

DISCUSSION PAPER SERIES

No. 9922

FINANCIAL ADVICE AND STOCK MARKET PARTICIPATION

Dimitris Georgarakos and Roman Inderst

FINANCIAL ECONOMICS



Centre for Economic Policy Research

www.cepr.org

Available online at:

www.cepr.org/pubs/dps/DP9922.asp

FINANCIAL ADVICE AND STOCK MARKET PARTICIPATION

**Dimitris Georgarakos, Johann Wolfgang Goethe-Universität Frankfurt
Roman Inderst, Johann Wolfgang Goethe-Universität Frankfurt, Imperial
College London and CEPR**

Discussion Paper No. 9922
April 2014

Centre for Economic Policy Research
77 Bastwick Street, London EC1V 3PZ, UK
Tel: (44 20) 7183 8801, Fax: (44 20) 7183 8820
Email: cepr@cepr.org, Website: www.cepr.org

This Discussion Paper is issued under the auspices of the Centre's research programme in **FINANCIAL ECONOMICS**. Any opinions expressed here are those of the author(s) and not those of the Centre for Economic Policy Research. Research disseminated by CEPR may include views on policy, but the Centre itself takes no institutional policy positions.

The Centre for Economic Policy Research was established in 1983 as an educational charity, to promote independent analysis and public discussion of open economies and the relations among them. It is pluralist and non-partisan, bringing economic research to bear on the analysis of medium- and long-run policy questions.

These Discussion Papers often represent preliminary or incomplete work, circulated to encourage discussion and comment. Citation and use of such a paper should take account of its provisional character.

Copyright: Dimitris Georgarakos and Roman Inderst

ABSTRACT

Financial Advice and Stock Market Participation

We introduce professional financial advice in households' choice to hold risky financial assets. Consistent with the predictions from a formal model, we present evidence that households' trust in financial advice only matters when their perceived own financial capability is low. Instead, for households with higher financial capability, only the perception of legal protection in financial markets matters for stock market participation. Our empirical analysis highlights economically significant differences in households' perception of their rights as consumers of financial services, even when their objective circumstances should not be much different.

JEL Classification: D8, E1 and G2

Keywords: consumer protection, financial advice, household finance and trust

Dimitris Georgarakos
Department of Money and
Macroeconomics
Goethe University Frankfurt
Grueneburgplatz 1, PF H32
D-60323 Frankfurt
GERMANY
Email: georgarakos@wiwi.uni-frankfurt.de

Roman Inderst
Professur für Finanzen und Ökonomie
Goethe Universität Frankfurt
Lehrstuhl für Finanzen und Ökonomie
Grueneburgplatz 1
60323 Frankfurt am Main
GERMANY
Email: inderst@finance.uni-frankfurt.de

For further Discussion Papers by this author see:
www.cepr.org/pubs/new-dps/dplist.asp?authorid=166990

For further Discussion Papers by this author see:
www.cepr.org/pubs/new-dps/dplist.asp?authorid=145025

Submitted 20 February 2014

1 Introduction

Professional financial advice is pervasive. According to the evidence presented in this paper, in most European countries the overwhelming majority of households expect financial institutions to provide advice. It is equally known for the US that mutual funds and equities (outside employer-sponsored plans) are overwhelmingly purchased after receiving financial advice.¹ The role of advice is further strengthened by the increased complexity of new financial products and by the gradual shift of responsibility to save for retirement away from Social Security and towards households. Departing from much of the literature on household finance (cf. Guiso, Haliassos, and Jappelli, 2001; Campbell, 2006), we introduce financial advice in an empirical and formal analysis of households' decision to hold risky assets.

While many households may use advisors or other intermediaries, households may significantly differ in how they actually make use of financial advice and thus also in the extent to which they rely on recommendations. We provide evidence that the use households make of advice is affected both by their own financial capability and by the trust they put in professional advice. For households with high financial capability or households who do not trust financial advice it is their perception of legal rights as consumers of financial services that significantly affects stock market participation. Households' perceptions of legal protection differ in an economically significant way even though, after controlling for a range of socio-economic variables, their objective circumstances are seemingly comparable.

