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FINANCIAL LITERACY AND THE DEMAND FOR FINANCIAL ADVICE

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Financial Literacy and the Demand for Financial Advice*

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Abstract

The low level of financial literacy in many countries suggests that households are at risk of sub-optimal financial decisions. In this paper we assess to what extent financial advisors can substitute for such a lack of knowledge, by analyzing the effect of investors' financial literacy on their decision about how much to rely on financial advisors. We model the strategic interaction between poorly informed investors and perfectly informed advisors facing conflicts of interest. We find that more knowledgeable investors are more likely to consult advisors, while less informed ones either invest by themselves (without any professional advice) or delegate their portfolio choice, suffering the agency costs of such decision. These results are confirmed empirically, where we investigate the effect of financial literacy on the demand for financial advice using the 2007 Unicredit Customers' Survey. Overall, our results suggest that non-independent advisors are not sufficient to alleviate the problem of low financial literacy.

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1 Introduction

The growing literature on financial literacy suggests that consumers' knowledge of basic financial principles and products is quite scarce, and that it may not be sufficient to guarantee that households make sound financial decisions. For instance, more financially illiterate households are more prone to lack of planning for retirement, portfolio under-diversification, and over-indebtedness (Guiso and Jappelli, 2008; Kimball and Shumway, 2007; Lusardi and Mitchell, 2006, 2007; Lusardi and Tufano, 2009).

One may argue that a low level of households' financial literacy does not necessarily imply that they will make poor financial decisions. At least in principle, households can seek advice and guidance from qualified sources. As long as households can resort to the advice of experts for their financial decisions, external advice can be seen as a substitute for learning by one's self, thus avoiding the effort of acquiring financial expertise. Indeed, common motivations for the demand for professional financial advice are that advisors are more knowledgeable about financial markets than non-professional investors (e.g., because they can exploit economies of scale in information acquisition), and that they can mitigate households' behavioral biases.

However, there are reasons to believe that the market for financial advice is imperfect and that the mere availability of qualified assistance will not necessarily translate into high-quality decision making. Not only advisors/brokers do not appear to fully correct investors' behavioral biases (Shapira and Venezia, 2001; Mullainathan et al., 2010), but it is evident that conflicts of interest may affect the supply of financial advice. When financial intermediaries are at the same time acting as advisors and selling financial products, they may be tempted of "misselling", i.e., selling a product that does not match a customer's specific needs (European Commission, 2009). Even more worryingly, consumers' ignorance may be exploited in retail financial markets as a source of market power by firms that increase the complexity of their financial products strategically (Carlin, 2009).

When looking at the consumers' side, it does not appear that advice is demanded in substitution for financial knowledge. Various authors suggested that formal sources of information and advice, including financial advisors, tend to be used by investors with higher financial literacy, while 'illiterate' ones prefer informal sources, such as friends, relatives, colleagues and neighbors (Lusardi and Mitchell, 2006; van Rooij et al., 2011). Moreover, Hackethal et al. (2009) show that advisors are matched with wealthier and older investors, rather than with poorer and inexperienced ones, suggesting that there may be a complementarity between financial knowledge and the demand for advice.

In this paper we assess to what extent financial advisors can substitute for a lack of financial knowledge. To do so, we analyze both theoretically

and empirically the effect of investors' financial knowledge on their decision about whether to invest autonomously, to ask for advice to a professional, or to delegate. First, we model the effect of investors' financial knowledge both on the advisors' decision about the informativeness of their recommendations, and on investors' choices about whether and how much to rely on advisors. Second, we analyze empirically the role of financial literacy on the demand for financial advice, studying which investors seek professional financial advice and to what extent they rely on it. We use the 2007 Unicredit Customers Survey, a representative sample of customers of one of the largest Italian banks.

In the theoretical framework we model the strategic interaction between an advisor/intermediary and an investor, where the customer is imperfectly informed about the risky asset future return while the advisor knows it perfectly. At the same time, the advisor earns a commission upon selling the risky product and faces a cost for misselling it (e.g. costs related to a loss of reputation or expected legal costs for being sued). The final utilities of both advisor and investor depend upon the investment decision of the latter. With respect to the previous literature on advice, we exploit the heterogeneity of investor's financial knowledge in affecting the degree of information transmission in equilibrium. We show that it is more profitable for advisors not to reveal the information they possess when investors are less knowledgeable. This implies that – if we allow investors to be fully rational and to observe the structure of advisor's selling incentives – advisors are visited only by the most knowledgeable customers, while less informed investors either invest completely by themselves (without any professional advice) or they delegate fully their portfolio choice.

In the empirical analysis we estimate the impact of investors' financial literacy (objectively measured by means of tests) on their choice between investing autonomously, asking for advice to professionals, or delegating their portfolio choice to them. The results indicate that, even controlling for a number of factors such as trust towards one's advisor, self-confidence in own financial ability, wealth and opportunity cost of time, financial literacy increases the probability of consulting the advisor, while at the same time it reduces that of investing autonomously or delegating.

Overall, our results suggest that the presence of non-independent advisors, who at the same time provide advice and sell financial assets, does little to alleviate the problem of low financial literacy of some investors. Indeed, our model and our empirical investigation show that these advisors are rarely relied upon by low financial literacy investors, who need advice the most. We conclude then that there is scope for various types of interventions, including financial literacy initiatives targeted to the population groups with the highest private costs of accessing financial knowledge, and for rules that reduce conflicts of interests between clients and intermediaries and that subsidize the development of independent advisors.

The rest of the paper is organized as follows. Section 2 reviews the relevant literature. Section 3 presents the model setup and characterizes both advisor's decision about information revelation and investor's choice about delegating to or consulting an advisor. Section 4 introduces the empirical analysis, presenting the dataset, the empirical strategy and the main results. Separate subsections perform robustness checks and discuss the issue of potential financial literacy endogeneity. Section 5 concludes.

2 Background

2.1 Models of financial advice

Several authors studied the issue of advisors' conflicts of interests in a strategic communication setting, modeling the interaction between an uninformed investor and an informed advisor whose preferences are 'biased' towards a partisan objective (e.g. through commissions and 'kickbacks'). Following the classic 'cheap-talk' communication game of Crawford and Sobel (1982), other works focussed on the origins of these conflicts. While in most cases the bias is simply assumed, Inderst and Ottaviani (2009) allow the conflict of interest between the advisor and the investor to arise endogenously from the agency relation between the advisor and the firm, which aims at setting the optimal compensation so as to induce its direct marketing agent to sell but not to missell. In Krausz and Paroush (2002) and Bolton et al. (2007) the bias of intermediaries providing advice is related to market competitiveness.

For our purposes, a particularly relevant strand of this literature is the one focusing on investors' characteristics and on how these affect information transmission. Ottaviani (2000) allows investors to differ with respect to their degree of strategic sophistication and shows that the nature of the communication in equilibrium changes drastically according to investor's naivety. Georgarakos and Inderst (2010) allow investors' decision to rely on advisor's recommendation to depend on the perception of their own financial capability, as well as on their perceived legal protection and trust in advice. Finally, Hackethal et al. (2010) introduce investors' knowledge of financial matters and their perception of advisor's conflict of interest in a game of cheap talk, with both elements reducing the likelihood that the customer follows advisor's recommendation.[1]

[1]Note that our work differs from that of Hackethal et al. (2010). They assume that the customer has to decide whether to follow advisor's recommendations or not upon receiving them, and they focus on the informative equilibrium only. On the contrary, in our model we exploit the different informativeness of the equilibria, and we focus on investor's decision on whether to visit the advisor or not, since it is always (never) optimal for the investor to follow the advice when this is (not) informative.

2.2 Financial literacy and financial advice

As financially literate investors have a better understanding of financial products and concepts, one might expect them to have an easier access to financial markets, suggesting that they may have a lower need for financial advisors. Financial knowledge can be interpreted as a way to reduce participation costs, since it has to do with "understanding basic investment principles as well as acquiring enough information about risks and returns to determine the household's optimal mix between stocks and riskless assets" (Vissing-Jorgensen, 2004, p. 179), which is typically identified as one of the main costs to stock market participation. van Rooij et al. (2011) show that financial literacy is related to higher stock market participation among Dutch households. If financial literacy increases stock market participation, then it may also increase the probability of investing autonomously and having less of a need for external support.

However, much of the existing empirical literature (in addition to the theoretical predictions of section 3) suggests the opposite, i.e. that advice is demanded by knowledgeable investors and not by financially illiterate ones.

The (mainly descriptive) evidence on financial literacy suggests that it may affect the choice of financial advisors and information sources (Bernheim, 1998). Lusardi and Mitchell (2006) show that individuals who are correct about three financial literacy questions tend to use formal tools for retirement planning (attend retirement seminar; use calculator/worksheet; consult a financial planner) rather than informal ones (talk to family, friends, coworkers). At the same time, those who used more sophisticated tools were always more likely to get the literacy questions right, as compared to those who relied on personal communications. Similar evidence is found in the Netherlands, where those who display high levels of basic and advanced financial literacy are less likely to rely on informal sources of information (family, friends) and are more likely to rely on formal sources (read newspapers, consult financial advisors, and seek information on the internet) (van Rooij et al., 2011).[2] Moreover, Hackethal et al. (2009) show that advisors are matched with wealthier and older investors, rather than with poorer and inexperienced ones, suggesting that the demand for advice might be a complement rather than a substitute to financial literacy.

Finally, the idea that advice is demanded by more knowledgeable in-

[2]One may argue that also 'formal' sources may act misleadingly, and that not necessarily resorting to them is a guarantee of sound financial decisions. For instance, investors may follow unscrupulous financial 'gurus', or use unreliable internet advisory websites and financial press. However, these sources are still more likely to provide valuable information than non-professional sources, such as friends, neighbors and relatives. This can be the case especially if individuals pair with similar people in terms of education and financial literacy (i.e, if low financial literacy investors have low financial literacy friends), and if investment knowledge is shared through social interaction with peers (Hong et al., 2004; Duflo and Saez, 2002).

vestors is shared also by the psychological research. This literature points to the fact that individuals who do not know much about (any) subject tend not to recognize their ignorance, and so fail to seek better information. Relatively less knowledgeable people are more likely to overestimate their abilities and as a consequence of their incompetence they also lack the metacognitive ability to realize it (Kruger and Dunning, 1999). This effect appears to be there also in the financial domain (Forbes and Kara, 2010).

3 The model

3.1 Setup

There are two agents: an intermediary who at the same time sells a risky financial product and provides advice to customers and an investor who decides how much of his wealth to invest in the risky product. We will refer to these agents respectively as the intermediary S (seller) and the investor B (buyer).

The interaction between the two agents involves decisions by both parties. The buyer B decides whether to delegate or not the portfolio choice to the seller. In case B delegates to S her portfolio choice, then S is free to acquire on her behalf any amount of the risky asset (compatible with the wealth of B). In case B does not delegate, she chooses how to invest her portfolio based on her information set, where this information set depends on whether she decides to ask for the seller's advice, or not. If he is asked for advice, the seller S decides whether to reveal or not the information he possesses through a message σ_S. We now review these decision processes and their timing more in detail.

The buyer decides how to optimally allocate her initial wealth W_0 between a risky and a riskless asset. We normalize the riskfree return r_f to zero. Her initial (i.e. $t = 0$) distribution of the risky asset payoff $\tilde{r}$ is

$$f(\tilde{r}) = \begin{cases} r_H & 1/2 \\ r_L & 1/2 \end{cases} \tag{1}$$

We assume that $r_H > 0$, $r_L < 0$ and $\frac{1}{2}r_H + \frac{1}{2}r_L > 0$ in order to depict a situation where B may incur real losses in case of an ill investment decision, but where the risky asset ex-ante provides an excess return over the riskless one.[3]

At $t = 0$, before undertaking the investment, the buyer obtains an informative signal s_i with (exogenous) precision π. The signal is correct with

[3]This means that we are restricting the analysis to those products that an uninformed, risk-neutral agent would buy. One can think of these risky assets as being sufficiently known among the large public, or assets whose historical past returns are above the riskfree rate, such as index funds.

probability $\pi = Pr(s_i = r_i|r_i) > 1/2$. For instance, if B receives the signal $s_i = r_L$, she bases her decisions upon $E[\tilde{r}|s_i = r_L] = \pi r_L + (1-\pi)r_H$. We interpret the information precision π as a proxy for the investor's degree of financial literacy, since a more financially educated B has access to a more precise information signal.[4]

Given that $r_L < 0$ and $E_{f(\tilde{r})}[\tilde{r}] > 0$, when $s_i = r_L$ there is a level $\pi_0 \in [1/2, 1]$ such that $\pi_0 r_L + (1-\pi_0)r_H = 0$. The seller knows exactly the realization of $\tilde{r}$ since the initial date $t = 0$.

