Financial Literacy and Portfolio Dynamics*

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May 2017

Forthcoming in *Journal of Finance*

Abstract

We match administrative panel data on portfolio choices with survey measures of financial literacy. When we control for portfolio risk, the most literate households experience 0.4% higher annual returns than the least literate households. Distinct portfolio dynamics are the key determinant of this difference. More literate households hold riskier positions when expected returns are higher. They more actively rebalance their portfolios and do so in a way that holds their risk exposure relatively constant over time. They are more likely to buy assets that provide higher returns than the assets that they sell.

*I thank the editor and an anonymous referee for very detailed and constructive comments as well as Bruno Biais, Alexander Guembel, Sébastien Pouget, Jean-Marc Tallon for very useful discussions. I also thank Henri Luomaranta for excellent research assistance and AXA, Amundi and SCOR Research Funds for financial support. I have no relevant or material financial interests that relate to the research described in this paper.

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1 Introduction

It is well established that households exhibit substantial heterogeneity in both the performance of their portfolios (Campbell (2006); Calvet, Campbell and Sodini (2007)) and their understanding of basic financial principles (Lusardi and Mitchell (2011)). Recent evidence also suggests a precise relationship between these facts: Households experiencing lower risk-adjusted returns tend to be less literate (Von Gaudecker (2015)).[1]

The mechanisms underlying the relationship between financial literacy and returns are much less understood. Part of the challenge is empirical. It is difficult to find data that combine detailed information on household portfolios with measures of household sophistication. Administrative data typically lack direct measures of financial sophistication. Survey data typically lack the details and the panel structure necessary to explore portfolio dynamics. An important dimension of heterogeneity may arise (in our setting, it will arise) from how households rebalance their portfolios over time in response to market conditions or to their own returns.

This paper exploits administrative panel data on portfolio choices matched with survey measures of financial literacy. This allows us to provide the first analysis of how financial literacy relates to rebalancing behaviors (or the lack thereof) and to uncover novel mechanisms connecting financial literacy and portfolio returns.

We obtained data from a large French financial institution. We observe portfolio choices in a widespread investment product, called *assurance vie,* in which households allocate their wealth between relatively safe and relatively risky funds - essentially, pre-defined bundles of bonds or stocks - and are able to rebalance their portfolios over time. These observations are monthly and cover the period $2002-2011$. In addition, we constructed the returns of each portfolio and various counterfactual returns. These data are combined with the responses to a survey that we conducted on these clients, which allows us to obtain a broader picture of clients' financial activities outside the company and of their behavioral characteristics, notably their financial sophistication.

While not covering the whole household portfolio, investments in *assurance vie* often represent a substantial fraction of investors' financial wealth.[2] Moreover, they display some specific features (in addition to their popularity among French households) that make them particularly useful for our purposes. When investing in these contracts, households face the same menu of assets (the funds offered by the company), and they select among pre-

[1] This should be contrasted with explanations of heterogeneous returns based on unobserved preferences or information (see Korniotis and Kumar (2013) for a discussion on this point).

[2] For the median household in our sample, the value of the contracts that we observe amounts to approximately 50% of its financial wealth.

defined funds with a given risk profile. This choice may be less subject to behavioral biases than direct stock picking.

We begin our analysis by constructing an index of financial literacy for each investor. Following standard procedures, we ask each subject a series of questions related to basic principles of household finance. Depending on the number of correct answers, we classify each household on a $1-7$ scale that serves as our main measure of financial literacy. Financial literacy correlates, as expected, with demographic variables (in particular, education and wealth) and with financial behaviors elicited in the survey (in particular, stock market participation and holdings of financial products). These relationships confirm previous findings in the literature and provide support for the consistency of our measure of financial literacy.

Our main interest is in how financial literacy relates to portfolio choices. We begin with the observation that, in our sample, more literate households experience higher portfolio returns. Controlling for various measures of portfolio risk, the most literate households experience approximately 0.4% higher yearly returns than the least literate households, relative to an average return of 4.3%. These magnitudes are in line with those estimated by Von Gaudecker (2015) for Dutch households.

The core of our analysis is the relationship between financial literacy and portfolio choices, focusing in particular on portfolio rebalancing. We pursue two main objectives: First, we wish to investigate how specific financial choices help us to understand the above-mentioned relationship between literacy and returns. Cross-sectional variations (for example, different exposures to risk at a given point in time) are of little assistance in our setting; portfolio dynamics appear to be more important. Second, we aim to provide direct evidence on whether some specific financial behaviors (such as inertia or trend chasing) that are commonly believed to result from a lack of sophistication are indeed correlated with low financial literacy.

Our first result is that more sophisticated households do not always take more risk. Instead, their risk exposure varies systematically with market conditions. More sophisticated households hold a larger risky share - that is, a larger fraction of risky funds in their portfolio - when risky funds are expected to offer higher returns.[3] According to our estimates, a 1% increase in the expected excess return of risky funds is associated to an increase in the risky share by 2% for each unit of financial literacy. This result is distinct from the more common observation that stock market participation increases with financial literacy,[4] and it suggests a specific mechanism whereby literate households obtain higher returns.

We then consider portfolio inertia. Several studies have documented

[3]As detailed below, in this analysis we use realized returns in period t as a proxy for expected returns in period t, given the information available at the end of $t-1$.

[4]See Christelis, Jappelli and Padula (2010), Van Rooij, Lusardi and Alessie (2011), Grinblatt, Keloharju and Linnainmaa (2011), Arrondel, Debbich and Savignac (2015).

inertia in household portfolios; a common claim is that such inertia is the result of low financial sophistication.[5] Our data allow to provide a direct test of this claim. Building on Calvet et al. (2009*a*), we decompose the observed changes in the risky share over time into active changes due to portfolio rebalancing and passive changes induced by differential returns of risky vs. riskless funds. We show that passive changes are relatively more important for less sophisticated households. For the least sophisticated households, the passive change accounts for 64% of the total change in the risky share over 12 months. For the most sophisticated households, by contrast, the passive change accounts for 30%. These estimates provide the first direct evidence that households with lower financial literacy display greater portfolio inertia.

Third, we investigate how the direction of rebalancing varies with financial literacy. Trend-chasing behaviors have been often associated with a lack of sophistication, as proxied, for example, by limited market experience.[6] We can directly test this relationship by examining how households move their wealth between safe and risky funds, depending on which funds have gained value relative to others. We show that more literate households are more likely to act as contrarians: they tend to move their wealth toward funds that have experienced relatively lower returns in the past. This allows them to hold their risky share relatively constant over time.

Finally, we show that rebalancing behaviors are an important determinant of portfolio returns: The returns experienced by more sophisticated households tend to exceed those that they would have earned without rebalancing their portfolios. More sophisticated households are more likely to buy funds that provide higher returns than the funds that they sell.

To the best of my knowledge, no other paper studies how survey measures of financial literacy relate to portfolio dynamics observed in administrative data. Our analysis contributes to a rapidly growing literature on financial literacy and portfolio choices, as recently reviewed in Hastings, Madrian and Skimmyhorn (2013) and Lusardi and Mitchell (2014). (See also Guiso and Sodini (2013) for a broader survey on household finance.) Most of this literature employs survey data on household portfolios. In particular, as mentioned above, Von Gaudecker (2015) employs detailed survey data to estimate the return loss associated with low financial sophistication and analyze its interaction with professional advising. Compared to our data, survey data are more comprehensive, but they often lack the details and panel dimension that we exploit to address our questions.

Several studies (reviewed, e.g., in Barber and Odean (2013)) use brokerage account data to document how the behavior of individual investors may depart from standard benchmarks. By employing explicit measures of

[5]See Calvet, Campbell and Sodini (2009*a*), Graham, Harvey and Huang (2009), Bilias, Georgarakos and Haliassos (2010).

[6]See Goetzmann and Kumar (2008); Greenwood and Nagel (2009); Bilias et al. (2010).

financial literacy, our analysis provides a more direct test of whether specific investment behaviors are linked to (a lack of) financial sophistication.

A few other studies investigate the effects of financial sophistication by matching survey and administrative data. Dorn and Huberman (2005) focus on the relationship between (over)confidence and portfolio underdiversification. Guiso and Viviano (2015) show that more sophisticated households made better portfolio choices during the 2008 financial crisis, although the effects of financial literacy are small.[7] Using Finnish administrative data, Grinblatt et al. (2011) show that investors with higher IQs are more likely to participate in the stock market and hold better performing portfolios; Grinblatt, Keloharju and Linnainmaa (2012) focus on the trading of individual stocks and show that investors with higher IQs display better stock picking and lower trading costs and they are less exposed to herding and the disposition effect. Clark, Lusardi and Mitchell (2015) analyze pension plan investments and show that more literate investors hold portfolios with higher expected returns.

Our study is most closely related to Grinblatt et al. (2011), Von Gaudecker (2015) and Clark et al. (2015), and our approach is complementary: their analysis is essentially static, while we highlight the dynamics of household portfolios. Our focus on rebalancing behaviors - as opposed to cross-sectional variations in participation or risk taking - provides new insights into the relationship between literacy and returns.

Finally, our study can serve as further motivation for the recent theoretical literature on the effects of financial literacy. In particular, Lusardi, Michaud and Mitchell (2017) calibrate a stochastic life-cycle model in which individuals endogenously choose their investment in financial knowledge. They show that differences in financial literacy amplify differences in wealth accumulation patterns and are a key determinant of wealth inequality. More broadly, Lusardi and Mitchell (2014) discuss theoretical approaches to financial knowledge as a human capital investment.

2 Data

We exploit three sources of data. First, we obtained data on portfolio choices from a large French financial institution. Second, we constructed the returns of these portfolios. The third source is a survey that we designed and administered to the same clients. These data are also employed in Bianchi and Tallon (2016), who focus on the effects of ambiguity and risk preferences.

[7] See also Gerardi, Goette and Meier (2013) on the relationship between numerical ability and mortgage default rates, Agarwal and Mazumder (2013) on the relationship among math ability, credit card usage and home loan applications and Agarwal, Ben-David and Yao (2017) on mistakes in mortgage decisions and (proxies for) financial sophistication.

2.1 Investment Data

We observe portfolio data for 511 clients at a monthly frequency from September 2002 to April 2011. These data describe the value and composition of clients' holdings of an investment product called *assurance vie*. A typical *assurance vie* contract (which, despite the name, has no insurance component) establishes the types of funds in which the household wishes to invest and the amount of wealth allocated to each fund. A key distinction is between relatively safe vs. relatively risky funds. The first assets, which are called *euro funds*, are basically bundles of bonds, mostly (French) government bonds. Their returns are rather stable, and the capital invested is guaranteed by the company.

The second funds are shares of mutual funds called *uc funds*. Investors do not observe the exact composition of these funds, and they typically do not directly select the funds in their contracts. They choose among pre-defined portfolios with broadly defined risk characteristics (for example, "aggressive" vs. "conservative" or "Europe" vs. "Emerging Markets").

It is however made clear to investors that allocating wealth to *uc funds* provides higher expected returns and greater risk. To give a sense of the trade-off, the *euro funds* in our sample experienced average returns of 0.38% per month, compared to the 0.43% experienced by *uc funds,* and the former have a standard deviation of 0.42% compared to 2.8% for *uc funds*. In Figure 1, we plot the average return of *euro funds* and *uc funds* in each month of our sample to highlight that *euro funds* provide more stable returns. In the following analysis, we will simply refer to *euro funds* as riskless assets and to *uc funds* as risky assets.

