed by changes in consumption and thus aggregate demand. Unfortunately, the time span of the data is too short to provide evidence on this conjecture.

A remaining question is why households have so much difficulty reducing their extrapolation bias. A possible explanation is this might be costly. A household might have to spend a

considerable amount of time or effort to improve the accuracy of its expectations. Also, individuals may naturally use heuristics when forming expectations and it may be costly for them to switch to a more rational mode (Kahneman, 2011). The literature proposes several behavioral foundations for extrapolative biases (Tversky and Kahneman, 1974; Gilovich et al., 1985; Rabin, 2002; Rabin and Vayanos, 2010).

Our paper is related to the empirical literature studying expectations using survey data (Manski, 2004; Pesaran and Weale, 2006). A large strand of the literature studies whether household expectations about their future income or consumer sentiment can be useful to predict consumption expenditure (Acemoglu and Scott, 1994; Carroll et al., 1994; Souleles, 2004; Ludvigson, 2004) and debt (Brown et al., 2005). Using the same data as we do, Bissonnette and Van Soest (2014) study whether the perception about the financial crisis predicts expectation errors and Christelis et al. (2015) study the effect of income expectations on precautionary savings. Finally, Ekici and Koydemir (2016) and Barazzetta (2015) use a British survey and also show that more overoptimistic households tend to report lower happiness.

Finally, we contribute to the growing body of evidence supporting extrapolative expectations. The evidence has been derived from laboratory experiments (Haruvy et al., 2007; Asparouhova et al., 2009; Hommes et al., 2008; Beshears et al., 2013; Frydman and Nave, 2016) or survey data (Tortorice, 2012; Greenwood and Shleifer, 2014; Gennaioli et al., 2015). A distinguishing feature of our work is that we focus on expectations about individual income. Using an older survey of dutch households, Das and van Soest (1999) also show that households whose income decreased underestimate their future income growth. Finally, our work is also in line with the increasing evidence that experience plays a crucial role on economic behavior through its effect on expectations (Barberis et al., 1998; Vissing-Jorgensen, 2004; Piazzesi and Schneider, 2009; Malmendier and Nagel, 2011).

The paper is organized as follows. Section 2 presents the data. Section 3 illustrates the concepts of extrapolation and over-extrapolation in a simple theoretical framework. Section 4 in-

investigates for the presence of an extrapolation bias. Section 5 studies whether expectation errors are costly. Section 6 discusses whether different household types display different degrees of extrapolation bias. Section 7 concludes.

2 Data

We use data from a Dutch household survey, the Tilburg Consumer Outlook Monitor (TILCOM). The TILCOM survey is a longitudinal monitor of consumer emotions and behavior. It has been built up to track economic expectations and consumption coping in response to economic developments. The TILCOM survey is conducted each quarter (March, June, September, and December) from September 2009 to December 2014.

The TILCOM survey is administered by CentERdata, a research institute located at Tilburg University. The participants are chosen among members of the LISS panel, which is a representative sample of Dutch households (8000 individuals from 5000 households). Panel members complete online questionnaires every month of about 15 to 30 minutes in total, and are paid for each completed questionnaire. The panel has been active since October 2007. See Scherpenzeel (2011) for more details on the design and the sample.

The TILCOM participants are chosen dividing the LISS panel into three groups interviewing only two groups per wave. Therefore, each panel member could have a maximum of three TILCOM questionnaires per year. The TILCOM unbalanced panel consists of 22 waves with more than 30,000 observations, averaging more than 1,400 participants per wave. The number of observations has been increasing over time, with about 1,100 participants in 2009 and 1,600 in 2014.

The two main questions we are interested in are expected and past changes of financial situation. The wording of these questions is as follows:

- Has the financial situation of your household gotten better or worse over the past 12

months? (1 Clearly gotten worse; 2 gotten a bit worse; 3 stayed the same; 4 gotten a bit better; 5 clearly gotten better; - I don't know.)