The buyer is assumed to have mean-variance utility over her final wealth W_3. Given any information set I_B, the investment decision of B then amounts to

$$\max_{v\in[0,1]} \quad E[U(W_3)\,|I_B] = E[W_3\,|I_B] - \frac{\gamma}{2}Var[W_3\,|I_B]$$
$$\text{s.t.} \quad W_3 = W_0 + v\tilde{r}$$

where v is the quota of initial wealth she invests in the risky asset[5] and $r_f = 0$. Given the distribution of returns in (1) and B's information set I_B, her optimal investment in the risky asset is:

$$v^* = \begin{cases} \frac{E[\tilde{r}|I_B]}{\gamma Var[\tilde{r}|I_B]} & \text{if} \quad v > 0 \\ 0 \quad \text{if} \quad v \leq 0 \end{cases} \tag{2}$$

In case the optimal portfolio v^* resulting from (2) were negative, then we fix $v^* = 0$, since we assume that the buyer faces short-selling constraints.[6] Substituting for v^* in the objective function we obtain the ex-ante expected utility for the buyer B:

$$E[U(W_3)\,|I_B] = W_0 + \begin{cases} \frac{1}{2}\frac{(E[\tilde{r}|I_B])^2}{\gamma Var[\tilde{r}|I_B]} & \text{if} \quad v > 0 \\ 0 \quad \text{if} \quad v \leq 0 \end{cases} \tag{3}$$

At $t = 1$, after receiving the signal s_i, the buyer chooses whether to delegate her portfolio choice to the seller or not. When she delegates, she forgoes the possibility to choose the optimal investment in the risky asset by herself.

If the buyer decides not to delegate her portfolio choice, at $t = 2$ she has two options: she can either (i) ask for further information about the future

[4] In a previous version of the paper we formalized this relation assuming that the precision π is endogenous and the cost to acquire information with precision π is equal to $c(\pi, k)$, a convex cost function depending on the individual level of financial literacy k. It is easy to show that under some regularity assumptions, investors with higher k choose more precise signals, coeteris paribus.

[5] It is well known that with CARA utility the optimal portfolio allocation is independent of the initial wealth, that we then normalize to one for simplicity.

[6] This assumption is reasonable for most of private investors trading standard assets as index funds, mutual funds and individual stocks.

realization of $\tilde{r}$ to intermediary S; or, (ii) choose the optimal portfolio using only the information contained in the signal s_i. If B asks for information to S, in the following we say that she asks for advice. If asked for advice, the seller can, in turn, decide to reveal his information or not through a message σ_S, based on the incentives and the costs he faces in doing this.

The seller's payoff depends on the buyer's investment decision and consists in a fixed commission $F > 0$ paid upon completing a sale with B, i.e. whenever $v^* > 0$. Moreover, S pays a penalty for misselling (as in Inderst and Ottaviani 2009), representing "reputational costs", expected legal costs for litigation procedures, or the monetary costs of forgone customers, among others. In particular, we assume that this cost is incurred with probability one whenever the message σ_S does not correspond to the true state, and that the cost is proportional to the difference between the action and the true state $[\sigma(r_i) - r_i]^2$.[7] The seller's payoff is then

$$U_S(r_i) = F_{|\{v^*>0\}} - [\sigma(r_i) - r_i]^2$$

In order to restrict the the analysis to a meaningful set of parameters, we impose the following assumption on the seller's commission F.

Assumption 1: $(r_H - r_L)^2 < F < \frac{(r_H - r_L)^2}{(1-\pi_0)}$.

By imposing that seller's incentives are larger than the cost of lying we ensure that sometimes it may be optimal for S not to tell the truth if he is asked advice. The second condition in Assumption 1 ensures that the seller's incentives are not too large to always offset the cost for not telling the truth, even when the buyer is relatively well informed, i.e. for $\pi \in [\pi_0, 1]$.

Assumption 1 also implies that in case B delegates her portfolio choice, then S always buys a positive amount of the risky asset even if he knows that the negative return $\tilde{r} = r_L$ will realize, because the positive fee F he gains upon performing a sale of the risky asset exceeds the reputational cost $(r_H - r_L)^2$.

Summarizing, the timing of the model is the following (see Figure 1). At $t = 0$ the investor obtains a signal s_i about the risky asset's return with a given precision π, representing her degree of financial literacy. At $t = 1$ the buyer decides whether to delegate or not. If she did not delegate, then at $t = 2$ she chooses whether to invest on her own (i.e. using only the information contained in the signal s_i) or to consult the seller who knows the realized risky asset return.[8] If at $t = 2$ B decides to ask for advice to S, then they interact in a communication game where the advisor decides whether to disclose his information or not. Then the buyer chooses her portfolio on

[7] Results are qualitatively not dependent on this particular assumption on the cost function.

[8] This timing assumption is made for sake of exposition: the final results would be similar if the decision to delegate or not is taken after observing the signal realization (see the proof of Lemma 3).

the basis of the whole information set available to her, including the seller's message. Otherwise, if at $t = 2$ the buyer decides not to ask for advice, then she invests by herself, only on the basis of her signal s_i. At final date $t = 3$ the return $\tilde{r}$ is realized.

In the next subsection we start solving the communication game between the seller and the buyer arising at $t = 2$ in case the investor decided to demand his advice.

3.2 Advisor's decision about information revelation

We start by analyzing period $t = 2$, in the case B did not delegate the portfolio choice to S and decided to ask his advice; in this case S and B play a communication game that we denote as $(S, B)-game$. Recall that the buyer enters this stage having already received a signal $s_i \in R = \{r_H, r_L\}$ with a given precision π. Let us now describe the agents' information sets, their strategies and the equilibrium of the game.

Information sets. The seller S knows the true state of $\tilde{r}$: using a standard terminology we say there are two types of sellers $S = \{S(r_H), S(r_L)\}$. He also knows the precision π of the buyer's signal but not its realization.[9] The buyer knows π, the realization of the signal s_i and the payoff function of the seller.

Strategies. The seller decides which signal to deliver given his type. Thus a strategy for S is a mapping $\sigma_S : \{r_H, r_L\} \to \triangle R$. The buyer chooses the optimal portfolio allocation as in (2), where $I_B = \{\pi, s_i, \sigma_S\}$.

Equilibrium. A Perfect Bayesian Nash equilibrium in the communication game (S, B) is defined by a set of strategies (σ_S^*, v^*) and beliefs $p = \Pr(r_H)$, $p : R \to [0, 1]$ such that:

(i) for both types $S(r_i)$, $r_i = \{r_L, r_H\}$, σ_S^* maximizes $U_S(r_i)$ given the optimal investment decision of the buyer, v^*;

(ii) the optimal portfolio v^* is equal to (2), where the information set is $I_B = \{\pi, s_i, \sigma_S^*\}$;

(iii) the belief distribution $(p, 1-p)$ is rational and consistent with σ_S^*, i.e. $p = \Pr(r_H \,|\pi, s_i, \sigma_S^*)$.

We show that this equilibrium depends on the information set of the buyer, and precisely on the level of π. In particular, for $\pi \in [1/2, \pi_0)$ and in

[9] We choose to relax the hypothesis that the seller knows the information contained in the signal s_i. However, it would not be unreasonable to assume that the advisor possesses this piece of information, because intermediaries in the European Union are supposed to collect information on risk attitudes and prior experience of their customers in order to comply with the EU Markets in Financial Instruments Directive (MiFID). We proved that the set of equilibria of the game in this case looks qualitatively as the one presented in the paper (the proof is available upon request to the authors).

the absence of any other signals (i.e., before receiving advisor message σ_S), the buyer would choose to invest a positive amount of wealth in the risky asset $v^* > 0$ regardless of the signal $s_i = \{r_H, r_L\}$ she received. On the contrary, for $\pi \in [\pi_0, 1]$ the buyer's strategy (irrespective of the message σ_S) would be to invest a positive amount of wealth in the risky asset $v^* > 0$ if and only if $s_i = r_H$, while she chooses $v^* = 0$ for $s_i = r_L$. The optimal response of the seller is different depending on the accuracy of the information owned by the buyer he faces.

Lemma 1. *If Assumption 1 holds, then:*

(i) whenever $\pi \in [1/2, \pi_0)$ *there exists a unique pooling equilibrium* $(\sigma^*(r_H) = r_H; \sigma^*(r_L) = r_H)$*;*

(ii) whenever $\pi \in [\pi_0, 1]$ *there exists a unique fully revealing equilibrium* $(\sigma^*(r_H) = r_H; \sigma^*(r_L) = r_L)$*.*

Lemma 1 shows that investors with relatively coarse information of their own do not benefit from the opportunity to consult a professional advisor. This is because a buyer with $\pi \in [1/2, \pi_0)$ assign a low probability to the event $\tilde{r} = r_L$ and so she would choose $v^* > 0$ even if she receives signal $s_i = r_L$. As a consequence, seller $S(r_L)$ has no incentives to reveal his true type, because if he did so the buyer would no longer buy the asset and he would lose his commission F.

On the other hand, investors entering the game (S, B) with more precise information do receive extra information when they consult a professional advisor. This is because the buyer with $\pi \in [\pi_0, 1]$ is informed enough to choose $v^* > 0$ when $s_i = r_H$ but not when $s_i = r_L$. Consequently, $S(r_L)$ has no incentive to deviate from the fully revealing equilibrium: if he did so he would still not earn F and he would have to pay the extra cost $(r_H - r_L)^2$.

Two insightful implications can be derived from Lemma 1. First, advisors are not useful to the investors who need them the most, because they fail to be a substitute to learning by one's self. Given this result, we will see in the next sub-section that rational investors with a relative coarse information do not demand advice, even if it has a negligible cost. Second, financial intermediaries/advisors have a regressive effect on the distribution of information among investors. They increase the information of the relatively more informed but do not provide any additional information to the less informed.

3.3 Investor's decision about consulting an advisor or to invest autonomously

At stage $t = 1$ the buyer decides whether to delegate her portfolio choice to the seller or not; if she does not delegate, then at $t = 2$ she has the

choice between consulting the seller S for advice or not, after observing the realization of the signal s_i. We start analyzing whether it is optimal for B to ask for advice, and in the following sub-section we will analyze the delegation choice.[10] A rational buyer correctly anticipates the seller's behavior as outlined in Section 3.2 in case she decides to rely on his advice. For tractability, we let $\overline{U} = W_0 r_H$ be the maximum utility B can attain investing all her initial wealth W_0 in the risky asset when she is sure of the realization r_H.[11] Moreover, we assume that there are arbitrarily small advisory fees $\epsilon \geq 0$. This ensures that our results are robust to the introduction of a very competitive market for financial advice.

As before, the buyer's decision depends on the level of the precision π of her private signal.

Lemma 2. *If $\overline{U}$ is sufficiently large, then*

(i) whenever $\pi \in [1/2, \pi_0)$ the investor will be indifferent between consulting the advisor or not. For any arbitrarily small cost of advice ϵ she will choose to invest autonomously (not consult the advisor);

(ii) whenever $\pi \in [\pi_0, 1]$ the investor will strictly prefer to consult the advisor.

Lemma 2 shows that, since advisors would provide empty advice to the least informed investors, the latter rationally do not visit them (as long as investors know advisors' incentives F). As investors are able to anticipate the informativeness of the advisor's signal, advisors are consulted only by sufficiently informed investors who know they will receive meaningful information.

This result also directly implies that investors with high signal precision $\pi \geq \pi_0$ (and high financial literacy), by consulting an advisor, are able to implement the "first best" investment decision, i.e. the one with complete information (because they learn the true state of $\tilde{r}$ from the advisor). Instead, uninformed investors, by not visiting the advisor, make investment mistakes and hence suffer from ex-post losses, precisely because they are not sufficiently informed about the true state.

This in turn bears further implications. First, as far as asset's market is concerned, advisors/intermediaries do not eliminate noise trading from the market. Second, as for asset prices, uninformed investors buy also in 'bad times', hence generating noise.[12]

[10] We break the advice vs. autonomous investment decision from the delegation vs. no-delegation decisions for ease of exposition, but we would obtain the same results if we allowed the investor to choose between the three options (delegation vs. advice vs. autonomous investment) simultaneously.

[11] This bound $\overline{U}$ on utility is finite if the investor cannot borrow at r_f to invest in the risky asset.

[12] The opposite, however, does not hold. This may be important to explain asset "bubbles".

3.4 The choice of delegation

So far we analyzed buyer's choice between either investing using only her own information set (including s_i) or doing this using the seller's advice (σ_S), if she anticipated that σ_S would add information over the signal s_i. In this section we allow B to pre-commit at $t = 1$ to delegate her portfolio decision to S before knowing his advice.

The possibility to delegate the portfolio decision is usually available to any investor and in the literature several reasons why an individual investor may want to do so are explained, including high opportunity cost of time (Hackethal et al., 2009), and naivete (Ottaviani, 2000). Our purpose in this model is to examine whether investors' choice to delegate or not their portfolio decision is related with the quality of information they own.

