Self-assessed cognitive ability and financial wealth: Are people aware of their cognitive decline?*

Fabrizio Mazzonna
Universitá della Svizzera Italiana (USI)

Franco Peracchi
Georgetown University and EIEF

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Abstract

We investigate whether people correctly perceive their own cognitive decline and the potential financial consequences of misperception. Using longitudinal data from the Health and Retirement Survey, we examine the relationship between self-ratings of memory ability and assessed memory performance and show that older people tend to underestimate their own cognitive decline. We then investigate the financial consequences of this underestimation. We show that respondents who experience a severe cognitive decline across waves, but are unaware of it, are more likely to experience financial losses. Finally, we examine potential explanations for the patterns of wealth changes observed among respondents who are unaware of their cognitive decline. Our findings support the view that financial losses among unaware respondents reflect bad financial decisions, not rational disinvestment strategies.

Keywords: Aging; cognitive ability; financial decisions; HRS.

JEL codes: J14, J24, C23.

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1 Introduction

A key aspect of the process of human aging is the decline of cognitive ability, a complex phenomenon whose causes and economic consequences are still not well understood. Our insufficient understanding of cognitive decline, and of human capital decumulation more generally, is unfortunate because cognitive functioning influences an individual's ability to process information and make the right choices, and is therefore crucial for task performance and decision making. The role of cognitive functioning is even more important in the light of the recent tendency to scale back publicly-provided safety nets that require relatively little individual decision-making – such as public social security and healthcare systems – and to rely more on private providers that require substantially higher decision-making skills. For instance, the pension landscape in the U.S. and many other countries has changed dramatically in the last three decades with a major shift away from defined benefit systems towards defined contribution systems (see e.g. Poterba et al., 2007). Irrespective of the precise nature of this shift (which in each country reflects a different mix of legislated changes, changes in the patterns of participation behavior, and changes in the level and composition of pension portfolios), the result is that older people are now asked to make decisions in complex choice situations that crucially affect their lifetime resources and welfare. If older people lack the skills required to properly manage their wealth, they are more likely to make mistakes that lower their own welfare with broader consequences for the whole economy (Campbell, 2016). Because of the significant amount of assets they hold,[1] older people are also more likely to be victimized by investment fraud (Kieffer and Mottola, 2016).

These observations motivate a growing body of research in economics on the cause and consequences of financial (il)literacy (see Lusardi et al., 2014 for a review) and its relationship with the process of cognitive aging (Agarwal and Mazumder, 2013; Korniotis and Kumar, 2011; Finke et al., 2016). They also raise fundamental questions about the optimal policy response (Agarwal et al., 2009). A crucial aspect that has received only limited attention is whether people recognize their own cognitive decline and are able to protect themselves from it. For example, if people perceive or predict their own cognitive decline, they may delegate financial decisions to someone they trust – another family members or to a financial advisor – without incurring financial losses. On the contrary, if people are unaware of their cognitive decline, they may incur financial losses or may be subject to financial frauds or scams (Lusardi et al., 2014). The consequences of cognitive decline may be even worse for those with high initial levels of cognitive ability, who tend to manage directly their finances and not seek advice due to a higher level of confidence (von Gaudecker, 2015; Kim et al., 2018).

Using longitudinal data from the Health and Retirement Survey (HRS), a large nationally representative survey, we study the relationship between self-ratings of memory ability and assessed

[1] According to the 2016 Survey of Consumer Finance of the Federal Reserve Bank, the highest value of the median family net worth in the U.S., roughly 265,000 U.S. dollars, is found among families whose head is 75+.

memory performances (measured by the total score in the word recall tests) and show that older people tend to grossly underestimate or even be unaware of their own cognitive decline. The availability of longitudinal data is important because it allows us to separate age and cohort effects while controlling for other time-invariant individual characteristics that may affect the level of cognitive ability. Our findings are consistent with the evidence, from a small longitudinal survey for the Chicago metropolitan area (Gamble et al., 2015), that decreases in cognition are strongly associated with decreases in financial literacy but not with decreases in self-confidence for managing financial matters.

We then analyze the financial consequences of this underestimation by focusing on individuals who experienced a severe cognitive decline, as measured by the change in their memory score across survey waves. We show that respondents who are unaware of their cognitive decline are more likely to experience large wealth losses compared to respondents who are aware of their cognitive decline and, more generally, compared to all other respondents who do not experience a similar decline. Substantial wealth losses across waves are mainly reported by people in the third and fourth quartiles of the distribution of total wealth, and amount to an average decline of 4% in mean total wealth across waves. These losses are concentrated among respondents who are unaware of their declining memory performance and are mainly driven by large decreases in the real value of financial wealth (about 10% on average across waves), particularly in the value of stocks, mutual funds and investment trusts owned. Furthermore, we show that wealth losses are much larger among respondents who were active on the stock market in the previous two years. Since these wealth losses mainly reflect a decrease in the value of the financial assets held by wealthier respondents who are unaware of their declining memory, they might be the result of bad financial decisions. In fact, we do not find comparable wealth losses among respondents who are aware of their declining memory performance, or among respondents who are unaware but are less likely to take financial decisions in the household (non-financial respondents). We show that wealthier but unaware respondents are actually more likely to show better memory performance before the occurrence of memory losses, which suggests an interpretation based on overconfidence. As argued by Barber and Odean (2001), overconfident investors incur larger return losses because they trade too much, hold unrealistic expectations about their investments and the accuracy of their estimates, and invest too much on information acquisition. The overconfidence interpretation is consistent with the finding in Korniotis and Kumar (2011) that older investors lose their investment skills as their cognitive ability declines. It is also in line with the evidence in von Gaudecker (2015) that the largest deviations from efficient portfolio strategies occur among those who neither score high on financial literacy nor seek external help with their investments, and with the findings in Kim et al. (2018) that people with higher levels of cognitive ability are more likely to seek financial advice from professionals outside of family members but are also more likely to be overconfident regarding their investments.

Differences in health or other unobservable characteristics may provide alternative explanations for the differences in wealth profiles, especially between people aware and unaware of their cognitive decline. For instance, if unaware respondents have lower subjective life expectancy, they might optimally decide to disinvest more and this would explain their different wealth profiles. We find, however, that unaware respondents decline are on average in better physical health. Moreover, unlike aware respondents, they do not show any negative change in their subjective assessment of life expectancy. Given their better health conditions and longer subjective time horizon, the life-cycle hypothesis would predict larger disinvestments for respondents aware of their cognitive decline, which is just the opposite of what we observe. Additionally, we do not find differences in financial transfers to children or differences in consumption using additional data from the HRS Consumption and Activities Mail Survey (HRS-CAMS).

Our paper is related to a growing literature that investigates the determinants of the large wealth dispersion observed in the U.S. and many other developed economies (see Campbell, 2016 for a review), especially around the age of retirement. While earlier literature attempts to explain the large cross-sectional wealth inequality through heterogeneity in saving rates (Dynan et al., 2004) or risk aversion (Calvet et al., 2009), recently attention has also been devoted to cross-sectional heterogeneity in rates of returns (Fagereng et al., 2016) arising from large differences in financial knowledge (see for example Lusardi et al., 2017). Unlike this literature, we provide evidence for a different channel that affects longitudinal variation in wealth, namely the process of cognitive aging for people unaware of their declining skills. Our findings also have different policy implications because, instead of pointing to interventions aimed at overcoming the lack of financial literacy of older cohorts, they point to interventions aimed at moderating the overconfidence of wealth owners unaware of the fact that their previously good skills are now rapidly deteriorating.

The remainder of this paper is organized as follows. Section 2 reviews the literature on cognitive aging and decision making. Section 3 describes our data and presents some descriptive statistics. Section 4 describes our modeling strategy. Section 5 presents our empirical results and discusses some alternative explanations. Finally, Section 6 concludes.

2 Cognitive aging and decision making

Cognitive ability is the ability to perform the mental processes required in a variety of tasks, so it is generally regarded as a multidimensional latent trait, only imperfectly measured by different types of performance test. As people get older, their cognitive ability tends to gradually deteriorate, though there is large variation across individuals at all ages (see for example Schaie, 1996). This age-related decline ranges from what may be considered as normal cognitive aging to large drops in cognitive performance due to neurological pathologies, such as Alzheimer's diseases or other forms of dementia

(Leshner et al., 2017).

The psychological literature usually draws a distinction between two different forms of intelligence, fluid and crystallized (Horn and Cattell, 1967). Fluid intelligence comprises fundamental skills, such as memory, executive functioning, abstract reasoning and processing speed (Salthouse, 1996), which are more closely related to biological factors. It is generally related to the performance on new tasks and is characterized by a steady decline over one's adult life starting already from the age of 20. Crystallized intelligence, which consists of the knowledge and experience acquired during the life, shows instead little age-related decline and partially compensates the large decline in fluid intelligence. Most day-to-day tasks rely on a different mix of these two forms of intelligence. Therefore, our ability to perform a specific task may decline over time at different rates (or even improve) depending on the tasks considered. For most tasks we can assume that cognitive performance is hump shaped with respect to age, with a peak reached around 50 years of age (for a recent review, see Mazzonna and Peracchi, 2018).

A rich literature, mainly in psychology, has investigated which way and to what extent the age related process of cognitive decline affects individuals' decision-making ability (see Carpenter and Yoon, 2011 for a review). According to this literature, older adults are more likely to use biased heuristic strategies in their decision making because the aging process increases the cost of engaging in effortful cognitive activities (Hess, 2014). Older adults may in fact choose to limit both the quantity and the complexity of the information that they use. As in the macroeconomic literature on rational inattention (see, e.g., Sims, 2003 and Paciello, 2012), this may in fact be perfectly rational given their increasingly limited capacity for processing information (Kim et al., 2016). Consistently with this view, Abaluck and Gruber (2011) find that the elderly choices under Medicare Part D tend to focus on a quite narrow range of dimensions, which is inconsistent with a fully informed rational decision process with no limit on information-processing capacity.

Given the fundamental role of preferences in economic modeling, economists have recently focused their attention on the relationship between cognition and risk aversion (Dohmen et al., 2010; Benjamin et al., 2013; Dohmen et al., 2018) and the effects of aging on this relationship. For instance, Bonsang and Dohmen (2015) find that the association between aging and risk aversion is mediated by numerical ability. Recent experimental evidence in psychology (Henninger et al., 2010; Koscielniak et al., 2016) also confirms the positive correlation between aging and risk aversion and the mediating effect of the age-related decline in processing speed and memory. More generally, Christelis et al. (2010) show that cognitive ability is strongly related to portfolio choices. They find that the propensity to invest in stocks is strongly associated with cognitive ability. Further, this relationship persists after controlling for differences in health conditions, which also affect the likelihood to invest in risky assets (Rosen and Wu, 2004; Bogan and Fertig, 2013).

3 Data

This section describes our data, in particular our measures of memory and wealth, and presents some descriptive statistics.

3.1 The HRS

The HRS is a longitudinal household survey that collects rich and detailed information on nationally representative samples of approximately 20,000 Americans aged 50 or older and their partners. The survey began in 1992 and is fielded biennially in even-numbered years. Interviews are conducted in-person and by telephone, with supplemental information collected via mail.

We use data from the RAND HRS files, a cleaned, easy-to-use and streamlined version of the data from the original HRS core interviews, with derived variables covering a large range of measures and RAND imputations of missing values on income, assets, and medical expenditures. These files have been used extensively in the economic literature because they are consistent and comparable across waves. We confine attention to the nine survey waves from 1998 (wave 4) to 2014 (wave 11) because the cognitive tasks and the questions on self-rating of memory changed in 1996 and full information on total wealth are available only from 1998. Our main sample includes all respondents aged 50 and older with non-missing information on our variables of interest, namely self-rated and assessed memory,[2] and household wealth. To avoid potential selection issues arising from mortality and institutionalization, we further restrict the sample to people not older than 80 years of age.