Over time, clients are free to change the composition of their portfolios, make new investments and liquidate their contracts in part or in full as they wish. There is some incentive not to liquidate the contract before 8 years to secure reduced taxes on capital gains. Investors may also delegate the rebalancing of their portfolio according to some pre-specified rule.[8] In our sample, less than 10% of investors have chosen this option. As we show, our results are not affected by these considerations.

Assurance vie contracts are widespread in France, and they are the most common way in which households invest in the stock market. According to the French National Institute for Statistics (INSEE), 41% of French households held at least one of these contracts in 2010.[9] These contracts can represent a sizable fraction of households' financial wealth. In our sample, the average value of a portfolio is $32,700$ euros and the maximum is $590,000$

[8]Specifically, clients can require the company to hold the fraction of *uc funds* relative to *euro funds* constant over time or to automatically increase the share of *euro funds* in the portfolio.

[9]This makes *assurance vie* the most widespread financial product after *livret A*, a savings account with returns that are set by the state. See INSEE Premiere n. 1361 - July 2011 (http://www.insee.fr/fr/ffc/ipweb/ip1361/ip1361.pdf).

euros. On average, that corresponds to approximately 50% of a household's financial wealth and approximately 10% of its total wealth.

The portfolio data we obtained from the company include a fund identifier that can be used to match the corresponding fund in *Datastream.* In our sample, we observe 151 distinct *euro funds* and 150 distinct *uc funds.* We obtain the monthly returns of each fund, which we aggregate to compute the returns experienced by each client on his *assurance vie* contracts. These returns are computed directly from *Datastream* and do not include the management fees collected by the insurance company. These fees are typically expressed as a percentage of the amount of capital invested, but we have no direct information on their value in our sample.

2.2 Survey Data

Our third source of data is a survey that we designed and administered to these clients. The survey was administered by a professional company at the end of 2010. The sampling was designed by the survey company following official INSEE classifications to obtain a representative sample of French households in terms of family status, employment status, sector of employment and revenues.[10] For comparison purposes, the median total wealth in our sample is between 225 and 300 thousand euros, and the median financial wealth is between 16 and 50 thousand euros. These figures are in line with those obtained for the general French population (see Arrondel, Borgy and Savignac (2012)).[11]

Clients were contacted at their home phone number and asked to connect to the internet. The survey was then completed over the internet while on the telephone with the surveyor. The response rate was 7%, which is in line with other studies of this type. Non-response was driven primarily by a refusal to respond (40%), having the wrong number or respondent (26%), a lack of internet access (18%), or the respondent not being at home (11%).[12] We have no information on individuals who were contacted but did not respond for any of the above-mentioned reasons.

[10] Specifically, the survey company obtained a sample of approximately 30,000 clients from the insurance company, stratified the sample according to geographic regions (Ile De France, North-East, West, South-East, South-West) and then implemented the survey to meet pre-specified quotas of respondents in terms of the above-mentioned socio-demographic characteristics.

[11] For official and comprehensive data, see the 2010 Household Wealth Survey from the French National Institute for Statistics (http://www.insee.fr/en/methodes/default.asp?page=sources/ope-enquete-patrimoine.htm).

[12] For example, Clark et al. (2015) report a response rate of approximately 17% for a sample of 16,000 employees. Riedl and Smeets (2017) contacted approximately 38,000 investors and obtained response rates of 8% for conventional investors and 12% for socially responsible investors. In both these cases, subjects were contacted via email as opposed to our approach of contacting them over the phone.

The survey serves two main purposes. First, we wish to gather information on demographic characteristics, wealth and portfolio holdings outside the company. While we do not observe detailed information on the financial products held outside the company, the survey helps us to obtain a broader picture of clients' financial activities. Second, we wish to have an idea of clients' behavioral characteristics. In particular, we focus on measures of clients' financial literacy. In the next section, we describe these measures in greater detail. Summary statistics of the variables employed in our analysis appear in Table 1.

3 Financial Literacy

Our main measure of financial literacy is based on the answers to a series of questions related to (basic) principles of household finance. The measure follows the spirit of the methodology proposed by Lusardi and Mitchell (2008) and adds some questions that are more specific to our institutional setting.

Subjects were given seven questions, detailed in the Appendix, which cover various aspects of financial sophistication: the ability to compute compound interest, knowledge of financial products, information about market trends, and math ability. We define the variable *Financial Literacy* as the number of correct answers to these questions. The variable takes values between 1 and 7, with an average of approximately 4.5 and a standard deviation of approximately 1.5.[13]

We conduct our main analysis with this aggregate measure of financial literacy. In the Online Appendix, we consider its various components in isolation and investigate their correlation (which is typically positive, as expected), as well as their separate effects on financial behaviors. We also discuss the robustness of our findings when considering alternative measures based on a subset of these questions.

In column 1 of Table 2, we report the correlation between *Financial Literacy* and a set of demographic variables that will serve as controls throughout the subsequent analysis. *Financial Literacy* is positively correlated with *Education*, *Income* and *Wealth*. It is negatively correlated with *Married* and *Female*. Comparing the magnitude of the effects (scaling for the standard deviation of the corresponding variables), we observe that, somewhat intuitively, *Education* and *Wealth* display the largest effects.

These correlations are consistent with other findings in the literature. Guiso and Jappelli (2008) show that financial literacy is positively correlated with education, income and wealth and negatively correlated with being female. Almenberg and Dreber (2015) and Fonseca, Mullen, Zamarro and

[13]Specifically, 1.6% of respondents score 1; 8.8% score 2; 17.8% score 3; 24.3% score 4; 19.2% score 5; 21.5% score 6; and 6.8% score 7.

Zissimopoulos (2012) document the gender gap in financial literacy. We refer to Lusardi and Mitchell (2014) for an exhaustive discussion of these relationships.[14]

In column 3, we consider a measure of perceived literacy. After the above-mentioned questions, we asked subjects to rank their performance (in terms of correct answers) relative to the other respondents. The resulting variable, *Subjective Literacy*, is positively associated with our objective measure of financial literacy, suggesting that subjects tend to hold a consistent perception of their ability to answer these questions. This is in line with Van Rooij et al. (2011), who find a positive correlation between objective and self-reported measures of financial sophistication among Dutch households.

Our survey also allows us to explore the correlation between *Financial Literacy* and preferences over risk, ambiguity and time. In Appendix 7.1, we provide a detailed description of how these variables are constructed. In column 3, we consider preferences over risk and ambiguity. We observe no significant relationship with financial literacy. In column 4, we consider the relationship with time preferences. The relationship between *Impatient* and *Financial Literacy* is negative (t-stat equal to 1.78).

Finally, we explore the relationship between financial literacy and financial behaviors as elicited in the survey. In column 5, the dependent variable *Stock Hold* equals one if the household reports holding stocks (either directly or indirectly) in its global portfolio. This is the case for 34% of our respondents. Our estimate shows that an additional unit of financial literacy is associated with a 3.5% increase in the probability of holding stocks.

In column 6, the dependent variable *Fin Products* is based on the number of different financial products (e.g., individual stocks, bonds, mutual funds) held by the household (again, we refer to Appendix 7.1 for details). We observe a positive relationship between financial literacy and *Fin Products*. These results are consistent with several studies documenting that more financially sophisticated households exhibit greater stock market participation (Christelis et al. (2010), Van Rooij et al. (2011), Grinblatt et al. (2011), Arrondel et al. (2015)).

In the next analysis, we focus on financial behaviors observed in our administrative data so as to explore in greater detail the relationship among financial literacy, portfolio choices and portfolio returns.

[14]We notice that our measure of financial literacy is consistent not only with other findings in the literature, but also with related measures obtained in a representative sample of French households. As reported in Arrondel et al. (2015), 48% of respondents in such sample correctly answered a question on compound interest. We have asked the same question for our measure of financial literacy (see Question 1 in the Appendix) and obtained 53% correct answers.

4 Portfolio Returns

We examine whether financial literacy relates to the returns that households experience in their portfolios. In Figure 2, we plot annual returns as a function of financial literacy, both non-parametrically (through local polynomial regressions) and after imposing a linear fit. The relationship is clearly positive, although, of course, only suggestive. We then turn to the following regression:

$$r_{i,t} = \alpha + \beta l_i + \Gamma_i^{'}\gamma + \Delta_{i,t-1}^{'}\delta + \mu_t + \varepsilon_{i,t}, \quad (1)$$

in which $r_{i,t}$ denotes the returns on the portfolio held by individual i in month t, $\Gamma_i^{'}$ includes a set of standard demographic variables (age, gender, education, marital status, income, wealth), $\Delta_{i,t-1}^{'}$ includes portfolio characteristics (such as its riskiness), as measured before portfolio returns, and μ_t are month-year fixed effects. Our main coefficient of interest is β, which describes the relationship between the survey measure of financial literacy l_i and portfolio returns. To allow for possible correlations over time, we cluster standard errors at the individual level.

These results are reported in Table 3. To better relate to other works, we report the results in terms of annual returns, which we compute as monthly rolling windows of 12-month returns (results with monthly returns are in the Online Appendix). In columns 1-2, the dependent variable is the portfolio returns as in equation (1). According to the estimates in column 2, one additional unit of financial literacy is associated with 0.08% higher returns, relative to an average return of 4.2%. In other words, those with the highest level of financial literacy experience approximately 0.5% higher returns than those with the lowest level of literacy.

To obtain a crude measure of the monetary loss experienced by less literate households, consider an investment of $32,700$ euros for 10 years, which corresponds to the average amount and average duration of *assurance vie* contracts in our sample. According to our estimates, the most literate households earn approximately 4.4% annual returns and the least literate households earn approximately 3.9% annual returns, which amounts to a difference of approximately $2,360$ euros on this investment.

We then explore the extent to which the previous results may be driven by different exposure to risk. We consider various measures of risk. In column 3, we control for the risky share, defined as the value of risky assets over the total value of the portfolio at the beginning of month t. In column 4, we control for the standard deviation of the returns in the previous 12 months. In column 5, we control for the beta of the returns, obtained by regressing returns in the previous 12 months on the French stock market index CAC40. We also consider higher moments of the return distribution: In column 6, we include the skewness of the returns and the coskewness

relative to the French stock market index CAC40.[15] The estimated impact of financial literacy is only slightly reduced. After controlling for risk, one additional unit of financial literacy is associated with approximately 0.07% higher returns, which corresponds to a 0.4% difference between the most and least literate households. These magnitudes are comparable to those reported in Von Gaudecker (2015), who shows that the least sophisticated households lose approximately 50 bps per year, and to those of Clark et al. (2015), who report a difference of 3.5 bps per month between households with high vs. low literacy.

In Table 4, we report a series of robustness checks. In column 1, we consider the effect of the recent financial crisis. The dummy *Crisis* equals one for months between October 2007 and February 2009, corresponding to the so-called bear market of 2007-09. We observe no significant interaction between *Crisis* and financial literacy; in particular, the relationship between literacy and returns holds outside the crisis period. In the Online Appendix, we provide further evidence that more literate households did not exhibit systematically different behaviors in their *assurance vie* contracts during the crisis.

We then consider the possibility of delegated portfolio management. The dummy *Delegate* equals one if the client has opted for delegated management in at least one contract. We find no significant relationship between *Delegate* and financial literacy (results reported in the Online Appendix). In column 2, we observe no differential impact of literacy depending on whether the management is delegated; in particular, our results hold for those clients (approximately 90% of the sample) who do not choose this option.