As we said, when the buyer delegates, she forgoes the possibility to choose whether to invest or not in the risky asset. Since the seller gains his commission F only upon selling the risky asset, in case of delegation he will buy a positive amount of it on behalf of the buyer even if he knows that the negative return $\tilde{r} = r_L$ realized. If the buyer has delegated to the seller the portfolio choice, we assume that in the 'good state' $\tilde{r} = r_H$ the choice of the seller coincides with the one the buyer would do if she knew $\tilde{r} = r_H$ realized, so that she obtains $\overline{U} = W_0 r_H$ from delegating. However, if $\tilde{r} = r_L$, given that the seller buys on behalf of the buyer a positive amount $v_{r_L}^{del} > 0$ of the risky asset, this causes to the buyer an expected loss equal to $\underline{U} = v_{r_L}^{del} r_L < 0$.

For the purposes of this paper, we consider both W_0 and $v_{r_L}^{del}$ as exogenous, that is equivalent to assuming that $\overline{U}$ (resp. $\underline{U}$) are equal to a given positive (resp. negative) value. In a more general model with many risky assets, the investor can choose the optimal allocation of her wealth among these different assets, hence $\overline{U}$ may depend on the overall investment opportunities as well as on the individual investor's wealth. The negative expected utility $\underline{U}$ that the investor suffers delegating the investment choice to the seller when $\tilde{r} = r_L$ is a function of $v_{r_L}^{del}$. In turn, we assume that $v_{r_L}^{del}$ depends on the commission F earned by the seller, the reputation cost he suffers for a bad investment and possibly other elements (e.g. the wealth of the investor, the length of the buyer-seller relationship etc...).

The following lemma shows that the delegation choice is again driven by the precision of the buyer's information π, with well informed investors asking and following advisor's recommendations, and less informed investors either delegating or investing by themselves.

Lemma 3. *If under delegation the advisor buys a positive amount of risky asset on behalf of the customer for any value of the asset's return inducing an expected loss $\underline{U} < 0$ to the investor, then:*

(i) when $\pi \in [1/2, \pi_0)$, for any given EU_B^{self}, EU_B^{del}, $\max\left\{EU_B^{self}, EU_B^{del}\right\} >$

EU_B^{adv} hence the investor either decides without asking advice or delegates the portfolio choice to the seller;

(ii) when $\pi \in [\pi_0, 1]$, for any $\overline{U} > 0$ and $\underline{U} < 0$, $EU_B^{del} < EU_B^{adv}$ so that the investor strictly prefers to consult the advisor.

The intuition behind this result is quite simple. For $\pi \in [1/2, \pi_0)$ we already know from Lemma 2 that the utility of asking for advice is at most the same as investing autonomously, so the investor never consults the advisor, if she decides not to delegate her choice to him. In such a case, the investor either invests without asking for advice or delegates the portfolio choice to the intermediary.

For $\pi \in [\pi_0, 1]$, instead, we know from Lemma 2 that autonomous investment will not be chosen, since the strategic interaction with the advisor will result in a fully revealing equilibrium hence a higher utility. It is simple then to show that the utility from delegating is lower than that of consulting and following the advisor's recommendations, because the advisor buys a suboptimal amount $v_{r_L}^{del} > 0$ of risky asset if $\widetilde{r} = r_L$.

We reported here the results for the case when the delegation decision is taken *after* observing the realization of s_i. However, the final results would be the same if the decision to delegate or not were taken *before* observing the signal realization.

The results of Lemma 3 have similar implications to those of Lemma 2, with one additional element. Most informed investors prefer asking (and following) advice whether delegation is permitted or not; less informed investors, however, by having the option to choose delegation ex-ante, risk severe losses ex-post since they receive a too high allocation of the risky asset when $\tilde{r} = r_L$.

In the following section we complement the theoretical model with an empirical analysis of the effect of financial literacy on investors' demand for advice, and in particular on their choice between investing autonomously, consulting advisors or delegating them.

4 Empirical analysis

4.1 Data and descriptives

The Unicredit Customers' Survey (UCS) is a representative sample of the customers of one of the largest Italian banks (Unicredit group). Eligible interviewees are account holders with at least 10,000 euro in the bank at the end of 2006. The 2007 UCS survey samples 1,686 individuals. Even though sample selection is based on individual Unicredit customers, the survey has detailed information on demographic characteristics of all components of account holders' households, including their labour market position, income,

and household wealth (financial wealth, real assets, insurance policies and pensions).[13] Additionally, the account holder is asked about her relations with the bank, her attitudes towards investments, and her level of financial literacy. The only information available based on the bank's administrative records is related to financial wealth holdings, while other (potential) pieces of administrative information – for instance about portfolio allocation, risk profile, advisors fixed effects, etc. – are not available.

Table 1 describes the construction of the main UCS variables used in the analysis, and contains description and data sources for the variables not contained in the Unicredit dataset.

Summary statistics for the variables used in the analysis are reported in Table 2. Bank customers are on average 55 years old and about one third are females; 32% are employees, 28% are self-employed and 33% are retired; they earn an average (total) individual income of 50,000 euro per year and 45% of the sample has been a customer of Unicredit for at least 20 years.

In addition, Table 3 shows a comparison between the UCS and the Bank of Italy's Survey on Household Income and Wealth (SHIW), which is a nationally representative sample. To improve comparability, we selected three sub-samples from the SHIW: the sample of household heads (because in the SHIW financial literacy tests are asked only to household heads), the sample of those who hold an account at a bank or at a post office (because the UCS only samples account holders), and finally the sub-sample of household heads who hold a bank/post account. In general, the Unicredit sample is older, more educated, more likely to live in the North, and with higher family income. Given that financial literacy is correlated with education, income and is usually higher in northern regions, it is reasonable to expect the UCS sample to display higher financial literacy than the SHIW one. However, it is hard to make financial literacy comparisons. First, it is not possible to compare single items since tests are different.[14] Second, it is not easy to make comparisons even by looking at the overall performance. On average UCS respondents report more correct answers, display a considerably lower number of "do not know"s and a lower fraction of individuals gave zero correct answers. Nevertheless, in the UCS there is a higher share of incorrect answers than in the SHIW.

Let us now describe in more detail the main variables used in the anal-

[13] Analyzing respondents who are customers of the same bank has advantages and shortcoming. One drawback is that the choice of the bank is certainly not random and it might be driven by the same factors that affect the extent of reliance on the bank as a source of advice. This selection, however, cannot be controlled for. Moreover, cross-bank heterogeneity cannot be used to explore, for instance, cost effects. On the positive side, analyzing customers of the same bank reduces unobserved heterogeneity (for instance in terms the cost and type of advice provided, etc.).

[14] The questions about inflation is similar, even though with a slightly different wording. On this questions the share of correct answers is much higher in the nationally representative SHIW sample than in the Unicredit one.

ysis, namely the extent of reliance on professional advisors (our dependent variable) and the the level of financial literacy in the UCS (our explanatory variable of interest).

The rationale for concentrating on relations with intermediaries has to do with the fact that they represent the main source of financial information in Italy. Figure 2 reports evidence from a survey of Italian investors' behavior (Beltratti, 2007), showing that banks are the main source of financial information and advice, both with respect to professional sources of advice and overall. The same is displayed also in Figure 3 from the UCS, showing that banks and brokers (*promotori finanziari*) are those visited most often, while friends/ relatives/ colleagues and internet are rarely used (see also Table 4).[15] The preference for intermediaries among professional sources of advice is in part explained by the fact that the supply of independent financial advice (fee-based) is very limited in Italy.

As for the extent of reliance on advice from a professional about financial investments decisions, respondents' choice is reported in Table 5. About 12% of the respondents holding risky assets decide completely by themselves, 68% ask for their banks's / advisors' advice before forming their own decisions, while almost 20% rely mostly or completely on advisors' indications.

The financial literacy measure is constructed as in Guiso and Jappelli (2008) and equals the number of correct answers to eight questions on interest, inflation, understanding risk diversification and understanding the riskiness of various financial products. The wording of the tests is reported in Table 1 and the answers are displayed in Table 6. The average index corresponds to 4.7 correct questions out of 8 and less than 1% of the sample can answer all of them correctly; the overall distribution of correct answers is displayed in Figure 4.

4.2 Empirical strategy

To assess the impact of financial literacy on the demand for financial advice, we concentrate on the relation between investors and professional financial advisors, and analyze the extent of reliance on the latter. As about 6% of the sample reports that Unicredit is not their main bank, these observations are dropped from the analysis, and only observations were Unicredit is the main or only bank are used.

Table 7 reports the financial literacy distribution across degrees of reliance on advice, showing that investors choosing an intermediate level of delegation (i.e., those who ask for the bank/advisor's opinion before investing) have higher financial literacy than those on the two extremes (i.e., those

[15] In Italy trade unions too can be considered as a source of financial advice, especially in relation to occupational pension funds. However, we will not consider their role in the present study, both because the focus here is not on retirement savings and, above all, because no information about workers' relations with trade unions is present in the data.

either investing by themselves, or fully delegating). To see whether this is confirmed in a more thorough analysis, we estimate an ordinal response model of the probability of choosing one of the five possible values.

Since the question about the extent of reliance on advice is asked only to a sub-sample of the survey (i.e., those who hold risky assets), the relation is first estimated by ordered probit controlling for the selection bias (see Table 8). The exclusion restrictions used are risk preferences and a dummy equal one if the household had zero saving rate, based on the idea that they affect the propensity to hold risky assets while they are not related to the frequency of use of any source of advice (e.g., it is not obvious which option is more 'risky' and more likely to be driven by risk aversion). As the selection is not significant, we proceed with the econometric analysis disregarding the selection issue.

We then estimate the following generalized ordered probit model of chosen delegation level[16]

$$\begin{aligned} P(D_i = 1) &= F(-X\beta_1) \\ P(D_i = j) &= F(\kappa_j - X\beta_j) - F(\kappa_{j-1} - X\beta_{j-1}), \quad j = 2, ..., J-1 \\ P(D_i = J) &= 1 - F(\kappa_J - X\beta_J) \end{aligned} \tag{4}$$

where $J = 5$, and $F(\cdot)$ is the cumulative normal distribution. Explanatory variables in X include gender, age, years of education, occupational status, (macro) regions of residence, log individual income, financial wealth categories,[17] experience in trading financial products, whether the respondent works in the financial sector, length of bank relationship, financial literacy, self-confidence and trust. D_i is the delegation level chosen by individual i, where:

$D_i = 1$: investor i decides completely by herself, the bank simply executes her decisions

$D_i = 2$: investor i tells the bank/advisor how she intends to invest and asks their opinion before deciding

[16] See Greene and Hensher (2010); Boes and Winkelmann (2006); Terza (1985).

[17] Financial wealth (dummies) are based on the bank's administrative records (indicating the amount of financial wealth held by the customer at the end of the year 2006) and are 'augmented' with self-reported financial wealth when the self-report exceeds the administrative information. This is to allow for the possibility that respondents hold additional financial assets outside their Unicredit account. Basing this variable on administrative data corrects the heavy item non-response and under-reporting of the 'subjective' financial wealth measure, where about 54% of the sample refuses to indicate in which range their wealth is included and the remaining respondents who provide an answer often under-report their holdings (i.e., indicate a lower bracket with respect to the administrative data).

$D_i = 3$: investor i considers bank/advisor's proposals before deciding
$D_i = 4$: investor i relies mainly on bank/advisor for her investment decision
$D_i = 5$: investor i lets the bank/advisor decide everything

In the generalized ordered probit model, the parameters β_j are allowed to vary across alternatives by generalizing the threshold parameters and making them dependent on covariates

$$\kappa_j = \tilde{\kappa}_j + X\gamma_j$$

Hence, the parameters β_j in (4) are defined as $\beta_j = \beta - \gamma_j$. In practice, equality of coefficients $\beta_1 = ... = \beta_J$ is not imposed when statistical tests reject the null of equality at the 5% level, implying that for these variables the parallel-lines assumption is violated; otherwise equality is imposed. In the present case, the parallel-lines assumption is violated for financial literacy and trust in advisors.

4.3 Results: How much to rely on advisors

Table 9 reports the marginal effects from a generalized ordered probit regression on the probability of choosing one the five options about autonomous investment/delegation.

The most interesting result is that the effect of financial literacy is non-monotonic across delegation levels, thus confirming the descriptive evidence found in Table 7.[18] Higher financial literacy reduces the probability of choosing to invest autonomously and it also reduces the probability of delegating financial decisions mostly or completely to the advisor. On the contrary, financial literacy increases the probability of choosing the intermediate option, i.e. consulting the advisor, while at the same time maintaining the final decision over investments. This is consistent not only with the theoretical predictions of Section 3, but also with the general finding that financial literacy is associated with a tendency to consult professionals. To some extent, these findings also lend support to the results of Hackethal et al. (2009) showing that advice is demanded by older and wealthier investors, rather than by poorer and inexperienced ones. The fact that more knowledgeable investors are *more* likely to consult an advisor but *less* likely to delegate is also consistent with the finding of Hackethal et al. (2010) that investors more interested in financial matters (and presumably more knowledgeable) are less likely to follow advisor's recommendations, conditional on receiving advice.