In our robustness checks we also employ data from the HRS-CAMS, a paper-and-pencil survey fielded biennially in odd-numbered years. In particular, we employ data on total household expenditure and household expenditure on four categories of goods, namely durables, non-durables, housing and transportation.

All sample statistics presented in the remainder of this section are computed using the HRS respondent-level weights, which adjust for differences in the composition of the sample and the population in terms of age, marital status, race and cohort of entry.

3.2 Self-rated and assessed memory

The HRS asks respondents to rate their memory at the time of the interview as either "Excellent", "Very good", "Good", "Fair", or "Poor". It also asks respondents to rate their current memory compared to their memory in the previous interview (about two years earlier) as either "better now",

[2] To minimize the effects of attrition and nonresponse due to aging and aging-related conditions, the HRS makes extensive use of proxy interviews, which are programmed and worded separately (see e.g. Weir et al., 2014). For most questions, the proxy interview only involves wording changes (e.g., from "you" to "her"), but some questions that are considered inappropriate to ask of proxies (e.g., cognitive performance tests) are omitted entirely. In what follows we drop proxy interviews because they do not contain the cognitive performance tests.

"about the same", or "worse now".

The HRS assesses memory performance using two word recall tasks designed as follows.[3] The interviewer reads a list of ten words to the respondent and asks her to recall as many words as possible from the list in any order. The respondent hears the list only once and is asked to recall the words two times, immediately after the encoding phase (immediate recall) and after a few minutes (delayed recall). We sum up the scores in the two tests, so our memory score ranges from 0 to 20.[4] Figure 1 shows the distribution of the memory score, both in levels and in differences across waves of the survey. On average, the memory score is equal to 9.78, while the difference in the score between two waves is only slightly negative (-.37), suggesting that many respondents actually improve their score from one wave to the next. This may partially reflect retesting effects (Salthouse et al., 2004). These arise because, although respondents are exposed to a different list of words in each wave, repeated exposure to the same test format might induce some learning. If attrition across waves is correlated with cognitive functioning, sample selection might also partially explain the observed distribution of changes in the memory score. All in all, it is reassuring to observe that the share of respondents who improve their score across waves strongly declines with age.

To simplify the comparison between self-rated and assessed memory changes, we dichotomize both variables. As for self-rated changes, we distinguish between declining memory ("worse now") and non-declining memory ("about the same" or "better now"). As for assessed performance, we first define a threshold – absolute or relative – that allows us to distinguish respondents who experience a severe memory loss across waves from those who do not. Following the neuropsychological literature (see e.g. Nasreddine et al., 2005), a memory loss may be regarded as severe if it exceeds one standard deviation, corresponding in our case to a loss of three or more words. Such "absolute" definition may understate cognitive declines among respondents with poor memory scores already in the baseline year (floor effect). Therefore, in what follows we present the results obtained using a "relative" definition that regards a memory loss as severe if it corresponds to a decline of the memory score by 20% or more. This corresponds to the first quintile of the distribution of the changes in the memory score and to an average decline of almost four words, starting from an initial score of 11.7 words on average. In the Appendix we also present the results obtained using the absolute definition or alternative thresholds and test for ceiling and floor effects.

Notice that, as a consequence of our sample selection criteria described in Section 3.1, these definitions of memory loss capture cognitive declines that occur at an earlier age and are likely to be much milder than those associate with the Alzheimer's disease or other forms of dementia.

[3] As argued by Dohmen et al. (2018), these tests only capture memory performance if other factors that might affect test performance are held constant. For example, distractions on the day of the test or personality traits that determine task motivation could play an important role.

[4] For more information about the cognitive measures in the HRS see Ofstedal et al. (2005).

The HRS also includes cognitive tasks aimed at assessing other cognitive dimensions, such as basic skills of reasoning, orientation, calculation, language, and knowledge. In the Appendix (Figure A.1) we shows that our measure of relative memory decline is strongly correlated with three other such tests, namely backward counting and serial 7, which involve simple numerical calculations, and the total mental status score, which sums the scores from the counting, naming and vocabulary tests.[5] On average, our definition of memory loss is associated with a decline of 10% of a standard deviation in the other test scores. This indicates that it captures the overall deterioration of an individual' cognitive performance.

Finally, it is worth noting that the order of the questions is always the same. The respondents are first asked to self-rate their memory and then follow the cognitive testing.

3.3 Household wealth

The HRS collects detailed information on household wealth and its individual components, distinguishing between thirteen asset categories: the value of primary residence; the value of secondary residence; the net value of real estate (not primary or secondary residence); the net value of vehicles; the net value of farm or business; the net value of individual retirement accounts (IRA or Keogh plans); the net value of stocks, mutual funds and investment trusts; the value of checking, savings, or money market accounts; the value of certificates of deposit (CDs), government savings bonds and Treasury bills (T-bills); the net value of bonds and bond funds; the net value of all other savings or assets; the value of all mortgages/land contracts (primary residence); the value of other home loans (primary residence); the value of all mortgages/land contracts (secondary residence); and the value of all other debt (credit card balances, medical debts, life insurance policy loans, loans from relatives, etc.). This information is obtained from the designated "financial respondent", one in each household, namely the person more knowledgeable about financial issues. Notice that the RAND HRS files do not encompass all components of total wealth, as they only contain fragmentary information on 401k, 403(b) and other employer-sponsored retirement plan balances, and no information on Social Security wealth. Including the value of these components would complicate matters considerably – as they can only be estimated indirectly, for example using the data and the procedure described in Barth et al. (2018)[6] – but is unlikely to substantially modify our results – as it is implausible that changes in these unmeasured components would offset those observed for the measured components, and do so in ways that differ across respondents' types.

We are primarily interested in the net value of total household wealth, computed as the sum of

[5] The serial 7 test asks the respondent to subtract 7 from 100, and continue subtracting 7 from each subsequent number for a total of five times. The vocabulary task scores the respondents ability to provide definitions of five given words.

[6] Barth et al. (2018) compute Social Security wealth by exploiting the link between individuals in the HRS and income data available through the Master Earnings File maintained by the U.S. Social Security Administration.

all assets and liabilities recorded in the HRS, and total household financial wealth, computed as the sum of all financial wealth components recorded in the HRS (excluding the net value of individual retirement accounts) less the value of all debt components except mortgages. We convert all monetary amounts to 2014 U.S. dollars using the average consumer price index (CPI) as deflator. Although the information on household wealth is self-reported, it is important to note that the HRS interview includes an asset verification procedure, in which the respondents are asked to verify or correct the asset values reported in the previous and the current waves whenever there is a large discrepancy (more than 50,000 U.S. dollars) between the initially reported values. Unfortunately, missing or incomplete information (e.g. bracketed amounts in an unfolding bracket sequence) on some wealth components represents a serious challenge. The RAND HRS files provide imputed values for these cases.[7] To limit the impact of the imputation procedures on our results, we restrict the sample to the observations for which the imputations represent less than 20% of the value of all asset and debt categories. To limit the impact of outliers we also trim all observations with total wealth below the 1st percentile or above the 99th percentiles. The resulting working sample consists of 22,747 individuals (9,720 males and 13,027 females), observed on average for 3.7 waves, and represents 94% of the individuals aged 50–80 in the original HRS sample. Figure 2 shows that, as expected, the wealth distribution is heavily skewed to the right. Moreover, in the case of financial wealth, a large fraction of respondents report zero or even negative values.[8]

We use the information on the composition of financial wealth by asset category in any given wave to predict total financial wealth in the following wave using monthly information on market returns by asset category obtained from the Thomson Reuters Datastream database. Specifically, for stocks we use the difference in the S&P 500 Composite Index; for long-term bonds we use the U.S. Treasury 10 Year Government Bond Yield; for CDs, government savings bonds and T-bills we use the interest rate on 3-month CDs; for debt we use the 24-month personal consumer credit interest rate; and for checking and savings accounts we use estimates obtained from Statista.[9] Suppose that individual i is interviewed in month t and re-interviewed m months later. Given her initial amount of wealth W_{ijt} in asset category j, we compute the predicted value $W^*_{ij,t+m}$ of her wealth in that category at the time of the next interview by the formula:

$$W^*_{ij,t+m} = W_{ijt} \prod_{s=t+1}^{m} (1 + r_{js}),$$

[7] Detailed information on the imputation procedure can be found in Hurd et al. (2016).

[8] This prevents us from using the log transformation, which would be natural given the skewness of the wealth distribution. As robustness check, we show that the results using the log transformation are very similar to those reported in the main text when focusing on the richest respondents for whom the probability of having a negative wealth value is close to zero (Section 5.3).

[9] http://www.statista.com/statistics/325600/average-interest-rate-checking-account-usa/. We assume that for the missing years (before 1998 and after 2014) the time profile of the interest rate is the same as the FED Federal Funds target rate, which we again obtain from Datastream.

where r_{js} is the return on asset category j between month $s-1$ and month s. The predicted value of total financial wealth is then computed by adding up the predicted values of all asset categories.

3.4 Descriptive statistics

Figure 3 shows the age profiles of the mean value of the memory score (the sum of the scores in the immediate and delayed word recall tasks) and of the self-rated memory level. Interesting, the first profile is much steeper than the second. This result is not affected by cohort effects, as confirmed by Figure A.2, which separately analyzes the longitudinal profiles of the first three HRS cohorts,[10] and by Figure A.3, which plots the mean residuals by age from a fixed effect regression.

We find similar evidence when we compare changes in the memory score with self-rated memory changes across waves. Table 1 shows that most respondents who experienced a severe memory loss between successive waves (defined as a either a relative decline of 20% or more in the memory score or an absolute decline of one standard deviation or more) actually rate their memory as stable or improved. Figure 4 shows that, as expected, the proportion of respondents who experience a severe memory loss increases with age, but the age-profiles for aware and unaware respondents are roughly parallel.

Figure 5 shows the distribution of the assessed memory performance in the wave before the occurrence of a severe memory loss. Although we use the relative definition of severe loss (a 20% decline of the initial memory score), respondents who experienced a severe loss still show on average higher initial memory performance than those who did not experienced a severe loss (top figure). When we only consider the subset of respondents with a severe memory loss (bottom figure), the distributions of their memory performance in the previous wave is much more similar for aware and unaware respondents, and is actually slightly better for unaware respondents.

In Table 2 we investigate the characteristics of those who are more likely to experience a severe memory decline and to be unaware of it. Specifically, we report the estimated marginal effects from probit models for the probability of experiencing a relative memory loss as defined above (Columns 1–3) and for the probability of being unaware conditional on having a memory loss (Columns 4–6). For both outcomes, we initially control only for basic socio-demographic characteristics and wealth quartiles (Columns 1 and 3). We then include additional controls for memory score (Columns 2 and 4) and health conditions in the previous wave (Columns 3 and 6). Consistently with Figure 4, age positively affects the likelihood of experiencing a memory loss but only weakly affects that of being unaware. As expected, education, wealth and health are negatively associated with severe memory

[10] Although the HRS includes six birth cohorts, here we only consider the four for which we have a longer observation window, namely the original HRS cohort born 1931–1941 entering in 1992, the Study of Assets and Health Dynamics (AHEAD) cohort born in 1923 or earlier and entering in 1993, and the Children of Depression (CODA) cohort born 1924–1930 and the War Baby (WB) cohort born 1942–1947, both entering in 1998. We do not include the Early Boomers (EBB) cohort born 1948–1953 and the Mid Boomers (MBB) cohort born 1954-1959.

declines. However, most of these "protective" factors only weakly affect the probability of being unaware or even increase that probability. In particular, respondents who have higher memory scores or are in better health conditions are more likely to be unaware of their memory decline in the next wave (Columns 5–6). Interestingly, the negative association between wealth and the probability of memory loss grows stronger as we move up along the wealth distribution. Contrary to what one might expect, among those who experience a severe memory decline, the unaware are not retired people living alone with low education and poor health and cognitive functioning. Instead, they appear to have better initial health and memory capacity, and therefore more likely to be still confident about their skills. It is worth noting that having children does not affect the probability of experiencing a memory decline but lowers the probability of being unaware. Finally, females have both a higher probability of experiencing a memory loss and of being unaware of it.