Our results may be of particular interest in light of the ongoing financial crisis, which has shattered the confidence in financial institutions, as many financial products are now thought to provide value for banks, brokers, and other financial intermediaries but less so for households. Policy makers have thus become concerned about the long-term repercussions that this loss of

¹ Cf. Bergstresser, Chalmers, and Tufano (2007) and "Equity Ownership in America 2005" (http://www.ici.org/pdf/rpt_05_equity_owners.pdf). In a survey, over 80% of respondents stated that they obtained financial advice from external sources such as financial advisors (Investment Company Institute, 2007, "Why Do Mutual Fund Investors Use Professional Financial Advisors?" Research Fundamentals 16).

confidence may have on households' decisions to participate in financial markets.² Our analysis throws light on how, more generally, households' perceptions and their confidence in financial institutions affect their willingness to hold risky financial assets.

At the basis of our analysis is a model of households' investment decisions that has the following features. Households with different financial capability can decide to rely more or less on the recommendations of financial advisors. Own financial capability or advice are needed to identify, from the large range of financial products, those that are most suitable given households' specific preferences and needs, e.g., with respect to risk aversion, liquidity needs, or tax status.³ The value of advice may be compromised by a conflict of interest between investors and advisors. Advisors may, for instance, earn higher commissions on some products than on others. Below we discuss some evidence that is suggestive of such a conflict of interest, which we model according to Inderst and Ottaviani (2009). Following Guiso, Sapienza, and Zingales (2008), investors in risky assets, most notably individual or collective stock holdings, run a higher risk of being defrauded.⁴ This risk is lower when the standard of legal protection is higher. Importantly,

² For the US, to "restore confidence in the integrity of our financial system" has become a key policy priority (cf. Financial Regulatory Reform. A New Foundation: Rebuilding Financial Supervision and Regulation, US Department of Treasury, June 2009, page 68). In Europe, the Directorate General for Consumer Protection (SANCO) has launched a series of projects to enhance customers' confidence in the retail financial sector (cf. Commission of the European Communities. 2009. On the Follow Up in Retail Financial Services to the Consumer Markets Scoreboard. Commission Staff Working Document 1251). Besides fears that firms will find financing more expensive when domestic households refuse to hold risky financial assets, policy makers may be concerned also that households miss out on the higher premium ("equity premium") earned with risky assets (cf., for instance, Coco et al. 2005 on the resulting welfare losses).

³ The decision space faced by retail investors is large. Even when restricted to retirement plans, Huberman and Jiang (2006) found that some plans offer as many as 59 funds, with most offering between 6 and 22. Outside such sponsored plans, the range of available products is even more bewildering. It is often observed that even the number of straightforward stock-oriented mutual funds far exceeds the number of stocks. In markets such as Germany, retail investors have access to and frequently invest in exchange-traded structured products, of which there are several hundred thousands. As discussed in Goldstein, Johnson, and Sharpe (2008), this complexity is compounded by the fact that a decision-maker must choose the set of funds to invest in, as well as the total sum of invested funds and how this is then allocated across the selected funds.

⁴ The risk of being defrauded may extend beyond the case of outright fraud by fund managers running Ponzi schemes (as in the case of Bernard Madoff for almost 20 years), including being, as a retail investor, on the "wrong side" of insider trading schemes (cf. the recent allegations against the large Galleon Group

households can have different perceptions with regards to both legal protection and the trustworthiness of professional financial advice.

The model's main predictions derive from the interaction of households' financial capability with both their trust in advice and their perception of legal protection. According to our model, for a household's decision whether to hold risky assets, trust in advice should matter only when the household would optimally rely on financial advice, given his own perceived financial capability. Instead, for a household with higher financial capability only household's perception for adequate legal protection in relation to financial services should matter for stock market participation.