Other interesting results emerge from Table 9. More educated investors and those working in the financial sector are less likely to delegate and more

[18]The same result about financial literacy, also quantitatively, is found estimating a non-ordinal model, such as a multinomial logistic regression (not reported).

likely to invest by themselves. The fact that women are more likely to delegate is not easy to interpret. It may be seen as an indirect effect of self-confidence: as women are typically found to be less overconfident than men (Barber and Odean, 2001), they might be less prone to invest by themselves. Other explanations, however, may be equally valid (e.g., they are less used than men to manage household's finances).

The results about investors' perception of their own financial knowledge is worth commenting. Even though self-assessed financial knowledge is often correlated with more objective measures (Guiso and Jappelli, 2008; van Rooij et al., 2011), it is likely to drive the demand for financial advice independently from the latter. Moreover, it is important to disentangle self-assessed and test-based financial literacy also because initiatives aiming at improving financial literacy may have the side-effect of raising self-confidence without improving ability, leading to worse decisions (Willis, 2008). Moreover, Georgarakos and Inderst (2010) study from a theoretical point of view the effect of investors' perceived financial capability on their decision to rely on a professional advisor or on their own judgment, arguing that when perceived financial capability is higher the investor is more likely to rely on her own knowledge instead of an advisor. Our results are that investors with higher perceived financial knowledge are more likely to invest their assets relying on their own judgment, instead of using an advisor. This confirms the idea that self-assessed and objective financial literacy have a different effect on financial behavior, and supports the theoretical predictions of Georgarakos and Inderst (2010).

Let us now turn to comment the variables that might be considered as proxy for investors' opportunity cost of time – such as their occupational status, or their individual income. Hackethal et al. (2009) study the investment behaviour of the customers of a large German brokerage firm and investigate the probability that investors have their accounts run by an independent financial advisor. They show that advisors tend to be matched with wealthier and older investors, who presumably delegate their investment decisions (also) because of a high opportunity cost of time. In our estimation, however, such variables do not affect the probability of delegating or investing autonomously. This may be in contrast with the previous findings because the Unicredit sample is richer than the national average. This may reduce the heterogeneity across the variables that are related to the opportunity cost. Finally, financial wealth appears to be related to a tendency to delegate (even if not all wealth categories are significant), consistently with Hackethal et al. (2009).

Finally let us comment the results about trust. As we argued before, the market for financial advice is affected by conflicts of interests and misselling practices may occur. Data from the European Social Survey 2004 show that, when asked how many times they had been cheated by a bank or insurance company in the last 5 years, non-negligible shares of the pop-

ulation reported of having experienced cheating more than once. Figure 5 shows the distribution to this answer for some European countries. In all the situations where investors may be afraid of being treated unfairly by their advisor or broker, trust becomes important for the investment to take place. Gambetta (1998) defines trust as "the subjective probability with which an agent assesses that another agent or group of agents will perform a particular action (p. 217)". Recent research has shown that lack of trust in the financial system and financial intermediaries reduces the probability to hold risky assets and pension plans (Guiso et al., 2008; Pasini and Georgarakos, 2009; Agnew et al., 2007). As expected, also in our case trust towards one's own advisor matters, as it increases the likelihood of delegation and reduces that of autonomous investment. On the other hand, the length of the relationship with the bank does not have a clear effect on the delegation choice.

4.4 Robustness checks

As discussed in section 4.1, the financial literacy index is constructed as in Guiso and Jappelli (2008). This equals the number of correct answers to four questions about interest, inflation and risk diversification, plus four questions based on understanding the riskiness of various financial products. This index may be problematic not only because it involves some degree of arbitrariness, but also because it may be overly dependent on some specific question(s). As a robustness check, we estimate again model (4) with alternative financial literacy indices.[19] Table 10 reports estimation results, showing that the effect of financial literacy is qualitatively the same across indices 1 to 3, while results for the fourth one are insignificant on almost all values of the dependent variable.

[19] Alternative indices (all of them are re-scaled so as to range between 0 an 10):

- Financial literacy 1. It is the same the main index (Guiso and Jappelli, 2008), rescaled: $10 \times (Inflation + Interest + Diversif1 + Diversif2 + Risk1 + Risk2 + Risk3 + Risk4)/8$
- Financial literacy 2. Since quizzes $Risk1 - Risk4$ are highly correlated among themselves, this index gives them a lower weight: $10 \times [Inflation + Interest + Diversif1 + Diversif2 + (Risk1 + Risk2 + Risk3 + Risk4)/4]/5$
- Financial literacy 3. It is the same as the previous one with the difference that the inflation question is eliminated, because it shows a very low correct response rate (34%) – much lower than a similar question in the SHIW (60%) – which might be related to a misinterpretation of the question rather than to financial illiteracy. The index is: $10 \times [Interest + Diversif1 + Diversif2 + (Risk1 + Risk2 + Risk3 + Risk4)/4]/4$
- Financial literacy 4: $10 \times [Interest + Diversif1 + Diversif2]/3$

A second robustness check has to do with the sample used for estimation. As was previously mentioned, the estimation sample includes only observations where Unicredit is the main or only bank (excluding about 6% of the total sample). We repeat the estimation of model (4) using alternative samples.[20] Estimates from Table 11 show that results in all rows are quantitatively very similar, even though in the third and fourth rows the effect of literacy on investing autonomously becomes insignificant (potentially also because of a reduction in sample size).

4.5 Potential financial literacy endogeneity

The fact that financial literacy is associated with the preference for formal sources of advice and with the tendency to consult rather than delegate to professional advisors does not necessarily provide indications on the direction of causality. Financial literacy may be positively correlated with a preference for advisors because individuals *learn* from formal sources, rather than because financially literate individuals *choose* formal sources of advice. Similarly, investors who consult professional advisors are more likely to learn from them than those who delegate or invest by themselves. Moreover, another source of endogeneity may be constituted by a an unobserved factor (such as time preferences) driving both the willingness to acquire financial literacy and the demand for financial advice.

To address this issue we follow two strategies. First, we concentrate on potential learning from the bank and consider various sub-samples of respondents who should be more likely to learn from the bank (i.e. those who use the bank often or prefer the bank to friends, and those who report $D_i = 3$). Then we check whether financial literacy increases with the length of bank relationship, under the assumption that if there is learning from the bank, it should be related to the length of relationship. Table 12 shows that financial literacy is not related to being a long-time customer of Unicredit in any of the sub-samples considered.

Second, as it is arguable that financial literacy may still be endogenous in spite of this evidence (for instance because of a spurious relation), model (4) is estimated again controlling for endogeneity via the control function approach (Rivers and Vuong, 1988).[21] The instruments for financial liter-

[20] Alternative sub-samples:

- Unicredit is the main or only bank (i.e., the baseline), with N = 1,116
- Unicredit is the only bank, with N = 802
- Unicredit is the main or only bank and the respondents uses brokers for advice never, seldom or sometimes, with N = 847
- Unicredit is the main or only bank and the respondent never or seldom uses brokers for advice, with N = 705

[21] When estimating a probit model with a continuous endogenous variable, the two-step

acy are the average financial literacy at regional level (taken from the Bank of Italy's Survey on Household Income and Wealth, SHIW) and experience with financial products (from UCS). Financial literacy at regional level is likely to increase individual knowledge through social interaction. The measure of previous experience is based on a question asking at what age the individual first traded a given financial product (either government bonds, stocks or mutual funds). This is strongly related to financial literacy, while it is not related to the extent of delegation (controlling for age and length of bank relationship, see Table 9). Estimates from a first stage regression are reported in Table 13, together with statistics about instruments validity. Both experience and regional financial literacy positively and significantly affect the financial knowledge of Unicredit customers, and taken together produce an F statistic of over 18, indicating that the instruments have sufficient explanatory power. Moreover, the Hansen's J test does not reject the null of instruments validity (p-value 0.169).

Results from Table 14 show that the positive relation between financial literacy and the propensity to consult an advisor is robust to controlling for endogeneity and is even stronger than in Table 9. The effect of financial literacy on investing autonomously and on delegating turns insignificant, even though it carries the same (negative) sign as before.

5 Concluding remarks

In this paper we analyze the effect of investors' financial literacy on their decision about whether and how much to rely on financial advisors. We pursue both a theoretical and an empirical analysis, that produce results consistent with each other.

We model the strategic interaction between an informed intermediary who at the same time sells a risky financial product and provides information to the investor, and the latter who is less informed than the seller about the risky asset return. Based on her prior knowledge, the investor decides whether to delegate or to consult the intermediary for information without delegating (or none of the two). In turn, the intermediary decides whether to reveal or not the information he possesses, depending on the costs and incentives he faces.

The theoretical analysis provides a number of new results. First, advisors are not informative towards the poorly informed investors, while they provide valuable information only to relatively more informed ones. This implies that advisors are not useful to the investors who need them the

approach due to Rivers and Vuong (1988) consists in saving the residuals from the first stage regression and then plugging them into the structural probit equation. This procedure can be easily extended to ordered probit response models (Wooldridge, 2007), and can analogously be extended to a generalized ordered probit model, since the generalization does not affect the error term of the discrete choice equation.

most since they fail to be a substitute to self learning. Second, if investors know advisor's selling incentives, advisors are visited only by sufficiently informed individuals who know they will receive meaningful information. On the contrary, poorly informed investors either invest without asking for advice or delegate their portfolio choice fully. This in turn implies that only knowledgeable investors, by consulting an advisor, implement the "first best" investment decision, i.e. the one with complete information (because they learn the true state of $\tilde{r}$ from the advisor), while less knowledgeable investors are likely to suffer from ex-post losses.

The empirical analysis confirms the theoretical predictions of the model about the effect of financial knowledge on the demand for financial advice. Exploiting the 2007 Unicredit Customer's Survey, a representative survey of the customers of one of the largest Italian commercial banks, we find that, controlling for a number of factors including trust towards one's own advisor, self-confidence in own financial ability, wealth and opportunity cost of time, financial literacy increases the probability of consulting an intermediary/financial advisor, as opposed to investing without consulting any professional or delegating. These results are robust to a number of checks and to the potential endogeneity of financial literacy.

The analysis carried out in this study is relevant for consumers, scholars and policy-makers. Consumers are affected by the quality of the advice they demand. Moreover, the concerns expressed by scholars and policy-makers about the lack of financial literacy would be less worrying if individual gaps were compensated by external advice coming from reliable and qualified sources.

However, our findings suggest that the presence of qualified sources of advice in presence of agency conflicts may not be enough to counteract the effects of the low level of financial literacy. This implies that further policy measures may be needed to ensure sound financial decision-making. For instance, our results provide a rationale for financial education initiatives, because they suggest that learning about finance is necessary in order to make the right financial decisions even in the presence of qualified financial advisors. Moreover, we show that there is scope for interventions which reduce the conflicts of interests between intermediaries and clients and which subsidize the development of independent advisors.

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A Proofs

Proof of Lemma 1: Let us start considering the case $\pi \in [1/2, \pi_0)$:

(i) *Existence.* Remember that, if the investor were to base her portfolio decision on her information set without any additional information from the advisor, when $\pi \in [1/2, \pi_0)$ she would choose to invest $v^* > 0$ regardless of the realization of the signal $s_i = \{r_H, r_L\}$ she received.

The candidate equilibrium is a pooling equilibrium where $\sigma^*(r_i) = r_H$ for both $r_i = \{r_H, r_L\}$ and where the equilibrium payoffs of the advisor are $U^*_{S(r_H)} = F$ and $U^*_{S(r_L)} = F - (r_H - r_L)^2$.

Consider a deviation $\sigma(r_L) = r_L$. Observing this out of equilibrium message, the investor assigns a probability $q = Pr(r_H|\sigma = r_L)$ to the event that such a message was sent by $S(r_H)$. Notice that for any belief $q \in]0, 1[$ the equilibrium payoff $S(r_H)$ obtains is larger than the one he would obtain by deviating, that is $U^{dev}_{S(r_H)} = \max\left\{F - (r_H - r_L)^2, -(r_H - r_L)^2\right\} = F - (r_H - r_L)^2 < F = U^*_{S(r_H)}$. On the contrary, the deviation may be profitable for $S(r_L)$ if q is such that the investor buys $v^* > 0$, by Assumption 1 (i.e. $F - (r_H - r_L)^2 > 0$). Hence, using the intuitive criterion (Cho and Kreps, 1987), we can restrict the out of equilibrium beliefs to $q = 0$. Under these beliefs, it is not profitable for $S(r_L)$ to deviate from the pooling equilibrium.