4 Modeling

The regression models we fit to the data are meant to reveal possible associations between wealth changes across waves and severe declines in memory performance, and whether the nature of this association depends on the respondents' awareness of their cognitive decline.

Although HRS respondents are asked to self-rate both their memory performance in the current wave and changes in memory performance across waves, we focus on self-rated memory changes for two reasons. First, we want to investigate the wealth profiles of respondents who experience a severe memory decline, so we are more interested in their perceived changes in memory performance than in their perceived memory performance at a point in time. Second, among respondents who experience a severe memory decline, as measured by the change in their memory score, we can distinguish between those who self-rate their memory as declining and those who do not. This is easier than defining a threshold for the self-rated memory level in a given wave (e.g., poor or fair) and comparing it with the assessed memory performance.

Our model for individual wealth changes is the following:

$$\Delta W_{it} = \beta_0 + \beta_1 Aware_{it} + \beta_2 Unaware_{it} + \boldsymbol{\beta}_3^\top \boldsymbol{X}_i + \boldsymbol{\beta}_4^\top \boldsymbol{Z}_{it} + \delta_t + \epsilon_{it} \tag{1}$$

where ΔW_{it} is the change in wealth of individual i between wave $t-1$ and wave t, $Aware_{it}$ is a binary indicator equal to one if individual i experiences a severe memory decline between the two waves and self-rates her memory as declining, $Unaware_{it}$ is a binary indicator equal to one if individual i experiences a severe memory decline between the two waves but self-rates her memory as stable or improving, $\boldsymbol{X}_i$ is a vector of time-invariant regressors including sex, race and years of education, $\boldsymbol{Z}_{it}$ is a vector of time-varying regressors including a quadratic age term and a set of indicators for marital status, labor force status, geographical region (census division), for being the financial respondent in the household and for respondents who do not experience a memory decline but self-rate their memory as worse now, δ_t is a survey-wave fixed effect common across individuals, ϵ_{it} is an unobservable error term assumed to be mean independent of the observable regressors, and β_0, β_1, β_2, $\boldsymbol{\beta}_3$ and $\boldsymbol{\beta}_4$ are parameters to be estimated.

The fact that model (1) is in first differences has two important implications. First, its parameters have a different interpretation than for a model in levels. For example, the difference $\beta_1 - \beta_2$ measures the difference in the predicted value of ΔW_{it} for two individuals with the same values of $\boldsymbol{X}_i$ and $\boldsymbol{Z}_{it}$, one aware of her memory decline and the other unaware. Whether the difference $\beta_1 - \beta_2$ may also be given a causal interpretation is an important question that we leave to the next section. Second, since wealth is self-reported, wealth changes across waves may be subject to a substantial amount of measurement error, which is likely to significantly increase the variability of the error term in (1) relative to a model for the levels of wealth.

To guarantee that we are comparing individuals who are otherwise similar in terms of observable characteristics, we present the results of a more general model that also controls for differences in the initial wealth and memory levels by including the wealth and memory score in the previous wave as additional time-varying regressors. This is done because wealth changes may be expected to be larger for people with a larger initial amount of wealth. Moreover, wealthier respondents are less likely to experience a severe memory loss but more likely to be unaware. Further, we investigate the heterogeneity of the results across quartiles of the initial wealth distribution. It is worth noting, that in Section 5.3, we implement a series of robustness checks that are meant to address a number of problems that may arise in case of model misspecification.

5 Results

We begin by examining the relationship between changes in total wealth and the occurrence of severe memory losses (defined here as a decline of 20% or more in the memory score) using various versions of the first-difference regression model (1). We then discuss alternative interpretations of our empirical findings and present the results of a number of robustness checks.

5.1 Baseline model

The first two columns of Table 3 show the results obtained when we do not distinguish between aware and unaware respondents, and only include an indicator for a severe memory loss, that is, we impose the restriction that $\beta_1 = \beta_2$ in model (1). In Column (1) we do not condition on initial wealth or memory levels. In this case we see little evidence of systematic differences in wealth changes over time between people with and without severe memory losses. In Column (2) we instead condition on a respondent's initial wealth and memory levels. The large and statistically significant negative coefficient now associated with the memory loss indicator reflects the fact that wealth changes tend to be negative for people starting with large wealth values, and these wealth losses tend to be much larger for people with severe memory losses. Column (3) removes the restriction that $\beta_1 = \beta_2$ in model (1) and shows that wealth losses are on average much larger for respondents who are unaware of their memory decline and that the estimates of the difference $\beta_1 - \beta_2$ are statistically significant at 10% level. In the last three columns of Table 3 we focus on the subset of respondents who experience a severe memory decline. Column (4) confirms that the expected difference in wealth losses between aware and unaware respondents is negative and statistically significant, that is, wealth losses are larger for respondents who are unaware of their memory decline. Columns (5) and (6) further distinguish between those who are designated in the survey as financial respondents, and therefore are more likely to take financial decisions in the household (Smith et al., 2010), and those who are not. A comparison of the two columns shows that the expected wealth losses are statistically different from zero only for the financial respondents, which suggests that being unaware of one's own cognitive decline has much more serious consequences for those who actually take financial decisions in a household. For this reason, we henceforth focus only on financial respondents.[11]

Table 4 presents the results of fitting model (1) separately by quartile of the distribution of initial wealth to account for heterogeneous effects depending on the position in the initial wealth distribution. The table shows that the wealth losses observed for respondents who are unaware of their own memory decline are concentrated among those in the top half (third and fourth quartiles) of the initial wealth distribution and represent roughly a 4% decline in their mean wealth. Furthermore, the difference $\beta_1 - \beta_2$ between aware and unaware respondents is statistically significant only for the wealthiest respondents. Table A.4 in the Appendix shows that wealth losses mainly involve respondents who are still employed or under age 70, and therefore probably in a phase of their life where they are still saving for retirement.

So far we only investigated the relationship between severe memory changes (self-rated or assessed) and total wealth changes. To explore potential mechanisms behind the observed relationship, Table 5 presents the results obtained by fitting model (1) for total wealth changes (Column 1 is the same as Column 3 of Table 3) and then separately for changes in the value of five broad wealth categories, namely financial wealth, individual retirement accounts, housing, other real estate, and farm/business.[12] The table shows that the wealth losses for respondents who are unaware of their declining memory are mainly the results of decreases in their financial wealth, followed by decreases

[11] The results for the whole sample are very similar and are available upon request.

[12] Financial wealth consists of the net value of stocks, mutual funds and investment trusts, the net value of checking, savings or money market accounts, the value of CDs, government savings bonds or T-bills, the net value of bonds and bonds funds, and the net value of all other savings or assets; individual retirement accounts consist of the net value of IRA/Keogh plans; housing consists of the net value of the primary residence; other real estate consists of the net value of the secondary residence and other real estate; and farm/business consists of the net value of farm or business.

in the value of their individual retirement accounts. Changes in the value of the other wealth categories (other real estate, and farm/business) are smaller and statistically less significant. Using the RAND HRS definition of financial wealth, which excludes individual retirement accounts, we account for about 65% of the total wealth loss reported in the first column of Table 5. If we also include individual retirement accounts, we account for almost 90%.

Table 6 presents the results of fitting model (1) separately for people with and without financial wealth in the initial wave, and for respondents in the third and fourth quartiles of the distribution of initial wealth. The table shows that the effect is concentrated among those who initially hold positive financial wealth and among those with wealth above the median. More specifically, people in the third and fourth quartiles of the wealth distribution who are unaware of their memory decline experience substantial financial losses across waves, the magnitude of which corresponds to roughly 10% of their mean financial wealth.

Since financial losses are observed only for respondents who hold positive financial wealth in the previous wave and are unaware of their cognitive decline, we concentrate on this group. Table 7 shows that more than half of the average loss in financial wealth (which, from Table 6, is equal to about 22 thousand U.S. dollars at 2014 prices) reflects a decrease in the net value of stocks, mutual funds and investment trusts owned (Column 1). The rest is due to a decrease in the net value of certificates of deposit, checking and savings accounts, and in the net value of other savings or assets (Columns 4–6). We instead observe hardly any changes in the value of bonds and bond funds (Column 2) and in the value of financial debt (Column 3).

All in all, these results show that wealth losses are concentrated among wealthier respondents who are unaware of their cognitive decline, and the losses mainly involve the value of their financial assets. Since wealth losses are concentrated among the financial respondents, who are more likely to take financial decisions, it is possible that these people may have undertaken bad financial investments because unaware of their falling cognitive performance. We also know that respondents who experience a severe memory loss show better cognitive performance at the baseline (Table 2 and Figure 5) and are therefore likely to be more confident about their ability. This interpretation is confirmed by our investigation of the information from Section R (Asset Change) of the HRS. This module asks financial respondents who report owning (or having previously owned) stocks or shares in mutual funds about their stock market activity in the last two years (namely whether they sold and/or bought stocks or mutual funds shares including automatic reinvestments).[13] Table 8 shows that the wealth losses in total and financial wealth are mainly observed among unaware respondents who reported to be active on the financial markets in the last two years (Columns 1 and 4). Losses are also observed

[13] The high number of brackets responses and missing values on the amount of stocks sold or bought in the last period do not allow to calculate meaningful monetary amounts for these financial transactions.

among unaware respondents who were inactive (Columns 2 and 5) or were inactive and did not own stocks (Columns 3 and 6), but these losses are much smaller than for unaware respondents active on the financial markets. It is worth noting that being unaware does not affect the probability of being active on the stock market, which suggests that overconfidence does not lead people to be more active on the stock market but mainly causes them to perform worse on familiar tasks.

5.2 Alternative interpretations

The evidence reported so far is consistent with our "bad investment" interpretation. However, we cannot a priori exclude alternative interpretations of our findings that stress differences in observable or unobservable characteristics between respondents aware and unaware of their declining memory performance.

One possibility is that the negative wealth changes observed for unaware respondents do not represent losses but rational disinvestments reflecting the fact that unaware respondents may also have shorter life horizons. As already noted when discussing Table 2, among the respondents who experience a severe memory loss, those who are unaware are more likely to be in better health or to perceive themselves as in better health. However, since we are investigating the sources of differential wealth changes, what matters is whether memory losses induce changes in subjective life expectancy and how individuals react to these changes. This is investigated in the first two columns of Table 9, where we regress changes in subjective life expectancy on the occurrence of severe memory losses[14] using a specification similar to model (1) for wealth changes. The only case when we find evidence of a negative association between severe memory losses and changes in subjective life expectancy is when we consider respondents who are aware of their cognitive decline.

The last two columns of Table 9 instead show no evidence that severe memory losses are associated with statistically significant changes in out-of-pocket medical expenditure, neither for the aware nor for the unaware respondents. This allow us to reject another possible interpretation, namely that people unaware of their cognitive decline face higher medical expenses which negatively affect their wealth profiles. Table A.5 in the Appendix, based on the HRS-CAMS data, shows that relative memory losses are associated neither with increases in total consumption nor with increases in particular consumption categories, and this is true for both aware and unaware respondents. All these findings lead us to reject the rational disinvestment explanation.

Given the well-know relationship between cognitive ability, health and stockholding, in Table 10 we investigate whether respondents (un)aware of their cognitive decline change the composition of their financial portfolio between risky assets (stocks, mutual funds or investment trusts, but not individual retirement accounts) and safe assets (all the other assets included in our measure of financial wealth),

[14] The HRS asks the respondents what is the percentage chance that she will reach a target age which varies from 75 to 95 years depending of the age of the respondent at the time of the interview.

distinguishing between changes in the probability of holding risky assets (the extensive margin) and changes in the expected share of risky assets (the intensive margin). Our results indicate that both aware and unaware respondents with wealth levels above the median appear to slightly change their portfolio towards less risky assets, but only at the extensive margin.