Turning to the effects of the duration of the contract, we construct the dummy *Duration* that equals one if the client holds no contract younger than 8 years. As mentioned previously, *assurance vie* contracts benefit from reduced taxes on capital gains after 8 years. In column 3, we observe that the interaction with financial literacy does not show any significant difference along this dimension. We then consider whether the effect is heterogeneous depending on the fraction of wealth invested in these contracts. The variable *Fraction* is defined as the value of the contracts held within the company over the value of wealth that the household reports in the survey.[16] This variable can be considered a rough measure of how representative these contracts are relative to the rest of a household's assets. We show that there is no relationship between *Fraction* and literacy (in the Online Appendix) and

[15] We measure the skewness as $E[(r-\mu_r)^3/\sigma_r^3]$, where μ_r and σ_r are the mean and the standard deviation, respectively, of the returns r in the previous 12 months. We measure the coskewness as $E[(r-\mu_r)^2(\iota-\mu_\iota)/\sigma_r^2\sigma_\iota]$, where μ_ι and σ_ι are the mean and the standard deviation, respectively, of the French stock market index ι in the previous 12 months.

[16] Specifically, *Fraction* is the value of the portfolio held in the company as of August 2010 (around the time when the survey was conducted) and the client's total wealth, which we estimate as the midpoint in the reported interval.

that our estimates do not significantly differ depending on the fraction of wealth invested in the company (column 4).

Finally, we consider the effect of alternative clustering of standard errors. In particular, we allow observations to be correlated both across individuals at a given point in time (which is also why equation (1) includes time fixed effects) and for a given individual over time. In column 5, we report standard errors clustered both by individual and by time following the procedure suggested by Petersen (2009), and our estimates are unchanged.

Overall, the findings in Tables 3 and 4 show that more financially literate households earn higher returns on their portfolios and that higher risk taking can only partly explain this relationship. In the next section, we more explicitly explore household portfolio choices.

5 Portfolio Choices

We investigate three main dimensions of portfolio choices. The first is how much risk households take, possibly in relation to market returns. The second is how frequently households adjust their risky position, possibly in relation to the returns experienced on their own portfolios. The third is, conditional on rebalancing, in what direction do households move their wealth? The analysis serves two main purposes. First, we wish to highlight how specific financial choices help us to understand the relationship between literacy and returns that we uncovered in the previous section. Second, we wish to provide direct evidence on whether some specific financial choices, which the literature regards as associated with low financial sophistication (e.g., inertia and trend chasing), are actually more likely to be observed among households with low financial literacy.

5.1 Risk Taking

We begin by considering how financial literacy affects overall risk exposure. The estimates shown in Table 5 derive from the same baseline specification as in equation (1) but with different dependent variables. In column 1, we observe no significant relationship between financial literacy and the risky share in household portfolios. The same pattern emerges when considering the standard deviation of the returns (column 2) or the beta of the returns (reported in the Online Appendix). We do not find evidence that, overall, households with higher financial literacy choose riskier portfolios.

This leads us to investigate whether risk taking varies with market conditions, in particular, whether households hold riskier positions when the market returns of the risky assets are expected to be higher. In this exercise, we use realized returns in period t as a proxy for expected returns in period t, given the information available at the end of $t-1$. To avoid any mechanical relationship between the risky share and portfolio returns

(whereby, for example, the risky share tends to increase after high returns), the risky share is measured before portfolio returns. Specifically, we measure the risky share on the last day of month $t-1$, while the returns in period t account for changes in the value of the funds between the first and the last day of month t. For example, the risky share is computed as of December 31st and the returns correspond to the period January 1st-31st. In this way, as confirmed in the Online Appendix, we can rule out any mechanical relationship between the two.

We first provide descriptive evidence. For each month, we compute the average risky share for households with financial literacy above the median in our sample (equal to 4) and the average risky share for those with financial literacy below the median. The difference between the two defines the variable *Difference in Risky Share*, which measures the difference in risk exposure between more literate and less literate households at the end of $t-1$. We also construct the variable *Market Returns* as the difference between the average monthly return of risky assets and that of riskless assets at t. In Figure 3, we plot *Difference in Risky Share* and *Market Returns* over time. We observe that the two curves tend to move together, suggesting that more literate households hold a relatively larger risky share when expected returns are higher. Similarly, Figure 4 plots *Difference in Risky Share* as a function of *Market Returns* and also suggests a positive relationship between the two.

We explore this pattern more systematically in columns 3 and 4 of Table 5. We are interested in the interaction term *Literacy*Mkt Returns,* which measures how the difference in risk exposure between more and less sophisticated households varies with expected market returns. The estimated coefficient is positive, showing that more sophisticated households take more risk than less sophisticated households when expected returns are higher.

In columns 5 and 6, we report the same regressions in changes instead of levels. The dependent variable is the change in the risky share relative to the previous month, and the variable *Change Market Returns* is the change in risky returns relative to the previous month. According to these estimates, a 1% increase in *Market Returns* is associated with a 2% increase in the risky share for each additional unit of financial literacy.

These results suggest that one way in which more sophisticated households experience higher returns is by holding a greater exposure to risk when expected market returns are higher. This complements the findings in Grinblatt et al. (2012), who show that investors with lower IQs tend to enter the stock market when returns are low, and with Guiso and Viviano (2015), who show that investors with higher financial literacy were more likely to exit the stock market just before the 2008 crash.

5.2 Inertia

We further investigate how the dynamics of households' portfolios vary with financial literacy. In particular, we consider how much of the observed change in risk exposure is driven by active rebalancing on the part of the household as opposed to passive changes induced by different returns of risky vs. riskless assets.

Inertia has been widely documented (Agnew, Balduzzi and Sunden (2003), Madrian and Shea (2001), Ameriks and Zeldes (2004), Brunnermeier and Nagel (2008)), and it is typically considered the result of low financial ability (Calvet et al. (2009*a*), Graham et al. (2009), Bilias et al. (2010)). Calvet, Campbell and Sodini (2009*b*) directly consider a lack of portfolio rebalancing as a measure of a lack of sophistication. Our data allow us to provide direct evidence on the relationship between financial sophistication and portfolio inertia.

Denote by $X_{i,t-1}$ the risky share of individual i in month $t-1$. If $r_{i,t}-r_f$ is the realized excess return of risky assets for individual i between $t-1$ and t, the passive share is defined as

$$X_{i,t}^P = \frac{(1+r_{i,t})X_{i,t-1}}{1+r_f+(r_{i,t}-r_f)X_{i,t-1}}. \tag{2}$$

If we observe that the risky share moves from $X_{i,t-1}$ to $X_{i,t}$, we define the passive change as

$$\Delta X_{i,t}^P = X_{i,t}^P - X_{i,t-1}, \tag{3}$$

the active change as

$$\Delta X_{i,t}^A = X_{i,t} - X_{i,t}^P, \tag{4}$$

and the total change as

$$\Delta X_{i,t} = \Delta X_{i,t}^P + \Delta X_{i,t}^A.$$

A structural model developed by Calvet et al. (2009*a*), which we follow closely in the subsequent analysis, allows us to derive measures of inertia by observing the evolution of $\Delta X_{i,t}^P$ and $\Delta X_{i,t}^A$. The model assumes that households differ in their speed of adjustment between the passive risky share and an unobservable target share. Under some assumptions (detailed in the Online Appendix), structural parameters such as the speed of adjustment can be conveniently estimated in the following equation:

$$\Delta x_{i,t} = a_t + b_0 \Delta x_{i,t}^P + b' w_{i,t} \Delta x_{i,t}^P + c_t' w_{i,t} + w_{i,t}' D_t w_{i,t} + \Delta u_{i,t}. \tag{5}$$

In (5), $\Delta x_{i,t}$ is the change in the log risky share,

$$\Delta x_{i,t} = \log(X_{i,t}) - \log(X_{i,t-1}),$$

and $\Delta x_{i,t}^P$ is the change in the log passive share,

$$\Delta x_{i,t}^P = \log(X_{i,t}^P) - \log(X_{i,t-1}^P),$$

where all the changes are expressed in yearly terms. The vector $w_{i,t}$ may include demographic characteristics (age, gender, education, marital status, income, wealth) and portfolio characteristics (returns, standard deviation). The coefficient b_0 measures the fraction of the total change in the risky share that is driven by the passive change. The greater portfolio inertia is, the closer b_0 should be to 1. Our main interest is in exploring whether portfolio inertia varies systematically with financial literacy, which we include in the set of characteristics $w_{i,t}$. As is clear from (5), our estimates include only portfolios that contain some risky assets (for which $X_{i,t-1}$ and $X_{i,t}$ are positive); if $X_{i,t-1} = 0$, the passive change in (3) is mechanically zero.

An important observation in Calvet et al. (2009*a*) is that OLS estimates of b_0 and b in equation (5) may be negatively biased since $\Delta x_{i,t}^P$ and $\Delta u_{i,t}$ may be negatively correlated. An instrument for $\Delta x_{i,t}^P$ can be defined as

$$\Delta x_{i,t}^{IV} = \hat{x}^P - x_{t-1}^P,$$

where

$$\hat{x}^P = \ln(\frac{(1 + r_{i,t})X_{t-1}^P}{1 + r_f + (r_{i,t} - r_f)X_{t-1}^P}).$$

In words, $\Delta x_{i,t}^{IV}$ is the (log) passive change that would be observed in the event that the household did not rebalance in period $t - 1$. As expected, given partial rebalancing, $\Delta x_{i,t}^{IV}$ is indeed highly correlated with $\Delta x_{i,t}^P$. The key assumption for the validity of the instrument is that the returns $r_{i,t}$ are uncorrelated with the error term.

We report our results in Table 6. In column 1, the OLS estimate of β equals 0.38; in column 2, the IV estimate is 0.43. The latter implies that, on average, our investors rebalance approximately 57% of their passive change over 12 months.

Our estimates are comparable to those obtained by Calvet et al. (2009*a*), who employ the same method on the entire portfolio holdings of Swedish households and report values of approximately 50%. Brunnermeier and Nagel (2008) employ a similar specification using survey data on U.S. households and report a rebalancing of approximately 25% of the passive change. They acknowledge this is likely to be an under-estimation due to the possibility of under-reporting of trades in their data.[17] We analyze in greater detail

[17]Regarding the above-mentioned literature on portfolio inertia, it should be noted that we do not observe when portfolios are rebalanced, and thus, we cannot directly estimate the frequency of rebalancing. Moreover, existing studies indicate some heterogeneity in this frequency with respect to investment products, from active trading of individual stocks to very infrequent trading in pension accounts (Guiso and Sodini (2013)). In terms

individual differences in the direction of rebalancing in the next section.

Our main interest here is in exploring whether the average effect masks significant heterogeneity with respect to households' financial literacy. Calvet et al. (2009*a*) show that the effect of passive change is larger for wealthier and more educated individuals, which they interpret as reflecting greater sophistication. Our data allow us to directly test the effect of financial literacy, while using demographic characteristics such as wealth and education as controls.

In columns 3-5, we interact the passive change with our measure of financial literacy. According to the IV estimates in column 3, each additional unit of financial literacy decreases the effect of the passive change by 5.7%. These magnitudes imply that for the least sophisticated households in our sample (which have financial literacy equal to 1), the passive change accounts for approximately 64% of the total change over 12 months. For the most sophisticated households (with financial literacy equal to 7), the passive change instead accounts for approximately 30% of the total change.