Finally, consider any deviation in mixed strategies, where for example $S(r_L)$ sends message $\sigma(r_L) = r_L$ with probability $\tau > 0$. An investor observing $\sigma = r_L$ even with a small probability assigns a higher belief to the event that such message was sent by $S(r_L)$ (indeed, as described above, it would be more profitable to deviate for $S(r_L)$ than for $S(r_H)$). But then $S(r_L)$ would obtain a lower payoff sending $\sigma(r_L) = r_L$ than at equilibrium.

Uniqueness. Let us show that in the region $\pi \in [1/2, \pi_0)$ the pooling equilibrium $(\sigma(r_i)^* = r_H)$ is unique.

- Rule out the perfectly revealing strategy profile $(\sigma(r_H) = r_H; \sigma(r_L) = r_L)$. Its payoffs are $U^*_{S(r_H)} = F$ and $U^*_{S(r_L)} = 0$. In this case $S(r_L)$ is better off sending $\sigma(r_L) = r_H$ and obtaining $U^{dev}_{S(r_L)} = F - (r_H - r_L)^2$ since $F - (r_H - r_L)^2 > 0$ by Assumption 1.
- Rule out the perfectly revealing strategy profile $(\sigma(r_H) = r_L; \sigma(r_L) = r_H)$. Its payoffs are $U^*_{S(r_H)} = F - (r_H - r_L)^2$ and $U^*_{S(r_L)} = 0 - (r_H - r_L)^2$. However, $S(r_H)$ is better off sending $\sigma(r_H) = r_H$ (resulting in payoff $U^{dev}_{S(r_H)} = F > U^*_{S(r_H)}$), while $S(r_L)$ is better off with $\sigma(r_L) = r_L$ (resulting in payoff $U^{dev}_{S(r_H)} = 0 > U^*_{S(r_L)}$).

– Rule out partially revealing strategies where $\sigma(r_H) = (r_H, r_L)$ with probability $(m, 1-m)$ and $\sigma(r_L) = (r_H, r_L)$ with probability $(n, 1-n)$, where $0 < m < 1$ and $0 < n < 1$. A necessary condition for the existence of such a mixed strategy equilibria is that, for each type of seller, the payoff obtained by playing either signal should be the same in equilibrium. This is clearly not verified, as long as $F \neq (r_H - r_L)^2$. For instance the payoff for the high-type seller $S(r_H)$ playing $\sigma = r_H$ can be either F or 0, while the payoff for the high-type seller playing $\sigma = r_L$ can be either $F - (r_H - r_L)^2$ or $-(r_H - r_L)^2$.

Now consider the case $\pi \in [\pi_0, 1)$.

(ii) *Existence.* Notice that if the buyer does not receive any additional information from the seller (i.e. as in a pooling equilibrium) when $\pi \in [\pi_0, 1)$ the investor chooses $v^* > 0$ when $s_i = r_H$, and $v^* = 0$ for $s_i = r_L$. Since the advisor does not observe the realization of the signal $s_i = (r_H, r_L)$, a high-type advisor will expect $v^* > 0$ with probability π and $v^* = 0$ with probability $(1 - \pi)$. On the contrary, a low-type seller expects $v^* > 0$ with probability $(1 - \pi)$ and $v^* = 0$ with probability π.

The candidate equilibrium is a fully revealing equilibrium where $\sigma(r_i)^* = r_i$ for $r_i = \{r_H, r_L\}$, and where the equilibrium payoffs of the seller are $U^*_{S(r_H)} = F$ and $U^*_{S(r_L)} = 0$.

Consider a unilateral deviation $\sigma(r_H) = r_L$ by $S(r_H)$. Given investor's prior beliefs $(\pi, 1-\pi)$, this deviation is not profitable because the payoff would be $U^{dev}_{S(r_H)} = \pi F - (r_H - r_L)^2 < U^*_{S(r_H)}$.

Consider now a unilateral deviation $\sigma(r_L) = r_H$ by $S(r_L)$. This would give the seller the payoff $U_{S(r_L)} = (1-\pi)F - (r_H - r_L)^2 < 0 = U^*_{S(r_L)}$ by Assumption 1 and by considering that $\pi > \pi_0$.

Finally, consider a deviation in mixed strategies, where seller $S(r_H)$ sends message $\sigma(r_H) = r_L$ with probability $\tau > 0$. This, again, is not a profitable deviation because it would result in a payoff $\pi F - (r_H - r_L)^2 < U^*_{S(r_H)}$ when $\sigma(r_H) = r_L$ realizes.

Uniqueness. Let us show that in the region $\pi \in [\pi_0, 1)$ the fully revealing equilibrium $(\sigma(r_i)^* = r_i)$ is unique by showing that all other equilibria do not exist:

– Pooling strategy profile $(\sigma(r_H) = r_H; \sigma(r_L) = r_H)$. Its payoffs are $U^*_{S(r_H)} = \pi F$ and $U^*_{S(r_L)} = (1-\pi)F - (r_H - r_L)^2$. These payoffs cannot be equilibrium payoffs since then it would be profitable

for $S(r_L)$ to send message $\sigma(r_L) = r_L$ obtaining $U^{dev}_{S(r_L)} = 0$ since $(1-\pi)F - (r_H - r_L)^2 < 0$ by Assumption 1.

– Pooling strategy profile $(\sigma(r_H) = r_L; \sigma(r_L) = r_L)$. If this was an equilibrium, the payoffs would be $U^*_{S(r_H)} = \pi F - (r_H - r_L)^2$ and $U^*_{S(r_L)} = (1-\pi)F$. Again, these payoffs cannot be at equilibrium since then it would be profitable for $S(r_H)$ to send message $\sigma(r_H) = r_H$ obtaining $U^{dev}_{S(r_H)} = F > U^*_{S(r_H)} = \pi F - (r_H - r_L)^2$.

– Partially revealing strategy profile where $\sigma(r_H) = (r_H, r_L)$ with probability $(m, 1-m)$ and $\sigma(r_L) = (r_H, r_L)$ with probability $(n, 1-n)$, where $0 < m < 1$ and $0 < n < 1$. Analogous to the proof for point (i). ■

Proof of Lemma 2: Let us compare the utility the investor would obtain by consulting the advisor and by investing autonomously. For convenience of exposition, let us consider three separate cases:

- $\pi \in [1/2, \pi_0)$ (irrespectively of $s_i = r_L$ and $s_i = r_H$): by Lemma 1, the investor anticipates an uninformative signal from the advisor; hence, for any small cost of advice $\epsilon > 0$, the investor prefers not to demand advice. Given that $\pi \in [1/2, \pi_0)$ she would choose $v^* > 0$ for any realization of the signal s_i. Therefore her utility $U^{self}_B = \frac{1}{2}\frac{(E[\tilde{r}|s_i=r_L,\pi])^2}{\gamma Var[\tilde{r}|s_i=r_L,\pi]} > U^{adv}_B$, for any $s_i = r_L$, r_H.

- $s_i = r_L$ and $\pi \in [\pi_0, 1]$: the investor anticipates an informative signal from the advisor by Lemma 1. The utility she would obtain by consulting an advisor is $U^{adv}_B = (1-\pi)\overline{U}$. This is because when $s_i = r_L$ the investor's expected probability that the true state is r_H is equal to $1 - \pi = Pr(r_H|s_i = r_L)$. Moreover, if the advisor's signal is $\sigma^*(r_H) = r_H$ and $\pi \in [\pi_0, 1]$, by Lemma 1 the variance of her portfolio goes to zero. We put an (arbitrarily large) bound to $\overline{U}$ to avoid the investor obtains an infinite utility.[22] The utility she would obtain investing by herself is $U^{self}_B = 0$, because, when $\pi \in [\pi_0, 1]$, $E[\tilde{r}\,|s_i = r_L] = \pi r_L + (1-\pi)r_H < 0$ and she would rather not invest in the risky asset. Since $U^{adv}_B = (1-\pi)\overline{U} > 0$ visiting the advisor is strictly preferred by the investor.

- $s_i = r_H$ and $\pi \in [\pi_0, 1)$: by Lemma 1, the investor anticipates an informative signal from the advisor so that the utility she would obtain by consulting an advisor is $U^{adv}_B = \pi\overline{U}$. This is because when

[22] With borrowing constraints, the boundary $\overline{U}$ is proportional to the wealth the buyer is able to invest (or is willing to invest, given her overall portfolio maximization) in the risky asset.

$s_i = r_H$ the investor's expected probability that the true state is r_H is $\pi = Pr(s_i = r_H|r_H)$. Since the advisor is perfectly informed, the variance of the portfolio goes to zero. The utility she would obtain by herself is $U_B^{self} = \frac{1}{2}\frac{(E[\tilde{r}|s_i=r_H,\pi])^2}{\gamma Var[\tilde{r}|s_i=r_H,\pi]}$. Given that $\overline{U}$ is arbitrarily large, we can safely assume that $\pi\overline{U} > U_B^{self}(\pi, s_i = r_H) \quad \forall \quad \pi \in [\pi_0, 1]$, and so demanding advice is preferred by the investor than investing by herself. ■

Proof of Lemma 3: Recall that we consider the case in which the investor decides to delegate her portfolio decision to the advisor or not after receiving the signal s_i.

Let us first derive the expected utility functions in case of astomous investment. For the case $s_i = r_H$, the expected value and variance of $\tilde{r}$ are:

$$\begin{aligned} E[\tilde{r}|\pi, s_i = r_H] &= r_H Pr[r_H|s_i = r_H] + r_L Pr[r_L|s_i = r_H] \\ &= r_H \frac{Pr[r_H]Pr[s_i = r_H|r_H]}{Pr[s_i = r_H]} + r_L \frac{Pr[r_L]Pr[s_i = r_H|r_L]}{Pr[s_i = r_H]} \\ &= r_H \frac{1/2\pi}{1/2\pi + 1/2(1-\pi)} + r_L \frac{1/2(1-\pi)}{1/2\pi + 1/2(1-\pi)} \\ &= \pi r_H + (1-\pi) r_L \end{aligned}$$

and

$$\begin{aligned} Var[\tilde{r}|\pi, s_i = r_H] &= \sum_i [r_i - E(\tilde{r}|s_i = r_H)]^2 Pr(r_i|s_i = r_H) \\ &= [r_H - E(\tilde{r}|s_i = r_H)]^2 Pr(r_H|s_i = r_H) + \\ &+ [r_L - E(\tilde{r}|s_i = r_H)]^2 Pr(r_L|s_i = r_H) \\ &= \pi(1-\pi)(r_H - r_L)^2 \end{aligned}$$

The case $s_i = r_L$ is analogous. We therefore have

$$\begin{aligned} EU_B^{self} = &\frac{1}{2} U_B(\pi, s_i = r_H) + \frac{1}{2} U_B(\pi, s_i = r_L) \\ &\frac{[\pi r_H + (1-\pi) r_L]^2}{4\gamma\pi(1-\pi)(r_H - r_L)^2} + \frac{[\pi r_L + (1-\pi) r_H]^2}{4\gamma\pi(1-\pi)(r_H - r_L)^2} - \end{aligned}$$

which – following Lemma 2 – can be further stated as

$$\begin{aligned} \pi &\in [1/2, \pi_0) : EU_B^{self} = \frac{1}{2} U_B(\pi, s_i = r_H) + \frac{1}{2} U_B(\pi, s_i = r_L) \\ \pi &\in [\pi_0, 1] : EU_B^{self} = \frac{1}{2} U_B(\pi, s_i = r_H) \end{aligned}$$

We know by Lemma 1 and 2 that for $\pi \in [1/2, \pi_0)$, $EU_B^{self} > EU_B^{adv}$ while for $\pi \in [\pi_0, 1]$, $EU_B^{adv} = \frac{1}{2}\overline{U} > EU_B^{self}$, irrespective of the signal realization. Let us proceed then analizing all possible cases:

(a) $s_i = r_H$ and $\pi \in [1/2, \pi_0)$: if she delegates her portfolio decision, she anticipates that her utility is equal to $\overline{U}$ if the risky asset return is r_H, and to $\underline{U}$ if the return is r_L. Since $\Pr(r_H \,|s_i = r_H\,) = \pi$ and $\Pr(r_L \,|s_i = r_H\,) = 1-\pi$ the utility the buyer obtains from delegation is equal to:

$$EU_B^{del} = \pi\overline{U} + (1-\pi)\underline{U} = \underline{U} + \pi(\overline{U} - \underline{U})$$

which is increasing in π while $EU_B^{self} > EU_B^{adv}$ is increasing and convex with respect to π for $\pi \in [1/2, 1]$.