We also investigate whether the differences observed in the wealth profiles reflect differences in the initial portfolio composition that lead to lower returns. Table 11 analyzes the differences between a respondent's total financial wealth in a given wave and the financial wealth predicted by capitalizing the value of total financial wealth in the previous wave at the average market return for the various asset categories, as described in Section 3.3. Specifically, we estimate model (1) replacing ΔW_{it} with these differences, in either absolute or relative terms (Columns 1–2 and Columns 3–4 respectively). Our results show that even taking account the initial composition of financial portfolios, respondents unaware of their cognitive decline appear to largely underperform relative to average market returns, far more so than the other respondents, including those aware of their cognitive decline. Again, the largest difference is found among the wealthier respondents (Columns 2 and 4).

We also consider whether the negative wealth changes associated to people unaware of their cognitive decline are the result of differential misreporting. People who experience a severe memory decline may find it harder to remember the value of their assets and make large errors across waves. These errors would appear as large wealth changes. The question is whether such problem affects aware and unaware respondents differently, and how. For example, if a survey participant recognizes her memory loss, then she may ask a family member or a caregiver to provide the necessary information about her assets. In this case, the wealth changes among people with poor memory may be attenuated or even eliminated for those who recognize the problem and take corrective actions. In fact, no evidence on the patterns of misreporting is possible without a linkage of HRS with administrative data. Nonetheless, all our test for differential misreporting (Table A.2 in the Appendix) credible reject such hypothesis. In particular, we find no indication that people unaware of their cognitive decline are characterized by higher levels of imputation of their financial wealth or, when restricting attention to stockholders, by a higher likelihood of providing missing or incomplete values. Furthermore, exploiting the asset verification procedure of HRS, which verifies whenever there is a substantial change in net worth or asset value, we find no evidence of differential asset misreporting between aware and unaware respondents.

Finally, Table A.3 in the Appendix shows no evidence of an association between severe memory losses and changes in financial transfer to children (neither in their probability nor in their total amount). This finding allows us to reject yet another interpretation, namely that the children, having noted the declining memory of their parents, take control of their parents' finances or anticipate the children's bequest.

5.3 Robustness checks

In this section we discuss the results of a number of robustness checks carried out mainly to assess the sensitivity of our results to alternative definition of memory loss. As already mentioned, our general conclusions do not change when we adopt the absolute definition of memory loss typically used in the neuropsychological literature, namely one standard deviation decline in memory score. Table A.7 in the Appendix shows that the results obtained in this case are quantitatively and qualitatively similar to those reported in Table 3.

We show in the Appendix that our results remain essentially unchanged when we vary the threshold for the relative definition of severe memory loss. Instead of our earlier 20% threshold (which roughly corresponds to the first quintile of memory changes) we consider two alternatives, namely a lower threshold of 15% (Table A.8) and a higher threshold of 25% (Table A.9). Irrespective of the threshold used, severe memory losses are associated with negative wealth changes. Not surprisingly, the difference between aware and unaware respondents is smaller when using the lower threshold and larger when using the higher threshold.

Although we use a relative definition of memory loss, ceiling and floor effects in the memory score might still affect the probability of observing a severe memory loss. To address this issue, we show that our results are substantially unaffected if we esclude the first and/or the last quintile of the initial memory score distribution (Table A.10).

Given the right-skewed distribution of wealth (Figure 2), we also considered using the log transformation. Unfortunately, the non-negligible number of negative or null wealth values (especially in the case of financial wealth) prevented us from following this approach for the full sample. However, when focusing on respondents in the third or fourth quartile of the initial wealth distribution – for whom the probability of having a negative wealth value is very low – the results obtained using the log transformation are very similar to those reported in the main text (Table A.1 in the Appendix).

Of course, the main concern with model (1) is potential model misspecification leading to failure of the assumption that the unobservable error term ϵ_{it} in (1) is mean independent of the included regressors. One possibility is that the estimated difference in wealth changes between aware and unaware respondents is only the consequence of a different timing or a different dynamic. For instance, some respondents might just experience a wealth loss one or a few years before their memory loss is detected by the HRS memory tasks. More generally, it is interesting to investigate how the wealth changes of these people look like before and after the memory loss event. Figure A.4 in the Appendix separately presents the wealth changes of aware and unaware respondents as an event study. Specifically, we look at the wealth changes of (un)aware respondents up to four years before and after the memory loss event. The figure shows that, for unaware respondents, substantial wealth losses are observed only at the time of the memory loss event. Aware respondents, instead, show no substantial wealth losses and, if anything, they seem to experience some wealth gains over a 4-year period. It is worth noting that some respondents experience more than one memory loss event, of which they need not be always aware or unaware. To partially address this issue, we only consider the time to and from the first memory loss event registered in the data. However it is reassuring that results are quantitatively similar to those reported in the main text.

More generally, the fact that people may experience more than one severe memory loss event implies that they may repeatedly switch state (e.g., from aware to unaware and viceversa) across waves. To address the identification concerns that might arise, we first show that 70% of the respondents experience zero or only one memory loss events, and even when they experience more than one severe loss, only a small share of our sample (8.7%) jumps from one state to another in the observation period (see Table A.11). Furthermore, it is reassuring that if we exclude people jumping from one state to another, or only those who declare a memory decline in the previous wave, our results are again quantitatively similar to those reported in the main text (results available upon request).

Finally, Table A.12 in the Appendix presents the results obtained when we include as additional regressors in model (1) controls for initial health status – self-rated health (SRH), activities of daily living (ADL) and instrumental activities of daily living (IADL) – or for changes in health status across waves. Ignoring health status may give rise to an omitted variables problem because health levels or health changes may be correlated with both wealth and memory changes. It turns out that including these additional regressors does not alter our main results.

6 Conclusions

Using data from HRS, a large representative longitudinal dataset on American people over age 50, we show that people tends to largely underestimate their own cognitive decline and the financial consequences of financial consequences of misperception. To evaluate people awareness of their cognitive decline we investigate the difference between self-rating of changes in memory across waves and the actual change in memory measured using using two word list recall test. We find that respondents unaware of their own cognitive decline are more likely to experience a larger decline in their financial wealth compared to respondents who are aware of their declining memory respondents, and to all other respondents who did not experience a similar decline in their memory performance. We investigate several alternative explanations for our results including a rational disinvestments explanation related to the fact that they might be in worse health conditions and have a shorter (subjective) life horizon. Moreover, we find differences neither in consumption nor in transfer to children between the two types of respondents. Then, the more reasonable explanation for our results seems to be that unaware respondents are likely to make bad financial decisions which negatively affect their wealth profiles across waves. This is consistent with an overconfidence interpretation, as wealth losses are concentrated among financial respondents and those in the highest wealth quartiles who show a better initial memory performance.

After the recent financial crisis, there has been a strong commitments among policymakers to improve the quality of household financial decision making, and lot of attention has been devoted on individuals' financial literacy and how to raise its levels especially among younger people. However, what we show is that the decline of financial wealth associated with declining cognitive performances mainly involves wealthier respondents who initially have better cognitive performances. Therefore, our results suggest that what matters is not only whether people in old age have accumulated sufficient financial knowledge, but also whether they are aware that their cognitive performance is declining.

As for the policy responses to the problems identified in our paper, most of the key issues have already been identified and lucidly discussed in Agarwal et al. (2009) who consider in detail the pros and cons of several types of intervention. Here we briefly review the interventions that primarily target individual investors, leaving aside regulations aimed at increasing the fiduciary duties of sellers of financial products or imposing safety and quality standards on the financial products themselves. Two of these interventions, namely strengthening disclosure requirements and "libertarian paternalism" (i.e., the use of benevolent institutional "nudges" to correct behavioral biases) may be ruled out because it is recognized that they are unlikely to be effective on older people with significant cognitive declines. Not to mention the fact that disclosure requirements "often resulted in lengthy and complicated disclosures mainly designed to minimize legal risk rather than to communicate clearly" (Keane and Thorp, 2016). This leaves four possible approaches: laissez-fair, financial "driver's licenses", protecting assets in a mandatory "safe harbor", and mandatory advance directives. Laissez-fair may be viewed as second-best optimal to overcome the problems associated with strong regulatory interventions. Financial "driver's licenses" would require individuals to pass a "license" test before being allowed to make nontrivial financial decisions. Such an approach faces important practical problems, including the exact nature of the test, how often would people be required to take it, and whether this would be enough to catch people as they transition into a state of significant cognitive impairment. Protecting a retiree's financial assets in a mandatory "safe harbor" account is essentially a generalization of the type of mandatory annuitization schemes already popular in several countries outside the U.S. Unfortunately, this approach would considerably restrict individual choices and may create risks of political manipulation. Finally, mandatory advance directives would require people to set up protective mechanisms well ahead of time in the form of family oversight, competent and trustworthy financial advisers, or formal trusts. Our paper stresses two key problems associated with this last approach, namely the failure to anticipate, when cognitively healthy, the possibility of one own's cognitive decline, and the mistaken belief that one will recognize when the time has come.

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Table 1: Self-rated vs. assessed memory.

Self-rated memory change	Severe relative mem. loss No	Yes	Total
Stable or improved	.608	.187	.796
Worse	.149	.055	.204
Total	.757	.243	1.00

Self-rated memory change	Severe absolute mem. loss No	Yes	Total
Stable or improved	.618	.178	.796
Worse	.154	.050	.204
Total	.773	.228	1.00

Notes: This table compares self-rated memory changes across waves with two different measures of memory loss: 1) severe "relative" memory loss is defined as a decline of 20% or more in the memory score (first quintile); severe "absolute" memory loss is defined as a memory score change of one standard deviation or more.

Table 2: Probit estimates of the probability of having a severe relative memory loss and of being unaware conditional on having a severe relative memory loss

	Having a memory loss			Unaware (conditional on memory loss)		
	(1)	(2)	(3)	(4)	(5)	(6)
Age	.002 ***	.002 ***	.003 ***	-.002	-.002	-.003 **
	(.001)	(.001)	(.001)	(.001)	(.001)	(.001)
Age^2	.000 ***	.000 ***	.000 ***	-.000	.000	.000
	(.000)	(.000)	(.000)	(.000)	(.000)	(.000)
$Alone_{t-1}$	-.007 *	-.007	-.005	-.017 *	-.017 *	-.023 **
	(.004)	(.004)	(.004)	(.010)	(.010)	(.009)
Female	.030 ***	.077 ***	.077 ***	.033 ***	.046 ***	.043 ***
	(.003)	(.004)	(.004)	(.008)	(.008)	(.008)
Children	-.000	-.001	-.001	-.005 **	-.005 ***	-.004 **
	(.001)	(.001)	(.001)	(.002)	(.002)	(.002)
Education	-.005 ***	-.016 ***	-.015 ***	.000	-.003 *	-.007 ***
	(.001)	(.001)	(.001)	(.001)	(.001)	(.001)
$Working_{t-1}$	-.020 ***	-.037 ***	-.028 ***	.052 ***	.047 ***	.008
	(.004)	(.004)	(.004)	(.009)	(.009)	(.009)
Q2 $wealth_{t-1}$	-.013 **	-.032 ***	-.027 ***	.027 **	.022 *	.000
	(.005)	(.006)	(.006)	(.011)	(.011)	(.011)
Q3 $wealth_{t-1}$	-.018 ***	-.050 ***	-.040 ***	.021 *	.012	-.023 *
	(.005)	(.006)	(.006)	(.013)	(.012)	(.012)
Q4 $wealth_{t-1}$	-.025 ***	-.064 ***	-.051 ***	.017	.007	-.042 ***
	(.006)	(.006)	(.006)	(.014)	(.014)	(.013)
$Recall_{t-1}$		.095 ***	.097 ***		.024 ***	.017 ***
		(.002)	(.002)		(.003)	(.003)
SRH_{t-1}			-.016 ***			.061 ***
			(.002)			(.004)
ADL_{t-1}			.015 ***			-.057 ***
			(.006)			(.011)
Obs.	82015	82015	82015	19843	19843	19843
N	22565	22565	22565	13740	13740	13740
Mean	.24	.24	.24	.24	.24	.24
Pseudo R^2	.012	.083	.085	.012	.016	.043

Notes: This table shows marginal effects from probit estimates of the probability of being aware conditional on experiencing a severe relative memory loss. Column (1) includes only socio-demographic controls and survey year fixed effects (not reported). Column (2) adds the initial memory score. Column (3) also includes, as controls for initial health, self-rated health (SRH) and limitations with activities of daily living (ADL). Observations are weighted using the HRS respondent-level weights. We use robust standard errors clustered at the household level. Significance levels: *** < 0.01, ** < 0.05, * < 0.1.

