WORKING PAPER NO. 110

Awareness and Stock Market Participation

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November 2003

This version June 2004

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Luigi Guiso* **and Tullio Jappelli****

Abstract

The extent to which consumers are aware of available financial assets depends on the incentives of asset suppliers to spread information about the instruments they issue. We propose a theoretical framework in which the amount of information disseminated and the probability of individuals becoming aware of financial assets are correlated with the probability that, once informed, they will invest in the asset and negatively affected by the cost of spreading information. Social learning is a further channel through which potential investors may come to be informed about existing assets. While social learning may limit the production of financial information by assets suppliers, it increases the probability that individuals become financially aware. These predictions are supported by data on awareness of financial assets available in the 1995 and 1998 waves of the Italian Survey of Household Income and Wealth. Lack of financial awareness has important implications for understanding the stockholding puzzle and for estimating stock market participation costs.

Keywords: financial information, portfolio choice.

JEL Classification: E2, D8, G1.

Acknowledgments: Work supported in part by the European Community's Human Potential Programme under contract HPRN-CT-2002-00235 (AGE). We also acknowledge financial support from the Italian Ministry of Education, Universities and Research (MIUR). We thank Raffaele Miniaci and seminar participants at the Bank of Italy, the University of Padua, the University of Venice, and the University of Salerno for helpful comments.

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1. Introduction

The classical theory of portfolio choice rests on strong assumptions: no transaction costs, investors' awareness of the full menu of assets available and knowledge of their risk and return, no uninsurable risks, such as human capital. If all investors face the same distribution of returns and have the same information set, in equilibrium they select the same menu of risky assets. Differences in attitudes to risk affect the allocation of wealth between safe and risky assets, but not the particular asset selected. And if the utility function has constant relative risk aversion, asset shares are independent of wealth. Under these assumptions, the rich man's portfolio is simply a scaled-up version of that of poor man's.

However recent empirical studies have shown that household portfolios exhibit far too much heterogeneity to be consistent with this sort of uniformity. In particular, many individuals simply do not invest in stocks, a feature that has come to be known as the *stockholding puzzle*.

Fixed entry costs have been the main thesis in the literature to resolve the puzzle. With entry costs, investors benefit from stock market participation only if the (certainty equivalent) expected excess return from participation exceeds the fixed cost. Since the gain increases with wealth, entry costs make strong predictions about the relation between wealth and the probability of investing in stocks. In particular, investors with wealth below a certain threshold do not enter the stock market, those above it do.

Empirical evidence in Guiso, Haliassos and Jappelli (2003) documents a strong positive correlation between stock market participation and household financial wealth in many industrialized countries, supporting the entry costs thesis.[1] But there is also the international evidence that many affluent households do not invest in stocks which suggests that other forces than entry costs alone may be at work. Furthermore, the entry cost literature does not explain the origin and nature of these costs. Yet understanding what inhibits stock market participation is crucial for policies aimed at encouraging portfolio diversification and spreading the "equity culture".

In this paper we call attention to information costs and barriers as an explanation for the

[1] The evidence is based on detailed microeconomic data for France, Germany, Italy, the Netherlands, Sweden, the United States and the United Kingdom.

stockholding puzzle. The barrier we consider is awareness of the menu of assets available, and particularly of stocks, mutual funds and the like. In a seminal paper, Merton (1987) related portfolio incompleteness and heterogeneity to lack of information on investment opportunities, calling attention to the indisputable fact that investors purchase only securities they know about. Merton showed that even in the absence of monetary transaction costs, portfolio choice depends on the particular asset menu known to each investor. So, quite obviously, lack of awareness is a complementary explanation for the stockholding puzzle.

The question then becomes how important is awareness in practice? We use a recent survey of Italian households with detailed data on awareness of financial assets. The survey uncovers considerable lack of basic financial information: 35 percent of potential investors are not aware of stocks, and 50 percent of mutual funds. The magnitude of these numbers suggests that asset awareness might be of first order importance in determining portfolio selection.

One could argue that since potential investors could obtain information by spending resources on financial advice, such explanations of the stockholding puzzle are indistinguishable from those based on entry costs. But this is incorrect. Suppose an individual could obtain a list of all available assets at a fixed cost. To be able to choose whether it is worthwhile to pay the fixed cost and receive the list or invest only in the assets of which he is already aware, he would have to be able to compute the benefits of knowing the list *before* buying it. But this implies that he must already be aware of the existence of the assets (and of their risk and return) before paying the cost. In other words, awareness is not a choice variable, but exogenous with respect to individual choice.

What, then, does explain asset awareness? Why do some individuals know about some assets and others not? And what are the mechanisms through which individuals become aware? As Merton (1977) points out, awareness affects asset prices because those that are less widely known, and thus less commonly selected, pay a premium. This makes it worthwhile for firms to invest resources in spreading information about their own stocks, suggesting one possible avenue through which investors gain awareness. When assets are not distributed directly by firms, financial intermediaries and asset distributors have a similar incentive to inform, because profits increase with the number of adopters.

In this paper we generalize these ideas, confront them with the data and provide evidence on the determinants of financial awareness. We present a simple framework to

analyze the seller's decision on the number of signals to send to potential investors. Both the production of signals and asset purchase, once investors become aware of it, are costly.

In principle, lack of awareness can explain the stockholding puzzle even without entry costs. However, our model shows that awareness and entry costs interact, with additional interesting insights. Entry costs do not just limit investors' opportunity set directly; they also discourage financial intermediaries from informing potential investors. When entry costs are high, there is little incentive to incur the cost of information because purchase remains unlikely. So a reduction in entry costs affects stockholding two ways: directly, as more people purchase stocks, and indirectly as the incentive to inform potential investors is greater, which in turn increases the number of aware investors and their market participation.

Learning from financial intermediaries is just one of way that people become aware of investment opportunities. Many learn from other individuals through social interaction, which is another channel for spreading the "equity culture". Hence, we extend our framework to allow for social learning, and show that social interaction indeed increases the probability that individuals become financially aware. However, we also show that, depending on parameter values, more intense social interaction may induce asset suppliers to rely on word-of-mouth rather than direct information production, thus saving on information dissemination costs.

Besides Merton's paper and the literature on the stockholding puzzle, our work is related to three further strands of the literature: financial information, social learning, and advertisement. Grossman and Stiglitz (1980) and Verrecchia (1980) examined how information on asset returns affects portfolio choice. In these models differences among investors are endogenous, and financial information reduces subjective uncertainty on returns. Wealthier investors benefit more from financial information and are therefore better informed. Peress (2004) studies stock market participation in this framework allowing also for fixed entry costs.[2] In contrast to our approach, these papers assume that investors are aware of all available assets but can acquire information, improving the precision of their subjective expectations of asset returns, whereas in our framework potential investors cannot choose to become aware.

The recent literature on portfolio choice and social interactions signals, as an important

[2] Peress shows that three types of investors coexist in equilibrium. Poor investors do not buy stocks and are not informed. For intermediate levels of wealth, investors buy stocks but choose to remain uninformed. Rich investors choose to buy stocks and to acquire information. That is, stock market participation and the amount of information increase with wealth.

channel of accumulation of financial information, the exchange of opinions among friends and peers and that investors have a preference for familiar firms. Duflo and Saez (2002), for instance, find that participation in pension plans is affected by one's peers' choices, and Hong, Kubik and Stein (2004) show that social interactions promote investment in stocks. Grullon, Kanatas and Weston (2004) provide empirical evidence that familiarity with the firm affects investors' behavior. Specifically, they measure a firm's overall visibility with investors by its product market advertising, and show that firms with greater advertising expenditures have a larger number of individuals and institutional investors, and better liquidity of their stocks.[3]

One way to explain these findings is that social individuals have lower information costs. Rather than inferring the role of social learning from the stock market participation decision, we are able to provide a direct test of the effect of social learning on awareness, thus providing important insights into the mechanism by which social learning affects stockholding.[4] But we also point out that social interactions can limit asset suppliers' incentive to produce costly information, because market participants can rely also on information collected and (freely) passed over by others through social contacts.

Finally, the paper is related to the industrial organization literature on advertisement, as summarized by Tirole (1989). Our empirical analysis considers that literature's point that the incentives to disseminate information are affected by market structure.

The remainder of the paper is organized as follows. Section 2 presents a simple theoretical framework on information production and dissemination. Section 3 describes the data and the indicators of financial awareness. Section 4 tests the basic implications of the model of financial awareness, with special focus on the effect of household characteristics, costs of information production, and social learning. Section 5 explores the implications of awareness for the stockholding puzzle and for the estimation of entry costs. We first compute the probability of investing in stocks and other risky assets in a sample of aware investors. We then impute the probability on a sample of unaware investors and estimate the quantitative

[3] In a related paper, Grinblatt and Keloharju (2001) document that distance, language and culture explain patterns of stockholding in Finland, and that investors are more likely to buy and sell stocks of companies that are close to the investor's location, that communicate in the investor's native tongue and that have chief executives of the same cultural background.

[4] Social interactions may increase stockholding not only because social individuals may become better informed, but also because social interaction enhances trust in others, including brokers and funds managers, as suggested by Guiso, Sapienza and Zingales (2004).

impact of awareness on stockholding. There is evidence that failure to consider the awareness factor leads to overestimation of participation costs. Section 6 summarizes the results.

2. The theoretical framework

We argued in the introduction that awareness of the existence of stocks (or, for that matter, any financial asset) is exogenous to the investor's choice set. But then, how is it that some investors are aware of a wide menu of financial assets, others only a small set of investment opportunities? And how do individuals come to know about financial assets? Here we address these questions, singling out some of the key determinants of awareness and obtaining predictions that can be tested empirically. Like Merton (1987), we stress that issuers and distributors of financial assets have strong incentives to inform the pool of potential investors; broadening the investor base lowers the cost of raising external capital for issuers and increases revenues for distributors.

2.1. Awareness

Although the analyses applies equally well to any financial asset, we focus on stocks. Let b denote the unit profit from increasing the stockholder base by one unit. There are N potential investors. The expected benefit for the issuer is the product of unit profit b and the expected amount invested in stocks:

$$bp(I)\,p(A\,|\,I)\bar{a}N\,,$$

where $p(I)$ denotes the probability that an investor is aware of the stock, $p(A|I)$ the probability that he will buy the stock, conditional on knowing about it, and $\bar{a}$ the average amount invested by those buying the stock. We assume that entry costs affect the participation decision, so that not all investors buy stocks and $p(A|I)<1$.[5] As we shall see, one implication of this assumption is that entry costs affect the issuer's incentive to inform potential investors.