In column 4, we add interactions between the passive change and demographic characteristics. It appears that more educated, older and female investors display lower levels of inertia. In column 5, we add interactions between the passive change and portfolio characteristics and find that portfolios that experience higher returns and higher volatility have lower inertia. The effect of financial literacy remains. The higher financial literacy is, the lower the contribution of the passive change to the total change in risk exposure. These findings provide direct evidence that more financially literate households more actively rebalance their portfolios.

5.3 Rebalancing

We now explore in greater detail the direction of rebalancing. Trend-chasing behaviors, for example, are often associated with proxies for unsophistication such as low market experience (Goetzmann and Kumar (2008); Greenwood and Nagel (2009); Bilias et al. (2010)). Tang (2016) shows that a large fraction of traders in 401(k) accounts are naïve momentum traders and obtain lower performance.

We ask how, conditional on rebalancing, households move their wealth between funds that have performed relatively well in the past and funds that have performed relatively poorly. Consider the ratio of the active change over the passive change,

$$W_{i,t} = \frac{\Delta X^A_{i,t}}{\Delta X^P_{i,t}}, \tag{6}$$

where $\Delta X^P_{i,t}$ and $\Delta X^A_{i,t}$ are defined in equations (3) and (4), respectively.

of horizon, assurance vie products are somewhere in between (their average duration is approximately 10 years).

A positive ratio indicates that an investor is chasing trends in the sense of investing a larger fraction of his wealth in funds that have performed better in the past. When $W_{i,t} \in [-1, 0)$, instead, the investor is rebalancing his portfolio to compensate for the fluctuations in the risky share induced by market trends. We say that such an investor acts as a *rebalancer*.

The rebalancing behavior affects how the risky share $X_{i,t}$ evolves over time. In the limit, when $W_{i,t} = -1$, the household would display a constant risky share. In Figure 5, we plot the change in risky share $\Delta X_{i,t}$ over time (through local polynomial regressions). We divide the sample in two: The solid line refers to households with financial literacy below the median in the sample; the dotted line refers to households with financial literacy below the median. We observe that more literate households tend to display lower fluctuations in their risky share, suggesting that they may be more likely to act as rebalancers.

We investigate this further in Table 7. In column 1, the dependent variable *Rebalancer* is a dummy equal to one if $W_{i,t} \in [-1, 0)$ and zero otherwise. Our estimates show a positive relationship between financial literacy and the probability of being a rebalancer. In magnitude, an additional unit of financial literacy increases this probability by 1% relative to an average of 30%.

The rebalancing decision may depend on expectations about future returns, which may in turn be affected by experienced returns. For example, Hurd, Van Rooij and Winter (2011) show that recent market uptrends raise expectations about future market returns; Vissing-Jorgensen (2004) documents how households change their expectations in response to their own portfolio returns. As a measure of market trends, in column 2, we include instead of time dummies the variable *Change Market Returns,* as defined above. As a measure of own portfolio returns, in column 3, we include *Passive Change,* as defined in equation (3). *Passive Change* is positive when $r_{i,t} > r_f$, that is, when the household has experienced positive excess returns in its portfolio. We observe that, consistent with the literature, investors are less likely to act as rebalancers when they experience positive excess returns and when market trends are positive. The effect of financial literacy is, however, unchanged: More literate households are more likely to act as rebalancers.

Finally, we investigate whether, by rebalancing, more sophisticated households earn higher returns. We compare the return experienced in month t with the passive returns in month t, defined as the return that the household would have experienced had it not rebalanced its portfolio. The variable *Higher Returns* is a dummy equal to one if experienced returns exceed passive returns and to zero if experienced returns are lower than passive returns.

As shown in column 4, one additional unit of financial literacy increases the probability that experienced returns exceed passive returns by 1.2%,

relative to an average of 61%. In column 5, we consider the possibility that higher returns are determined by an increased exposure to risk. Specifically, the dummy *Higher Risk* equals one if the risky share exceeds the passive share (as defined in (2)). Intuitively, *Higher Risk* is positively associated with *Higher Returns*; the effect of financial literacy is, however, unchanged. We also show, in column 6, that the results are not affected by excluding households with $X_{i,t-1}$ equal to 0 or 1, for which the passive change is mechanically equal to 0. These results suggest that households with higher financial literacy are more likely to buy assets that provide higher returns than the assets that they sell.

6 Conclusion

In this paper, we have exploited a unique dataset in which administrative panel data on portfolio choices are combined with survey measures of financial literacy. We have provided a new set of results on the relationship among financial literacy, portfolio choices and returns, emphasizing in particular how more and less sophisticated investors display distinct portfolio dynamics.

Our analysis lacks an exogenous variation in financial literacy that would allow us to cleanly establish its causal effects. One may argue, for example, that individuals who are particularly lucky or unlucky in their investments are induced to acquire financial literacy, meaning that the causality would go from returns to literacy. We note, however, that the more literate households in our sample do not experience more extreme returns in the period before our survey (see the Online Appendix). Our data also allow us to control for financial wealth, which may help to reduce issues of reverse causality (Clark et al. (2015)), and more generally for a broad set of demographic characteristics that may be correlated with the incentives to invest in financial literacy (Lusardi et al. (2017)). Our estimates are typically strengthened by the inclusion of these controls. Finally, several studies have employed various instruments for financial literacy and shown that IV estimates confirm (and sometimes strengthen) the case for a causal relationship between literacy and returns.[18]

The aim of this study has been to uncover novel mechanisms relating financial literacy to financial outcomes. In this way, we believe that our results can inform the substantial policy debate on the effects of financial education (Greenspan (2002); Bernanke (2006); Schuchardt, Hanna, Hira, Lyons, Palmer and Xiao (2009); Willis (2011)).

[18]See Behrman, Mitchell, Soo and Bravo (2012) and Cole, Paulson and Shastry (2014) for recent contributions and Lusardi and Mitchell (2014) for a review

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7 Appendix

7.1 Description of variables

Financial Literacy

The variable *Financial Literacy* equals the number of correct answers to the following questions:

1) *Suppose that you have 1000 € in a savings account that offers a return of 2% per year. After five years, assuming that you have not touched your initial deposit, how much would you own? a) Less than 1100€; b) Exactly 1100€; c) More than 1100€; d) I don't know.*

2) *Livret A are used to finance social housing.*

3) *In 2008, the value of the CAC 40 Index of the largest listed companies decreased by more than 50%.*

4) *The value of the CAC 40 Index increased during 2009.*

5) *A share gives the right to fixed revenue.*
6) *Assurance vie contracts benefit from special fiscal treatment.*
7) *40 divided by one-half, plus 10 equals 30.*

For questions 2-7, the choice was among a) True; b) False; and c) I don't know. The correct answers were (c), (a), (b), (a), (b), (a), and (b), respectively. The percentages of correct answers were 53%, 57%, 62%, 63%, 89%, 84%, and 38%, respectively. We refer to the Online Appendix for a discussion of these questions and for alternative measures of financial literacy.

Subjective Literacy

The variable is based on the following question: *"In terms of correct answers, do you think that you are above or below the average of the other respondents?"* The variable *Subjective Literacy* takes the value 1 if the subject declared "*above the average*", 0 if he declared "*average*", and -1 if he declared "*below the average.*"

Risk Aversion

The variable is based on the following questions: *"You have two options: (a) win* 400 *euros for sure vs. (b) win* 1000 *euros with a* 50% *chance and zero otherwise. Which one would you choose?"* If (a) is chosen, we offer a choice between (c) win 300 euros for sure vs. (d) win 1000 euros with a 50% chance and zero otherwise. If (b) is chosen, we instead offer a choice between (e) win 500 euros for sure vs. (f) win 1000 euros with a 50% chance and zero otherwise. We construct the variable *Risk Aversion* that takes value 4 if (a) and (c) are chosen, 3 if (a) and (d) are chosen, 2 if (b) and (e) are chosen, or 1 if (b) and (f) are chosen.

Ambig Aversion

The variable is based on the following questions: *"You have two options: (a) win* 1000 *euros with a completely unknown probability vs. (b) win* 1000 *euros with a* 50% *chance and zero otherwise. Which one would you choose?"* If (a) is chosen, we propose (c) win 1000 euros with a completely unknown probability vs. (d) win 1000 euros with a 60% chance and zero otherwise. If (b) is chosen, we propose (e) win 1000 euros with a completely unknown probability vs. (f) win 1000 euros with a 40% chance and zero otherwise. We construct the variable *Ambig Aversion* that takes value 1 if (a) and (c) are chosen, 2 if (a) and (d) are chosen, 3 if (b) and (e) are chosen, or 4 if (b) and (f) are chosen.

Impatient

The variable is based on the following question: *"You can choose between 1) 1000 euros now; 2) 1020 euros in a month. Which one would you choose?"* The variable *Impatient* is a dummy equal to 1 if 1) was chosen.

Education

The variable takes value 1 if no formal education is reported, 2 refers to vocational training, 3 refers to baccalaureat, 4 refers to a 2-year post bac diploma, 5 refers to a 3-year post bac diploma, 6 refers to a 4-year post bac diploma, and 7 refers to a 5-year post bac diploma or above.

Age

The variable takes value 1 if the respondent is less than 30 years old, 2 refers to between 30 and 44 years old, 3 refers to between 45 and 64 years old, and 4 refers to 65 years or older.

Income

Monthly net revenues of the household (in euros). A value of 1 corresponds to less than 1000, 2 indicates between 1000 and 1499, 3 indicates between 1500 and 1999, 4 indicates between 2000 and 2999, 5 indicates between 3000 and 4999, 6 indicates 5000 and 6999, 7 indicates between 7000 and 9999, and 8 indicates over 10,000.

Wealth

Total wealth of the household (in euros). A value of 1 corresponds to less than 8000, 2 indicates between 8000 and 14,999, 3 indicates between 15,000 and 39,999, 4 indicates between 40,000 and 79,999, 5 indicates between 80,000 and 149,999, 6 indicates between 150,000 and 224,999, 7 indicates between 225,000 and 299,999, 8 indicates between 300,000 and 449,999, 9 indicates between 450,000 and 749,999, 10 indicates between 750,000 and 999,999, and 11 indicates over 1 million.

Fraction

Value of the portfolio held in the company as of August 2010 over the client's total wealth, estimated as the midpoint in the reported interval, except for the highest interval for which we consider the minimum of the interval.