Given that, by Lemma 2 $U_B^{self}(\pi, s_i = r_H)$ is increasing and convex in π it is always possible to find two values $\overline{U} > 0$ and $\underline{U} < 0$ such that it exists a threshold $\widehat{\pi}(\underline{U}, \overline{U}) \in [1/2, \pi_0)$ for which

$$\begin{array}{rcll} EU_B^{self} & \geq & EU_B^{del} & \text{for } \pi \in [1/2, \widehat{\pi}) \\ EU_B^{self} & < & EU_B^{del} & \text{for } \pi \in [\widehat{\pi}, \pi_0) \end{array}$$

(b) $s_i = r_H$ and $\pi \in [\pi_0, 1]$: by Lemmas 1-2, we have that $EU_B^{adv} = \pi\overline{U} > EU_B^{self}$ given that $\Pr(r_H \,|s_i = r_H\,) = \pi$; the utility under delegation is equal to

$$EU_B^{del} = \pi\overline{U} + (1-\pi)\underline{U} < EU_B^{adv}$$

hence the buyer never delegates her investment decision.

(c) $s_i = r_L$ and $\pi \in [1/2, \pi_0)$: by Lemmas 1-2, anticipating a pooling equilibrium, $EU_B^{self} > EU_B^{adv}$ and EU_B^{self} is decreasing and convex with respect to π for $\pi \in [1/2, 1]$. As in the case (a), if she delegates her portfolio decision, the investors's utility is equal to $\overline{U}$ if the risky asset return is r_H, and to $\underline{U}$ if the return is r_L. Since $\Pr(r_H \,|s_i = r_L\,) = 1 - \pi$ and $\Pr(r_L \,|s_i = r_L\,) = \pi$ the utility the buyer obtains from delegation is equal to:

$$EU_B^{del} = (1-\pi)\overline{U} + \pi\underline{U} = \overline{U} - \pi(\overline{U} - \underline{U})$$

which is decreasing in π. Thus, for two values $\overline{U} > 0$ and $\underline{U} < 0$, there exists a threshold $\widehat{\widehat{\pi}}(\underline{U}, \overline{U}) \in [1/2, \pi_0)$ such that

$$\begin{array}{rcll} EU_B^{self} & < & EU_B^{del} & \text{for } \pi \in [1/2, \widehat{\widehat{\pi}}) \\ EU_B^{self} & \geq & EU_B^{del} & \text{for } \pi \in [\widehat{\widehat{\pi}}, \pi_0) \end{array}$$

(d) $s_i = r_L$ and $\pi \in [\pi_0, 1]$: by Lemma 1-2 we obtain $EU_B^{adv} = (1-\pi)\overline{U} > 0 = EU_B^{self}$ given that $\Pr(r_H \,|s_i = r_L) = 1-\pi$; the utility the buyer obtains delegating is

$$EU_B^{del} = (1-\pi)\overline{U} + \pi\underline{U} < EU_B^{adv}$$

hence as in case (b) the buyer never delegates her investment decision.

Note that the proof is analogous for the case in which the delegation decision is taken before observing the realization of signal s_i. ■

B Figures

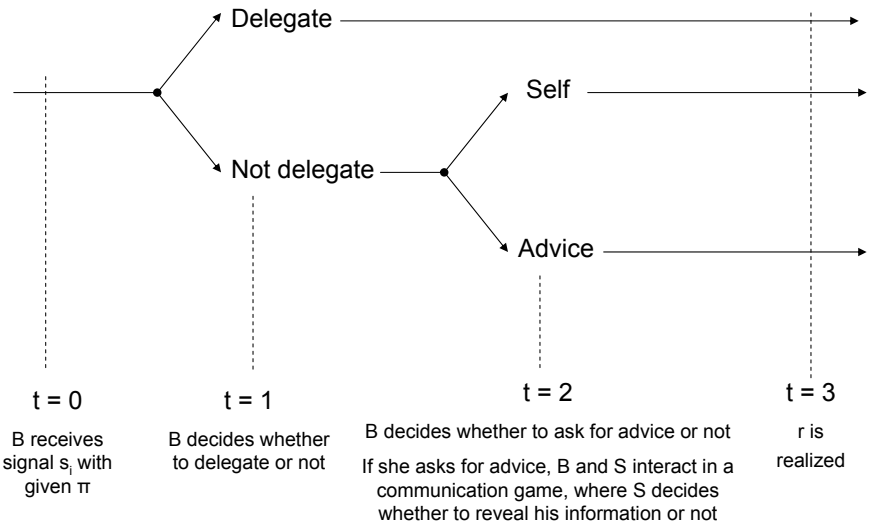

Figure 1: Timing

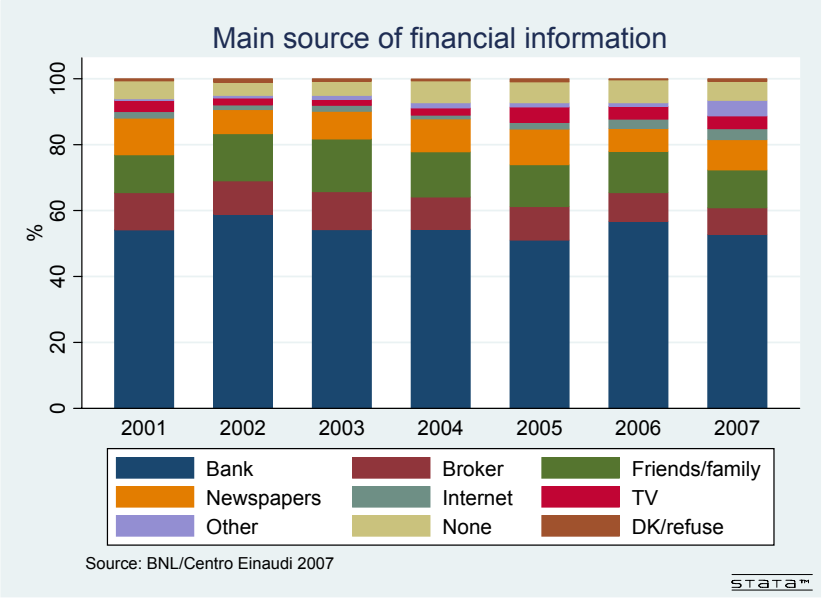

Figure 2: Main source of financial information

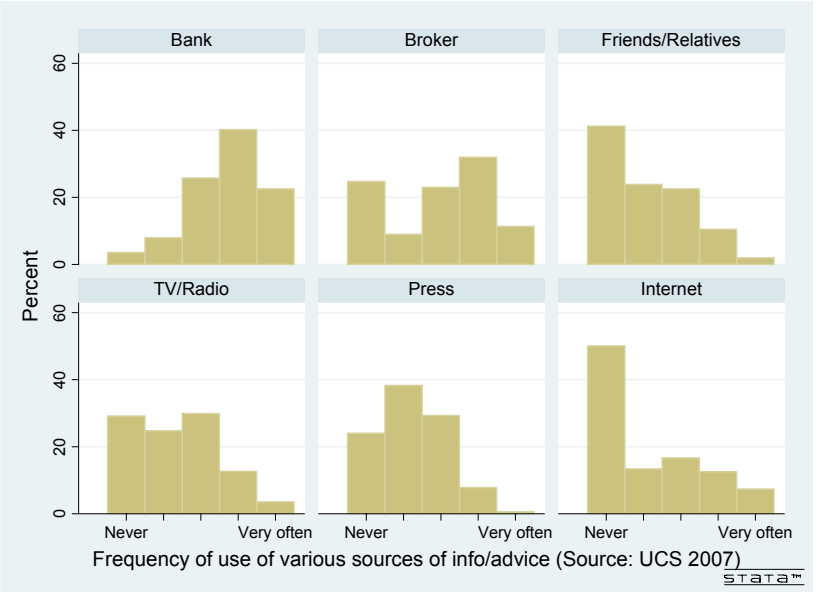

Figure 3: Frequency of use of sources of information/advice

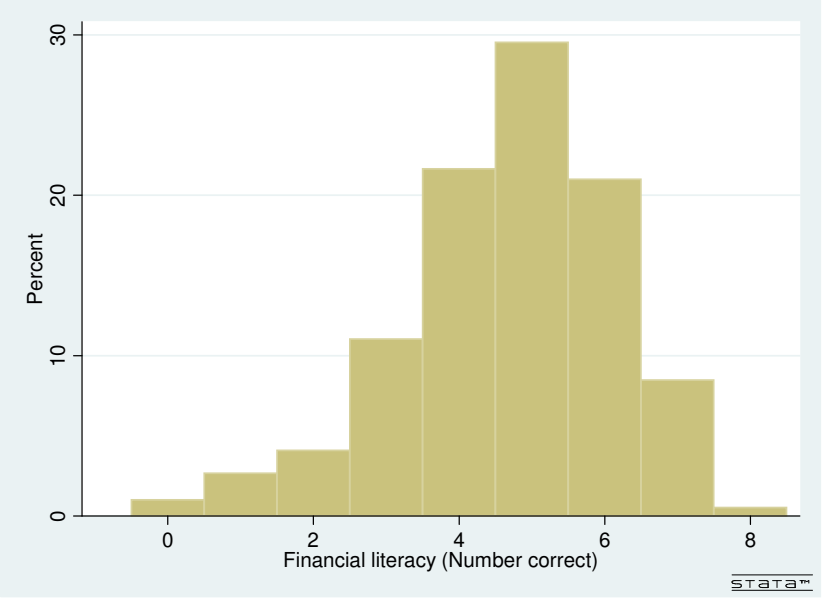

Figure 4: Financial literacy distribution (baseline definition)

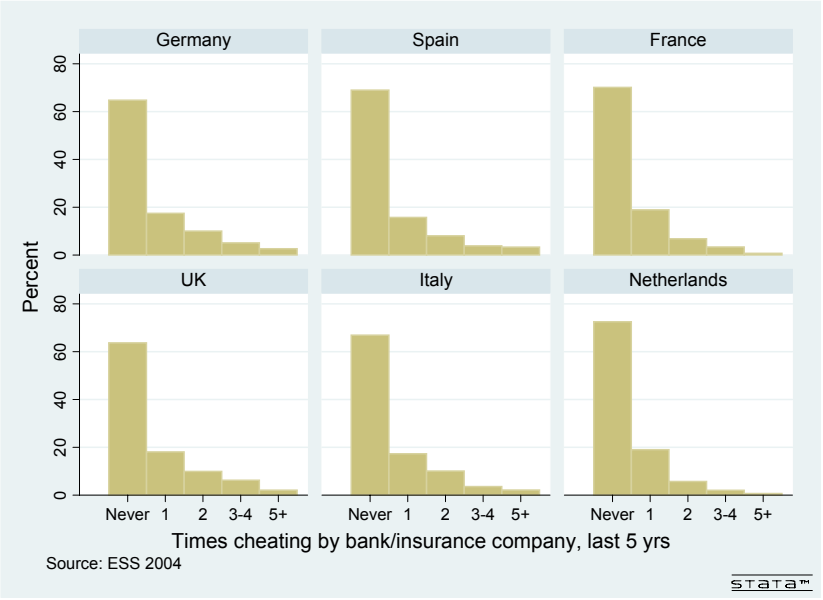

Figure 5: Frequency of cheating by bank/insurance company

C Tables

Table 1: Variable Description and Data Sources

Variable	Description	Source
Financial Literacy	The financial literacy measure is constructed as in Guiso and Jappelli (2008). One point is given if the respondent can answer correctly to each of the following questions: - *Inflation*: Imagine an account yields 2% yearly (net of costs and taxes). With inflation at 2% per year, how much do you think you will be able to buy after two years (without moving funds in the account)? More than what I could buy today | Less | The same | Do not know; - *Interest*: Imagine you know with certainty that in six months interest rates will rise. Do you think you should buy fixed rate bonds today? Yes | No | Do not know - *Diversif1*: What do you think having correctly diversified investments means? Having in one's own portfolio both bonds and stocks | Do not invest for too long in the same financial product | Invest in as many assets as possible | Invest in several assets at the same time, in order to limit exposure to risks linked to single assets | Do not invest in very risky products | Do not know - *Diversif2*: Which of these portfolios is better diversified? 70% T-bills, 15% European equity fund, 15% in 2-3 Italian stocks | 70% T-bills, 30% European equity fund | 70% T-bills, 30% in 2-3 Italian stocks | 70% T-bills, 30% in stocks of companies I know well | Do not know Four other indicators are based on the question "How risky do you think these products are?" The answers can be from 1 (Not risky at all) to 5 (Very risky) and 'Do not know' is always an option. One point is given if the respondent can correctly state that - *Risk1*: Private bonds are at least as risky as deposits - *Risk2*: Stocks at least are as risky as government bonds - *Risk3*: Stocks mutual funds are at least as risky as bonds mutual funds - *Risk4*: Housing is at least as risky as deposits	UCS
Self-confidence (Self-assessed financial knowledge)	It is based on the question: "For each of these ten assets I would like you to tell me how much you think you know it", where the answer can be in the range 1 (I do not know it at all) to 5 (I know it very well). The assets are: government bonds, repurchase agreements, private bonds, mutual funds, derivatives, unit-linked or index-linked life insurance, ETFs, managed portfolios, structured products. The self-confidence index used in the analysis is the average of these ten measures, and ranges from 1 to 5.	UCS