If issuers are able to sort potential investors into groups with similar characteristics the

[5] In the standard portfolio model with no entry costs, $p(A|I)=1$, and only those who are not aware of stocks do

analysis can be thought of as applying to one of these groups. Even though for simplicity we do not keep track of the group index, note that if potential investors are sorted into similar groups, $p(A \mid I)\bar{a}$ will differ across groups and depend on their characteristics.

Issuers and distributors can broaden the investor base by disseminating information about their stocks, by such means as mailings, advertising in the financial press or direct contacts with potential investors. Let S denote the number of information signals, contacts or ads sent. The probability that an investor receives the signal and becomes aware increases with the number of signals. However, some investors may never receive a signal even if the number of signals is very large, because the information technology never reaches them (for instance, they don't read newspapers and have no contacts with financial intermediaries). The following function of the probability of receiving a signal captures this possibility:

$$p(I) = \frac{S/N}{\beta + S/N} \tag{1}$$

Equation (1) posits that the probability of receiving a signal increases with the number of signals per potential investor, S/N. The parameter $\beta > 0$ measures the efficiency of the information technology. A lower value of β implies that a given number of signals entails a larger $P(I)$. As the number of signals approaches infinity, $P(I)$ converges to 1, the faster the lower is β. But for finite number of signals, $P(I) < 1$.

Producing a signal costs c euros to the issuer, who chooses the number of signals in order to maximize profits:[6]

$$\max_{\{S\}} \pi(S) = bp(A \mid I)\bar{a}N\left[\frac{S/N}{\beta + S/N}\right] - cS \tag{2}$$
$$s.t. \quad S \geq 0$$

From the first order condition of the problem, one obtains:

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not buy them.

[6] If potential investors are sorted in K groups, the issuer chooses the number of signals for each group maximizing total profits:

$$\max_{\{S_k\}} \sum_k \pi(S_k) = bp_k(A \mid I)\bar{a}_k N_k\left[\frac{S_k/N_k}{\beta + S_k/N_k}\right] - cS_k,$$

where k=1,…K denotes a particular group of potential investors. From the first order conditions one obtains an

$$\frac{S}{N} = \sqrt{\frac{\beta b P(A \mid I)\bar{a}}{c}} - \beta \qquad (3)$$

The optimal number of signals falls with the cost of a signal and increases with the probability of buying conditional on receiving the signal and being aware, and with the average amount invested by buyers. If the latter is too small, issuers may not send any signal, because too few investors would buy even if they received the signal. This will occur if $P(A \mid I)\bar{a} \leq \frac{\beta c}{b}$.

The point here is that entry costs and awareness interact. Lower entry costs affect stock market participation directly, encouraging aware investors to buy. But they can also increase participation indirectly, because issuers find it more profitable to send signals when they have a strong impact on the stockholder base, while if entry costs are so high as to discourage most investors from buying, issuers will be less willing to spend on advertising.

Substituting equation (3) into (1), we obtain an expression for the probability of receiving a signal and being aware:

$$p(I) = \begin{cases} 1 - \sqrt{\frac{\beta c}{b P(A \mid I)\bar{a}}} & if \quad P(A \mid I)\bar{a} \geq \beta c / b \\ 0 & if \quad P(A \mid I)\bar{a} < \beta c / b \end{cases} \qquad (4)$$

The probability of becoming informed is an increasing function of the probability of buying stocks (if aware) and a decreasing function of the cost of the signal. These are neat empirical predictions which will be confronted with the data in Section 4.

expression similar to equation (3) in the text for each group.

2.2. Social learning

Besides learning from signals and contacts with issuers and distributors, individuals often learn about investment opportunities from peers who have been informed by financial intermediaries. Social learning changes distributors' incentives and hence the optimal signal policy. How this occurs depends on the specific process of social learning and on how people interact.

The simplest case is one in which each potential investor interacts sequentially with another investor. Suppose that individual i has a probability $0<\delta<1$ of meeting individual i+1. The probability δ increases with the strength of social networks and exchange in a community. If i+1 is aware, then i also becomes aware. Thus, i can become aware if he receives a signal – with probability given in equation (1) which we denote s here – or because he does not receive a signals, which occurs with probability $1–s$, but meets i+1, provided i+1 is aware. In turn, i+1 is aware with probability s given again by (1) or because he does not receive a signal but meets and learns from i+2 with probability δ, provided again i+2 is aware. Thus, the probability that i is aware is:

$$p_i(I) = s + (1-s)\delta p_{i+1}(I) = \frac{S/N}{\beta + S/N} + \left(\frac{\beta}{\beta + S/N}\right)\delta p_{i+1}(I) \quad (5)$$

Repeated substitution gives:

$$p_i(I) = \frac{s}{1-\delta(1-s)} = \frac{S/N}{\beta(1-\delta) + S/N} \quad (6)$$

which is bounded between zero and 1. Note that, *for given s*, the probability of being aware is larger with social learning than without social learning. In fact $1/\left[1-\delta(1-s)\right] = \mu > 1$ is the social learning multiplier. Social learning amplifies the effectiveness of a given signal, which thus has a better chance of reaching a potential investor. Second, the social multiplier increases with the extent of social interactions as parameterized by δ. Third, an increase in the intensity of social interactions has a stronger impact on the social multiplier the lower is the value of s, the frequency of signals. Using equation (6) to solve problem (2) gives the optimal number of signals with social learning:

$$\frac{S}{N} = \sqrt{\frac{(1-\delta)\beta b P(A \mid I)\bar{a}}{c}} - \beta(1-\delta) \tag{7}$$

Equation (7) implies that the with social learning it is less likely that an intermediary will send no signals; this will occur only if $P(A \mid I)\bar{a} \leq \frac{\beta c(1-\delta)}{b}$ which is smaller than $\frac{\beta c}{b}$, the threshold for no signals if there is no social learning.

In our setting, the existence of social learning is equivalent to a more efficient information technology and this makes it more rewarding to send a positive number of signals. However, assuming a positive number of signals is optimally sent, equation (7) implies that an increase in the intensity of social learning has an *ambiguous* effect on the optimal number of signals. It is easy to check that an increase in the intensity of social learning (a higher value of δ) lowers the number of signals if $P(A \mid I)\bar{a} > 4\frac{\beta c(1-\delta)}{b}$.

Thus, for some parameters' values, financial assets distributors choose to rely on social interactions to spread financial information, thereby saving the cost of sending signals. This is an important point because it implies that social interactions can undermine agents' incentives to invest in information gathering/spreading as they may choose to wait and receive information for free in the social context.

Substituting equation (7) into equation (6) the probability of being aware with social learning is:

$$p(I) = \begin{cases} 1 - \sqrt{\frac{\beta c(1-\delta)}{bP(A \mid I)\bar{a}}} & if \quad P(A \mid I)\bar{a} \leq \beta c(1-\delta)/b \\ 0 & if \quad P(A \mid I)\bar{a} > \beta c(1-\delta)/b \end{cases} \tag{8}$$

and implies that the probability of being aware increase with the intensity of social learning. These are additional propositions that can be tested empirically. [7]

[7] Needless to say, the quantitative effect of social learning on the signal policy and the degree of awareness will depend on the structure of the network. The structure assumed in our example is one where learning is directional (individual *j* learns from individual *j*+1 but not vice versa) and sequential (*j* can learn from individual *j*+1 but not from *j*+*k*, with *k*>1). This structure is clearly arbitrary as any other one, and a priori it is not obvious what a "realistic" network structure looks like. For instance, if the structure is sequential but not directional, so that learning can occur in both directions, the probability of being aware depends on the signal according to the

3. Measuring financial awareness

We explore the determinants of financial awareness using the 1995 and 1998 Surveys of Household Income and Wealth (SHIW), conducted by the Bank of Italy.[8] The surveys collected information on wealth, both real and financial, as well as income and demographic characteristics. Before asking if households invest in any particular asset, and how much, interviewers elicit data on financial awareness. In particular, each household head reports whether he or she is aware of the existence of financial assets by answering, for each asset category, the following question:

> *I will show you a list of possible forms of saving. I would like you to tell me which forms of saving you (or another member of your household) know, even if only by hearsay.*

The financial asset categories refer to *types* of assets available to potential investors. Some of the categories correspond to a single asset (for instance, checking accounts and specific types of government bonds, quite popular in Italy), but others refer to broad groups of assets (for instance, stocks, mutual funds, and corporate bonds). Unfortunately, the survey does not distinguish between mutual funds and investment accounts that are predominantly bonds or stocks.

Two points about the wording of the questions are worth stressing. First, those who are not aware of stocks or mutual funds should not be aware of *any* stock. But even those who report that they do know about stocks are likely to know about only a small set. Therefore

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relation: $p(I) = \frac{2(1-s)\delta - 1 + \sqrt{1-4\delta(1-\delta)(1-s)}}{2(1-s)\delta^2}$. For given values of s and δ, this probability is larger than if learning is directional, as in equation (6). However, the qualitative results of the model are the same: the effect of the intensity of interactions on the number of signals is ambiguous, but the probability of being aware is larger with social interactions than without.

[8] The SHIW collects detailed data on demographic variables, households' consumption, income and balance sheets. The survey covers 8,135 households in 1995 and 7,147 in 1998. In each year, the surveys are representative samples of the Italian resident population. Sampling is in two stages, first municipalities and then households. Municipalities are divided into 51 strata defined by 17 regions and 3 classes of population size (more than 40,000, 20,000 to 40,000, less than 20,000). Households are randomly selected from registry office records. Households are defined as groups of individuals related by blood, marriage or adoption and sharing the same dwelling. The net response rate (ratio of responses to contacted households net of ineligible units) was 57 percent in 1995 and 44 percent in 1998. The SHIW archive can be downloaded from the web site *www.bancaditalia.it* or obtained by writing to: Bank of Italy, Research Department, Via Nazionale 91, 00186

their portfolio should be more diversified than that of totally uninformed individuals, but they might still invest in only a few stocks, contrary to the implication of the classical portfolio theory that in equilibrium all stocks should be held.