- How do you think the financial situation of your household will develop over the coming 12 months? (1 Clearly gotten worse; 2 gotten a bit worse; 3 stayed the same; 4 gotten a bit better; 5 clearly gotten better; - I don't know.)

On average, less than 4% of the participants chose the "I don't know" option.

Our next main variable of interest is the expectation error which we compute by taking the difference between expected change of financial situation over the next year and realized change of financial situation one year later. This way of computing expectation errors implies that a positive error is associated with overoptimism and a negative error with overpessimism. More precisely, let y_t be the current expectation about the change in income at time $t + 4$, where t refers to a quarter. Let x_t be the income change with respect to the previous four quarters at the current time t . The expectation error, e_t is computed as the difference between y_t and x_{t+4} . The measure ranges from -4 to 4 . We compute the expectation errors using x_{t+3} or x_{t+5} when x_{t+4} is not available.

Table 1 provides information about the distributions of household' expectations and expectation errors. Out of 30,000 household-wave observations in the panel, we were able to compute more than 20,000 expectation errors. On average households expect their future income to decrease and report a deteriorating financial situation. This is not surprising since most of our sample is a crisis period. Finally, households do not make expectation errors on average.

Table 1: Summary statistics - Household's Financial Situation

Variable	Mean	Std. Dev.	Min.	Max.	Obs.
Exp Income	2.62	0.863	1	5	30771
Past Income	2.603	0.839	1	5	31076
Exp Error	-0.013	0.88	-4	4	23152

Table 2 provides information about the distributions of household' characteristics for the

expectations sample and the expectation errors sample. Although we lose almost one third of our observations when computing the expectation errors, the two samples remain similar in terms of these observable characteristics.

Table 2: Summary statistics - Household's Characteristics

Variable	Expectations Sample		Exp Errors Sample	
	Mean	SD	Mean	SD
Female	0.29	0.45	0.28	0.45
Age	55.30	15.27	55.95	14.80
Partner	0.58	0.49	0.59	0.49
Members	2.13	1.21	2.12	1.19
Children	0.53	0.96	0.52	0.95
High School	0.34	0.47	0.34	0.47
College	0.11	0.31	0.11	0.31
Gross Income	3200	2558	3200	2536
Net Income	2300	1600	2300	1600

3 Framework

This section presents an illustration of the concepts of extrapolation and over-extrapolation in the simple case of an AR(1) process. The same idea generalizes to more complicated processes.

We assume that households have to predict their future income change y , which follows an AR(1) process

$$y' = \alpha y + \epsilon,$$

where y' refers to future income change, $0 < \alpha < 1$ is a parameter, ϵ is a random shock with zero mean.

With perfect information, households know ϵ and can perfectly anticipate the evolution of their future income. With imperfect information, households receive a signal that is correlated with their future income. Their forecasts will not be as good as under perfect information, but expectations should on average point in the direction of the change in future income.

If households receive no information and know the data-generating process, the best forecast they can make is $y^f = \alpha y$. If $\alpha > 0$, forecasts will have an extrapolative structure, since they will

be positively correlated with y . Also, forecast errors $y^f - y'$ will be independent of past income.

Alternatively, households might form biased expectations

$$y^f = \beta y. \tag{1}$$

Their average expectation error would then be given by

$$y^f - y' = \gamma y, \tag{2}$$

where $\gamma = \beta - \alpha$.

We are interested in estimating Equations (1) and (2). If β is positive, households extrapolate their recent experience and consider shocks to have some persistence. If β is negative, then households mean-revert and they consider shocks to be short lived. Whether β is positive or negative might depend on the types of shocks that we are interested in, but also on the forecasting horizons since some shocks might be persistent in the short run and mean revert in the long run.

If γ is positive, then households extrapolate too much. They consider shocks to be more persistent than they actually are. This suggests the presence of an extrapolation bias. Following a positive shock to their income, households expect their income to keep increasing. By contrast, if γ is negative, households mean-revert too much.