Our empirical investigation is based on micro data from a 2003 Eurobarometer survey, which is administered by the European Commission. The survey interviews a representative sample of European households across fifteen EU countries and asks a series of questions about attitudes to various products and services. In particular, the survey asks households whether they perceive their rights as consumers of financial services to be protected and whether they trust advice from financial institutions. In addition, the data offers information on ownership of risky financial assets (i.e., stocks held directly or indirectly through mutual funds and retirement accounts) as well as a range of socio-economic characteristics. As we discuss below in much detail, the survey allows us to obtain a range of proxies for households' perceived financial capability, such as their level of general education or their perceived complexity of finances. Further, we use respondents' attitudes towards non-financial products and services as instruments for the indicators of interest to address possible endogeneity issues.

Our empirical analysis supports the picture of two different groups of investors: those who need to rely on advice in case they invest in risky assets and those who feel capable to make their own judgment. Further, as we explore below in more detail, our findings indicate that

hedge fund; see for an account of the ongoing investigations <http://topics.wsj.com/subject/g/galleon-group/>).

households who should face the same objective standard of legal protection still have different perceptions, and that these differences in perceptions have significant economic consequences. Moreover, households' different perceptions of their legal rights interact with either their own financial capability or their trust in advice, depending on whether they can be expected to rely on their own judgment or not.

Our model also predicts that households' perception of legal protection and their perceived ability to choose suitable assets are complements in the following sense. For households who do not rely on financial advice, the effect that their own financial capability has on stock market participation is stronger when they have a higher perception of legal protection, and the effect of this perception is, in turn, stronger when they have higher financial capability. For households who need to rely on advice, it is, instead, trust in advice that has a stronger effect when, at the same time, households also believe that their legal rights are adequately protected, and again vice versa. In our empirical investigation we find support for such complementarity.

By using internationally comparable micro-survey data, we can extensively control for any institutional differences that may exist at the national level, simply by introducing country fixed effects. By including, in addition, regional dummies, next to personal characteristics such as income, we control for differences in households' socio-economic circumstances that could affect their local access to legal institutions and could, thereby, account for differences in their objective level of legal protection within the same country (i.e. even when the same laws apply).⁵ Our finding that, even with these controls, households have different perceptions and that these differences matter economically relates our analysis to Butler, Giuliano, and Guiso (2009), who use respondents' different perceptions of other people's trustworthiness. They argue that differences in perceptions may be deeply ingrained, as they are learnt in the family and are possibly subject to much inertia. Osili and Paulson (2008) document this for the financial

⁵ Incidentally, average perception of rights does not change with education.

participation of immigrants and their offspring.⁶ We also supplement our data with information from the World Values Survey on average generalized trust at a regional level, which leaves our baseline findings virtually unaffected.

In a seminal paper, Guiso, Sapienza, and Zingales (2008) show that for Dutch households generalized trust in others has a large and significant effect on stock market participation. They estimate similar effects for the trust in brokers and bank officials among customers of a major Italian bank. While our data do not offer detailed information on amounts invested in risky assets, we can disentangle, along the predictions of our model, the role of households' trust in financial advice and of their perception of legal protection. This allows to obtain a richer picture of households' financial decision-making and of how various aspects of their confidence in financial institutions affect stock market participation. Further, questions from the survey that relate to non-financial products allow to address the issue of potentially endogenous covariates. For households with low own financial capability we can thus establish that they are indeed more likely to invest in risky assets when they trust financial advice, rather than trusting their advisor because, say, their investment decisions put them into closer or more frequent contact.