Second, the question distinguishes between aware and unaware individuals, but not between individuals who, apart from its existence, know very little about the asset - such as past returns, volatility and liquidity - and more sophisticated investors. Finer data would of course shed further light on the determinants of financial information and on the effects of financial information on household portfolios.[9]

After answering questions on financial awareness, the same individuals are asked two sets of questions to identify assets selected in the past and assets held at the end of the year:

> *Have you or any other member of your household ever invested in …[this particular asset] at any time in your life*?
>
> *Did you or any of your household members have… [this particular asset] at the end of the previous year*?

Table 1 reports data on awareness of 14 types of financial asset, investment over the lifetime, and holdings at the end of the year. The answers must be mutually consistent. If an asset is owned or was previously owned, the respondent should report that the asset is known. If an asset is currently owned, the respondent should report that he has previously purchased the asset. These consistency requirements apply to each individual in the sample and to each asset. Inconsistency is very rare, causing less than 1 percent of the sample to be discarded.

Many households are aware of the existence of certain assets even when they do not invest in them. Not surprisingly, the most popular assets are transaction accounts (checking, savings and postal accounts), short-term government bonds (BOT and CCT), and bonds issued by the national postal service. About 5 percent of the sample do not know of the existence of checking accounts and 25 percent have never had one. Part of the reason is that some people, especially the elderly and the poor, use post-office accounts, a close substitute.

The most interesting statistics refer to riskier assets. Over one third of the sample are

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Roma, Italy.

[9] The wording of the question indicates that the respondent should report being aware of the asset also if another household member is aware. This is unlikely to be a problem. Information flows within the household and if a member is aware of an asset, the information is passed to the other members as well. Where financial decisions are a collective choice, awareness by one of the members is shared with the other members. And where financial investment is not a collective choice, the head, as defined by the SHIW, is the person in charge of the financial

not aware of stocks, 50 percent do not know about mutual funds and corporate bonds, and almost 70 percent are unaware of investment accounts. Combining, less than 30 percent of the sample is simultaneously aware of stocks, mutual funds and investment accounts. Except for stocks, awareness increases by 6 or 7 percentage points between 1995 and 1998 for mutual funds, investment accounts and corporate bonds.

The other columns in Table 1 document the Italian stockholding puzzle and the lack of diversification of most household portfolios. In 1995 only 5 percent were direct stockholders, and 7.8 percent in 1998.[10] In 1998 total stock market participation through stocks, mutual funds or investment accounts was just 15 percent. The standard explanation of this asset allocation puzzle cites entry costs. As we shall see in Section 5, asset awareness is a complementary explanation.

The data can be used to construct summary indicators of financial awareness. One measure is simply the number of assets that each individual knows about divided by the number of potential assets (14 in all). A second measure is an index that gives less weight to popular assets (such as checking accounts) than to assets that are less widely known (such as corporate bonds and mutual funds). In practice, we weight the index by the inverse of the proportion of people aware of the asset, and scale it by the sum of the weights.[11]

The two indicators are obviously very strongly correlated and provide useful summary statistics of financial awareness. They can also be conveniently related to household characteristics in the descriptive and regression analysis of Section 4. Sample statistics on the two indexes of financial awareness are reported in Table 2. On average, in 1998 respondents were aware of 59 percent of the assets (50 percent using the weighted index). The cross-sectional distribution of the index reveals considerable heterogeneity of potential investors. Households in the first quartile of the distribution are aware of only one third of the assets (4 out of 14). Those in the fourth quartile are aware of at least 12 assets; 15 percent of the sample reports being aware of all asset categories.

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decisions of the household.

[10] This is an overestimate of indirect stockholding because some households have mutual funds that invest predominantly or exclusively in bonds or in the money market. Since the survey does not distinguish between different categories of mutual funds and investment accounts, we assume that if a household has a mutual fund or an investment account he invests at least part of his wealth in stocks.

[11] For instance, checking accounts have a weight of 1.046, stocks 1.64.

4. The determinants of financial awareness

The model outlined in Section 2 has three relevant testable implications. First, issuers will target the individuals (or groups) that have a greater probability of investing in the stock market. Clearly, the benefits of a euro spent on information are greater where, once individuals are aware of investment opportunities, the chances of adoption are high. Second, individuals are more likely to be aware where the cost of sending signals is lower, e.g. in areas where the cost of contacting investors is relatively low. Third, awareness should be higher in areas where the chance of learning from others is higher, because in those areas one can learn from peers as well as from the general media and from intermediaries.

In the model we have implicitly assumed that issuers send signals evenly to all potential investors, and have related the incentive to send signals to the average probability of buying among the aware, multiplied by the average amount invested by those who do buy the stock, or $p(A|I)\,\overline{a}$. This is a reasonable assumption if information is communicated through, say, TV or other general media, so that in principle all potential investors are contacted. However, advertisement is costly, and it is unwise to send signals to people who are unlikely to buy stocks even if informed about them.

A more realistic case is one in which issuers or distributors observe some characteristics of potential investors that are correlated with the probability of buying stocks and the amount invested. Then, issuers are able to group potential investors according to these characteristics and target the likely buyers. The immediate implication is that the probability of receiving a signal also depends on a set of observable individual characteristics associated with stockholding.

In the empirical analysis we focus on household resources (income, financial wealth, real wealth), age and education as proxies for the probability of adoption and the average amount invested, $p(A|I)\,\overline{a}$. Since with fixed costs of adoption the affluent are more likely to buy stocks and invest larger amounts, they will receive more signals and will therefore be more likely to be aware. A similar argument applies to individuals with university education and to younger people, in-so-far as they follow the practice of financial advisors of investing more in stocks when young.[12] On the other hand, groups with very low probability of buying

[12] Bodie, Merton and Samuelson (1992) show that this popular advice is supported by theoretical arguments.

stocks are not targeted and remain unaware, unless there are information spillovers from other individuals.

In order to test the relation between awareness and the cost of sending signals we rely on geographical differences in newspapers readership. We focus on sales of national newspapers (defined as newspapers sold in at least half of the Italian provinces) as they host the greatest portion of financial product advertisement. Most importantly for our purposes, the cost of advertising financial products in national newspapers is borne out at the national level and reflects the overall readership, rather than local readership. Therefore, the effective cost of contacting investors and spreading information is lower in areas where newspapers sales are highest. For example, suppose that the cost of sending a signal using a national newspaper is *x*, that there are two regions and that readership is twice as large in the first region. Then the effective cost of contacting an unaware investor will be twice as large in the second region. Thus, one driving variable of awareness should be newspaper readership, as measured by the number of copies sold in the local market scaled by the local population. This ratio, computed by pooling together the 14 newspapers that sell in at least half of the Italian provinces, varies considerably across provinces, ranging from less than 1 newspaper per 100 inhabitants in the Sicilian provinces of Agrigento, Caltanissetta and Enna to over 15 newspapers in the Northern provinces of Genoa, Piacenza and Ravenna.[13] The cost of contacting investors through the general press is accordingly lower in, say, Genoa than Agrigento.

As a proxy for social interactions – our third determinant of awareness – we use the number of voluntary organizations – excluding sport clubs and organizations that represent group interests - per 1,000 inhabitants in each province.[14] As shown in Figure 1, the indicator varies considerably across provinces, from a minimum of 0.07 in the Southern province of Foggia to a maximum of 0.18 in Genoa. The chart also shows that social interactions are more intense in the Northern provinces, suggesting that our regressions must control for North-South differences to avoid simply picking up a North-South divide.

Although it is not obvious a priori how to measure the intensity of social interactions in

[13] The list includes: Avvenire, Corriere della Sera, Giornale, Il Giorno, Italia Oggi, Manifesto, Il Mattino, Il Messaggero, Repubblica, Il Resto del Carlino, Il Secolo XIX, Il Sole 24 Ore, La Stampa, Il Tempo. We exclude sport newspapers as they are not used as a vehicle for financial information. Restricting the list to the 5 largest national newspapers (Corriere della Sera, Repubblica, La Stampa, and the two business papers Sole 24 Ore and Italia Oggi) does not change the econometric results.

a community, alternative available measures tend to be highly correlated. In fact, as shown by Putnam (1993) with reference to Italian regions, communities that are more social in one dimension (e.g. participation in voluntary organizations concerned with health, such as blood donation) tend also to be more social in other dimensions (e.g. participation in political movements, recreational and charity groups, engagement in the civic community, etc.).

4.1. Descriptive evidence

We start with a graphical analysis of the correlation between financial awareness and education, age, wealth, density of financial salesmen and social learning. In each case, we graph awareness of stocks, mutual funds, investment accounts, corporate bonds and the overall index of financial information separately. We choose to focus on the weighted index for all financial assets and for the four risky assets combined. Results for the unweighted index, not reported for brevity, are similar. In each graph we merge 1995 and 1998 data. In the regression analysis, however, we introduce a time dummy to distinguish between the two surveys.

The relation between education and information (Figure 2) is positive and quite strong. The proportion of individuals aware of stocks increases from 25 percent for those with no more than elementary education to 80 percent for those with a university degree. Over the same range of education, the proportion aware of mutual funds raises from 5 to 60 percent, and the overall index of financial awareness from 20 to 75 percent.

In Figure 3 we plot the proportion of households aware of stocks, mutual funds, investment accounts, corporate bonds and the index of financial awareness by year of birth. Awareness clearly increases with year-of-birth, particularly for cohorts born between 1910 and 1945. Subsequent cohorts (born 1946-70) display only a moderate increase in awareness, for each of the assets considered.

With only two years of data, we cannot identify the separate effects of cohort and age. If we were to interpret the data in terms of age, absent any cohort effect, we would conclude that financial information falls with age, with the implausible implication that people start to decumulate past knowledge around retirement age. In our interpretation, rather, year-of-birth is one of the observable variables used by intermediaries to target potential investors. Since

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[14] The source is *1° Censimento delle istituzioni private e imprese nonprofit - anno 2000*, Istat (2002).

younger cohorts tend to invest more in risky assets and are more likely to participate, they will also receive more signals and thus be more likely to be aware.[15]

The relation between wealth and financial awareness in Figure 4 is positive, consistent with the hypothesis that financial intermediaries target the affluent. Furthermore, the relation is non-linear. At low levels of wealth (less than 2,500 euros), the relation is strongly positive. At higher levels, the correlation is still positive but attenuated. This suggests considering non-linear terms in wealth in the regression analysis below.

Figure 5 plots the proportion of aware individuals and the index of financial awareness against the cost of sending signals, as proxied by the number of national newspapers sold per 100 inhabitants in a province. Awareness is positively correlated with readership, particularly at low levels of readership. Figure 6 displays a positive relation between awareness and the index of social learning, in agreement with the model of Section 2.