4 Extrapolation Bias?

We investigate whether the data is consistent with the presence of an extrapolation bias. We first regress expectations and expectation errors about future income change on past income change. If households extrapolate their recent experience, we expect that past income change will be positively correlated with expected income change. Furthermore, the presence of an extrapolation bias would imply a positive correlation between expectation errors and past income. We use a

Table 3: Individual experience

VARIABLES	(1) Exp Income	(2) Exp Error	(3) Exp Income	(4) Exp Error
Past Income	0.326*** (0.00990)	0.347*** (0.0129)	0.299*** (0.00980)	0.322*** (0.0129)
Constant	1.772*** (0.0258)	-0.904*** (0.0331)	1.902*** (0.0336)	-0.885*** (0.0446)
Observations	30,718	23,116	30,718	23,116
R-squared	0.107	0.072	0.150	0.092
Number of households	3,911	3,215	3,911	3,215
IND FE	YES	YES	YES	YES
TIME FE	NO	NO	YES	YES

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

fixed-effect estimator to control for household-specific characteristics and also include time fixed effects to control for aggregate shocks. Standard errors are clustered at the household level.

Table 3 shows that households are more optimistic about their financial situation when it increased during the previous year. This result is highly significant. This suggests that households consider shocks to their income to have some persistence.

The table also shows that expectation errors are positively correlated with past changes in financial situation. Again this result is significant. This suggests that households exaggerate the persistence of the shocks and over-extrapolate. They become too optimistic when their financial situation has improved and too pessimistic when it has deteriorated.

We now study whether past income has persistent effects on expectations. Compared to the previous specification, we further control for the fourth lag of past income change. That is, we look at the effect of a change in the financial situation over the previous year as well as two years ago on expectations. If a change in financial situation experienced further in the past has an impact on expectations, this implies that households extrapolate more strongly a streak of similar experience and thus that following a streak households make larger mistakes. This also implies that when faced with a reversal, households will take time to recognize this break.

Column (1) of Table 4 shows that households do not extrapolate a change in income that occurred two years ago. Instead they tend to mean revert indicating that they consider shocks to their income to last less than 2 years. However, column (2) suggests that they do not mean-revert enough since the lag of past income is positively and significantly associated with expectation errors. This result suggests that two years after a shock, households still extrapolate too much. Since past income retains its significance, the results also suggest that households make larger mistakes following a streak of same-sign shocks.

Next, we study whether households react asymmetrically to positive and negative experience. We run a similar set of regressions but allow for the effect of positive and negative changes in financial situation to be different. We now control for four indicator variables that correspond to the possible evolution of past income: a lot worse, a bit worse, a bit better and a lot better.

Column (3) of Table 4 suggests that households extrapolate negative events more than positive ones. This result is mostly driven by large changes in financial situation as small changes have a roughly symmetric effect. Furthermore, Column (4) shows that expectation errors also react asymmetrically to positive and negative past income. Again, this result is driven by large changes as small changes are roughly symmetric. This implies that households make larger mistakes following negative shock than following a positive shock.

These results support the idea that individuals may suffer asymmetric losses when forming expectations (Elliott et al., 2008). Households might indeed prefer to be a bit too conservative to avoid disappointment. Following an improving financial situation, they will become more optimistic but not too much to avoid disappointment. Our results suggest that disappointment aversion is not so strong that it overcomes the tendency to over-extrapolate. Following a negative shock, households will become more pessimistic not only because they expect the shock to be persistent but also because they want to avoid disappointment. These results can have consequences on the documented asymmetry of business cycles (Neftci, 1984; Sichel, 1993). If households become more pessimistic following a negative shock than they become optimistic