Stock Hold

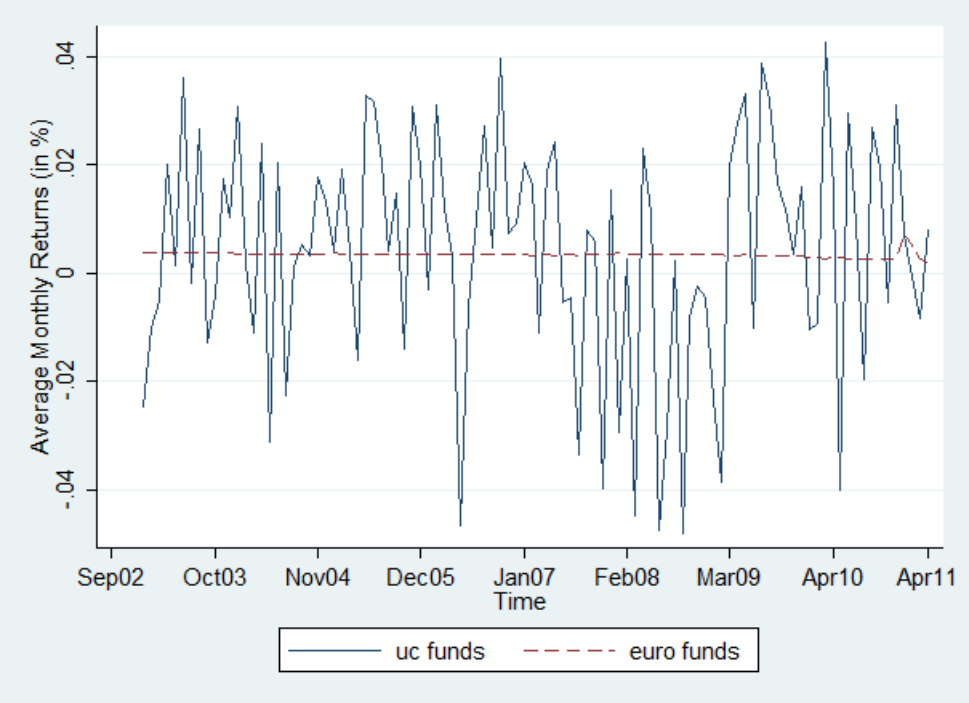
The variable is based on the following question: *"Do you hold stocks in your portfolio?"*

Fin Products

The variable *Fin Products* is equal to the number of different financial instruments held by the household. It is based on the following question: *"Which of the following financial products do you hold? 1) Stocks (except PEA); 2) Bonds (except PEA); 3) PEA (securities account with fiscal benefits); 4) Livret A (savings products with publicly fixed returns); 5) CEL/PEL (savings accounts with preferential mortgage rates); 6) Other saving accounts; 7) Retirement plans; 8) Employee savings plans; 9) Assurance vie; 10) Mutual funds (except PEA); and 11) Other placements."*

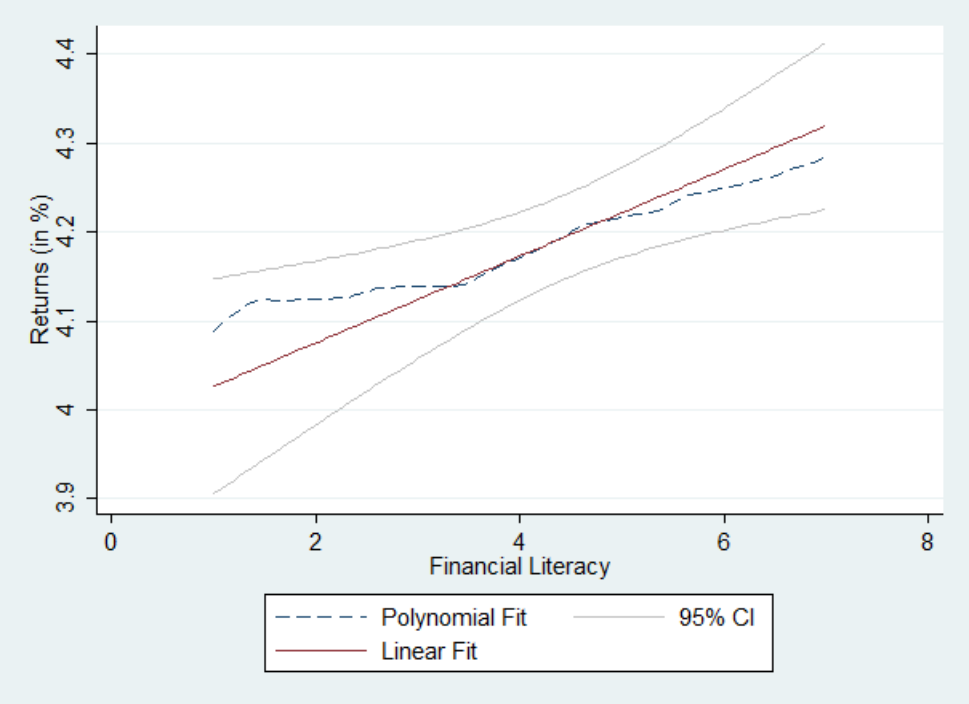
7.2 Figures

Figure 1: Returns of UC and Euro Funds



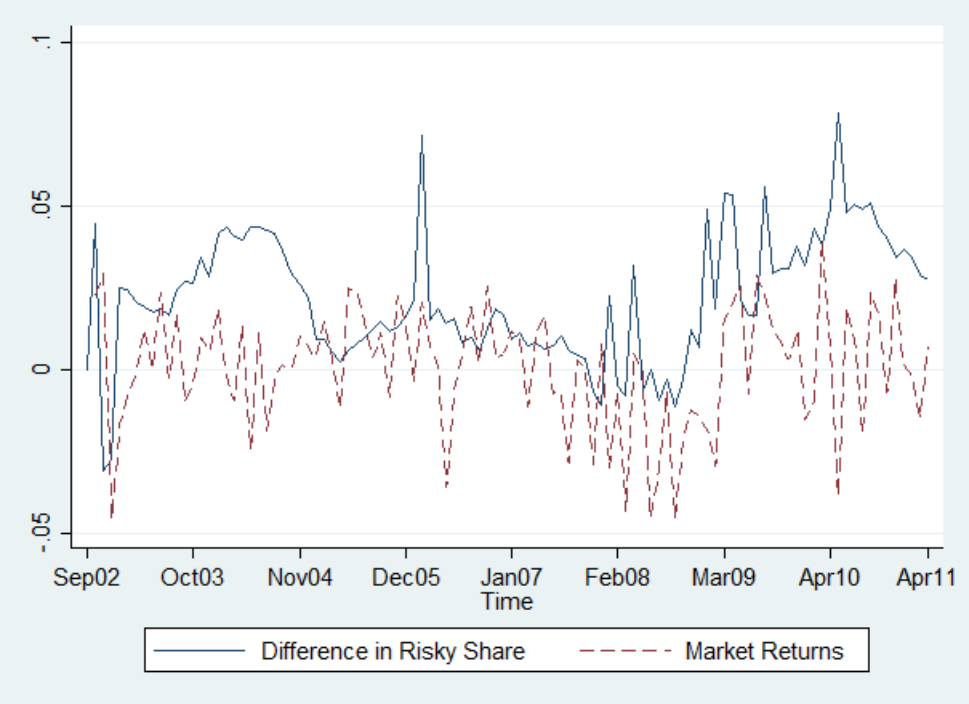
NOTE: This figure plots the average monthly returns of euro funds and uc funds in our sample period, from September 2002 to April 2011.

Figure 2: Financial Literacy and Portfolio Returns



NOTE: This figure plots annual returns (in %) over our 1-7 index of financial literacy. The middle solid line corresponds to linear estimates, the upper and lower solid lines draw the 95% confidence interval. The dotted line corresponds to non-parametric estimates through local polynomial regressions (local-mean smoothing estimated with the Epanechnikov kernel and the rule-of-thumb bandwidth.)

Figure 3: Risk Taking and Market Returns over time

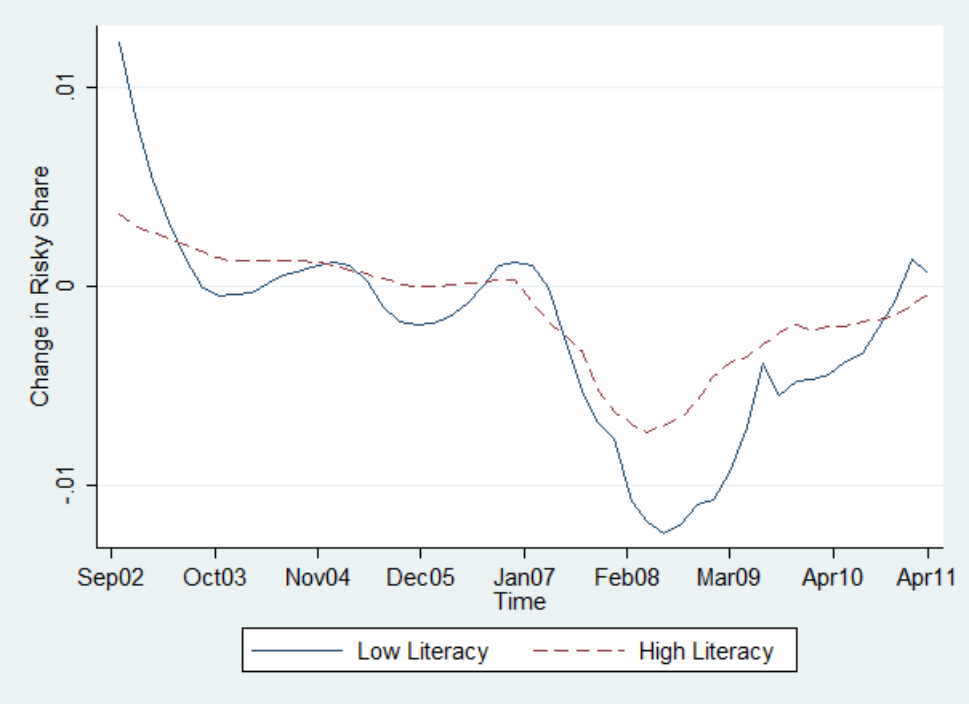


NOTE: This figure plots Difference in Risky Share and Market Returns in our sample period, from September 2002 to April 2011. Difference in Risky Share is the difference between the average risky share at the end of month t-1 for households with financial literacy above the median in our sample (equal to 4) and the average risky share for those with financial literacy below the median. Market Returns is the difference between the average return of risky assets and that of riskless assets at month t.

Figure 4: Risk Taking and Market Returns

NOTE: On the vertical axis, Difference in Risky Share is the difference between the average risky share at the end of month t-1 for households with financial literacy above the median in our sample (equal to 4) and the average risky share for those with financial literacy below the median. On the horizontal axis, Market Returns is the difference between the average return of risky assets and that of riskless assets at month t. The dots correspond to the observed relation in our sample period, the middle solid line corresponds to the linear fit, the upper and lower solid lines draw the 95% confidence interval.

Figure 5: Change over Time in Risk Exposure



NOTE: This figure plots the change in the risky share $\Delta X_{i,t}$ over time through local polynomial regressions (local-mean smoothing estimated with the Epanechnikov kernel and the rule-of-thumb bandwidth). The sample is split in two. High literacy refers to households with financial literacy above the median in our sample (equal to 4). Low literacy refers to households with financial literacy below the median.

7.3 Tables

Table 1: Summary Statistics

Variable	Obs.	Mean	Std. Dev.	Min	Max
Financial Literacy	511	4.427	1.471	1	7
Subjective Literacy	502	-0.102	0.884	-1	1
Risk Averse	511	0.384	0.487	0	1
Ambig Averse	511	0.389	0.488	0	1
Impatient	511	0.654	0.476	0	1
Education	501	4.421	1.886	1	7
Married	511	0.763	0.426	0	1
Age	511	2.613	0.753	1	4
Female	511	0.472	0.500	0	1
Income	494	4.532	1.553	1	8
Wealth	469	6.885	2.467	1	11
Stock Hold	511	0.348	0.477	0	1
Fin Product	511	4.168	2.104	0	11
Fraction	438	0.103	0.137	0.0001	0.678
Portfolio Returns (in %)	39969	4.195	4.820	-63.334	84.220
Risky Share	39892	0.231	0.286	0	1
Std Dev (in %)	39430	2.378	2.455	0	59.504
Beta	40083	0.097	0.174	-0.126	1.180
Skewness	38121	-0.070	0.686	-3.606	3.606
Coskewness	37435	-0.073	0.473	-4.096	3.916
Crisis	40084	0.183	0.387	0.000	1.000
Delegate	40084	0.097	0.296	0	1
Duration	39479	0.496	0.500	0	1
Market Returns (in %)	39707	0.037	2.177	-5.179	3.996
Change in Risky Share	38827	-0.002	0.077	-1	1
Change in Market Returns	39707	0.001	0.029	-0.058	0.059
Total Change (log)	16455	-0.011	0.547	-7.752	6.709
Passive Change (log)	13957	-0.104	0.521	-7.357	6.762
Passive Change (IV)	13927	-0.106	0.486	-6.051	5.225
Rebalancer	21611	0.307	0.461	0	1
Higher Return	20531	0.613	0.487	0	1
Higher Risk	20531	0.418	0.493	0	1

NOTE: The table reports summary statistics for all variables used in the regressions. A definition of these variables can be found in the text and in Appendix 7.1.