Table 3: Changes in total wealth (thousands 2014 U.S. dollars)

	All respondents			Resp. w/severe mem. loss		
	(1)	(2)	(3)	(4)	(5)	(6)
Severe mem. loss	-1.203	-21.213 ***				
	(4.167)	(4.384)				
Aware			-10.202			
			(7.828)			
Unaware			-25.052 ***	-13.064 *	-18.005 **	-5.649
			(4.754)	(7.582)	(9.257)	(12.849)
$\beta_1 - \beta_2$			-14.850 *			
			(8.053)			
Obs.	83193	83193	83193	20231	14270	5961
N	22747	22747	22747	13926	9970	4311
Mean	423.7	423.7	423.7	385.9	342.1	490.8
Mean Δ	4.7	4.7	4.7	1.3	-2.5	10.5
Age & year	Yes	Yes	Yes	Yes	Yes	Yes
Socio-dem.	Yes	Yes	Yes	Yes	Yes	Yes
Initial wealth & memory	No	Yes	Yes	Yes	Yes	Yes
Fin. resp. (FR)	All	All	All	All	Only FR	Non-FR

Notes: Age enters as a quadratic. Socio-demographic controls include years of education and dummies for marital status, labor force status, gender, race, and census region. Observations are weighted using the HRS respondent-level weights. We use robust standard errors clustered at the household level. Significance levels: *** < 0.01, ** < 0.05, * < 0.1.

Table 4: Changes in total wealth (thousands 2014 U.S. dollars) by quartile of initial wealth, only financial respondents

	1st quartile	2nd quartile	3rd quartile	4th quartile
	(1)	(2)	(3)	(4)
Aware	-5.399 *	-.870	-7.388	35.208
	(3.037)	(5.248)	(9.832)	(32.147)
Unaware	-2.449	-3.818	-16.118 ***	-45.701 **
	(2.006)	(2.765)	(5.998)	(18.491)
$\beta_1 - \beta_2$	2.950	-2.948	-8.730	-80.909 **
	(3.347)	(5.625)	(10.569)	(34.803)
Obs.	17089	14808	13701	12843
N	6878	6582	5959	4500
Mean	27.175	131.436	359.417	1154.363
Mean Δ	20.627	21.967	43.117	-73.270
Age & year	Yes	Yes	Yes	Yes
Socio-dem.	Yes	Yes	Yes	Yes
Initial mem.	Yes	Yes	Yes	Yes

Notes: Age enters as a quadratic. Socio-demographic controls include years of education and dummies for marital status, labor force status, gender, race, and census region. Observations are weighted using the HRS respondent-level weights. We use robust standard errors clustered at the household level. Significance levels: *** < 0.01, ** < 0.05, * < 0.1.

Table 5: Changes in wealth components (thousands 2014 U.S. dollars), only financial respondents

	Total	Financial	IRAs	Housing	Real estate	Business
	(1)	(2)	(3)	(4)	(5)	(6)
Aware	-6.390	-4.318	-2.892	-2.550	.003	.005
	(9.307)	(5.182)	(3.062)	(2.381)	(.004)	(.004)
Unware	-27.291 ***	-17.806 ***	-6.196 ***	-2.171	-.003	.002
	(5.608)	(3.065)	(1.728)	(1.855)	(.002)	(.002)
$\beta_1 - \beta_2$	-20.901 **	-13.488 **	-3.303	.378	-.006	-.002
	(9.884)	(5.341)	(3.059)	(2.691)	(.004)	(.004)
Obs.	58441	58441	58441	58441	58441	58441
N	16723	16723	16723	16723	16723	16723
Mean	379.195	96.643	58.479	149.609	32.323	26.521
Mean Δ	3.479	-1.260	2.876	9.034	-.004	-.003
Age & year	Yes	Yes	Yes	Yes	Yes	Yes
Socio-dem.	Yes	Yes	Yes	Yes	Yes	Yes
Initial wealth & memory	Yes	Yes	Yes	Yes	Yes	Yes

Notes: Age enters as a quadratic. Socio-demographic controls include years of education and dummies for marital status, labor force status, gender, race, and census region. Observations are weighted using the HRS respondent-level weights. We use robust standard errors clustered at the household level. Significance levels: *** < 0.01, ** < 0.05, * < 0.1.

Table 6: Changes in financial wealth (thousands 2014 U.S. dollars) by initial financial wealth ownership and initial financial wealth quartile, only financial respondents

	No financial wealth	Positive financial wealth	3rd wealth quartile	4th wealth quartile
	(1)	(2)	(3)	(4)
Aware	-3.187 **	-.343	-4.653	9.869
	(1.336)	(7.199)	(5.389)	(19.844)
Rel. Mem loss unaware	1.252	-22.526 ***	-10.700 ***	-36.639 ***
	(1.469)	(3.955)	(3.930)	(10.629)
$\beta_1 - \beta_2$	4.440 ***	-22.183 ***	-6.046	-46.508 **
	(1.624)	(7.495)	(5.893)	(20.224)
Obs.	17745	40696	12137	12344
N	8279	13336	5437	4357
Mean	2.895	137.520	85.577	344.363
Mean Δ	12.887	-6.689	13.052	-37.176
Age & year	Yes	Yes	Yes	Yes
Socio-dem.	Yes	Yes	Yes	Yes
Initial wealth & memory	Yes	Yes	Yes	Yes

Notes: Age enters as a quadratic. Socio-demographic controls include years of education and dummies for marital status, labor force status, gender, race, and census region. Observations are weighted using the HRS respondent-level weights. We use robust standard errors clustered at the household level. Significance levels: *** < 0.01, ** < 0.05, * < 0.1.

Table 7: Changes in the value of financial wealth components (thousands 2014 U.S. dollars) for respondents with positive initial financial wealth, only financial respondents

	Stocks	Bonds	Debt	CDs	Checking/ savings	Other assets
	(1)	(2)	(3)	(4)	(5)	(6)
Aware	-3.724	.080	-.038	.990	-1.485	3.142
	(5.524)	(1.195)	(.251)	(1.328)	(2.147)	(2.227)
Unaware	-12.558 ***	.235	.004	-1.383 **	-3.952 ***	-4.233 ***
	(2.555)	(.889)	(.247)	(.648)	(1.114)	(1.240)
$\beta_1 - \beta_2$	-8.834	.155	.042	-2.373 *	-2.466	-7.376 ***
	(5.395)	(1.368)	(.316)	(1.410)	(2.254)	(2.329)
Obs.	40696	40696	40696	40696	40696	40696
N	13336	13336	13336	13336	13336	13336
Mean	65.979	8.966	2.965	15.843	34.125	15.572
Mean Δ	-3.785	-.160	1.173	.034	.640	-2.246
Age & year	Yes	Yes	Yes	Yes	Yes	Yes
Socio-dem.	Yes	Yes	Yes	Yes	Yes	Yes
Initial wealth & memory	Yes	Yes	Yes	Yes	Yes	Yes

Notes: Age enters as a quadratic. Socio-demographic controls include years of education and dummies for marital status, labor force status, gender, race, and census region. Observations are weighted using the HRS respondent-level weights. We use robust standard errors clustered at the household level. Significance levels: *** < 0.01, ** < 0.05, * < 0.1.

Table 8: Changes in the value of total and financial wealth (thousands 2014 U.S. dollars) by stock market activity, only financial respondents

	Total wealth			Financial Wealth		
	Active	Inactive	Inactive + no stocks	Active	Inactive	Inactive + no stocks
	(1)	(2)	(3)	(4)	(5)	(6)
Aware	2.164	17.930	-4.092	8.311	.116	-3.984
	(40.582)	(26.797)	(9.170)	(33.724)	(15.344)	(6.638)
Unaware	-71.570 ***	-19.709	-14.032 **	-53.370 ***	-6.491	-9.928 **
	(21.370)	(15.413)	(5.471)	(18.665)	(10.713)	(4.337)
$\beta_1 - \beta_2$	-73.734 *	-37.639	-9.940	-61.681 *	-6.607	-5.944
	(41.255)	(28.662)	(9.985)	(35.296)	(17.132)	(7.456)
Obs.	5600	7764	45077	5600	7764	45077
N	2976	4295	14803	2976	4295	14803
Mean	909.868	587.445	277.400	343.669	169.357	53.430
Mean Δ	9.702	-4.115	3.989	4.832	-8.799	-.742
Age & year	Yes	Yes	Yes	Yes	Yes	Yes
Socio-dem.	Yes	Yes	Yes	Yes	Yes	Yes
Initial wealth & memory	Yes	Yes	Yes	Yes	Yes	Yes

Notes: Age enters as a quadratic. Socio-demographic controls include years of education and dummies for marital status, labor force status, gender, race, and census region. Activity on the stock markets is based on the assets change module of HRS where respondents are asked about their activity on the stock market (whether they sold or bought stocks in the last two years) conditional on stock holding at time $t-1$ or at time t stocks. Observations are weighted using the HRS respondent-level weights. We use robust standard errors clustered at the household level. Significance levels: *** < 0.01, ** < 0.05, * < 0.1.

Table 9: Differences in subjective life expectancy and in out-of-pocket health expenditure

	Subj. life expectancy		Out-of-pocket exp.	
	(1)	(2)	(3)	(4)
Mem. loss	-.290			
	(.408)			
Mem. loss aware		-1.351 *		-.077
		(.749)		(.624)
Mem loss unaware		.187	-.026	-.292
		(.443)	(.137)	(.417)
Obs.	43553	43553	48284	10882
N	13669	13669	15228	8084
Mean	48.677	48.677	3.230	3.230
Age and year controls	Yes	Yes	Yes	Yes
Socio-demographic controls	Yes	Yes	Yes	Yes
Initial wealth & memory	Yes	Yes	Yes	Yes

Notes: In Columns (1) and (2), the dependent variable is variable indicating the self-assessed individual probability of living for 10 or more years while in (3) and (4) the out-of-pocket expenditure in thousand dollars. Age enters as a quadratic. Socio-demographic controls include years of education and dummies for marital status, labor force status, gender, race, and census region. Observations are weighted using the HRS respondent-level weights. We use robust standard errors clustered at the household level. Significance levels: *** < 0.01, ** < 0.05, * < 0.1.