Table 4: Individual experience - asymmetry

VARIABLES	(1) Exp Income	(2) Exp Error	(3) Exp Income	(4) Exp Error
Lot worse			-0.603*** (0.0274)	-0.670*** (0.0372)
Bit worse			-0.298*** (0.0120)	-0.340*** (0.0166)
Bit better			0.359*** (0.0192)	0.368*** (0.0285)
Lot better			0.420*** (0.0588)	0.357*** (0.0795)
Past Income	0.316*** (0.0169)	0.396*** (0.0235)		
Lag Past Income	-0.0268** (0.0133)	0.0474** (0.0199)		
Constant	1.796*** (0.0765)	-1.128*** (0.0860)	2.797*** (0.0224)	0.0899*** (0.0296)
Observations	9,938	7,339	30,718	23,116
R-squared	0.167	0.120	0.152	0.094
Number of households	2,842	2,329	3,911	3,215
IND FE	YES	YES	YES	YES
TIME FE	YES	YES	YES	YES

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

following a positive shock, then busts will be sharper than booms.

5 Are expectation errors costly?

In a textbook permanent income model, households make expectation errors but know the distribution of the income shocks that hit them. As a result, they are able to smooth their consumption despite not being able to correctly anticipate income shocks. According to this model, consumption decisions should be unaffected by expectation errors.

This prediction does not hold, however, if households over-extrapolate their recent experience. Following an improvement in their financial situation, households expect their income to keep increasing and might want to increase their consumption. Since they are too optimistic, they realize at some point that they are not as rich as they thought and thus have to cut consumption. Following the same reasoning, households might cut consumption too much following a deterioration of their financial situation. The extrapolation bias thus works against consumption smoothing and might entail welfare losses.

Another way expectation errors could influence welfare is through disappointment. An overoptimistic household might expect to increase his consumption and form a reference point in line with this higher consumption level. Once he realizes that he was too optimistic, he will have to renounce on his consumption plans. Even though his consumption might fall back to what would have been an optimal level in the first place, his welfare might nonetheless decrease because his consumption will be lower than what he expected and he will thus be disappointed. An overpessimistic household will instead feel happier once he learns the good news because he will be able to consume more than he expected.

The purpose of this section is to investigate whether expectation errors are indeed costly.

5.1 Consumption Plans

We first investigate the effect of expectation errors on consumption plans. If households act on their expectations, we expect that more overoptimistic households should plan to consume more. We use two sets of variables that measure consumption plans.

First, we use six questions that ask households to state the chance that they will buy different goods over the next year. The exact formulation of the question is as follows:

We now ask you to estimate, as well as you can, the chance that you will do one of these things in the future, in terms of a percentage between 0 and 100 percent. For example, if you are fully convinced that you will do one of these things, then you answer with 100 percent. If, on the other hand, there is a small chance that you might not do it, then you answer with 97 percent or less. If you are fully convinced that you will not do one of these things, then you indicate 0 percent. But if there is a small chance that you might do it, then you indicate 3 percent or more. And if you think that the chance is actually just as good as not, then you answer with 50 percent, or slightly more or slightly less if that seems more appropriate to how you feel. How much chance is there that you or someone in your household will, in the coming 12 months...

- buy a house or have a house built?
- buy a new car (not second-hand or used)?
- buy new big appliances, such as a washing machine or television?
- buy new big interior objects, such as furniture?
- take a long holiday (more than eight days consecutively)?
- take a short holiday (two to seven days consecutively)?

We then regress the measures of consumption plans on expectation errors. Table 5 shows that

Table 5: Consumption plans and expectation errors

VARIABLES	(1) House	(2) Car	(3) Appliance	(4) Furniture	(5) Short Holiday	(6) Long Holiday
Exp Error	-0.0447 (0.112)	0.529*** (0.131)	0.877*** (0.191)	0.655*** (0.189)	0.940*** (0.241)	1.390*** (0.237)
Constant	4.760*** (0.469)	7.119*** (0.599)	21.14*** (0.842)	14.58*** (0.760)	45.93*** (0.990)	33.39*** (1.145)
Observations	23,087	23,087	23,087	23,087	23,088	23,087
R-squared	0.003	0.007	0.011	0.006	0.005	0.079
Number of households	3,215	3,215	3,215	3,215	3,215	3,215
IND FE	YES	YES	YES	YES	YES	YES
TIME FE	YES	YES	YES	YES	YES	YES

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

more over-optimistic households expect that there is a higher chance that they will consume each of these consumption items, with the exception of a house. This suggests that the households who fail to correctly anticipate future changes in their financial situation also fail to make the appropriate consumption plans.