Continues

Table 1: (continued)

Variable	Description	Source
Experience	Three questions are used in measuring experience in assets trading. If the respondent has ever invested in either bonds, stocks or mutual funds, then the UCS asks at which age the respondent first invested in each of bonds, stocks and mutual funds. Experience in each asset is computed as the difference between current age and age of first investment. Overall experience is computed as the maximum of these three numbers. If the respondent has never invested in any of the three assets, experience is set to zero.	UCS
Finance sector	A dummy variable taking value of one if the respondent works in the sector related to "monetary and financial intermediation, and insurances"	UCS
Financial wealth categories	Given the categorical variable $fpatrim$ based on administrative data and indicating in which class the financial holdings (at the bank) of each respondent fall, and given the categorical variable $selfw$ indicating the self reported category in which the (total) financial holdings of each respondent fall, I build a categorical variable $finw$ that is $$finw = \begin{cases} fpatrim & \text{if} \quad selfw \leq fpatrim \\ selfw & \text{if} \quad selfw > fpatrim \end{cases}$$ Since about 54% of the observations in $selfw$ are missing, it is likely that $finw$ is still under-reported with respect to the true financial wealth.	UCS
Zero saving rate	It is captured by a question asking "On average, in the year 2006 which percentage of your income did you save? More then 50% of your annual income | 30-50% | 20-30% | 10-20% | 5-10% | 1-5% | 0%, I did not save anything". The variable used in the analysis is a dummy variable taking the value of one if the answer is "0%, I did not save anything"	UCS
Risk preferences	It is based on the question "In managing your financial investments which of these attitudes do you usually have? When I invest I usually look for: Very high returns, even with a high risk of losing part of your principal | High returns with a fair degree of principal safety | Fair returns with high safety of your principal | Low returns without risk of losing your principal"	UCS
Trust towards own financial advisors	It is based on the question "Overall, how much trust do you have in your bank advisor or financial advisor concerning your financial investments?" with the answers ranging from 1 (No trust at all) to 5 (I trust a lot).	UCS

Table 2: Summary statistics

	Mean	Median	Std. Dev.	Min	Max
Female	0.30	0	0.46	0	1
Age	54.81	57	12.27	25	89
Years schooling	12.47	13	4.04	0	20
Employee	0.32	0	0.47	0	1
Self-employed	0.28	0	0.45	0	1
Unemployed	0.01	0	0.07	0	1
Retired	0.33	0	0.47	0	1
Other out of the labor force	0.07	0	0.25	0	1
Total individual income (th.)	50.72	31	67.85	0.2	822
Fin Wealth $10 - 50,000$ euro	0.15	0	0.36	0	1
Fin Wealth $50 - 100,000$ euro	0.22	0	0.41	0	1
Fin Wealth $100 - 150,000$ euro	0.19	0	0.39	0	1
Fin Wealth $150 - 250,000$ euro	0.18	0	0.38	0	1
Fin Wealth $250 - 500,000$ euro	0.19	0	0.39	0	1
Fin Wealth $500,000+$ euro	0.07	0	0.25	0	1
Experience	13.37	12	12.82	0	53
Years at Unicredit: < 1	0.01	0	0.11	0	1
Years at Unicredit: $1 - 5$	0.10	0	0.31	0	1
Years at Unicredit: $6 - 10$	0.19	0	0.39	0	1
Years at Unicredit: $11 - 20$	0.24	0	0.43	0	1
Years at Unicredit: 20+	0.45	0	0.50	0	1
Trust towards advisor	3.78	4	0.91	1	5
Financial literacy	4.68	5	1.48	0	8
Self-assessed fin knowledge	2.90	2.9	0.85	1	5
Very risk tolerant	0.02	0	0.13	0	1
Risk tolerant	0.28	0	0.45	0	1
Risk averse	0.52	1	0.50	0	1
Very risk averse	0.19	0	0.39	0	1
Saving: $> 50\%$	0.03	0	0.17	0	1
Saving: $30 - 50\%$	0.09	0	0.28	0	1
Saving: $20 - 30\%$	0.16	0	0.37	0	1
Saving: $10 - 20\%$	0.20	0	0.40	0	1
Saving: $5 - 10\%$	0.17	0	0.38	0	1
Saving: $1 - 5\%$	0.13	0	0.34	0	1
Saving: 0%	0.22	0	0.42	0	1

Data: Unicredit 2007. N = 1,686

Table 3: Comparison between UCS and SHIW datasets

	UCS 2007	SHIW 2006		
	Account holder	Household head (answering FL tests)	Account holder at bank or post office	Household head and account holder
Male	69.9	62.8	49.1	65.0
Age: ≤ 30	2.5	3.4	29.7	3.3
$31-40$	12.9	13.8	13.0	14.3
$41-50$	21.6	19.8	15.4	20.4
$51-65$	38.3	28.4	22.0	29.4
66+	24.6	34.6	20.0	32.6
No education	0.4	5.7	11.0	4.0
Primary	8.7	25.8	20.0	23.7
Secondary	20.9	27.9	28.9	28.2
High school	43.7	31.8	31.1	34.3
University degree or more	26.4	8.8	9.0	9.8
North-west	22.8	25.9	25.5	28.2
North-east	28.5	22.0	22.8	23.5
Center	24.3	19.7	21.0	20.5
South	16.9	20.9	19.9	17.7
Isles	7.5	11.6	10.9	10.1
Household income (avg.)	71,324.6	31,659.5	37,850.9	33,653.1
$< 20,000$	7.4	32.5	19.9	27.2
$20-50,000$	44.5	53.3	60.0	57.1
$50-100,000$	31.7	12.5	17.9	14.0
$100,000+$	16.4	1.6	2.2	1.8
Financial Literacy				
Inflation	34.2			
Interest	52.0			
Diversification 1	39.9			
Diversification 2	13.0			
Risk 1 (Private bond vs. deposit)	83.8			
Risk 2 (Stocks vs. gov bonds)	89.1			
Risk 3 (Equity fund vs. bond fund)	81.0			
Risk 4 (Housing vs. deposits)	75.0			
Account statement		50.8		54.7
Inflation		60.5		64.1
Compare returns		27.2		29.5
Interest compounding		39.6		42.5
Equity fund		51.3		54.3
Mortgage		53.6		56.9
N correct (%)	58.5	47.2		50.3
N don't know (%)	11.9	34.2		30.4
N incorrect (%)	29.6	18.6		19.2
Zero correct	1.0	18.9		15.2
N	1,686	3,992	17,688	3,574

Data: Unicredit 2007 and SHIW 2006

Table 4: How much do you use each of these sources to have information about your financial investments?

	Bank	Broker	Friends, relatives, colleagues	Econ TV/radio programs	Econ pages in non-econ newspapers
Never	3.5	24.7	41.2	29.2	26.1
Seldom	8.0	9.0	23.9	24.7	20.6
Sometimes	25.8	23.0	22.5	29.9	29.8
Often	40.2	32.0	10.5	12.7	19.3
Very often	22.5	11.3	1.9	3.5	4.3
	Econ inserts in non-econ newspapers	Econ newspapers	Non-econ magazines	Econ magazines	Econ websites
Never	36.8	30.8	45.8	50.4	50.1
Seldom	21.7	19.6	21.8	20.3	13.4
Sometimes	24.6	25.9	21.8	17.7	16.6
Often	14.0	15.6	8.5	9.6	12.5
Very often	3.0	8.1	2.1	2.1	7.4
Total	100	100	100	100	100

Unicredit 2007. N = 679. Conditional on spending at least some time to gather information about how to manage savings and investments.

Table 5: Which of these statements best describes your behaviour in deciding how to invest your savings?

	Unconditional	Conditional on having risky assets
I decide completely autonomously, the bank executes my decisions	8.60	12.03
I tell bank/advisor how I intend to invest and ask for their opinion	21.59	30.21
I consider bank/advisor proposals before deciding	27.16	38.01
I mostly rely on bank/advisor for my investment decisions	11.51	16.10
I let bank/advisor decide everything	2.61	3.65
Non-participation	28.53	
Total	100	100
N	1,686	1,205

Unicredit 2007.

Table 6: Answers to financial literacy tests (N = 1,686)

	Freq.	Percent
Inflation:		
More than today	39	2.3
Less than today	881	52.3
Same as today (correct)	577	34.2
Do not know	189	11.2
Interest:		
Yes	388	23.0
No (correct)	876	52.0
Do not know	422	25.0
Diversification 1:		
To have both bonds and stocks	282	16.7
Do not hold same asset for too long	111	6.6
Invest in as many assets as possible	144	8.5
Invest in more assets to limit risk exposure of single ones (correct)	672	39.9
Do not invest in very risky assets	292	17.3
Do not know	185	11.0
Diversification 2:		
70% T-bills, 15% European equity fund, 15% in 2-3 Italian stocks	688	40.8
70% T-bills, 30% European equity fund (correct)	219	13.0
70% T-bills, 30% in 2-3 Italian stocks	117	6.9
70% T-bills, 30% in stocks of companies I know well	149	8.8
Do not know	328	19.5
Correct on risk 1	1,413	83.8
Correct on risk 2	1,502	89.1
Correct on risk 3	1,365	81.0
Correct on risk 4	1,264	75.0

Unicredit 2007.

Table 7: Financial literacy by degree of reliance on advice

	Freq	Mean	Std. Dev.
I decide completely autonomously, the bank executes my decisions	145	4.97	1.33
I tell bank/advisor how I intend to invest and ask for their opinion	364	4.98	1.25
I consider bank/advisor proposals before deciding	458	5.09	1.32
I mostly rely on bank/advisor for my investment decisions	194	4.63	1.48
I let bank/advisor decide everything	44	4.30	1.19
Total	1205	4.94	1.34

Unicredit 2007.

Table 8: Investing autonomously or delegating financial decisions

	$D_i = 1$	$D_i = 2$	$D_i = 3$	$D_i = 4$	$D_i = 5$	Selection
Female	-0.035***	-0.047***	0.028***	0.042***	0.012**	-0.002
	(0.01)	(0.02)	(0.01)	(0.02)	(0.01)	(0.03)
Age	-0.001	-0.001	0.000	0.001	0.000	0.007
	(0.00)	(0.01)	(0.00)	(0.00)	(0.00)	(0.01)
Age squared	-0.000	-0.000	0.000	0.000	0.000	-0.000
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Years school	0.005***	0.006***	-0.004***	-0.005***	-0.001**	0.008**
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Self-employed	-0.000	-0.000	0.000	0.000	0.000	0.018
	(0.01)	(0.02)	(0.01)	(0.02)	(0.00)	(0.03)
Retired	0.008	0.010	-0.007	-0.009	-0.002	-0.034
	(0.02)	(0.02)	(0.02)	(0.02)	(0.01)	(0.04)
North	0.022*	0.027*	-0.018*	-0.024*	-0.006*	0.019
	(0.01)	(0.02)	(0.01)	(0.01)	(0.00)	(0.03)
Log tot ind income	-0.008	-0.010	0.007	0.009	0.002	-0.002
	(0.01)	(0.01)	(0.01)	(0.01)	(0.00)	(0.01)
FinW 50-100 th	-0.050**	-0.071**	0.037**	0.064**	0.019**	0.105***
	(0.02)	(0.03)	(0.02)	(0.03)	(0.01)	(0.03)
FinW 100-150 th	-0.032	-0.043	0.025	0.039	0.011	0.131***
	(0.02)	(0.03)	(0.02)	(0.03)	(0.01)	(0.03)
FinW 150-250 th	-0.053**	-0.078***	0.038**	0.071**	0.022**	0.149***
	(0.02)	(0.03)	(0.01)	(0.03)	(0.01)	(0.03)
FinW 250-500 th	-0.048**	-0.069**	0.035**	0.063**	0.019*	0.162***
	(0.02)	(0.03)	(0.02)	(0.03)	(0.01)	(0.03)
FinW 500+ th	-0.026	-0.036	0.020	0.032	0.009	0.173***
	(0.03)	(0.04)	(0.02)	(0.03)	(0.01)	(0.04)
Financial literacy	-0.000	-0.001	0.000	0.000	0.000	0.046***
	(0.00)	(0.01)	(0.00)	(0.01)	(0.00)	(0.01)
Self-confidence	0.026***	0.032***	-0.022***	-0.029***	-0.007**	0.028*
	(0.01)	(0.01)	(0.01)	(0.01)	(0.00)	(0.02)
Experience	-0.000	-0.000	0.000	0.000	0.000	0.008***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Finance sector	0.111**	0.079***	-0.097**	-0.077***	-0.016***	0.054
	(0.05)	(0.02)	(0.04)	(0.02)	(0.00)	(0.06)
Trust advisor	-0.076***	-0.093***	0.063***	0.084***	0.022***	0.046***
	(0.01)	(0.01)	(0.01)	(0.01)	(0.00)	(0.01)
Years at UC: 6-10	0.019	0.021	-0.016	-0.019	-0.005	0.089**
	(0.03)	(0.03)	(0.02)	(0.03)	(0.01)	(0.04)
Years at UC: 11-20	0.031	0.035	-0.027	-0.031	-0.008	0.208***
	(0.03)	(0.03)	(0.02)	(0.03)	(0.01)	(0.03)
Years at UC: > 20	0.018	0.022	-0.015	-0.020	-0.005	0.218***
	(0.02)	(0.03)	(0.02)	(0.03)	(0.01)	(0.04)
Very risk tolerant						0.225***
						(0.02)
Risk tolerant						0.127***
						(0.03)
Risk averse						0.138***
						(0.03)
Saving: 0%						-0.138***
						(0.03)
N						1581
Log-Lik						-2173.711
ρ						0.188
ρ std. err.						(0.168)

Data: Unicredit 2007. Dependent variable: columns I-V, probability of delegating financial decisions ($D_i = 1, ..., 5$); Column VI, probability of holding risky assets. Model: Ordered Probit with selection. Exclusion restrictions (Column VI) are risk preferences; zero saving rate. Standard errors are robust to heteroskedasticity. Significance: *** p<0.01, ** p<0.05, * p<0.1.