Table 10: Differences in ownership and share of risky assets

	Risky assets ownership		Risky assets share	
	(1)	(2)	(3)	(4)
Mem. loss aware	-.016	-.026 *	-.004	-.012
	(.011)	(.015)	(.018)	(.017)
Mem. loss unaware	-.009	-.020 **	.007	-.010
	(.007)	(.009)	(.010)	(.010)
Obs.	40696	27086	13634	12387
N	13336	9309	5172	4662
Mean	.361	.457	.455	.558
3rd-4th wealth quartile	No	Yes	No	Yes
Age and year controls	Yes	Yes	Yes	Yes
Socio-demographic controls	Yes	Yes	Yes	Yes
Initial wealth & memory	Yes	Yes	Yes	Yes

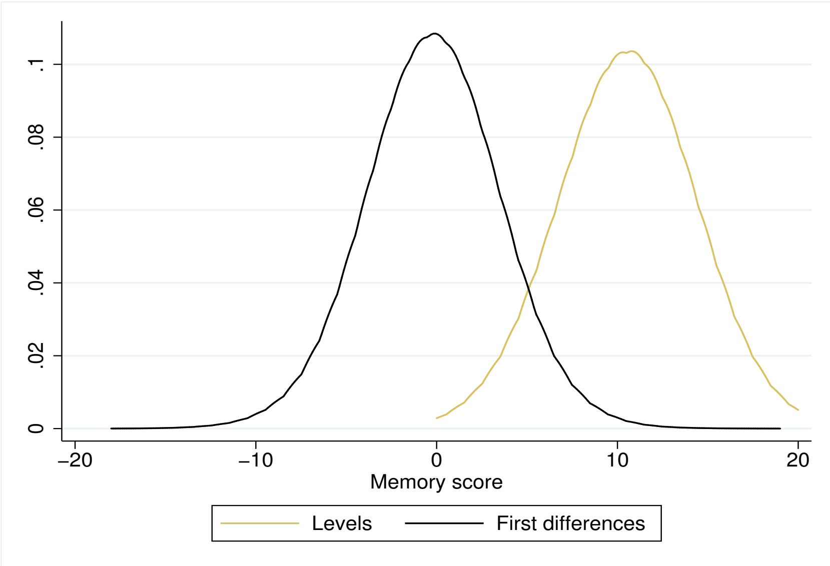
Notes: In Columns (1) and (2), the dependent variable is a dummy variable which indicates whether the respondent owns any risky financial asset (extensive margin), while in Columns (3) and (4) the share invested in risky asset conditional on owning risky assets (intensive margin). Age enters as a quadratic. Socio-demographic controls include years of education and dummies for marital status, labor force status, gender, race, and census region. Observations are weighted using the HRS respondent-level weights. Standard errors are robust and clustered at the household level. Significance levels: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table 11: Actual vs. predicted financial wealth in the next wave for respondents with positive initial financial wealth

	Absolute difference		Relative difference	
	(1)	(2)	(3)	(4)
Aware	-6.344	-7.776	-.095	-.071
	(7.404)	(10.939)	(.081)	(.058)
Unaware	-16.631 ***	-22.892 ***	-.058	-.140 ***
	(4.282)	(5.872)	(.050)	(.037)
$\beta_1 - \beta_2$	-10.287	-15.116	.036	-.068
	(8.080)	(11.714)	(.088)	(.062)
Obs.	40696	27086	38925	27019
N	13336	9309	12891	9296
3rd-4th wealth quartiles	No	Yes	No	Yes
Age & year	Yes	Yes	Yes	Yes
Socio-dem.	Yes	Yes	Yes	Yes
Initial wealth & memory	Yes	Yes	Yes	Yes

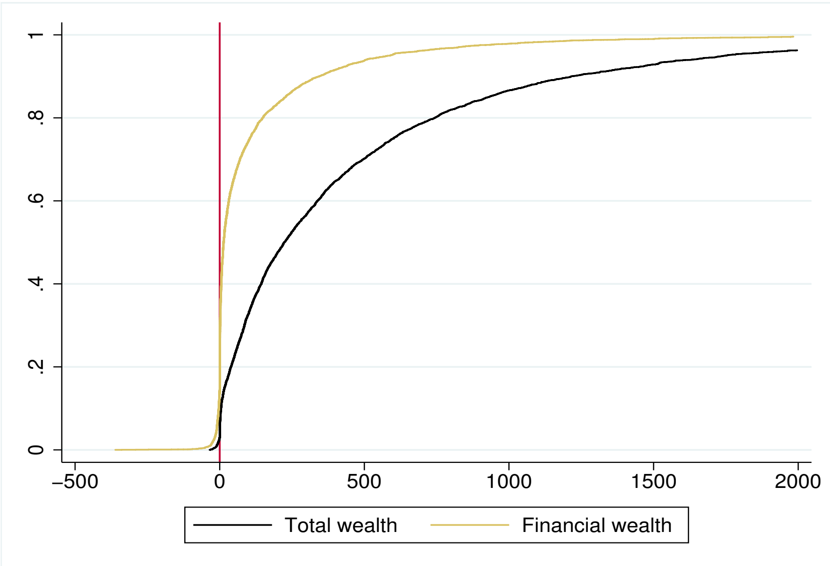
Notes: In Columns (1) and (2) the dependent variable is a variable indicating the absolute difference between the observed financial wealth at time t and the expected financial wealth. The expected financial wealth is constructed as the financial wealth that the respondents would have at time t if the financial assets he owned at time $t-1$ had yielded the average market returns (taking into account the portfolio composition at $t-1$). In Columns (3) and (4) the absolute difference has been standardized using the value of the financial wealth at $t-1$ (we trim the distribution of the ratio at 1st and 99th percentile to exclude outliers). Age enters as a quadratic. Socio-demographic controls include years of education and dummies for marital status, labor force status, gender, race, and census region. Observations are weighted using the HRS respondent-level weights. We use robust standard errors clustered at the household level. Significance levels: *** < 0.01, ** < 0.05, * < 0.1.

Figure 1: Density of memory scores in levels and first differences



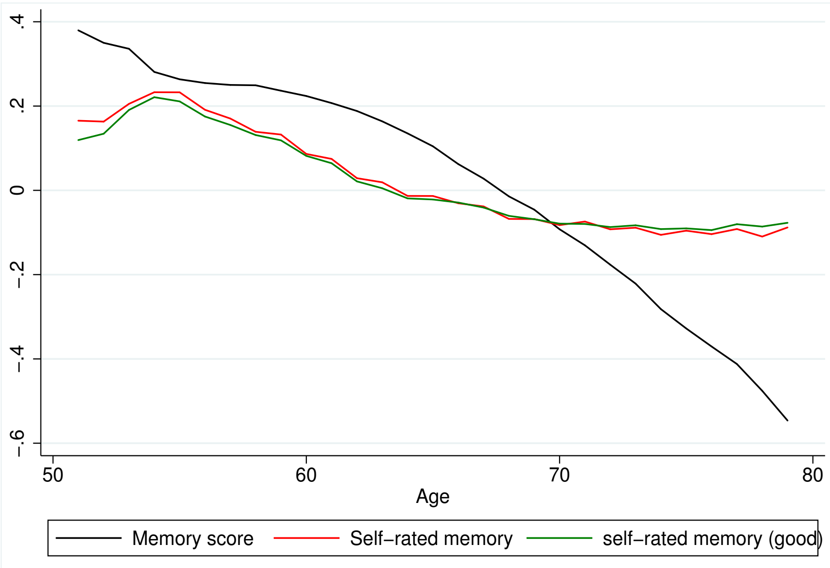
Notes: The figure show the univariate kernel density estimation of the memory score in levels and first differences using the Epanechnikov kernel and a bandwidth of 2.

Figure 2: Distribution of total and financial wealth



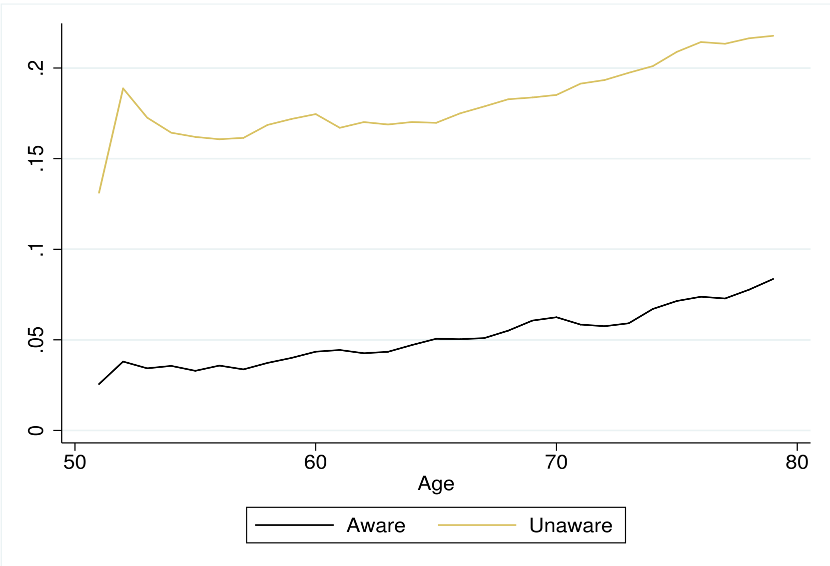
Notes: This figure shows the empirical distribution functions of total and financial wealth (in thousands 2014 U.S. dollars) using the HRS respondent-level weights (we trim the distribution at -500 and 2000 thousands).

Figure 3: Age profiles of assessed vs. self-rated memory



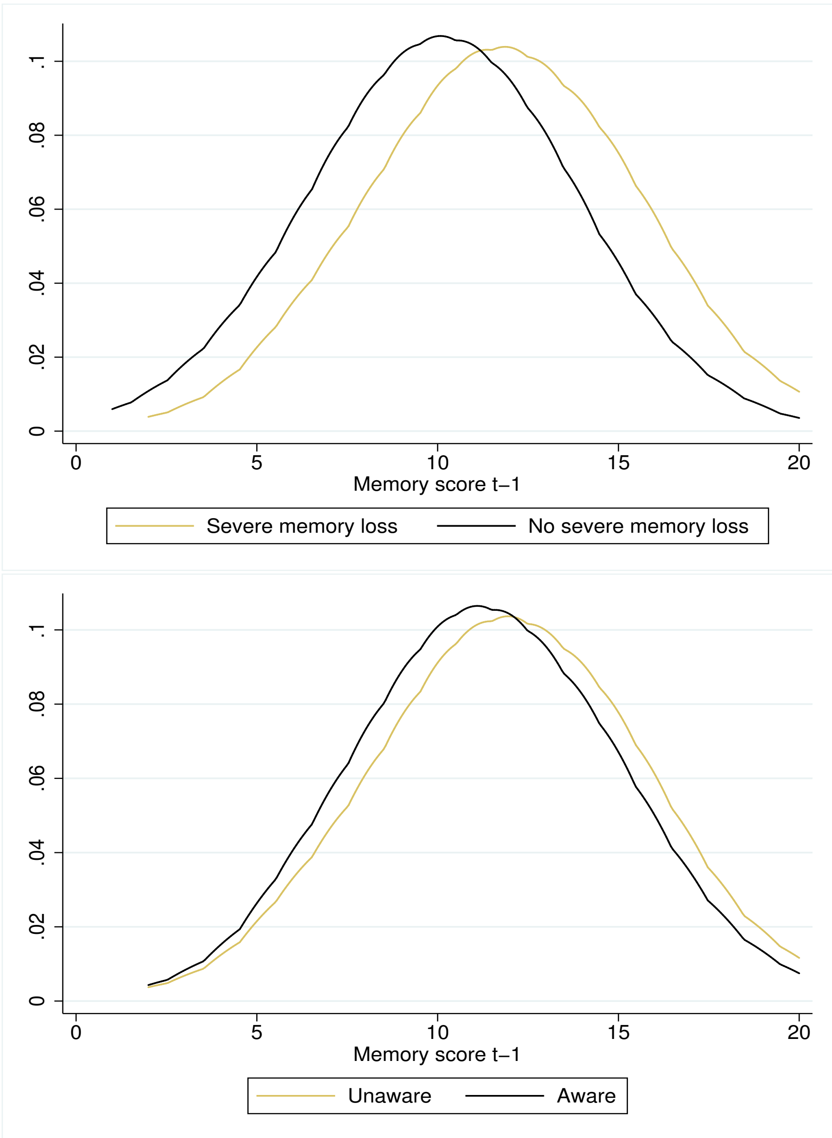
Notes: This figure presents the average age-profile of three indices: the total score in the immediate and delayed recall tasks (in black), the self-rated memory score (in red) and the share of respondents rating their memory as "good" or "very good" (in green). We standardize each index using its mean and standard deviation over the entire period 1996–2014 and compute age-specific averages of the standardized index using the HRS respondent-level weights. We then smooth each profile using a 3-year moving average.