Second, we use an additional set of variables that also measure consumption plans but cover different consumption items and are formulated slightly differently. Households are asked whether they intend in the coming six months to consume more or less clothing, restaurant meals, and entertainment compared to today. The exact formulation is as follows:

Of the things listed below, please indicate whether you intend, in the coming six months, to do so less or more than you do at present. Compared to what I do now, over the next six months I intend to... (1 much less so; 2 less so; 3 a bit less so; 4 just as much; 5 a bit more so; 6 more so; 7 much more so)

- spend money on clothing and clothing accessories.
- spend money on eating out in restaurants.
- spend money on leisure (such as visiting the cinema and performance acts) and on sports (including membership fees and materials).

Table 6: Consumption plans and expectation errors

VARIABLES	(1) Clothing	(2) Restaurant	(3) Leisure
Exp Error	0.121*** (0.00761)	0.123*** (0.00818)	0.107*** (0.00807)
Constant	3.505*** (0.0274)	3.208*** (0.0307)	3.357*** (0.0298)
Observations	23,074	23,074	23,074
R-squared	0.027	0.027	0.020
Number of households	3,214	3,214	3,214
IND FE	YES	YES	YES
TIME FE	YES	YES	YES

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

We then study the relationship between this variable and expectation errors. Table 6 shows that more over-optimistic households are more likely to intend to consume more than they do at present.

This first set of results suggests that expectation errors have consequences on the *intentions* to consume. In the next section, we investigate whether expectations errors are also followed by changes in consumption plans.

5.2 Consumption Adjustments

Next, we want to verify whether households revise their consumption plans when they realize that their income did not turn out to be as expected. To check whether expectation errors are costly, we indeed want to know whether they are followed not only by intentions to change consumption but also by actual changes in consumption. First, more overoptimistic households might have lower welfare because their consumption becomes more volatile. Second, they might have lower welfare because they consume less than what they expected and are thus disappointed. In this section, we look at the relationship between expectation errors and two measures of consumption adjustments.

First, we use another set of questions from the survey that asks households to report whether they bought different consumption goods over the past year. The exact formulation of the question is as follows:

The following questions are about your purchasing behavior in the past, the present and the future. We first want to ask you about your purchasing behavior over the past 12 months. In the past 12 months (calculated back from today), did you or someone in your household... (1 yes; 2 no)

- buy a house or have a house built?
- buy a new car (not second-hand or used)?
- buy new big appliances, such as a washing machine or television?
- buy new big interior objects, such as furniture?
- take a long holiday (more than eight days consecutively)?
- take a short holiday (two to seven days consecutively)?

We can then compute changes in consumption plans by taking the difference between the consumption plan described in the previous section and future realized consumption. A higher value implies that the household was too optimistic concerning his consumption level, that is, he expected to consume more than he did. We recode the past consumption variables as 0 if the answer to each question was negative and 100 if the answer was positive. For each consumption item, we then take the difference between the consumption plan and the realized consumption reported one year later. The resulting variable gives a measure of consumption adjustment. It can take any value between -100 and 100. The average consumption adjustment is close to zero and its mode is always zero. For more expensive items such as houses, households make almost no changes to their plans while for cheaper items such as a short holiday households revise their plans more often.

We then investigate how expectation errors are related to changes in consumption plans. Table 7 shows that more overoptimistic households are more likely to give up on their plan to consume a good, with the exception of housing. This suggests that expectation errors are followed by changes in consumption plans.

This first set of results suggests that expectation errors may bring welfare losses through disappointment. An overoptimistic household may anticipate to buy a new car, for example, and might have to renounce on the new car once he realizes that he actually cannot afford it. This renouncement might bring him disutility in case his reference point was that he will get a new car.