Overall, the descriptive evidence is consistent with the predictions of the model which relates the mechanism through which consumers become aware of available assets to the economic incentives of issuers and distributors.

4.2. Econometric analysis

Education, financial resources, and birth cohort are correlated variables: notoriously education and income or wealth are positively correlated, while wealth and income vary in predictable ways with age, as life cycle models imply. Education and wealth are also likely to be correlated with social learning, because the wealthy and individuals with higher education are more likely to interact and learn from others. To account for these correlations and to isolate the contribution of each factor while holding others constant, we run probit regressions for the probability of individuals being aware of stocks, mutual funds, investment accounts and corporate bonds, and Tobit regressions for the index of financial information.

Table 3 reports summary statistics – mean, standard deviation, minimum and maximum value – for all the variables used in the estimation. Data are pooled over 1995 and 1998. Household head is defined as the person primarily responsible for economic decisions. They

[15] If we interpreted the profile in Figure 2 in terms of age rather than cohort, a flat or even declining age-information profile would also contrast with the hypothesis set forth by King and Leape (1987), who explain the increasing pattern of asset diversification over the life-cycle in terms of a positive relation between age and

are males in about 70 percent of the cases; on average, financial wealth is 18,000 euros, and real wealth about 120,000 euros; over 20 percent of the sample have a high school diploma, 7 percent a university degree and 1 percent an economic degree. Comparison between the two surveys indicates that the sample is quite stable in demographic structure, education of the head and regional location.

Besides controlling simultaneously for economic resources (financial wealth, real wealth, household disposable income), education, year-of-birth, social learning and density of financial intermediaries, we include in each regression a dummy variable for whether the household head is married or male and a time dummy to control for differences between survey years. We also include the Herfindhal index in each province and year, as a proxy for the competitive structure of local financial markets. The literature on advertisement suggests that the competitive structure of the market affects producers' incentives to disseminate information on their products (Tirole, 1989). If the gains from spreading information can be appropriated by the competitors – as in industries with relatively high product substitution and low market power – issuers would have less incentive to disseminate basic information. However, the coefficient of this variable never turns out to be statistically different from zero.

As another indicator of banks' behavior affecting stock and other financial assets awareness, we define a dummy variable taking the value of one if the respondent has a long-term relation (more than 10 years, or more than 5 years) with a bank. Our hypothesis is that, controlling for age, education and economic resources, banks are more likely to target individuals on which they have accumulated more information (for instance, because they have a more precise assessment of financial wealth and portfolio behavior). These individuals are therefore more likely to have received signals in the past, and, therefore, more informed.

Since we use provincial variability to measure differences in the cost of distributing information, in the intensity of social learning and to proxy competition in the local markets, the standard errors of our estimates are adjusted for clustering. Furthermore, to make sure that our geographical indicators do not pick up differences between the North and the South that just happen to be correlated with measures of social interactions and the cost of distributing information, we add to the regression a dummy variable for the North. To make sure that social interactions and newspaper readership are not picking up geographical differences in

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financial sophistication.

economic development, we have also expanded the set of regressors to include provincial per capita GDP and the provincial unemployment rate. Since these variables were never statistically different from zero, they are dropped in the reported specification.

The probit results in Table 4 confirm the patterns in Figures 2 to 6. The coefficients of the cohort dummies are positive for each of the assets considered, indicating that the older cohorts are less likely to be aware than the young. Education is a strong predictor of financial awareness. In particular, having a university degree is associated with an increase of 17 percentage points in the probability of being aware of stocks, and of 25 points for mutual funds, investment accounts and corporate bonds. Having an economic degree further increases the probability of awareness of mutual funds, investment accounts and corporate bonds by 13 to 21 points. Only in the case of stocks is the coefficient of the dummy for an economic degree not statistically different from zero.

The coefficients on financial wealth, real wealth and income indicate that the awareness is positive correlated to individual resources. Increasing simultaneously the three variables from the 25^{th} to the 75^{th} percentile of their distribution, raises the probability of being aware of stocks by 13 percentage points, and that for mutual funds, investment accounts and corporate bonds by 18, 11 and 19 points, respectively. Experimenting with quadratic terms of these variables does not change these conclusions. Our interpretation is that these correlations reflect the incentives of intermediaries to target financial information primarily towards individuals with a higher probability of actually buying the financial instruments they advertise.[16]

The dummy for long-term bank relation (more than 10 years) has a strong impact on awareness, between 5 and 8 percentage points, depending on the asset considered. Since we are holding constant age, education and economic resources, the most plausible interpretation of this effect is that it is "supply-driven": banks have a greater incentive to inform individuals on which they have superior information. Results are unchanged if long-term relations are defined over 5-years.

Newspaper readership has a positive impact on awareness, and its coefficient is highly

[16] Another possibility is that education and wealth proxy for individual characteristics that are related to individual exposure to financial information. For instance, the better educated and the affluent may have access to circles where financial information is more easily available, and therefore have more frequent contacts with financial intermediaries. Given the reduced form of our regressions, we cannot distinguish this particular channel from the explicit targeting of some population groups by financial intermediaries suggested by our

significant in all the regressions. Increasing readership from the lowest (the Sicilian province of Agrigento) to the highest value (the Northern province of Ravenna) raises the probability of stock awareness by 5.4 percentage points and that of being aware of mutual funds, investment accounts and corporate bonds by 25, 23, and 21 points, respectively. Similar results are obtained if we use the provincial readership of the top five national newspapers or of the leading national economic newspapers (*Il Sole 24 Ore* and *Italia Oggi*).

The coefficient of the proxy for social learning is positive in all regressions, and statistically different from zero at conventional levels for stocks, investment accounts and corporate bonds. Raising the index of social learning from the lowest to the highest value (Foggia and Genoa, respectively) increases the probability of being aware of stocks by 12 percentage points; for mutual funds, investment accounts and corporate bonds the respective figures are 14, 12 and 8 percentage points.[17] To make sure that our results are not driven by the particular measure chosen we check their robustness with an alternative measure: the number of non profit organizations, scaled by population in the province (Mortara, 1985). A non-profit institution is any organization whose status does not allow its members, founders or those in control, to obtain any income or other yield through it. The estimates show that also this proxy of social interactions has a positive and statistically significant effect on financial awareness.

Table 5 presents a Tobit regression for the weighted index of financial awareness using the same specification as in Table 4. A two-limit Tobit estimator is warranted because the index ranges from 0 for 248 individuals reporting being aware of no asset at all, to 1 for 2,585 individuals aware of all 14 assets. Also in this case standard errors are adjusted for provincial cluster effects. We report results for the index based on all financial assets and for that referring to risky assets only. In both cases the results confirm the evidence on individual assets. Awareness is strongly correlated with education, year-of-birth, wealth, long-term banks relations, newspaper readership and the index of social learning.

Raising economic resources (financial wealth, real wealth, and disposable income) from the 25th to the 75th percentile increases the overall index of financial awareness by 9

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model.

[17] Section 2 shows that more intense social interactions have an ambiguous effect on the optimal number of signals sent by financial intermediaries. Since we don't observe the signals, we cannot estimate the relation between intensity of information production and strength of social interactions.

percentage points (15 percent if we consider the index relative to risky assets only). Long-term relations increase the index by 6.5 percentage points. Increasing the density of newspaper readership and the index of social learning from the lowest to the highest value increases the overall index by 8 and 11 percentage points, respectively. Like Table 4, this is evidence of the awareness mechanism outlined in Section 2.

5. Implications

Financial awareness carries major implications for at least two important issues in the analysis of household portfolios: the extent to which lack of awareness explains the stockholding puzzle, and whether failing to consider asset awareness leads to overstating participation costs.

Consider a situation in which investors can choose between a safe and a risky asset (bonds and stocks). Stocks yield an equity premium equal to $\tilde{r}$, distributed according to the p.d.f. $g(\tilde{r})$, with expected value $E\tilde{r} = r > 0$ and variance σ^2. We normalize the return on bonds to one and assume that in some states of the world $\tilde{r}$ <0 so that stocks do not dominate bonds.

Each investor *i* is endowed with wealth w_i and invests a fraction of wealth α_i in stocks. The investor must pay a fixed entry cost f_i (say, a brokerage fee) to enter the stock market. If he chooses to purchase stocks, he pays f_i and invests $\alpha_i w_i$ in stocks; otherwise he keeps all of his wealth in bonds.

There are two types of investors, aware and unaware. Aware investors know of the existence and characteristics of both assets and have the same information on the probability distribution of the stock return $g(\tilde{r})$. The others are unaware that stocks exist. Hence, they can only invest in bonds, regardless of entry costs. The shadow cost of ignorance of stocks is *r*, the expected excess return.[18]

Let $I(x_i)$ be an indicator function equal to 1 if the investor is aware and zero if

[18] One could consider a third type of investor, aware of stocks but not well informed about the distribution of the return on them. For instance, he might perceive a p.d.f. $g_u(\tilde{r})$ with the same mean as $g(\tilde{r})$ but larger variance. Other things equal, this investor is less likely than fully informed investors to enter the stock market.

unaware. As was shown in Sections 2 and 4, the indicator depends on a vector of characteristics x_i which include the costs of disseminating financial information in the local market, the strength of social interactions, and personal characteristics, such as education, cohort, and wealth. If $I(x_i) = 0$ all wealth is invested in bonds and $\alpha_i = 0$. If $I(x_i) = 1$, the problem of the aware investor is:

$$\max_{\alpha} Eu\left[(\alpha_i \tilde{r} + 1)(w_i - f_i)\right]$$

and the optimal share invested in stocks, α_i^*, satisfies the first order condition:

$$Eu'\left[(\alpha_i^* \tilde{r} + 1)\tilde{r}(w_i - f_i)\right] \equiv 0$$

The investor chooses to invest in stocks if:

$$Eu\left[(\alpha_i^* \tilde{r} + 1)(w_i - f_i)\right] > u(w_i) \qquad (9)$$

If the benefit from stockholding exceeds the fixed cost, the investor chooses to purchase stocks, pays the fixed cost f_i and invests α_i^* (w_i -f_i) in stocks. Given our assumptions, α_i^* is strictly positive. Condition (9) indicates that, for given w_i and f_i, participation is more likely if the excess return is high. Since one additional euro of wealth increases the right-hand side more than the left-hand-side, there exists a sufficiently high level of wealth that triggers stock market participation. As entry costs approach zero, all aware investors purchase stocks.