Table 9: Investing autonomously or delegating financial decisions

	$D_i = 1$	$D_i = 2$	$D_i = 3$	$D_i = 4$	$D_i = 5$
Female	-0.030***	-0.056***	0.026***	0.049***	0.011**
	(0.01)	(0.02)	(0.01)	(0.02)	(0.00)
Age	0.000	0.000	-0.000	-0.000	-0.000
	(0.00)	(0.01)	(0.00)	(0.01)	(0.00)
Age squared	-0.000	-0.000	0.000	0.000	0.000
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Years school	0.004***	0.008***	-0.004***	-0.007***	-0.001***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Self-employed	0.000	0.000	-0.000	-0.000	-0.000
	(0.01)	(0.02)	(0.01)	(0.02)	(0.00)
Retired	0.005	0.008	-0.004	-0.007	-0.001
	(0.01)	(0.02)	(0.01)	(0.02)	(0.00)
North	0.016	0.029	-0.015	-0.025	-0.005
	(0.01)	(0.02)	(0.01)	(0.02)	(0.00)
Center	-0.006	-0.011	0.006	0.010	0.002
	(0.01)	(0.02)	(0.01)	(0.02)	(0.00)
Log tot ind income	-0.007	-0.012	0.007	0.011	0.002
	(0.01)	(0.01)	(0.01)	(0.01)	(0.00)
FinW 50-100 th	-0.035**	-0.070**	0.029***	0.062**	0.014*
	(0.01)	(0.03)	(0.01)	(0.03)	(0.01)
FinW 100-150 th	-0.021	-0.039	0.018	0.034	0.008
	(0.02)	(0.03)	(0.01)	(0.03)	(0.01)
FinW 150-250 th	-0.038***	-0.078**	0.031***	0.069**	0.017*
	(0.01)	(0.03)	(0.01)	(0.03)	(0.01)
FinW 250-500 th	-0.033**	-0.065**	0.028***	0.058**	0.013*
	(0.01)	(0.03)	(0.01)	(0.03)	(0.01)
FinW 500+ th	-0.015	-0.028	0.013	0.024	0.005
	(0.02)	(0.04)	(0.02)	(0.04)	(0.01)
Financial literacy	-0.012**	-0.003	0.037***	-0.017**	-0.005**
	(0.01)	(0.01)	(0.01)	(0.01)	(0.00)
Self-confidence	0.022***	0.039***	-0.021***	-0.033***	-0.007***
	(0.01)	(0.01)	(0.01)	(0.01)	(0.00)
Experience	0.000	0.001	-0.000	-0.000	-0.000
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Finance sector	0.104**	0.105***	-0.104**	-0.091***	-0.014***
	(0.05)	(0.02)	(0.04)	(0.02)	(0.00)
Trust advisor	-0.085***	-0.018	-0.009	0.086***	0.026***
	(0.01)	(0.02)	(0.02)	(0.01)	(0.00)
Years at UC: 6-10	0.024	0.038	-0.024	-0.032	-0.006
	(0.02)	(0.03)	(0.02)	(0.03)	(0.00)
Years at UC: 11-20	0.037*	0.057**	-0.036*	-0.048**	-0.009**
	(0.02)	(0.03)	(0.02)	(0.02)	(0.00)
Years at UC: > 20	0.024	0.042	-0.023	-0.036	-0.007
	(0.02)	(0.03)	(0.02)	(0.03)	(0.01)
N obs	1116				
Log-Lik	-1419.615				

Unicredit 2007. Dep Var: probability of delegating financial decisions ($D_i = 1, ..., 5$), where D_i=1: I decide completely autonomously, the bank executes my decisions; D_i=2: I tell bank/advisor how I intend to invest and ask for their opinion; D_i=3: I consider bank/advisor proposals before deciding; D_i=4: I mostly rely on bank/advisor for my investment decisions; D_i=5: I let bank/advisor decide everything. Model: Generalized Ordered Probit (marginal effects reported). Sub-sample of investors holding risky assets. Standard errors reported in parentheses are robust to heteroskedasticity. Significance: *** p<0.01, ** p<0.05, * p<0.1.

Table 10: Investing autonomously or delegating – Robustness on financial literacy index

	$D_i = 1$	$D_i = 2$	$D_i = 3$	$D_i = 4$	$D_i = 5$
Financial literacy 1	-0.0100**	-0.0023	0.0298***	-0.0137**	-0.0039**
	(0.005)	(0.009)	(0.008)	(0.006)	(0.002)
Financial literacy 2	-0.0070*	-0.0019	0.0208***	-0.0084	-0.0035**
	(0.004)	(0.007)	(0.008)	(0.006)	(0.002)
Financial literacy 3	-0.0033	0.0027	0.0141**	-0.0096*	-0.0040***
	(0.004)	(0.007)	(0.007)	(0.005)	(0.002)
Financial literacy 4	-0.0016	0.0023	0.0078	-0.0054	-0.0031**
	(0.003)	(0.005)	(0.005)	(0.004)	(0.001)

Unicredit 2007. Dep Var: probability of delegating financial decisions ($D_i = 1, ..., 5$), where D_i=1: I decide completely autonomously, the bank executes my decisions; D_i=2: I tell bank/advisor how I intend to invest and ask for their opinion; D_i=3: I consider bank/advisor proposals before deciding; D_i=4: I mostly rely on bank/advisor for my investment decisions; D_i=5: I let bank/advisor decide everything. Model: Generalized Ordered Probit (marginal effects reported). Definition of financial literacy indices: Financial literacy 1: the baseline (Guiso and Jappelli, 2008), re-scaled ($10 \times (Inflation + Interest + Diversif1 + Diversif2 + Risk1 + Risk2 + Risk3 + Risk4)/8$; Financial literacy 2: $10 \times [Inflation + Interest + Diversif1 + Diversif2 + (Risk1 + Risk2 + Risk3 + Risk4)/4]/5$; Financial literacy 3: $10 \times [Interest + Diversif1 + Diversif2 + (Risk1 + Risk2 + Risk3 + Risk4)/4]/4$; Financial literacy 4: $10 \times [Interest + Diversif1 + Diversif2]/3$. Sub-sample of investors holding risky assets. Regressors not reported: same covariates as in Table 9. Standard errors reported in parentheses are robust to heteroskedasticity. Significance: *** p<0.01, ** p<0.05, * p<0.1.

Table 11: Investing autonomously or delegating – Robustness on bank/broker relationships

	$D_i = 1$	$D_i = 2$	$D_i = 3$	$D_i = 4$	$D_i = 5$
Sample: Unicredit main or only bank (baseline) (N = 1,116)					
Financial literacy	-0.012**	-0.003	0.037***	-0.017**	-0.005**
	(0.01)	(0.01)	(0.01)	(0.01)	(0.00)
Sample: Unicredit only bank (N = 802)					
Financial literacy	-0.016**	0.005	0.033***	-0.017*	-0.005
	(0.01)	(0.01)	(0.01)	(0.01)	(0.00)
Sample: Unicredit main/only bank and use broker never/seldom/sometimes (N = 847)					
Financial literacy	-0.012	0.002	0.032***	-0.016*	-0.005**
	(0.01)	(0.01)	(0.01)	(0.01)	(0.00)
Sample: Unicredit main/only bank and use broker never/seldom (N = 705)					
Financial literacy	-0.012	0.001	0.037***	-0.019*	-0.007**
	(0.01)	(0.01)	(0.01)	(0.01)	(0.00)

Unicredit 2007. Dep Var: probability of delegating financial decisions ($D_i = 1, ..., 5$), where D_i=1: I decide completely autonomously, the bank executes my decisions; D_i=2: I tell bank/advisor how I intend to invest and ask for their opinion; D_i=3: I consider bank/advisor proposals before deciding; D_i=4: I mostly rely on bank/advisor for my investment decisions; D_i=5: I let bank/advisor decide everything. Model: Generalized Ordered Probit. Regressors not reported: same covariates as in Table 9. Standard errors are robust to heteroskedasticity. Significance: *** p<0.01, ** p<0.05, * p<0.1.

Table 12: Financial literacy and length of bank relationship

	Whole sample	Use bank often or very often	Use bank more often than friends	$(D_i = 3)$	$(D_i = 3)$ and do not use brokers
Years at UC: 6-10	-0.243	-0.295	-0.412*	-0.102	0.144
	(0.15)	(0.27)	(0.25)	(0.25)	(0.28)
Years at UC: 11-20	-0.102	0.019	-0.035	-0.036	0.090
	(0.15)	(0.27)	(0.24)	(0.23)	(0.26)
Years at UC: > 20	-0.018	0.006	0.070	-0.036	0.010
	(0.15)	(0.26)	(0.23)	(0.21)	(0.26)
N obs	1116	393	475	429	320
Adj. R^2	0.121	0.089	0.127	0.129	0.149

Unicredit 2007. Dep Var: Financial literacy (baseline). Model: linear regression model estimated by OLS. Standard errors are robust to heteroskedasticity. Regressors not reported: gender, age, education, occupational status, macro-regions, log income, financial wealth categories, trust, self-confidence, experience, working in the financial sector. Significance: *** p<0.01, ** p<0.05, * p<0.1.

Table 13: First stage for financial literacy endogeneity

	Dep var: Fin Lit (UCS)
Experience	0.018***
	(0.00)
Regional Fin Lit (SHIW)	0.426**
	(0.15)
N obs	1116
F excl instr	18.71
Hansen J	1.893
Hansen J p-val	0.169
Endog test	0.200
Endog test p-val	0.655

Unicredit 2007. Dep Var: Financial Literacy (baseline). Model: linear model estimated by GMM (only the first stage is reported). Standard errors reported in parentheses are robust to heteroskedasticity and clustering on regions. Regressors not reported: gender, age, education, occupational status, macro-regions, financial wealth categories, log individual income, self-confidence, financial sector dummy, trust, length of bank relationship. Significance: *** p<0.01, ** p<0.05, * p<0.1.

Table 14: Investing autonomously or delegating (controlling for financial literacy endogeneity)

	$D_i = 1$	$D_i = 2$	$D_i = 3$	$D_i = 4$	$D_i = 5$
Financial literacy	-0.018	-0.026	0.085**	-0.028	-0.013
	(0.03)	(0.05)	(0.04)	(0.04)	(0.01)
Fitted residuals	0.007	0.028	-0.057	0.012	0.010
	(0.03)	(0.05)	(0.04)	(0.04)	(0.01)
N obs	1116				
Log-Lik	-1417.376				

Unicredit 2007. Dep Var: probability of delegating financial decisions ($D_i = 1, ..., 5$), where D_i=1: I decide completely autonomously, the bank executes my decisions; D_i=2: I tell bank/advisor how I intend to invest and ask for their opinion; D_i=3: I consider bank/advisor proposals before deciding; D_i=4: I mostly rely on bank/advisor for my investment decisions; D_i=5: I let bank/advisor decide everything. Model: Generalized Ordered Probit, controlling for financial literacy endogeneity via control function approach (marginal effects reported). Instruments for financial literacy: average financial literacy at regional level (SHIW) and experience with financial products (UCS). Bootstrapped standard errors (200 repetitions) are robust to heteroskedasticity and clustering at regional level. Regressors not reported: same covariates as in Table 9. Sub-sample of investors holding risky assets. Significance: *** p<0.01, ** p<0.05, * p<0.1.

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N° 4/01	Peter Diamond	Towards an Optimal Social Security Design
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N° 2/00	Pier Marco Ferraresi Elsa Fornero	Social Security Transition in Italy: Costs, Distorsions and (some) Possible Correction
N° 1/00	Guido Menzio	Opting Out of Social Security over the Life Cycle