It is less clear, however, how expectation errors should influence a more objective measure of welfare that does not take into account a reference point. Had the household held more realistic expectations about his future financial situation, he would have realized in the first place that he could not afford to buy a new car. Since the results suggest that overoptimistic households tend to renounce on buying a new car, their welfare is not impacted by whether they form the correct expectation or not. However, the results do not rule out the fact that some households might have bought the new car before they realize that they were too optimistic. In this case, overoptimism might entail welfare losses if those households presently consume more than is optimal. We try to make further progress on this question in the next section.

Second, we use another measure of consumption adjustment provided in the survey. The question covers additional consumption items and is formulated slightly differently. Households are asked whether, over the last 6 months, they consumed more or less clothing, restaurant meals, and entertainment compared to before. The exact formulation is as follows:

Please indicate for each item whether, over the last six months, you did them more or did them less, compared to what you did before. Compared to what I did before, in the last six months I... (1 much less so; 2 less so; 3 a bit less so; 4 just as much; 5 a

Table 7: Consumption Adjustments and Expectation Errors

VARIABLES	(1) House	(2) Car	(3) Appliance	(4) Furniture	(5) Short Holiday	(6) Long Holiday
Exp Error	-0.231 (0.163)	0.891*** (0.235)	1.665*** (0.429)	1.231*** (0.352)	2.553*** (0.423)	1.411*** (0.383)
Constant	0.950 (0.645)	-1.182 (1.032)	-6.657*** (1.590)	-1.339 (1.281)	-29.54*** (1.646)	-1.910 (1.433)
Observations	23,081	23,081	23,081	23,081	23,081	23,082
R-squared	0.001	0.002	0.004	0.001	0.042	0.004
Number of households	3,214	3,214	3,214	3,214	3,214	3,214
IND FE	YES	YES	YES	YES	YES	YES
TIME FE	YES	YES	YES	YES	YES	YES

Robust standard errors in parentheses
 *** p<0.01, ** p<0.05, * p<0.1

bit more so; 6 more so; 7 much more so)

- spend money on clothing and clothing accessories.
- spend money on eating out in restaurants.
- spend money on leisure (such as visiting the cinema and performance acts) and on sports (including membership fees and materials).

While the previous variables measured a change in consumption plans, these variables measure a change in consumption habits. We then study the relationship between these measures of consumption adjustment and expectation errors. We also control for past changes of financial situation and the interaction between these changes and expectation error. The reason is that overoptimistic households might adjust their consumption habit not because they are overoptimistic but simply because their income decreased and as a result turned out to be too optimistic. For example, an individual who loses his job may cut on consumption independently of whether he expected to lose his job or not. We also control for the interaction between past expectation errors and past income because households might not decrease their consumption as much if they were too optimistic but their financial situation did not deteriorate. The interaction term helps us to compare, for example, households who did not get the bonus they expected (they were

Table 8: Consumption Adjustments and Expectation Errors

VARIABLES	(1) Clothing	(2) Restaurant	(3) Leisure
Lag Exp Error	-0.0777* (0.0414)	-0.109*** (0.0378)	-0.113*** (0.0375)
Past Income	0.334*** (0.0241)	0.319*** (0.0246)	0.243*** (0.0243)
Lag Exp Error*Past Income	0.0479*** (0.0143)	0.0551*** (0.0129)	0.0490*** (0.0133)
Constant	2.433*** (0.0872)	2.265*** (0.0896)	2.641*** (0.129)
Observations	9,927	9,927	9,927
R-squared	0.060	0.058	0.038
Number of households	2,839	2,839	2,839
IND FE	YES	YES	YES
TIME FE	YES	YES	YES

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

too optimistic but their financial situation did not deteriorate) to households who unexpectedly lost their job (they were also too optimistic but their financial situation deteriorated). The former group may indeed not change its consumption habits as much as the latter group.

Table 8 shows that more overoptimistic households are more likely to report to consume less than they used to. This result holds after controlling for past income change. Households whose financial situation improved consume more than they used to. Finally, overoptimistic households do not cut as much on consumption when their financial situation deteriorated less.