Table 2: Financial Literacy

Dep Variable	Financial Literacy				Stock Hold	Fin Products
	(1)	(2)	(3)	(4)	(5)	(6)
Financial Literacy					0.035	0.167
					(2.274)**	(2.288)**
Subjective Literacy		0.313				
		(4.032)***				
Ambiguity Averse			0.009			
			(-0.152)			
Risk Averse			-0.08			
			(-1.517)			
Impatient				-0.223		
				(-1.776)*		
Education	0.15	0.115	0.147	0.146	0.025	0.074
	(3.805)***	(2.947)***	(3.733)***	(3.701)***	(1.759)*	(1.106)
Married	-0.301	-0.258	-0.298	-0.283	-0.072	-0.16
	(-1.785)*	(-1.530)	(-1.774)*	(-1.673)*	(-1.306)	(-0.629)
Age	0.145	0.137	0.148	0.139	0.014	-0.328
	(1.627)	(1.542)	(1.668)*	(1.577)	(0.47)	(-2.591)***
Female	-0.527	-0.404	-0.515	-0.508	-0.056	-0.296
	(-4.106)***	(-3.080)***	(-4.014)***	(-3.945)***	(-1.278)	(-1.524)
Income	0.105	0.095	0.101	0.098	0.009	0.126
	(1.829)*	(1.664)*	(1.723)*	(1.698)*	(0.451)	(1.391)
Wealth	0.085	0.073	0.08	0.087	0.04	0.199
	(2.782)***	(2.374)**	(2.623)***	(2.804)***	(4.000)***	(4.237)***
Mean Dep Var	4.427	4.427	4.427	4.427	0.348	4.168
Observations	458	452	458	458	458	458
R-squared	0.163	0.193	0.167	0.168	0.114	0.14

NOTE: This table reports the results of OLS regressions. A detailed description of all the variables appears in Appendix 7.1. Robust t-statistics are in brackets. *, ** and *** denotes significance at 10%, 5% and 1% level, respectively.

Table 3: Returns and Risk

Dep Variable	Portfolio Returns (in %)					
	(1)	(2)	(3)	(4)	(5)	(6)
Financial Literacy	0.053	0.08	0.067	0.07	0.065	0.062
	(1.889)*	(2.611)***	(2.188)**	(2.423)**	(2.234)**	(1.970)**
Risky Share			1.287			
			(3.924)***			
Std Dev				0.112		0.114
				(1.898)*		(1.887)*
Beta					2.257	
					(5.281)***	
Skewness						-0.332
						(-6.870)***
Coskewness						0.076
						(0.818)
Controls	No	Yes	Yes	Yes	Yes	Yes
Time Dummies	Yes	Yes	Yes	Yes	Yes	Yes
Mean Dep Var	4.195	4.195	4.195	4.195	4.195	4.195
Number of Obs	37539	33463	33391	33013	33463	31222
Number of Clusters	509	456	456	456	456	456
R-squared	0.242	0.252	0.258	0.272	0.258	0.289

NOTE: This table reports the results of OLS regressions. The dependent variable is the annual returns of the portfolio in percentage points, computed as monthly rolling windows of 12-months returns. Risky Share is the value of the risky assets over the total value of the portfolio at the end of the previous month. Std Dev and Skewness are respectively the standard deviation and the skewness of the returns in the previous 12 months. Beta is obtained by regressing the returns in the previous 12 months on the French stock market index CAC40. Coskewness measures the coskewness between the returns and the French stock market index CAC40 in the previous 12 months. Controls include age, gender, education, marital status, income and wealth. Standard errors are clustered at the individual level. Robust t-statistics are in brackets. *, ** and *** denotes significance at 10%, 5% and 1% level, respectively.

Table 4: Robustness

Dep Variable	Portfolio Returns (in %)				
	(1)	(2)	(3)	(4)	(5)
Financial Literacy	0.105	0.076	0.117	0.081	0.08
	(2.228)**	(2.333)**	(2.214)**	(2.528)**	(2.584)***
Literacy*Crisis	-0.141				
	(-0.778)				
Literacy*Delegate		0.053			
		(-0.491)			
Delegate		0.273			
		(-0.517)			
Literacy*Duration			-0.068		
			(-1.070)		
Duration			0.18		
			(-0.605)		
Literacy*Fraction				0.006	
				(-0.18)	
Fraction				-0.073	
				(-0.383)	
Controls	Yes	Yes	Yes	Yes	Yes
Time Dummies	Yes	Yes	Yes	Yes	Yes
Mean Dep Var	4.195	4.195	4.195	4.195	4.195
Number of Obs	33463	33463	33010	33137	33463
Number of Clusters	456	456	456	447	104/456
R-squared	0.252	0.253	0.249	0.254	0.252

NOTE: This table reports the results of OLS regressions. The dependent variable is the annual returns of the portfolio in percentage points, computed as monthly rolling windows of 12-months returns. In column 1, Crisis is a dummy equal one for the bear market of 2007-09. In column 2, the dummy Delegate equals one if the client has opted for delegated management in at least one contract. In column 3, Duration is a dummy equal to one if the client holds no contract younger than 8 years. In column 4, Fraction is the value of the contracts over the total value of household wealth as of August 2010. In columns 1-4, standard errors are clustered at the individual level. In column 5, standard errors are clustered by individual and time. Controls include age, gender, education, marital status, income and wealth. Robust t-statistics are in brackets. *, ** and *** denotes significance at 10%, 5% and 1% level, respectively.

Table 5: Risk Taking

Dep Variable	Risky Share	Std Dev	Risky Share		Change in Risky Share	
	(1)	(2)	(3)	(4)	(5)	(6)
Financial Literacy	0.008	0.026	0.008	0.008	0.001	0.001
	(0.888)	(1.297)	(0.885)	(0.899)	(0.553)	(0.21)
Literacy* Mkt Returns			0.001	0.001		
			(2.048)**	(2.121)**		
Market Returns			-0.002			
			(-1.433)			
Literacy*Change Mkt Returns					0.017	0.02
					(1.977)**	(2.282)**
Change Market Returns					0.037	
					(-0.94)	
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Time Dummies	Yes	Yes	No	Yes	No	Yes
Mean Dep Var	0.231	2.378	0.231	0.231	-0.002	-0.002
Number of Obs	35578	35153	35244	35244	34377	34377
Number of Clusters	457	457	457	457	457	457
R-squared	0.073	0.117	0.059	0.072	0.003	0.13

NOTE: This table reports the results of OLS regressions. In columns 1, 3 and 4, the dependent variable is the Risky Share, defined as the value of the risky assets over the total value of the portfolio at the end of t-1. In column 2, the dependent variable is the standard deviation of the returns in the previous 12 months. In column 5 and 6, the dependent variable is the change in the Risky Share from the previous month. The variable Market Returns is the difference (in percentage points) between the average return of risky assets and that of riskless assets in month t. The variable Literacy* Returns is the interaction between Financial Literacy and Market Returns. The variable Change in Market Returns is the change in Market Returns from the previous month, and the variable Literacy* Change Returns is the interaction between Financial Literacy and Change in Market Returns. Controls include age, gender, education, marital status, income and wealth. Standard errors are clustered at the individual level. Robust t-statistics are in brackets. *, ** and *** denotes significance at 10%, 5% and 1% level, respectively.

Table 6: Change in Risk Exposure

Dep Variable	Total Change log Risky Share				
	OLS	IV			
	(1)	(2)	(3)	(4)	(5)
Passive Change	0.386	0.432	0.697	1.365	1.928
	(43.818)***	(45.074)***	(19.287)***	(9.418)***	(10.740)***
Fin Liter * Pass Change			-0.057	-0.035	-0.041
			(-8.072)***	(-5.058)***	(-5.821)***
Financial Literacy			-0.126	-0.13	-0.158
			(-7.071)***	(-7.097)***	(-8.400)***
Education * Pass Change				-0.056	-0.077
				(-7.333)***	(-9.092)***
Married * Pass Change				-0.021	-0.078
				(-0.724)	(-2.532)**
Age * Pass Change				-0.166	-0.24
				(-5.395)***	(-6.865)***
Female * Pass Change				-0.163	-0.244
				(-7.500)***	(-9.851)***
Income * Pass Change				0.001	0.011
				(0.01)	(1.16)
Wealth * Pass Change				0.004	0.006
				(0.005)	(0.005)
Returns* Pass Change					-0.041
					(-4.054)***
Std Dev * Pass Change					-0.279
					(-12.266)***
Controls	Yes	Yes	Yes	Yes	Yes
Controls Squared	No	No	No	Yes	Yes
Time Dummies	Yes	Yes	Yes	Yes	Yes
Mean Dep Var	-0.011	-0.011	-0.011	-0.011	-0.011
Number of Obs	12506	12477	12477	12477	12477
R-squared	0.185	0.178	0.168	0.145	0.124

NOTE: This table reports the results of OLS regressions (columns 1) and IV regressions (columns 2-5). The dependent variable is the total change in the log risky share $\Delta x_{i,c,t}$. Passive Change in the passive change in the log risky share $\Delta x^{P}_{i,c,t}$. In columns 2- 6, the instrument is the zero-rebalancing (log) passive change $\Delta x^{IV}_{i,c,t}$. Fin Liter * Pass Change is the interaction between financial literacy and $\Delta x^{P}_{i,c,t}$. In columns 4 and 5, for each control variable, we include its interaction with $\Delta x^{P}_{i,c,t}$ as well as its squared value. Controls include age, gender, education, marital status, income and wealth. In column 5, controls include also the returns and the standard deviation of the returns in percentage points. Robust t-statistics are in brackets. *, ** and *** denotes significance at 10%, 5% and 1% level, respectively.