Figure 4: Fraction of respondents aware and unaware of their memory loss



Notes: This figure shows the fraction of respondents aware and unaware of their memory loss (defined as a decline of 20% or more in their word recall test) by age. The figure is constructed by pooling all observations from the HRS (1996–2014) and using the HRS respondent-level weights. We smooth each profile using a 3-year moving average.

Figure 5: Memory score in the previous wave



Notes: This figure compares the density of the memory test score in the previous waves across groups. The top figure compares respondents who experience a severe memory decline with all the other respondents. The bottom figure focuses only on respondents who experience a severe memory decline comparing aware and unaware respondents. Test score densities are based on Epanechnikov kernel density estimations with a bandwidth of 2.

A Appendix

Table A.1: Changes in the logarithm of total wealth (thousands 2014 U.S. dollars) and severe memory losses by quartile of the initial wealth distribution

	All respondents (1)	1st quartile (2)	2nd quartile (3)	3rd quartile (4)	4th quartile (5)
Aware	-.028	-.150 *	-.018	-.043	.010
	(.023)	(.088)	(.038)	(.029)	(.026)
Unaware	-.038 ***	-.093 *	-.043 *	-.051 ***	-.038 **
	(.014)	(.051)	(.024)	(.017)	(.017)
$\beta_1 - \beta_2$	-.009	.056	-.025	-.009	-.048 *
	(.025)	(.093)	(.041)	(.032)	(.028)
Obs.	50415	9523	14433	13635	12824
N	14778	4660	6375	5910	4488
Mean	438.047	40.372	135.048	361.194	1156.084
Mean Δ	-.027	.287	-.079	-.054	-.147
Age and year controls	Yes	Yes	Yes	Yes	Yes
Socio-demographic controls	Yes	Yes	Yes	Yes	Yes
Initial memory	Yes	Yes	Yes	Yes	Yes

Notes: Age enters as a quadratic. Socio-demographic controls include years of education and dummies for marital status, labor force status, gender, race, and census region. Observations are weighted using the HRS respondent-level weights. We use robust standard errors clustered at the household level. Significance levels: *** < 0.01, ** < 0.05, * < 0.1.

Table A.2: Tests for misreporting: imputation of asset values and assessed misreporting of assets

	Fraction of financial wealth imputed (1)	Incomplete or missing value of stocks (2)	Any asset misreported (3)	Any fin. asset misreported (4)
Aware	-.001	-.001	-.009	-.006
	(.002)	(.002)	(.009)	(.006)
Unaware	.000	.000	-.007	-.008*
	(.001)	(.001)	(.007)	(.004)
Obs.	58441	13566	58441	58441
N	16723	5160	16723	16723
Mean	.063	.106	.088	.050
Age and year	Yes	Yes	Yes	Yes
Socio-demographic	Yes	Yes	Yes	Yes
Initial wealth & memory	Yes	Yes	Yes	Yes

Notes: The dependent variable in Column (1) is an indicator of the degree of imputation of the respondent's financial wealth (ranging between 0 and 1) for respondents with positive financial wealth, while in Column (2) is a dummy variable indicating whether the respondents provided incomplete or missing value on stock value (conditional on owning some stock). In the last two columns the dependent variable is a dummy variable indicating whether the asset verification procedure of HRS detected any mistake in the reported value of any asset (Column (3)) or only in financial assets (Column (4)). Socio-demographic controls include years of education and dummies for marital status, labor force status, gender, race, and census region. Observations are weighted using the HRS respondent-level weights. We use robust standard errors clustered at the household level. Significance levels: *** < 0.01, ** < 0.05, * < 0.1.

Table A.3: Changes in transfers to children

	Transfers (Yes/No)		Transfers (Amount)	
	(1)	(2)	(3)	(3)
Severe mem. loss	-.001		-.868	
	(.005)		(1.082)	
Mem. loss aware		-.006		-1.618
		(.010)		(3.313)
Mem. loss unaware		.001		-.636
		(.006)		(.775)
Obs.	81040	81040	13869	13869
N	22304	22304	6566	6566
Mean	.296	.296	11.843	11.843
Men Δ	-.006	-.006	-.772	-.772
Age and year controls	Yes	Yes	Yes	Yes
Socio-demographic controls	Yes	Yes	Yes	Yes
Initial wealth & memory	Yes	Yes	Yes	Yes

Notes: The dependent variable in Columns (1) and (2) is the indicator of whether the respondent did any transfer to children, while in Columns (3) and (4) is the amount transferred to children conditional on a positive transfer. Age enters as a quadratic. Socio-demographic controls include years of education and dummies for marital status, labor force status, gender, race, and census region. Observations are weighted using the HRS respondent-level weights. We use robust standard errors clustered at the household level. Significance levels: *** < 0.01, ** < 0.05, * < 0.1.

Table A.4: Heterogeneity by age and employment status, only financial respondents

	Employed (1)	Not employed (2)	Aged<70 (3)	Aged≥70 (4)
Aware	2.292	-12.418	-4.268	-9.192
	(20.602)	(8.765)	(13.031)	(12.132)
Unaware	-31.015 ***	-20.954 ***	-33.322 ***	-11.752 *
	(9.405)	(5.602)	(7.426)	(6.045)
$\beta_1 - \beta_2$	-33.308	-8.535	-29.054 **	-2.559
	(20.517)	(9.517)	(13.696)	(12.607)
Obs.	20841	37600	36329	22112
N	8222	12573	12719	8465
Mean	385.405	375.753	355.674	417.840
Mean δ	16.985	-6.989	9.116	-10.498
Age and year controls	Yes	Yes	Yes	Yes
Socio-demographic controls	Yes	Yes	Yes	Yes
Initial wealth & memory	Yes	Yes	Yes	Yes

Notes: Age enters as a quadratic. Socio-demographic controls include years of education and dummies for marital status, labor force status, gender, race, and census region. Observations are weighted using the HRS respondent-level weights. We use robust standard errors clustered at the household level. Significance levels: *** < 0.01, ** < 0.05, * < 0.1.

Table A.5: Changes in consumption (thousands 2014 U.S. dollars) and severe memory losses

	Total spending (1)	Durables (2)	Non-durables (3)	Household spending (4)	Transport spending (5)
Aware	-1.576	-.003	-.773	-.165	-.635
	(1.494)	(.048)	(.974)	(.481)	(.827)
Unaware	.705	-.050	.367	.263	.125
	(1.011)	(.035)	(.553)	(.377)	(.552)
$\beta_1 - \beta_2$	2.281	-.047	1.140	.428	.760
	(1.666)	(.054)	(1.050)	(.553)	(.920)
Obs.	13823	13823	13823	13823	13823
N	4294	4294	4294	4294	4294
Mean	46.631	.403	26.916	9.443	9.870
Mean Δ	-1.458	-.039	-.213	-.539	-.667
Age and year controls	Yes	Yes	Yes	Yes	Yes
Socio-demographic controls	Yes	Yes	Yes	Yes	Yes
Initial wealth & memory	Yes	Yes	Yes	Yes	Yes

Notes: The data are from the HRS-CAMS. Age enters as a quadratic. Socio-demographic controls include years of education and dummies for marital status, labor force status, gender, race, and census region. Observations are weighted using the HRS respondent-level weights. We use robust standard errors clustered at the household level. Significance levels: *** < 0.01, ** < 0.05, * < 0.1.

Table A.6: Differences in household income

	Total income (1)	Capital income (2)	Earnings (3)
Aware	15.320	-.407	-2.340 **
	(19.276)	(.862)	(1.126)
Unaware	-5.081 ***	-2.273 ***	-2.567 ***
	(1.488)	(.591)	(.883)
$\beta_1 - \beta_2$	-20.401	-1.866 *	-.226
	(18.378)	(.964)	(1.265)
Obs.	83193	83193	83193
N	22747	22747	22747
Mean	81.802	15.480	39.445
Age and year controls	Yes	Yes	Yes
Socio-demographic controls	Yes	Yes	Yes
Initial wealth & memory	Yes	Yes	Yes

Notes: Age enters as a quadratic. Socio-demographic controls include years of education and dummies for marital status, labor force status, gender, race, and census region. Observations are weighted using the HRS respondent-level weights. We use robust standard errors clustered at the household level. Significance levels: *** < 0.01, ** < 0.05, * < 0.1.

Table A.7: Changes in total wealth (thousands 2014 U.S. dollars) and occurrence of severe absolute memory losses

	All respondents			Respondents with memory losses		
	(1)	(2)	(3)	(4)	(5)	(6)
Severe mem. loss	-2.309	-23.054 ***				
	(4.368)	(4.628)				
Aware			-10.363			
			(8.912)			
Unaware			-27.323 ***	-16.194 *	-19.293 *	-10.377
			(4.994)	(8.771)	(10.291)	(16.266)
$\beta_1 - \beta_2$			-16.959 *			
			(9.213)			
Obs.	83193	83193	83193	20231	14270	5961
N	22747	22747	22747	13926	9970	4311
Mean W	423.7	423.7	423.7	385.9	342.1	490.8
Mean ΔW	4.7	4.7	4.7	1.3	-2.5	10.5
Age and year controls	Yes	Yes	Yes	Yes	Yes	Yes
Socio-demographic controls	Yes	Yes	Yes	Yes	Yes	Yes
Initial wealth & memory	No	No	Yes	Yes	Yes	Yes
Financial resp. (FR)	Yes	Yes	Yes	Yes	Only FR	Non FR

Notes: This table replicates Table 3 except for the use of the absolute definition of memory loss. Age enters as a quadratic. Socio-demographic controls include years of education and dummies for marital status, labor force status, gender, race, and census region. Observations are weighted using the HRS respondent-level weights. We use robust standard errors clustered at the household level. Significance levels: *** < 0.01, ** < 0.05, * < 0.1.

Table A.8: Changes in total wealth (thousands 2014 U.S. dollars) and occurrence of relative memory losses (decline of 15% or more in the memory score)

	All respondents			Respondents with memory losses		
	(1)	(2)	(3)	(4)	(5)	(6)
Severe mem. loss	-2.289	-22.304***				
	(4.005)	(4.199)				
Aware			-16.885**			
			(7.216)			
Unaware			-24.051***	-5.903	-11.109	4.165
			(4.477)	(6.667)	(8.015)	(12.960)
$\beta_1 - \beta_2$			-7.166			
			(7.122)			
Obs.	83193	83193	83193	20231	14270	5961
N	22747	22747	22747	13926	9970	4311
Mean W	423.7	423.7	423.7	385.9	342.1	490.8
Mean ΔW	4.7	4.7	4.7	1.3	-2.5	10.5
Age and year controls	Yes	Yes	Yes	Yes	Yes	Yes
Socio-demographic controls	Yes	Yes	Yes	Yes	Yes	Yes
Initial wealth & memory	No	No	Yes	Yes	Yes	Yes
Financial resp. (FR)	Yes	Yes	Yes	Yes	Only FR	Non FR

Notes: This table replicates Table 3 except for the use of the milder definition of memory loss (decline of least 15% in memory score). Age enters as a quadratic. Socio-demographic controls include years of education and dummies for marital status, labor force status, gender, race, and census region. Observations are weighted using the HRS respondent-level weights. We use robust standard errors clustered at the household level. Significance levels: *** < 0.01, ** < 0.05, * < 0.1.