5.3 Feelings

The analysis so far suggests that expectation errors have consequences on consumption decisions but is not very conclusive on how they could affect welfare. Expectation errors can have consequences on welfare by preventing households from smoothing their consumption or in case of reference-dependent preferences by disappointing them or positively surprising them. In this section, we use a more direct measure of welfare provided by the survey that directly

asks households about their feelings. The exact formulation of the question is as follows:

The following questions are about how you feel and how you have felt over the past four weeks. For every question, please choose the answer that best resembles how you have felt. Over the past four weeks, for how much of the time did you feel... (1 never; 2 a small part of the time; 3 half of the time; 4 a large part of the time; 5 most of the time; 6 all of the time.)

- a nervous person?
- gloomy and dejected?
- exhausted?

We then study the relationship between these measures of welfare and expectation errors. We expect two possible results. If expectation errors prevent households from smoothing their consumption, we would expect both overoptimistic and overpessimistic households to report more negative feelings. If expectation errors only affect a more subjective measure of welfare through disappointment or positive surprises, then we should expect overoptimistic households to report feeling worse and overpessimistic households to report feeling better. To distinguish between these two hypotheses, we distinguish between positive and negative expectation errors in the regressions. A positive (negative) expectation error is equal to the expectation error if it was positive (negative), and to 0 otherwise. As before, we also control for past income since this could affect feelings independently of past expectation errors. We also control for the interaction between past income and past expectation errors (positive and negative). A household who did not expect to lose his job might indeed feel worse than someone who did not get an expected bonus. Symmetrically, a household who got an unexpected bonus might not feel as better off as someone who expected to lose his job but did not.

Note that the measures of feelings are imperfect for our purpose since they only ask households how they felt over the past four weeks while expectations are about the next year and past

income is about the previous year. It is not clear whether an expectation formed one year earlier could have an impact on feelings experienced in the past month. Households might indeed have realized that they were too optimistic or pessimistic already a long time ago and may have forgotten about it or gotten used to it. This should work against finding an effect of expectation errors on feelings. To mitigate this concern, we take the expectation error associated with an expectation formed three rather than four quarters before. The limitation of this choice is that some households might not have yet realized that they were too optimistic or too pessimistic, for example, they have not learned yet about their bonus or dismissal. We also ran the same regressions with the fourth and second lags. The results are similar but generally insignificant.

Table 9 shows the results. More overoptimistic households subsequently feel worse. More overpessimistic households, however, feel better. This is consistent with households feeling good about the fact that they will be able to consume more than they expected. Ekici and Koydemir (2016) and Barazzetta (2015) report similar findings using a British survey. While the evidence above suggests that overpessimistic households might fail to smooth consumption, this does not seem to lead to worse feelings. Not surprisingly, we also find that households who report a deteriorating financial situation feel worse. Finally, the effect of expectation errors on feelings is muted when it is associated with a less severe deterioration of the financial situation.

6 Discussion

If expectation errors are costly, households might try to reduce their extrapolation bias. For example, older households might have more experience and learn over time how to make more accurate forecasts. Furthermore, more educated households might be better at forecasting their future income. We should thus expect a smaller expectation bias for older and more educated households. This would imply that when we regress expectation errors on the interaction between past income and age or education, the overall coefficient on past income should be closer to 0 for older and more educated households. We also investigate whether the extrapolation bias