Table 7: Portfolio Rebalancing

Dep Variable	Rebalancer			Higher Returns		
	(1)	(2)	(3)	(4)	(5)	(6)
Financial Literacy	0.011	0.01	0.01	0.012	0.012	0.012
	(2.298)**	(2.324)**	(2.255)**	(2.719)***	(2.901)***	(2.479)**
Change Market Returns		-0.791				
		(-8.280)***				
Passive Change			-0.814			
			(-9.517)***			
Higher Risk					0.075	0.026
					(5.759)***	(1.929)*
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Time Dummies	Yes	No	Yes	Yes	Yes	Yes
Mean Dep Var	0.307	0.307	0.307	0.613	0.613	0.613
Number of Obs	19534	19486	19534	18638	18638	14064
Number of Clusters	304	304	304	419	419	290
Pseudo R-squared	0.103	0.003	0.114	0.102	0.105	0.158

NOTE: This table reports the results of Probit regressions, marginal effects are displayed. In column 1-3, the dependent variable is a dummy equal to one if the ratio between active change and passive change is between -1 and 0, and zero otherwise. The variable Change in Market Returns is the change in Market returns (defined as the difference in percentage points between the average return of risky assets and that of riskless assets in month t) from the previous month. Passive Change is the passive change in the risky share. In columns 4-6, the dependent variable is a dummy equal to one if experienced returns exceed passive returns, and equal to zero if experienced returns are lower than passive returns. Higher Risk is a dummy equal to one if the risky share of the contract in month t exceeds the passive share. In column 6, the sample is restricted to households with a risky share $X_{i,t-1}$ different from 0 or 1. Controls include age, gender, education, marital status, income and wealth. Standard errors are clustered at the individual level. Robust t-statistics are in brackets. *, ** and *** denotes significance at 10%, 5% and 1% level, respectively.

8 Online Appendix

8.1 Alternative Measures of Financial Literacy

Our variable *Financial Literacy* is based on 7 questions, some of which are common to the rest of the literature and some of which are specific to the setting under study. Question 1 regards the ability to compute compound interest and is one of the "big-three" questions proposed by Lusardi and Mitchell (2008). Questions 2 and 6 are about knowledge of some specific features of *livret A* and *assurance vie*, the two most popular investment products among French households. *Livret A* pays a fixed interest rate that is determined by the state, it is exempt from taxes, and there is a cap on the amount of capital that each individual can invest. Financial institutions need to transfer part of the money collected to the state, which uses the proceeds to build social housing (this is what Question 2 is referring to). This specific feature is somewhat salient in the debate on saving instruments, it dates back to Napoleon and is considered a way to promote *livret A*, as it translates into "socially valuable" investments. Regarding Question 6, as mentioned in the text, a specific feature of *assurance vie* products (relative to other instruments of stock market participation) is their fiscal treatment that reduces the taxes on capital gains realized after 8 years from the opening of the contract. Question 5 addresses a basic distinction between investing in stocks as opposed to fixed income products.

Questions 3 and 4 are about awareness of the French market. The idea is that following (at least roughly) stock market trends provides useful information that households can use to decide whether and how to adjust their investment strategies. Including these dimensions is in line with approaches to financial literacy as a human capital investment (Lusardi et al. (2017)), and it seems particularly important in our setting, which focuses on portfolio dynamics.

Question 7 is simple arithmetic and is motivated by previous studies on math ability and financial behaviors (e.g., Gerardi et al. (2013), Agarwal and Mazumder (2013)). However, financial literacy is distinct from math ability (Lusardi and Mitchell (2014)). In fact, as shown below, our measure of financial literacy would be even stronger if we removed Question 7 (which in our case could be viewed mostly as adding noise).

Based on these considerations, we construct several alternative measures of financial literacy. *Financial Literacy (2)* is based on the correct answers to Questions 1-6, excluding Question 7 on math ability. *Financial Literacy (3)* is based on the number of correct answers to Questions 1 (on compound interest) and 5 (on stock investment). These questions do not depend on our specific context.

Alternatively, one could construct more disaggregated measures and consider the various dimensions of financial literacy in isolation. In our ques-

tions, we can distinguish four dimensions and construct four corresponding variables: *Compute Interest* (Question 1); *Know Product* (Questions 2, 5 and 6); *Follow Market* (Questions 3 and 4); *Math Ability* (Question 7). One can then ask whether these dimensions are correlated and what their separate contribution is to the effects highlighted in our main analysis.

We begin with some descriptive statistics. In Table 8, we observe that *Compute Interest*, *Know Product*, and *Follow Market* are significantly (and positively) correlated with one another and are positively correlated with education and wealth. The variable *Math Ability* is, however, not significantly related to those demographic characteristics or to other dimensions of financial literacy.

In Tables 9-14, we review our main results using each of the six variables separately to shed light on which dimensions of financial literacy are more relevant for the main effects presented above. We note from Tables 9 and 10 that the effect of financial literacy on portfolio returns is stronger if one considers the measure *Financial Literacy (2)*, which omits math ability. Among the four disaggregated measures, higher experienced returns are essentially driven by those with greater information about market trends (*Follow Market*). The pattern of increased risk taking when expected returns are higher is robust across the various measures of financial literacy, and it is driven in particular by investors who follow the market and can compute compound interest (Table 11). All dimensions of financial literacy are associated with lower portfolio inertia (Table 12), although the largest effects are for the variables *Know Product* and *Follow Market.* The likelihood of being a rebalancer (Table 13) is positively associated with *Compute Interest* and *Know Product* and with the alternative measures *Financial Literacy (2)* and *(3).* In Table 14, we observe that the probability that experienced returns exceed passive returns is positively associated with *Compute Interest*, *Follow Market,* and *Know Product* and with the alternative measures *Financial Literacy (2)* and *(3).*

Table 8: Descriptive Statistics

Variable	Obs.	Mean	Std. Dev.	Min	Max
Financial Literacy (2)	511	4.045	1.331	1	6
Financial Literacy (3)	511	1.424	0.618	0	2
Compute Interest	511	0.534	0.499	0	1
Math Ability	511	0.382	0.486	0	1
Follow Market	511	1.249	0.679	0	2
Know Product	511	2.262	0.760	0	3

	Compute Interest	Math Ability	Follow Market	Know Product	Education
Compute Interest	1				
Math Ability	0.104	1			
Follow Market	0.203*	0.051	1		
Know Product	0.327*	0.095	0.094	1	
Education	0.155*	0.113	0.149*	0.193*	1
Married	0.015	0.021	-0.061	0.053	0.006
Age	0.072	-0.051	-0.007	0.256*	-0.048
Female	-0.132*	-0.129*	-0.080	-0.109	0.105
Income	0.085	0.097	0.109	0.212*	0.506*
Wealth	0.143*	0.055	0.133*	0.301*	0.261*

	Married	Age	Female	Income	Wealth
Married	1				
Age	0.025	1			
Female	-0.092	-0.024	1		
Income	0.359*	0.073	-0.043	1	
Wealth	0.178*	0.377*	-0.133*	0.478*	1

NOTE: This table reports descriptive statistics as well as pairwise correlations between our disaggregated measures of financial literacy. Financial Literacy (2) is the number of correct answers to questions 1-6. Financial Literacy (3) is the number of correct answers to questions 1 and 5. Compute Interest is the ability to compute compound interests (see question 1 in the definition of Financial Literacy, Appendix 7.1); Know Product relates to the understanding of simple financial products (questions 2, 5 and 6); Follow Market captures whether subjects know of (basic) trends in financial markets (questions 3 and 4); Math Ability is on the ability to perform basic algebra (question 7). * denotes significance at 5% level.

Table 9: Returns

Dep Variable	Portfolio Returns (in %)					
	(1)	(2)	(3)	(4)	(5)	(6)
Financial Literacy (2)	0.088					
	(2.729)***					
Financial Literacy (3)		0.109				
		(1.427)				
Compute Interest			0.157			
			(1.724)*			
Follow Market				0.162		
				(2.413)**		
Know Product					0.052	
					(0.651)	
Math Ability						0.054
						(0.527)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Time Dummies	Yes	Yes	Yes	Yes	Yes	Yes
Mean Dep Var	4.195	4.195	4.195	4.195	4.195	4.195
Number of Obs	33463	33463	33463	33463	33463	33463
Number of Clusters	456	456	456	456	456	456
R-squared	0.252	0.251	0.251	0.252	0.251	0.251

NOTE: This table reports the results of OLS regressions. The dependent variable is the annual returns of the portfolio in percentage points, computed as monthly rolling windows of 12-months returns. Controls include age, gender, education, marital status, income and wealth. Standard errors are clustered at the individual level. Robust t-statistics are in brackets. *, ** and *** denotes significance at 10%, 5% and 1% level, respectively.

Table 10: Returns and Risk

Dep Variable	Portfolio Returns (in %)					
	(1)	(2)	(3)	(4)	(5)	(6)
Financial Literacy (2)	0.074					
	(2.357)**					
Financial Literacy (3)		0.097				
		(1.339)				
Compute Interest			0.12			
			(1.387)			
Follow Market				0.13		
				(2.043)**		
Know Product					0.056	
					(0.777)	
Math Ability						0.071
						(0.722)
Std Dev	0.112	0.114	0.113	0.111	0.114	0.114
	(1.883)*	(1.919)*	(1.907)*	(1.868)*	(1.940)*	(1.943)*
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Time Dummies	Yes	Yes	Yes	Yes	Yes	Yes
Mean Dep Var	4.195	4.195	4.195	4.195	4.195	4.195
Number of Obs	33013	33013	33013	33013	33013	33013
Number of Clusters	456	456	456	456	456	456
R-squared	0.272	0.272	0.272	0.272	0.271	0.271

NOTE: This table reports the results of OLS regressions. The dependent is the annual returns of the portfolio in percentage points, computed as monthly rolling windows of 12-months returns. Std Dev is the standard deviation of the returns in the previous 12 months. Controls include age, gender, education, marital status, income and wealth. Standard errors are clustered at the individual level. Robust t-statistics are in brackets. *, ** and *** denotes significance at 10%, 5% and 1% level, respectively.

Table 11: Risk Taking

Dep Variable	Change in Risky Share					
	(1)	(2)	(3)	(4)	(5)	(6)
Literacy(2)*Change Returns	0.021					
	(2.297)**					
Literacy(3)*Change Returns		0.052				
		(2.458)**				
Interest*Change Returns			0.05			
			(2.091)**			
Follow*Change Returns				0.042		
				(2.360)**		
Know*Change Returns					0.008	
					(0.428)	
Math*Change Returns						0.025
						(0.994)
Financial Literacy (2)	-0.001					
	(-0.451)					
Financial Literacy (3)		-0.001				
		(-0.319)				
Compute Interest			-0.001			
			(-1.001)			
Follow Market				-0.001		
				(-0.599)		
Know Product					-0.001	
					(-0.374)	
Math Ability						-0.001
						(-0.478)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Time Dummies	Yes	Yes	Yes	Yes	Yes	Yes
Mean Dep Var	-0.002	-0.002	-0.002	-0.002	-0.002	-0.002
Number of Obs	34377	34377	34377	34377	34377	34377
Number of Clusters	457	457	457	457	457	457
R-squared	0.13	0.13	0.13	0.129	0.13	0.129

NOTE: This table reports the results of OLS regressions. The dependent variable is the change in the Risky Share from the previous month. The variable Change in Market Returns is the change in Market returns from the previous month, where market returns are the difference (in percentage points) between the average return of risky assets and that of riskless assets in month t. For each measure of financial literacy, we denote with *Change Returns the interaction between the measure and Change in Market Returns. Controls include age, gender, education, marital status, income and wealth. Standard errors are clustered at the individual level. Robust t-statistics are in brackets. *, ** and *** denotes significance at 10%, 5% and 1% level, respectively.