Table A.9: Changes in total wealth (thousands 2014 U.S. dollars) and occurrence of relative memory losses (decline of 25% or more in the memory score)

	All respondents			Respondents with memory losses		
	(1)	(2)	(3)	(4)	(5)	(6)
Severe mem. loss	-4.766	-23.928 ***				
	(4.742)	(4.698)				
Aware			-7.447			
			(8.840)			
Unaware			-29.574 ***	-20.772 **	-27.404 **	-6.387
			(5.150)	(9.044)	(11.141)	(14.829)
$\beta_1 - \beta_2$			-22.127 **			
			(9.281)			
Obs.	83193	83193	83193	20231	14270	5961
N	22747	22747	22747	13926	9970	4311
Mean	423.7	423.7	423.7	385.9	342.1	490.8
Mean Δ	4.7	4.7	4.7	1.3	-2.5	10.5
Age and year controls	Yes	Yes	Yes	Yes	Yes	Yes
Initial wealth & memory	No	No	Yes	Yes	Yes	Yes
Financial resp. (FR)	Yes	Yes	Yes	Yes	Only FR	Non FR

Notes: This table replicates Table 3 except for the use of the stricter definition of memory loss (decline of 25% or more in memory score). Age enters as a quadratic. Socio-demographic controls include years of education and dummies for marital status, labor force status, gender, race, and census region. Observations are weighted using the HRS respondent-level weights. We use robust standard errors clustered at the household level. Significance levels: *** < 0.01, ** < 0.05, * < 0.1.

Table A.10: Test for ceiling and floor effects: changes in total wealth (thousands 2014 U.S. dollars) excluding bottom and top quintiles of the initial memory score distribution

	All	No bottom quintile	No top quintile	No bottom and top quintiles
	(1)	(2)	(3)	(4)
Aware	-6.390	-4.472	-7.757	-5.565
	(9.307)	(10.229)	(8.845)	(10.005)
Unaware	-27.291 ***	-27.450 ***	-26.077 ***	-26.628 ***
	(5.608)	(6.036)	(5.284)	(5.911)
$\beta_1 - \beta_2$	-20.901 **	-22.978 **	-18.319 *	-21.063 *
	(9.884)	(10.838)	(9.567)	(10.829)
Obs.	58441	47774	48721	38054
N	16723	15061	15843	14088
Mean	379.195	414.133	350.411	386.204
Mean Δ	3.479	3.364	2.110	1.641
Age and year controls	Yes	Yes	Yes	Yes
Socio-demographic controls	Yes	Yes	Yes	Yes
Initial wealth & memory	Yes	Yes	Yes	Yes
Only financial respondents	Yes	Yes	Yes	Yes

Notes: Columns (1)–(4) correspond to different samples. Column (1) includes all financial respondents; Column (2) excludes people in the bottom quintile of the initial memory score; Column (3) excludes people in the top quintile; Column (4) excludes people in the bottom or in top quintile (Column 4). Age enters as a quadratic. Socio-demographic controls include years of education and dummies for marital status, labor force status, gender, race, and census region. Observations are weighted using the HRS respondent-level weights. We use robust standard errors clustered at the household level. Significance levels: *** < 0.01, ** < 0.05, * < 0.1.

Table A.11: Number of respondents by memory loss events experienced

# of memory loss events	Exclusively aware or unaware	
	No	Yes
0	0	5,713
1	0	8,129
2	1,093	3,406
3	631	1,101
4	197	219
5	21	22
6	0	1
Total	1,942	18,591

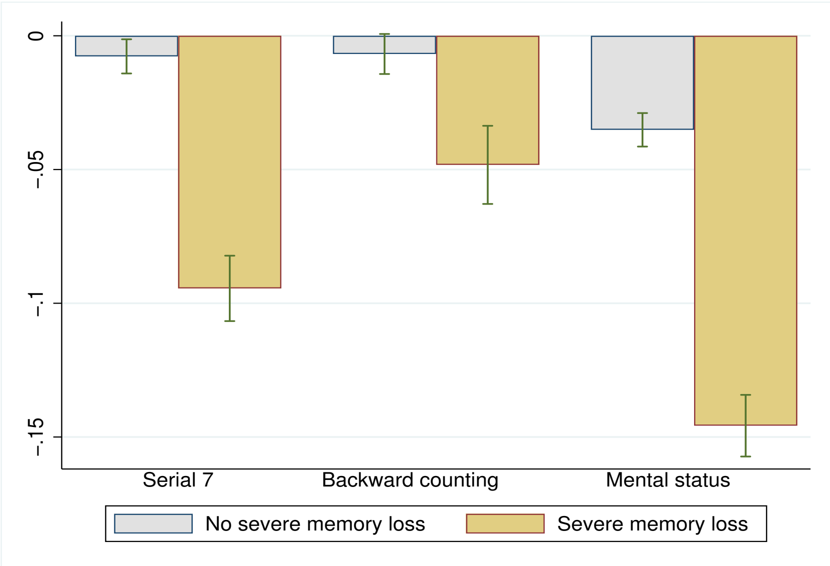
Notes: The table shows the number of respondents according to the number of severe memory loss events the experience (first column) and in case of more than one event whether they were exclusively aware or unaware (No or Yes).

Table A.12: Changes in total wealth (thousands 2014 U.S. dollars) and occurrence of memory losses, health controls included

	(1)	(2)	(3)
Aware	-4.979	10.617	-4.094
	(9.451)	(9.615)	(9.445)
Unaware	-26.527***	-23.562***	-26.185***
	(5.597)	(5.389)	(5.592)
$\beta_1 - \beta_2$	-21.548**	-34.178***	-22.090**
	(10.048)	(10.582)	(10.046)
Obs.	57514	57514	57514
N	16551	16551	16551
Mean	380.665	380.665	380.665
Mean Δ	3.138	3.138	3.138
Age and year controls	Yes	Yes	Yes
Socio-demographic controls	Yes	Yes	Yes
Initial wealth & memory	Yes	Yes	Yes
Initial health	No	Yes	No
Health change	No	No	Yes

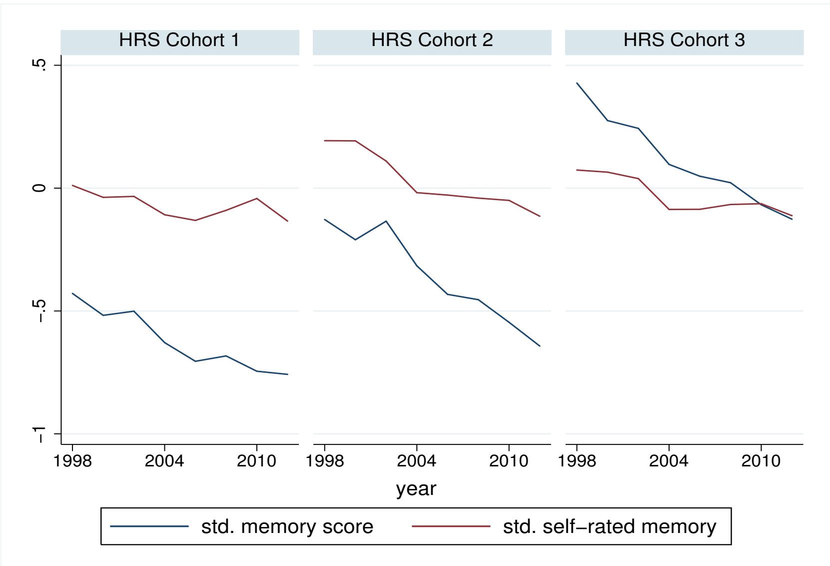
Notes: Columns (1)–(3) correspond to different sets of controls. Age enters as a quadratic. Socio-demographic controls include years of education and dummies for marital status, labor force status, gender, race, and census region. Health controls include self-reported health number of activity of daily living limitations at $t-1$ or changes between t and $t-1$. Observations are weighted using the HRS respondent-level weights. We use robust standard errors clustered at the household level. Significance levels: *** < 0.01, ** < 0.05, * < 0.1.

Figure A.1: Average change in other cognitive tests by memory loss



Notes: This figure compares the average changes in other cognitive test scores (serial 7, backward counting and total mental status) for respondents who experience a severe memory loss versus all other respondents.

Figure A.2: Longitudinal profiles of assessed vs. self-rated memory by HRS cohort

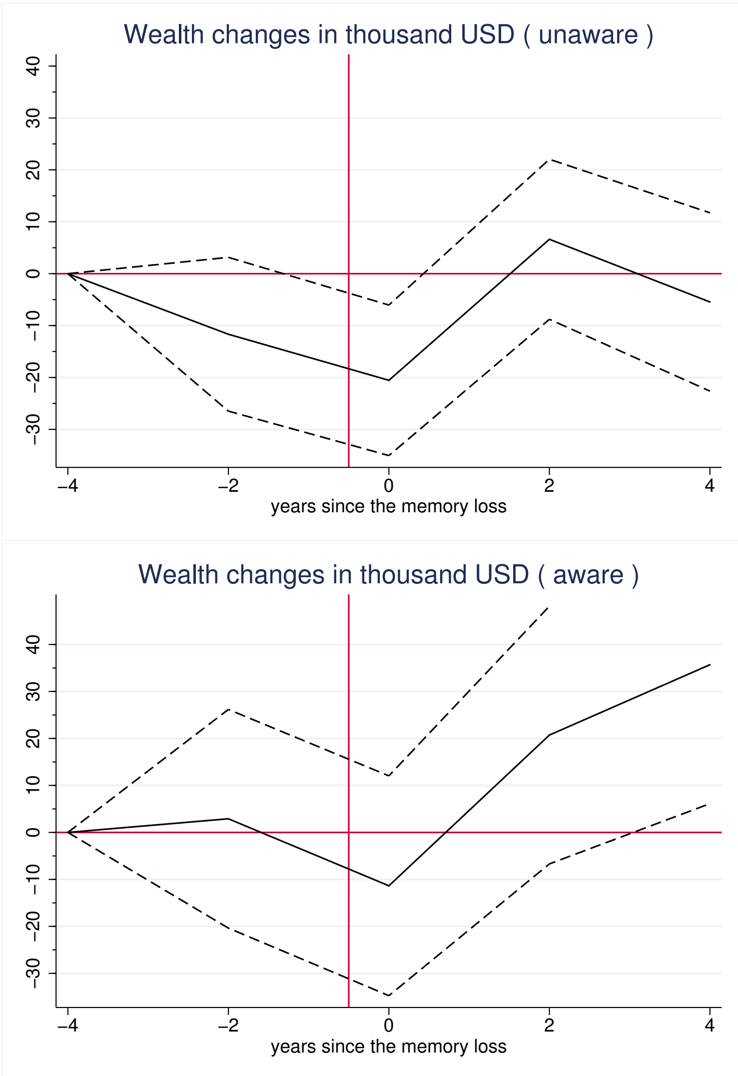


Notes: This figure compares the average longitudinal profile of the word recall test (assessed memory) and of the self-rated memory of the first three HRS cohorts.

Figure A.3: Age profiles HRS, fixed effects

Notes: This figure compares the same average age-profile of the three indices presented in Figure 3, namely the total score in the immediate and delayed recall tasks (in black), the self-rated memory score (in red) and the share of respondents rating their memory as "good" or "very good" (in green), but uses the residuals from a fixed effect regression without controls.

Figure A.4: Estimated time profile of wealth changes



Notes: This figure shows the estimated wealth changes over time with respect to the first memory loss event (t=0) for unaware (upper figure) and aware respondents (bottom figure). The estimated time coefficients are the results of a regression that also includes controls for initial wealth and memory scores, a quadratic age term, gender, race, education, and survey year fixed effects. The figure also includes 95% confidence intervals.