Table 9: Feelings and Expectation Errors

VARIABLES	(1) Nervous	(2) Gloomy	(3) Exhausted
Lag Neg Exp Error	0.0347 (0.0308)	0.0629** (0.0316)	0.0648* (0.0331)
Lag Pos Exp Error	0.0655** (0.0322)	0.0760** (0.0309)	0.0340 (0.0285)
Past Income	-0.0362*** (0.0111)	-0.0490*** (0.0111)	-0.0272** (0.0115)
Lag Neg Exp Error*Past Income	-0.0104 (0.00997)	-0.0150 (0.00973)	-0.0172* (0.0103)
Lag Pos Exp Error*Past Income	-0.0275** (0.0130)	-0.0330*** (0.0125)	-0.0132 (0.0114)
Constant	1.717*** (0.0372)	1.871*** (0.0369)	1.918*** (0.0398)
Observations	21,391	21,390	21,389
R-squared	0.007	0.010	0.004
Number of households	3,156	3,156	3,156
IND FE	YES	YES	YES
TIME FE	YES	YES	YES

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

depends on income or gender, though we do not have a prior hypothesis.

To study these conjectures, we regress expectations and expectation errors on past income, age, education, gender, income, and also interact each household characteristic with past income. Since the characteristics of households changed very little or not at all, we do not include individual fixed effects. Table 10 shows the results.

We find that the impact of past income on expectation errors actually increases with age. Older individuals thus over-extrapolate more. This suggests that individuals do not learn how to form more accurate expectations over time, rather the contrary. According to the estimates, a 50-year old household has an extrapolation bias that is about 50% higher than a 30-year old one. We also checked for the presence non-linear effects of age but did not find any (results not reported).

Second, we look at the impact of education on expectation errors where we would expect households with more education to suffer less from the extrapolation bias. Participants to the survey provide their education level: primary school (1), middle school (2), high school (3), middle vocational school (4), high vocational school (5), and College (6). We then regress expectation errors on past income, education, and their interaction. We find that more educated households have a lower extrapolation bias. A household with a college education has an extrapolation bias that is about one third of the one of a household who only went to primary school.

Third, we study the effect of income on expectations. We use a question from the survey that asks households to report the gross income of the household and categorize it in quartiles. It is not clear how the extrapolation bias should depend on income. We find that income does not affect the extrapolation bias.

Finally, we investigate whether males and females differ in their expectation formation process and find that the extrapolation bias does not depend on gender.

Table 10: Households characteristics

VARIABLES	(1) Exp Income	(2) Exp Error	(3) Exp Income	(4) Exp Error
Past Income	0.516*** (0.00656)	0.124*** (0.00858)	0.509*** (0.0348)	0.110** (0.0482)
Age	-0.00760*** (0.000305)	-0.00299*** (0.000442)	-0.0154*** (0.00122)	-0.00806*** (0.00165)
Education	0.0245*** (0.00306)	-0.00585 (0.00427)	0.106*** (0.0125)	0.0576*** (0.0163)
Female	-0.0298*** (0.00992)	-0.0111 (0.0141)	0.102** (0.0395)	-0.00297 (0.0517)
Income	0.00887* (0.00455)	-0.0235*** (0.00640)	0.0143 (0.0182)	-0.0342 (0.0237)
Past Income*Age			0.00286*** (0.000428)	0.00189*** (0.000596)
Past Income*Education			-0.0313*** (0.00453)	-0.0245*** (0.00604)
Past Income*Female			-0.0513*** (0.0143)	-0.00319 (0.0194)
Past Income*Income			-0.00283 (0.00649)	0.00373 (0.00868)
Constant	1.641*** (0.0391)	-0.0975* (0.0523)	1.692*** (0.101)	-0.0409 (0.135)
Observations	28,540	21,502	28,540	21,502
R-squared	0.336	0.042	0.341	0.044
IND FE	NO	NO	NO	NO
TIME FE	YES	YES	YES	YES

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

7 Conclusion

This paper documents new facts about the expectation formation process of households. It finds evidence consistent with over-extrapolation of recent experience. Households whose financial situation improved tend to become too optimistic. We also show that these expectation errors have implications on consumption choice and possibly on welfare. Overoptimistic households intend to consume more and tend to subsequently renounce on their initial consumption plans. The result could be an excessively volatile consumption. Finally, over-extrapolation could also have macroeconomic implications by amplifying fluctuations. For example, a crisis could be prolonged if many households become too pessimistic in a context of deteriorating financial situation.

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