Equation (9) delivers three insights. First, if all investors are aware of stocks, everyone above the wealth threshold invests in stocks. Second, if there are no entry costs, the people who do not invest in stocks are simply those who are not aware of their existence. Third, with both unaware investors and entry costs, a person who does not invest in stocks may be uninformed or may have low wealth.

Let now $\hat{r}_i$ be the certainty equivalent equity premium defined implicitly by[19]

$$Eu\left[(\alpha_i^* \tilde{r} + 1)(w_i - f_i)\right] = u\left[(\alpha_i^* \hat{r}_i + 1)(w_i - f_i)\right]$$

[19] The certainty equivalent premium is approximately equal to $\hat{r} = r\left(1 - \frac{1}{2} a \frac{\alpha^* \sigma^2}{1 + \alpha^* r}\right)$, where a is the investor's degree of relative risk aversion evaluated at final wealth.

Then, the stock market participation condition can be written as:

$$w_i > \frac{f_i(\alpha_i^* \hat{r} + 1)}{\alpha_i^* \hat{r}_i} = \overline{w}_i \qquad (10)$$

All aware investors with wealth above $\overline{w}_i$ purchase stocks; all unaware investors and all those with $w_i < \overline{w}_i$ do not. Equation (10) states that the wealth threshold increases with the fixed cost, risk aversion (because the optimal share α_i^* and the certainty equivalent premium $\hat{r}$ fall with risk aversion) and the variance of returns to stocks. Other things being equal, people who are willing to invest a large share of their wealth in stocks are more likely to enter the stock market because they have more to lose from not taking advantage of the equity premium.

Using (10), one can compute the proportion of stockholders in the population as the product of the proportion of stockholders among aware investors and the probability of being aware:

$$h = prob(w_i \geq \overline{w}_i \mid I = 1)\, prob(I = 1) \qquad (11)$$

If $prob(I = 1) < 1$, equation (11) implies that lack of awareness can account for at least part of the stockholding puzzle. Clearly, even if all consumers where informed (I = 1 for all investors), stock market participation would still be limited by entry costs.

5.1. The stockholding puzzle

A simple way to assess the importance of awareness in explaining the stockholding puzzle is to compare the proportion of investors who enter the stock market in the total sample with that in the restricted sample of aware investors. Table 6 indicates that if the unaware investors were aware of stocks - and their adoption probability were the same as that of the aware - the proportion of stockholders would increase by over 50 percent (that is, from 5.6 to 8.7 percent).

Table 6 also shows that awareness may have an even more important role in explaining lack of participation in mutual funds, investment accounts and corporate bonds. In each case the proportion investing in these assets would more then double if all investors were aware of these assets. The last row of Table 6 indicates that if all investors were aware of all risky

assets, total stockholding (stocks, mutual funds and investment accounts) would increase from 12.6 to 27.6 percent.

These simple estimates are subject to criticism, however, because the characteristics of aware investors are different from those of the unaware. Since the former tend to be richer and more educated, and since education, income and wealth are positively associated with stockholding, the simple calculation tends to overestimate the effect of awareness on participation. Therefore we refine our calculation, estimating the probability of aware investors being stockholders (or investing in any of the four assets considered) and then imputing the probability in the sample of unaware individuals.

The imputed figures are obtained from a probit regression with Heckman sample selection in which the decision to invest in a particular asset is a function of age, education dummies, dummies for quartiles of financial wealth, real wealth and income, a dummy for residence in the north and a year dummy. Since each probit is performed on a sample of people who know the asset, and since the error term of the participation decision is potentially correlated with unobserved determinants of asset awareness, each probit is corrected for sample selection using the same specification for the probability of being aware as in Table 4.[20] The coefficient of the participation decision, not reported for brevity, confirm previous evidence: direct and indirect stock market participation increases with household resources and education, is higher in the North, and increases over time.

As expected, considering the differing characteristics of aware and unaware investors, attenuates the effect of awareness on participation. Still, stock market participation would increase from 5.6 to 7.5 percent, mutual funds from 7.6 to 12.0, and investment accounts from 1.8 to 3.1 percent. Overall, direct and indirect participation would almost double (from 12.6 to 23 percent).

Clearly, we still find that the proportion of aware investors is much larger than the proportion of households investing in the asset. For instance, while about 50 percent are aware of mutual funds (Table 1), less than 15 percent of this group actually invests in mutual funds (Table 6). Thus, while lack of awareness may help reconcile the theory with the data, other factors are needed to explain the stockholding puzzle, including monetary entry costs,

[20] The participation equations confirm the standard results in the literature that wealth, both real and financial, income and education are statistically significant and important determinants of stockholding (Guiso, Haliassos and Jappelli, 2003).

indivisibilities, minimum investment requirements and lack of financial sophistication beyond asset awareness.

5.2. Participation costs

To address the relation between awareness and entry costs, consider again equation (10) and assume that the asset share invested in stocks and the certainty equivalent equity premium are the same for all investors. The condition for participating can then be expressed as:

$$f_i < \frac{\hat{r}\alpha w}{(1+\alpha\hat{r})}$$

As in Mulligan and Sala-i-Martin (2000) and Vissing-Jorgensen (2004), we use the joint distribution of wealth and stock ownership to infer information on the distribution of entry costs. As an example, suppose that $\hat{r}$ = 0.03, α = 0.3, and 10% of the households with w = € 25,000 invest in the stock market. Then 10% of this group must have participation costs below $\frac{0.03\times0.3\times25{,}000}{1+(0.03\times0.3)} = 223$ euro. If the entry cost f is not correlated with w, this also implies that 10% of these households has participation costs lower than 296 euro.[21]

To estimate the empirical distribution of entry costs, we split the sample into wealth percentiles and repeat the procedure for each different percentile. The lower line in Figure 7 plots the fraction of total stockholders (defined as direct stockholders plus indirect stockholders through mutual funds and investment accounts) against participation costs for the total sample, i.e. without distinguishing between aware and unaware investors. Assuming, as in the example, $\hat{r}$ =0.03 and α=0.3, median entry costs so estimated are € 850 euro.

The point is that some people do not invest in stocks because they are not aware of stocks, not because entry costs are too high. So entry costs should be estimated on the sample of aware investors, the only group that has the option of paying or not the fixed cost. In the

[21] Vissing-Jorgensen (2004) considers three types of transaction costs: a pure entry cost, a per-period participation cost and a trading cost. Using data from the Panel Study of Income Dynamics, she finds median per period participation costs of $800 in 1984, $500 in 1989, and $350 in 1994. Luttmer (1999) focuses on the lower bound of fixed costs that make consumption data consistent with data on asset returns, suggesting transaction costs of at least 3 percent of monthly consumption for an investor with log utility function. Paiella (2001) follows a similar approach, and using the same dataset as Vissing-Jorgensen estimates that annual participation

previous example, suppose that only 50 percent of the households with w = € 25,000 are aware of stocks. Then one should conclude that only 5 percent – not 10 – have participation costs lower than € 223. Clearly, the overestimation of entry costs increases with the fraction of unaware individuals.

The upper line in Figure 7 reports an estimate of the distribution of entry costs in the restricted sample of aware investors. These are defined as those who are aware of stocks, mutual funds and managed investment accounts. The downward revision in participation costs is substantial. In fact, the median value in the restricted sample is about € 380, less than half the value in the total sample.[22] The corresponding wealth threshold is € 31,700.

It is worth noting that the calculation of participation costs could be refined by allowing for heterogeneity in the asset share invested in stocks, estimating a selection model for the asset share. Vissing-Jorgensen (2004) reports that this refinement does not appreciably change the estimated distribution of entry costs, given that models of the share invested in stocks typically have low explanatory power, which we also observe in our data.

6. Conclusions

The point of departure is that in two large, representative cross-sections of Italian households a significant fraction of consumers are unaware of the existence of available financial instruments such as stocks and mutual funds. Starting from this observation, this paper makes three contributions to the literature on household portfolios. First, we propose an explanation for the mechanism whereby asset awareness may be acquired. Producers and distributors of financial assets have an incentive to disseminate information that is stronger when aware households are more likely to adopt the asset and when the cost of spreading information is lower. In addition, social learning facilitates awareness because it represents a further channel through which potential investors can become aware, though it may induce financial intermediaries to disseminate less information.

We provide evidence consistent with these hypotheses. We find that awareness is

costs range from $95 to $175.

[22] This does not imply that considering awareness would reduce participation costs in the US by a comparable amount. It may well be that in the US the fraction of unaware individuals is much smaller, and so is the bias. Indeed, it is likely that US households are better informed than Italians. However, where the stock market is less developed and the mutual fund industry still lags behind, as in many European countries, the problem we are

positively affected by demographic variables – education, wealth, income and birth cohort – that increase the probability of purchasing stocks and the amount invested, long-term bank relations, the intensity of social interactions and national newspaper readership (as a proxy for the cost of disseminating information) in the area where investors live.

In a third step of our analysis, we show that lack of awareness can help resolve part of the stockholding puzzle. Ignorance of investment opportunities is a specific impediment to stockholding that goes beyond the generic reference to fixed adoption costs as a cause of non-participation typically found in the literature. Our calculations show that if all investors were aware of risky securities, participation in risky financial markets could increase substantially (and even double) from its current level. Yet we also find that a large fraction of potential investors do not own stocks even if aware, suggesting that entry costs are an important reason for non-participation even when awareness is accounted for. Our results also imply that estimates of participation costs that do not take awareness into account may be seriously biased upwards. In our data, if we ignore lack of awareness, median participation cost is estimated at €850; considering awareness lowers that figure to a more realistic value of € 380.

Our model and empirical evidence also uncover important interactions between participation costs and awareness. Lower entry cost itself tends to increase awareness, because financial intermediaries' incentive to invest resources to inform potential investors is greater. This, in turn, further increases stock market participation. Policies aimed at lowering transaction costs in financial markets should therefore take into account the interaction between entry costs, financial information and stockholding.

An implication of our analysis is that lack of awareness can contribute to explain the home equity bias. If the cost of sending signals increases with the distance between the sender and the recipient, information will tend to be disseminated locally and individuals will be mostly aware of local stocks, consistent with the findings of Grinblatt and Keloharju (2001). Furthermore, since investors would tend to receive mostly signals from local firms, they will be aware of only a subset of available stocks and thus unable to diversify.