Table 12: Change in Risk Exposure

Dep Variable	Total Change log Risky Share					
	(1)	(2)	(3)	(4)	(5)	(6)
Literacy(2)* Pass Change	-0.071					
	(-8.383)***					
Literacy(3)* Pass Change		-0.105				
		(-5.561)***				
Interest* Pass Change			-0.047			
			(-2.579)***			
Follow* Pass Change				-0.127		
				(-9.437)***		
Know* Pass Change					-0.147	
					(-6.915)***	
Math* Pass Change						-0.042
						(-2.322)**
Financial Literacy (2)	-0.115					
	(-5.723)***					
Financial Literacy (3)		-0.095				
		(-2.819)***				
Compute Interest			-0.023			
			(-2.548)**			
Follow Market				-0.048		
				(-2.207)**		
Know Product					-0.135	
					(-3.619)***	
Math Ability						-0.023
						(-2.558)**
Passive Change	0.724	0.586	0.457	0.451	0.592	0.772
	(18.867)***	(18.780)***	(31.641)***	(34.586)***	(27.993)***	(14.569)***
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Time Dummies	Yes	Yes	Yes	Yes	Yes	Yes
Mean Dep Var	-0.011	-0.011	-0.011	-0.011	-0.011	-0.011
Number of Obs	12477	12477	12477	12477	12477	12477
R-squared	0.167	0.17	0.177	0.177	0.175	0.161

NOTE: This table reports the results IV regressions. The dependent variable is the total change in the log risky share $\Delta x_{i,c,t}$. Passive Change in the passive change in the log risky share $\Delta x^{P}_{i,c,t}$. The instrument is the zero-rebalancing (log) passive change $\Delta x^{IV}_{i,c,t}$. For each measure of financial literacy, we denote with * Pass Change the interaction between the measure and $\Delta x^{P}_{i,c,t}$. For each control variable, we include its interaction with $\Delta x^{P}_{i,c,t}$ as well its squared value. Controls include age, gender, education, marital status, income and wealth. Robust t-statistics are in brackets. *, ** and *** denotes significance at 10%, 5% and 1% level, respectively.

Table 13: Portfolio Rebalancing

Dep Variable	Rebalancer					
	(1)	(2)	(3)	(4)	(5)	(6)
Financial Literacy (2)	0.01					
	(1.863)*					
Financial Literacy (3)		0.024				
		(2.127)**				
Compute Interest			0.025			
			(1.812)*			
Follow Market				0.001		
				(0.112)		
Know Product					0.017	
					(2.013)**	
Math Ability						0.022
						(1.556)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Time Dummies	Yes	Yes	Yes	Yes	Yes	Yes
Mean Dep Var	0.307	0.307	0.307	0.307	0.307	0.307
Number of Obs	19534	19534	19534	19534	19534	19534
Number of Clusters	304	304	304	304	304	304
R-squared	0.102	0.103	0.102	0.102	0.102	0.102

NOTE: This table reports the results IV regressions. The dependent variable is the total change in the log risky share $\Delta x_{i,c,t}$. Passive Change in the passive change in the log risky share $\Delta x^P_{i,c,t}$. The instrument is the zero-rebalancing (log) passive change $\Delta x^{IV}_{i,c,t}$. For each measure of financial literacy, we denote with * Pass Change the interaction between the measure and $\Delta x^P_{i,c,t}$. For each control variable, we include its interaction with $\Delta x^P_{i,c,t}$ as well its squared value. Controls include age, gender, education, marital status, income and wealth. Robust t-statistics are in brackets. *, ** and *** denotes significance at 10%, 5% and 1% level, respectively.

Table 14: Higher Returns

Dep Variable	Higher Returns					
	(1)	(2)	(3)	(4)	(5)	(6)
Financial Literacy (2)	0.017					
	(3.111)***					
Financial Literacy (3)		0.023				
		(2.030)**				
Compute Interest			0.035			
			(2.492)**			
Follow Market				0.021		
				(1.936)*		
Know Product					0.017	
					(1.874)*	
Math Ability						-0.01
						(-0.600)
Higher Risk	0.074	0.074	0.074	0.074	0.074	0.074
	(5.785)***	(5.728)***	(5.777)***	(5.745)***	(5.734)***	(5.742)***
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Time Dummies	Yes	Yes	Yes	Yes	Yes	Yes
Mean Dep Var	0.613	0.613	0.613	0.613	0.613	0.613
Number of Obs	18638	18638	18638	18638	18638	18638
Number of Clusters	419	419	419	419	419	419
R-squared	0.106	0.105	0.105	0.104	0.105	0.105

NOTE: This table reports the results of Probit regressions, marginal effects are displayed. The dependent variable is a dummy equal to one if experienced returns exceed passive returns, and equal to zero if experienced returns are lower than passive returns. Higher Risk is a dummy equal to one if the risky share of the contract in month t exceeds the passive share. Controls include age, gender, education, marital status, income and wealth. Standard errors are clustered at the individual level. Robust t-statistics are in brackets. *, ** and *** denotes significance at 10%, 5% and 1% level, respectively.

8.2 Extra Results

Table 15: Extra Results

Dep Variable	Month Ret	Delegate	Fraction	Beta	Skewness	Coskewness
	(1)	(2)	(3)	(4)	(5)	(6)
Financial Literacy	0.005	-0.005	0.068	0.006	-0.013	-0.001
	(2.031)**	(0.009)	(0.067)	(-1.277)	(-0.913)	(-0.178)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Time Dummies	Yes	Yes	No	Yes	Yes	Yes
Mean Dep Var	0.358	0.097	0.103	0.097	-0.07	-0.073
Number of Obs	33391	35759	448	35759	33830	33359
Number of Clusters	456	458		458	457	457
R-squared	0.234	0.089	0.083	0.126	0.114	0.203

NOTE: This table reports the results of OLS regressions. In column 1, the dependent variable is the monthly returns in percentage points. In column 2, the dependent variable is a dummy equal to one if the client has opted for delegated management in at least one contract. In column 3, the dependent variable is the value of the contracts over the total value of household wealth as of August 2010. In column 4, the dependent variable Beta is obtained by regressing the returns in the previous 12 months on the French stock market index CAC40. In column 5, the dependent variable is the skewness of the returns in the previous 12 months. In column 6, the dependent variable is the coskewness between the returns and the French stock market index CAC40 in the previous 12 months. Controls include age, gender, education, marital status, income and wealth. Standard errors are clustered at the individual level. Robust t-statistics are in brackets. *, ** and *** denotes significance at 10%, 5% and 1% level, respectively.

Table 16: Risky Share and Portfolio Returns

Dep Variable	Risky Share						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Portfolio Returns (t-1)	1.079			1.173	1.444		
	(3.496)***			(3.963)***	(4.114)***		
Portfolio Returns (t)		0.446		0.293	0.502		
		(1.582)		(1.035)	(1.452)		
Portfolio Returns (t+1)			-0.086	0.01	0.36		
			(-0.298)	(0.036)	(1.073)		
Market Returns (t-1)						0.002	0.002
						(3.883)***	(3.955)***
Market Returns (t)						0.0001	0.0001
						(0.27)	(0.783)
Controls	No	No	No	No	Yes	No	Yes
Time Dummies	No	No	No	No	Yes	No	No
Mean Dep Var	0.231	0.231	0.231	0.231	0.231	0.231	0.231
Number of Obs	38892	39892	38889	37994	33860	39027	34800
Number of Clusters	510	510	510	510	457	510	457
R-squared	0.001	0.001	0.001	0.002	0.071	0.001	0.058

NOTE: This table reports the results of OLS regressions. The dependent variable Risky Share is the value of the risky assets over the total value of the portfolio. Portfolio Returns (t-1) are the monthly returns of the portfolio in period t-1, Portfolio Returns (t) are the monthly returns of the portfolio in period t, Portfolio Returns (t+1) are the monthly returns of the portfolio in period t+1. Market Returns (t-1) are the difference (in percentage points) between the average return of risky assets and that of riskless assets at month t-1, Market Returns (t) are the difference (in percentage points) between the average return of risky assets and that of riskless assets at month t. Controls include age, gender, education, marital status, income and wealth. Standard errors are clustered at the individual level. Robust t-statistics are in brackets. *, ** and *** denotes significance at 10%, 5% and 1% level, respectively.

Table 17: Behaviors during the Crisis

	(1)	(2)	(3)	(4)	(5)
Literacy*Crisis	-881.082	54.33	-0.006	0.0001	-0.241
	(-1.060)	(0.928)	(-1.538)	(0.263)	(-3.131)***
Financial Literacy	-1520.568	-20.727	0.011	0.0001	0.152
	(-1.034)	(-1.176)	(1.206)	(-0.693)	(2.412)**
Controls	Yes	Yes	Yes	Yes	Yes
Time Dummies	Yes	Yes	Yes	Yes	Yes
Mean Dep Var	32668	211.231	0.231	-0.002	5.227
Number of Obs	33561	33113	33391	32490	33463
Number of Clusters	457	457	456	456	456
R-squared	0.093	0.028	0.079	0.131	0.118

NOTE: This table reports the results of OLS regressions. In column 1, the dependent variable is the value of the portfolio held by the client. In column 2, the dependent variable is change in the value of the portfolio. In column 3, the dependent variable is the Risky Share, which is the value of the risky assets over the total value of the portfolio. In column 4, the dependent variable is the change in the Risky Share from the previous month. In column 5, the dependent variable is the absolute value of the annual returns of the portfolio (in percentage points). Literacy*Crisis is the interaction between Financial Literacy and the dummy Crisis, which takes value one for the bear market of 2007-09. Controls include age, gender, education, marital status, income and wealth. Standard errors are clustered at the individual level. Robust t-statistics are in brackets. *, ** and *** denotes significance at 10%, 5% and 1% level, respectively.

8.3 A model of portfolio rebalancing

We reproduce the model proposed by Calvet et al. (2009*a*), which we use to derive equation (5) in the main text. The model is based on the following assumptions. First, the log of the risky share $x_{i,t}$ is a weighted average between the log of the passive share $x^P_{i,t}$ and the log of the (unobservable) target risky share $x^*_{i,t}$. Denoting by ϕ_i the speed of adjustment toward the target share, we have

$$x_{i,t} = \phi_i x^*_{i,t} + (1 - \phi_i) x^P_{i,t} + u_{i,t}. \tag{7}$$

Second, the speed of adjustment is a linear function of a set of observable household characteristics $w_{i,t}$; that is,

$$\phi_i = \gamma_0 + \gamma^{'} w_{i,t}. \tag{8}$$

Third, the change in the log target share is a linear function of these characteristics:

$$\Delta x^*_{i,t} = \delta_{0,t} + \delta^{'}_t w_{i,t}. \tag{9}$$

An advantage of the log specification is that $\Delta x^*_{i,t}$ can be defined independent of individual-specific time-invariant characteristics. Taking the first difference of (7) and using ϕ_i and $\Delta x^*_{i,t}$ from (8) and (9), we obtain

$$\Delta x_{i,t} = a_t + b_0 \Delta x^P_{i,t} + b^{'} w_{i,t} \Delta x^P_{i,t} + c^{'}_t w_{i,t} + w^{'}_{i,t} D_t w_{i,t} + \Delta u_{i,t}, \tag{10}$$

in which $a_t = \gamma_0 \delta_{0,t}$; $b_0 = 1 - \gamma_0$; $b = -\gamma$; $c_t = \gamma_0 \delta_t + \gamma \delta_{0,t}$ and $D_t = \gamma \delta^{'}_t$. This corresponds to equation (5). From (7) and (10), we can observe that $\Delta u_{i,t}$ may be negatively correlated with $\Delta x^P_{i,t}$. A positive shock to $u_{i,t-1}$, for example, would reduce $\Delta u_{i,t}$; simultaneously, it would increase $x_{i,t-1}$, which in turn would increase $x^P_{i,t}$ and thus increase $\Delta x^P_{i,t}$.