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discussing is likely to be of first order importance.

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Table 1
Financial awareness: descriptive statistics

The table is based on questions asked in the 1995 and 1998 SHIW about asset awareness, participation over the life cycle and current participation. BOT are Treasury Bills up to one-year maturity. CCT are floating-rates Treasury credit certificates, 2-4 years in maturity indexed to BOT. BTP are long-term, fixed interest rates government bonds. CTZ are zero-coupon Treasury credit certificates. Statistics are computed using population weights. All values are expressed in percentages.

Financial asset	*Aware of the asset*		*Has invested in the asset at least once*		*Currently investing in the asset*	
	1995	*1998*	*1995*	*1998*	*1995*	*1998*
Checking accounts	94.6	93.3	74.7	76.9	68.9	73.2
Saving accounts	92.1	88.6	49.2	47.2	26.7	28.0
Postal accounts	87.6	82.7	17.6	18.2	9.6	11.5
Certificates of deposit	57.9	61.8	10.5	11.5	5.3	3.7
Government bonds: BOT	89.6	86.3	38.2	30.1	22.4	8.7
Government bonds: CCT	77.5	73.7	13.9	14.2	7.8	4.4
Government bonds: BTP	52.9	54.5	6.9	6.9	4.4	2.5
Government bonds: CTZ	24.9	30.3	1.5	2.3	0.9	0.6
Postal bonds	82.9	76.8	15.5	13.4	7.4	5.9
Corporate bonds	49.4	55.8	4.7	8.9	2.6	5.1
Mutual funds	48.4	55.5	7.0	13.7	4.2	9.6
Investment accounts	31.5	37.1	1.5	3.4	1.0	2.7
Stocks	64.9	63.7	7.3	11.1	5.0	7.8
Saving in cooperative societies	34.9	35.1	1.8	1.9	1.4	1.3

Table 2
The index of financial awareness

The unweighted index of financial awareness is the sum of the financial assets known divided by the number of potential assets known. The weighted index uses as weights the inverse of the aggregate fraction of households aware of the asset. Statistics are computed using population weights. Values are expressed in percentages.

	1995	*1998*
Unweighted index		
I quartile	42.8	35.3
Median	64.3	58.8
III quartile	85.7	82.3
Average	63.5	58.6
Standard deviation	27.4	29.9
Weighted index		
I quartile	20.3	23.0
Median	58.3	46.3
III quartile	76.7	80.9
Average	57.8	50.9
Standard deviation	27.2	32.2

Table 3
Selected statistics for variables used in the estimation

Indicators of financial awareness, demographic variables, financial assets and real assets are drawn from the 1995-98 Survey of Household Income and Wealth (15,281 observations in total). Newspaper readership is measured by the number of copies sold in each province scaled by the population in the province. The ratio is computed considering the 14 newspapers that sell in at least half of the Italian provinces. The index of social learning is the number of voluntary organizations per 1000 residents in the province. The Herfindhal index is the provincial sum of squared market shares of loans of all banks in each province. Data refer to 1995. Source: *Centrale dei Rischi*, the Italian Central Credit Register managed by the Bank of Italy. Financial and real wealth are converted in 1998 prices using the CPI deflator, and expressed in thousand euro. Sample means and standard deviations are computed using population weights.

Variable	*Mean*	*Standard deviation*	*Minimum*	*Maximum*
Aware of stocks	0.64	0.48	0	1
Aware of mutual funds	0.51	0.50	0	1
Aware of investment accounts	0.34	0.47	0	1
Aware of corporate bonds	0.52	0.50	0	1
Index of financial information	0.55	0.30	0	1
Index of financial information – risky assets only	0.48	0.41	0	1
Born before 1930	0.27	0.44	0	1
Born in 1931-45	0.28	0.45	0	1
Born in 1946-60	0.30	0.46	0	1
Born after 1960	0.14	0.34	0	1
High school	0.21	0.40	0	1
College	0.07	0.25	0	1
B.A. in economics	0.01	0.11	0	1
Married	0.70	0.45	0	1
Male	0.72	0.45	0	1
Financial wealth	18.5	54.9	0	1674
Real wealth	119.8	244.0	0	17242
Disposable income	22.46	18.59	-36.36	508.16
Long-term bank relation	0.50	0.50	0	1
Newspapers sales, per capita (%)	5.92	4.10	0.62	18.11
Index of social learning	0.271	0.134	0.073	0.652
Herfindhal index	0.15	0.08	0.06	0.50
Resident in the North	0.47	0.50	0.00	1
Dummy for 1998	0.47	0.50	0.00	1

Table 4
The determinants of awareness: Probit regressions

The regressions pool 1995 and 1998 data. We report marginal effects and robust *z* statistics in parentheses. Standard errors are adjusted for clustering at the provincial level.

	Stocks	*Mutual funds*	*Investment accounts*	*Corporate bonds*
Born in 1931-45	0.124	0.163	0.124	0.154
	(10.42)**	(11.76)**	(8.27)**	(10.47)**
Born in 1946-60	0.180	0.232	0.180	0.212
	(14.80)**	(15.91)**	(11.47)**	(13.19)**
Born after 1960	0.205	0.275	0.209	0.256
	(15.21)**	(13.36)**	(8.48)**	(12.09)**
High school	0.165	0.237	0.211	0.246
	(12.79)**	(16.97)**	(14.00)**	(19.83)**
College	0.169	0.253	0.272	0.251
	(8.79)**	(11.72)**	(11.35)**	(10.45)**
B.A. in economics	0.056	0.129	0.208	0.174
	(0.82)	(2.05)*	(3.83)**	(2.75)**
Married	0.005	0.001	0.009	-0.001
	(0.38)	(0.05)	(0.66)	(0.05)
Male	0.070	0.114	0.094	0.093
	(3.96)**	(6.41)**	(6.72)**	(6.36)**
Financial wealth (x1000)	0.518	0.989	0.529	0.735
	(1.69)	(2.50)*	(2.57)*	(2.10)*
Real wealth (x1000)	0.147	0.224	0.119	0.222
	(3.55)**	(4.19)**	(2.78)**	(4.08)**
Disposable income (x100)	0.557	0.752	0.451	0.751
	(6.48)**	(9.02)**	(7.73)**	(9.15)**
Long-term bank relation	0.063	0.084	0.048	0.077
	(5.24)**	(6.10)**	(4.26)**	(5.41)**
Newspapers sales	0.102	0.060	0.061	0.094
	(2.55)*	(1.65)	(1.86)	(2.54)*
Index of social learning	0.205	0.216	0.194	0.110
	(2.17)*	(2.28)*	(2.39)*	(1.35)
Herfindhal index	-0.026	-0.082	-0.160	-0.073
	(0.16)	(0.56)	(1.04)	(0.51)
North	0.157	0.196	0.122	0.175
	(6.07)**	(7.16)**	(4.40)**	(6.79)**
Dummy for 1998	-0.045	0.057	0.045	0.041
	(1.80)	(2.51)*	(2.10)*	(1.79)
Proportion aware	0.64	0.51	0.34	0.52
R square	0.16	0.20	0.15	0.19
Observations	15281	15281	15281	15281

significant at 5%; ** significant at 1%

Table 5
The determinants of awareness: Tobit regressions for the index of financial awareness

The index of financial awareness is the sum of the financial assets known divided by the number of potential assets known, weighted by the inverse of the aggregate fraction of people aware of the asset. The index based on risky assets is computed using only stocks, mutual funds, investment accounts, and corporate bonds. We report robust *z* statistics in parentheses. Standard errors are adjusted for clustering at the provincial level.

	All assets	*Only risky assets*
Born in 1931-45	0.107	0.202
	(13.29)**	(11.73)**
Born in 1946-60	0.155	0.280
	(17.36)**	(15.27)**
Born after 1960	0.179	0.333
	(13.04)**	(12.45)**
High school	0.169	0.293
	(19.19)**	(15.22)**
College	0.174	0.313
	(10.88)**	(10.99)**
B.A. in economics	0.155	0.185
	(4.97)**	(3.95)**
Married	0.012	0.019
	(1.42)	(1.42)
Male	0.073	0.127
	(8.50)**	(7.69)**
Financial wealth (x1,000)	0.124	0.187
	(1.15)	(1.13)
Real wealth (x1,000)	0.077	0.127
	(3.50)**	(3.32)**
Disposable income (x100)	0.398	0.642
	(9.33)**	(8.47)**
Long-term bank relation	0.065	0.107
	(7.88)**	(7.22)**
Newspapers sales	0.053	0.099
	(2.52)*	(2.86)**
Index of social learning	0.177	0.294
	(2.93)**	(2.92)**
Herfindhal index	-0.077	-0.103
	(0.78)	(0.59)
North	0.100	0.205
	(5.76)**	(7.08)**
Dummy for 1998	0.017	0.052
	(1.13)	(1.99)*
Constant	0.111	-0.446
	(4.22)**	(7.09)**
Average index of financial awareness	0.55	0.48
Observations	15281	15281

significant at 5%; ** significant at 1%

Table 6
Awareness and the stockholding puzzle

The first column reports the proportion of households with stocks, mutual funds, investment accounts, and corporate bonds. The second column reports the same proportions in the sample of informed investors. The third column uses selectivity adjusted estimates for the probability of having stocks, mutual funds, investment accounts and corporate bonds in the sample of aware investors to predict the probability of participation in the total sample (including aware and unaware investors). The selectivity adjustment takes into account that the probit is estimated on the sample of aware investors. All statistics are computed using population weights.

	Proportion in the total sample	*Proportion in the sample of aware investors*	*Proportion if all investors were aware (estimated from probit with sample selection)*
Stocks	5.6	8.7	7.5
Mutual funds	7.6	14.4	12.0
Investment accounts	1.8	5.2	3.1
Corporate bonds	3.8	7.3	5.5
Total	12.6	27.6	23.1

Figure 1
The intensity of social interactions in Italian provinces

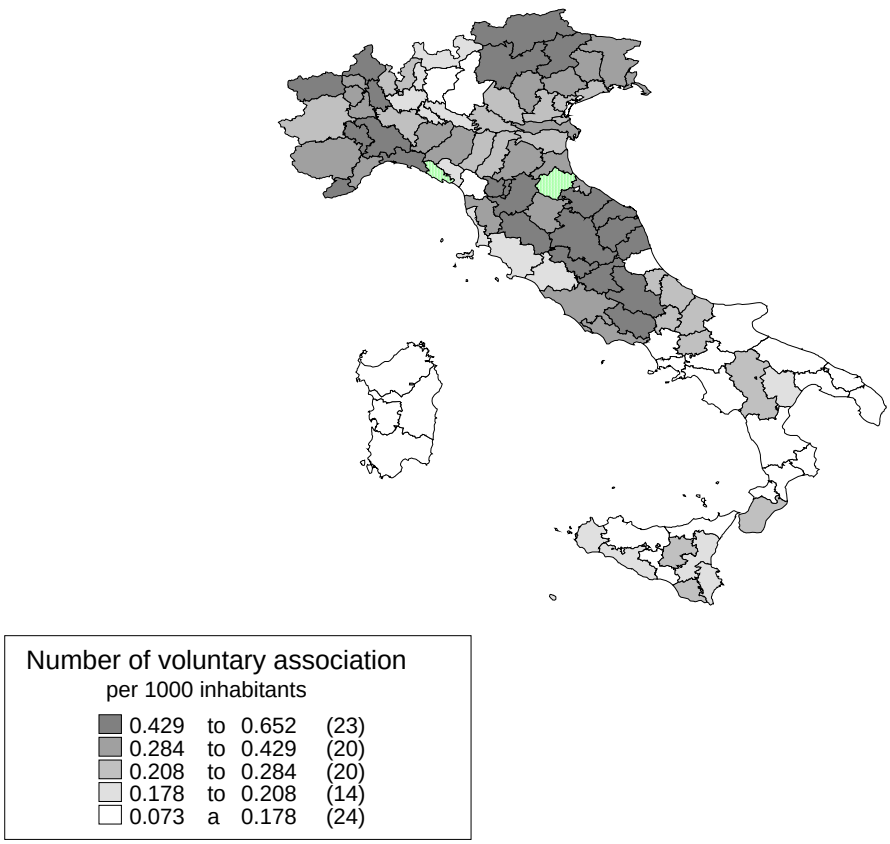
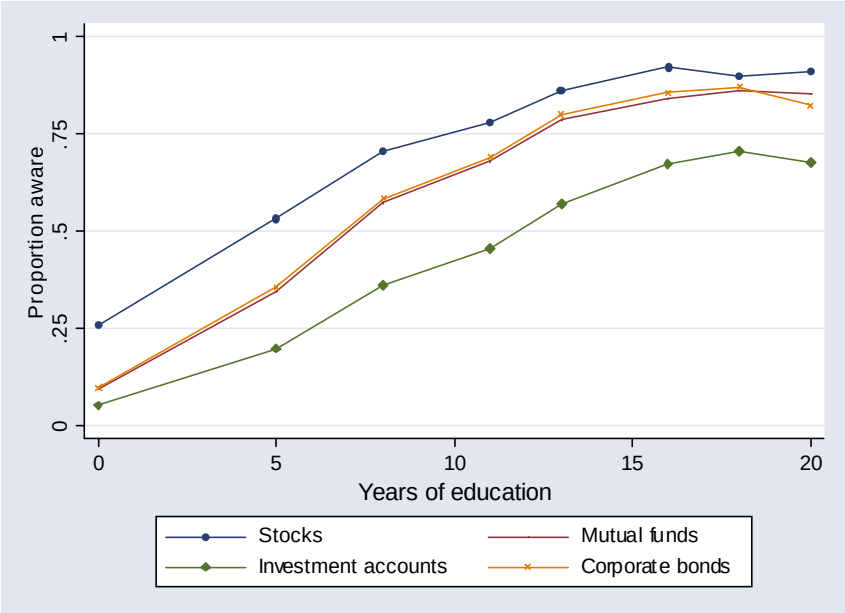


Figure 2
Awareness and education

The index of financial awareness is the sum of the financial assets known weighted by the inverse of the aggregate fraction of people aware of the asset. The index for risky assets includes stocks, mutual funds, investment accounts and corporate bonds. Data refer to the pooled 1995-98 sample.



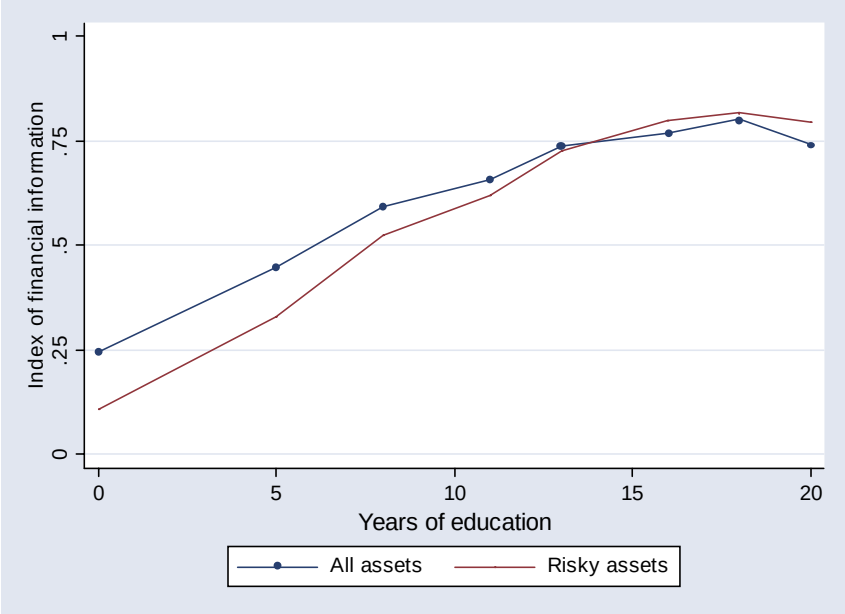
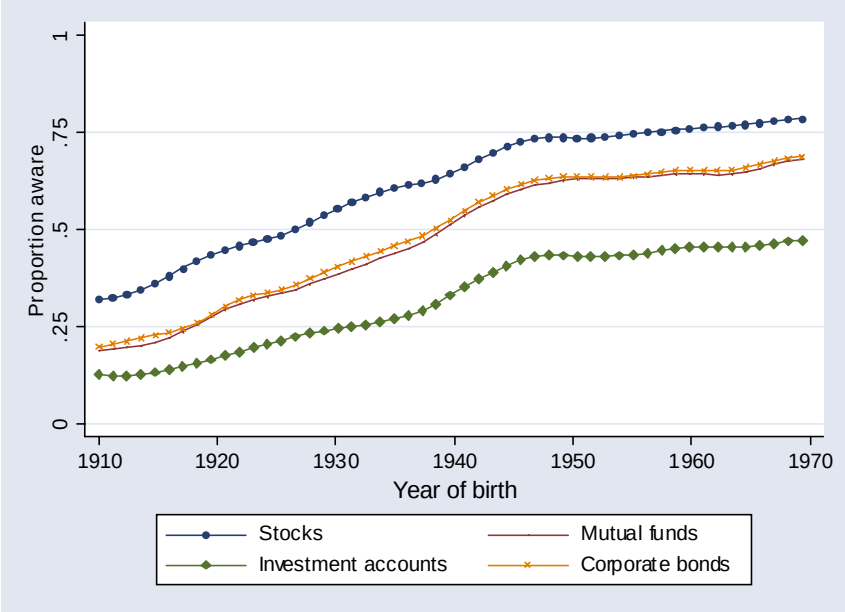


Figure 3
Awareness and cohort

The index of financial awareness is the sum of the financial assets known weighted by the inverse of the aggregate fraction of people aware of the asset. The index for risky assets includes stocks, mutual funds, investment accounts and corporate bonds. The cohort profiles are estimated by a kernel regression using a Gaussian weight function. Data refer to the pooled 1995-98 sample.



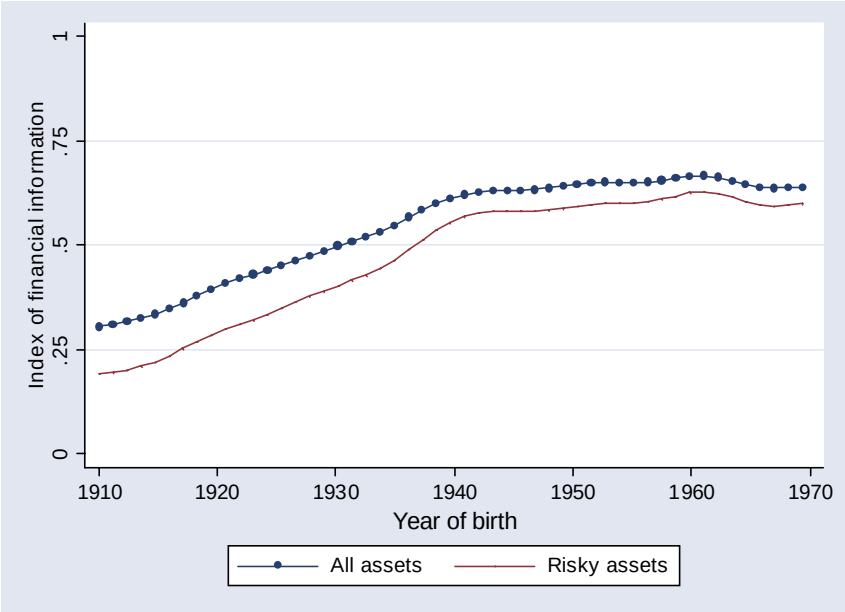
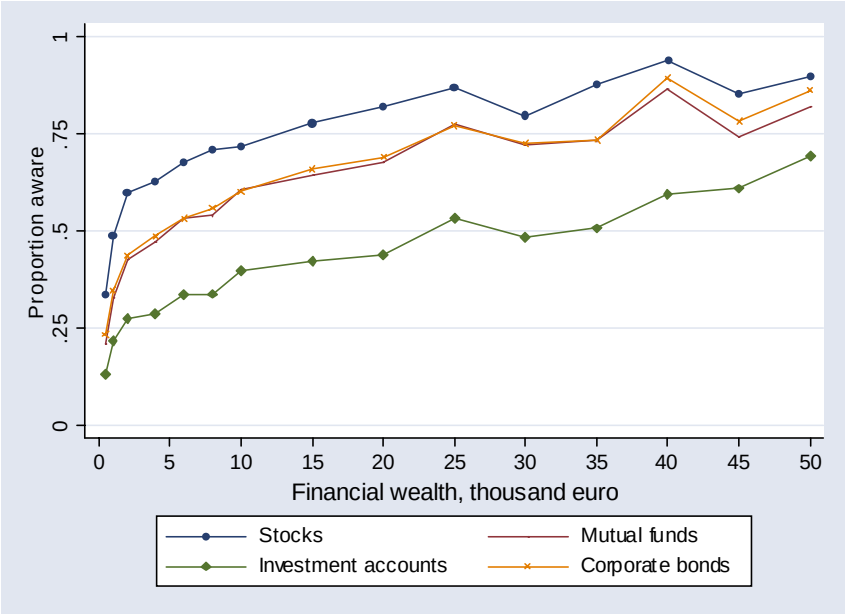


Figure 4
Awareness and financial wealth

The index of financial awareness is the sum of the financial assets known weighted by the inverse of the aggregate fraction of people aware of the asset. The index for risky assets includes stocks, mutual funds, investment accounts and corporate bonds. Financial wealth is expressed in thousand Euro. Data refer to the pooled 1995-98 sample.



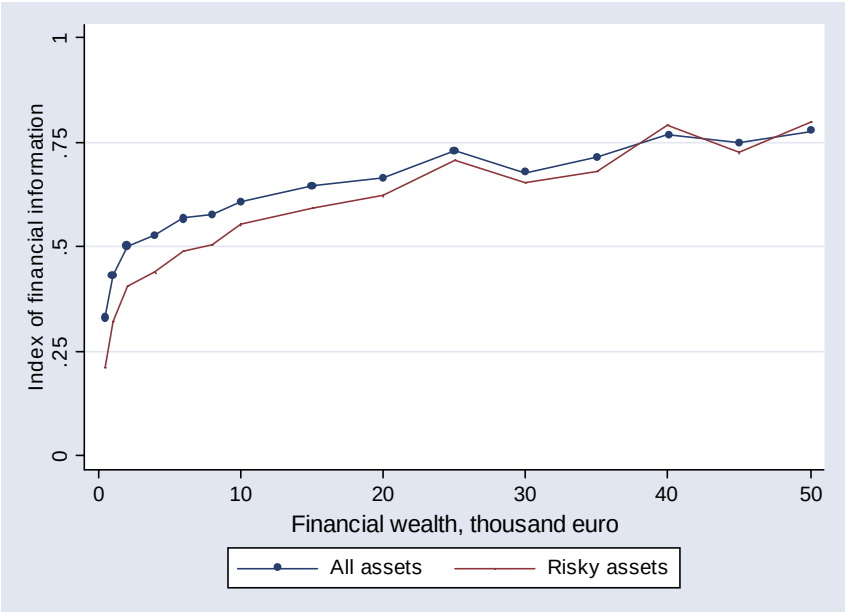
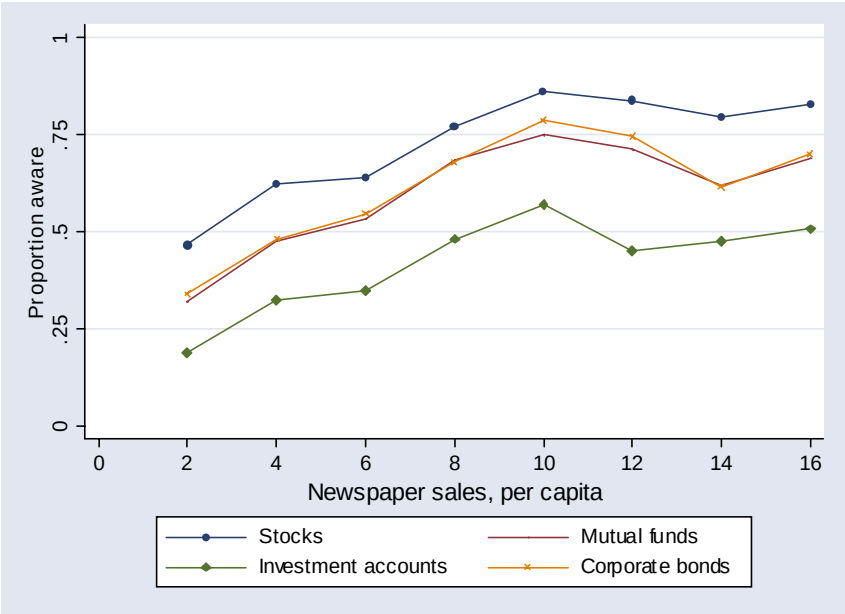


Figure 5
Awareness and newspapers readership

Newspaper readership is measured by the number of copies sold in each province scaled by the population in the province. The ratio is computed considering the 14 newspapers that sell in at least half of the Italian provinces. The index of financial awareness is the sum of the financial assets known weighted by the inverse of the aggregate fraction of people aware of the asset. The index for risky assets includes stocks, mutual funds, investment accounts and corporate bonds. Data refer to the pooled 1995-98 observations.



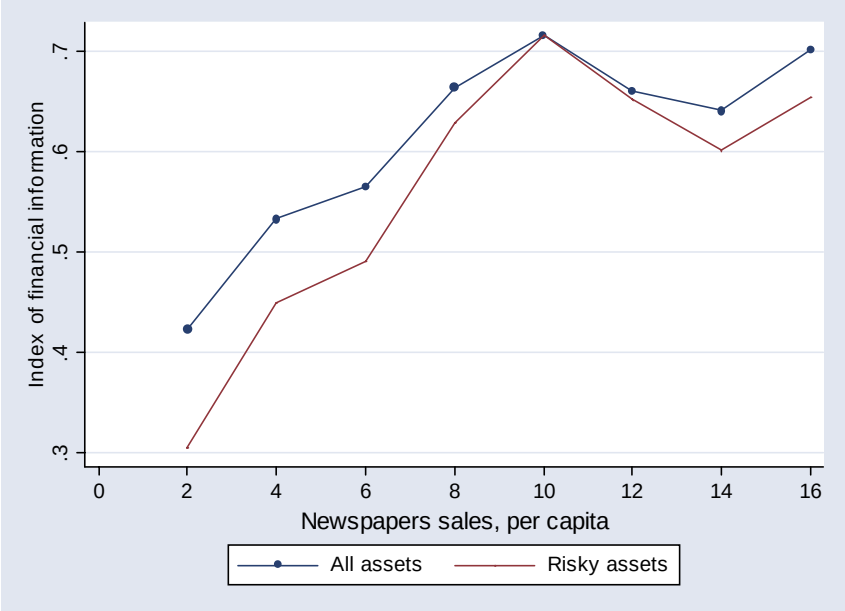
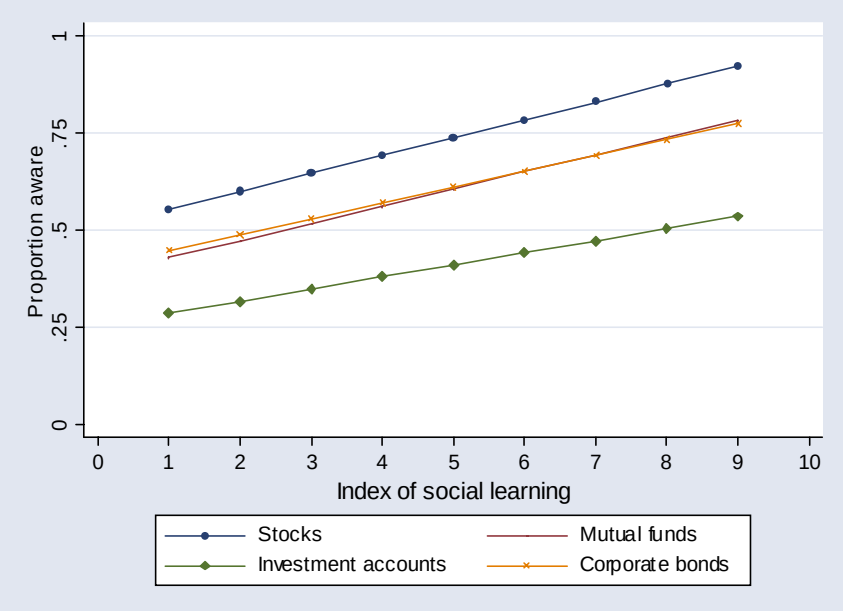


Figure 6
Awareness and social learning

The index of social learning is the number of number of non-profit institutions per 100 inhabitants in the province. The index of financial awareness is the sum of the financial assets known weighted by the inverse of the aggregate fraction of people aware of the asset. The index for risky assets includes only stocks, mutual funds, investment accounts and corporate bonds. Data refer to the pooled 1995-98 observations.



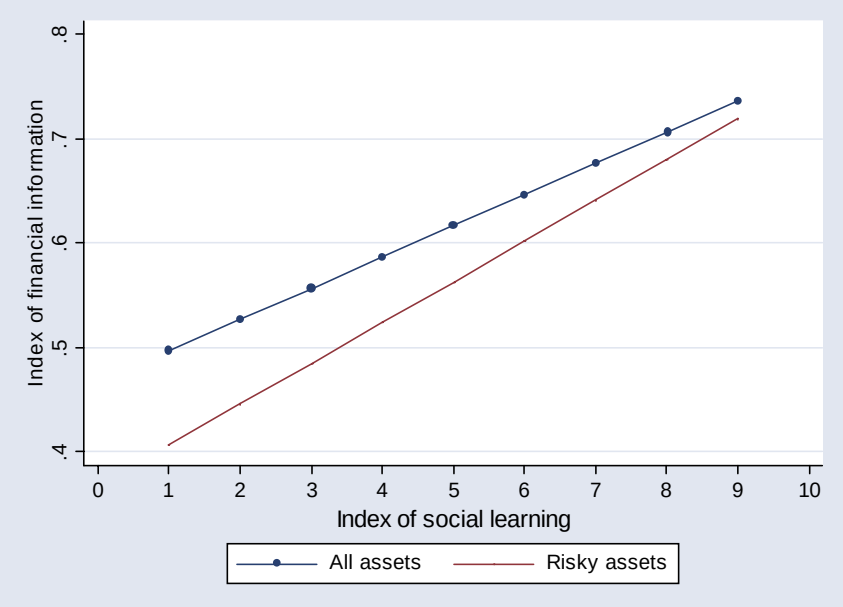


Figure 7
Stockholding and participation costs

The figure plots the proportion of stockholders and the associated participation costs for the total sample and the sample of informed investors, defined as those who are aware of stocks, mutual funds and managed investment accounts. The participation cost is expressed in Euro.