Guiso, Sapienza, and Zingales (2004) find a smaller effect of social capital on financial participation for the more educated households who live in Italian regions with high stocks of social capital (measured by the average propensity to vote, donate blood or trust the others). They argue that the more educated need to rely less on trust because of their better understanding of explicit contracting mechanisms. They find also that the effect of social capital is stronger in

⁶ For households migrating between different regions of Italy, Guiso, Sapienza, and Zingales (2004) report separately the impact of the social capital of origin and the social capital of residence. Differences in households' perceptions are also reported in Pinotti (2008), which links differences in trust to differences in the perceived need for regulation. Dominitz and Manski (2005) and Kézdi and Willis (2009), amongst others, report heterogeneity in households' stock market expectations and how this matters for participation; cf. also Christensen, van Els, and von Rooij (2006) on households' heterogeneous perceptions on growth and inflation.

Italian regions with weaker legal enforcement.⁷ In our model and empirical analysis, we refer specifically to the trust that households have in professional financial advice and to their perceived protection in relation to financial services. We show that, at least for households with lower financial capability, trust in financial advice and households' perception of legal rights go hand-in-hand: they are complements, rather than substitutes, in raising the propensity to hold risky assets.

In this respect, our analysis also sheds some light on the underlying mechanism through which financial advice can influence households' stock market participation decision. Collins (2010) presents evidence from US survey data showing that households with higher educational attainment and higher financial literacy are more likely to seek professional financial advice. Also Van Rooij, Alessie, and Lusardi (2007) make a similar observation for Dutch households with high advanced financial literacy, albeit such a difference in households' propensity to seek professional financial advice did not exist with respect to basic financial literacy. Based on our analysis, we would conjecture that households tend to rely on financial advice to a different extent. While those with high advanced financial literacy may use professional advice as an additional source of information, though ultimately making a self-directed decision, those with lower financial literacy actually end up relying on an adviser's recommendation to a large extent.⁸

Our analysis is based on data that precedes the ongoing financial crisis. Several recent studies suggest that over the course of this crisis, trust in financial institutions has decreased, albeit studies differ in the reported magnitude of changes and the resilience of trust (cf. Guiso, Sapienza, and Zingales, 2009; Knell and Stix, 2009; and for a survey Guiso, 2010). Several recent papers point to a potential conflict of interest in the provision of financial advice (e.g., Bolton,

⁷ Also Carlin, Chowdhry, and Garmaise (2007) and Aghion, Algan, Cahuc, and Shleifer (2009) pursue the idea that social capital/trust and regulation are substitutes, albeit their focus is on the joint endogeneity.

⁸ Hackethal, Inderst, and Meyer (2009) also document that households who are less educated or who report to be less informed about financial matters are more likely to state that they follow the recommendations of their financial adviser at a large German bank.

Freixas, and Shaprio, 2007; Carlin and Gervais, 2009; Inderst and Ottaviani, 2009). Empirically, this is supported, for instance, by the findings in Bergstresser, Chalmers, and Tufano (2007), Edelen, Evans, and Kadelec (2008), and Chen, Hong, and Kubik (2006).⁹ Finally, as noted above, we contribute to the large and growing literature on household finance (cf. Guiso, Haliassos, and Jappelli, 2001; Campbell, 2006; Tufano, 2009). While recent contributions have added a range of new determinants affecting stock market participation,¹⁰ the novelty of our formal model and empirical analysis lies, in particular, in the role of financial advice.

The rest of this paper is organized as follows. Section 2 presents the model and derives testable predictions. Section 3 contains our main empirical analysis, which is discussed further in Section 4. Section 5 concludes. Some material for the empirical analysis is relegated to Appendix A. Appendix B contains proofs.

2 The Model

In what follows, we envisage a two-stage decision process. Working backwards, at the second stage, $t = 2$, a household that has decided to invest in risky assets must make a choice between different strategies. Though for simplicity we consider only a single decision, more realistically the decision would be recurrent, e.g., each time the household wants to invest additional funds. Our model can easily be extended in this direction. Different investment strategies may be associated with different levels of risk or illiquidity, next to different tax

⁹ For a detailed discussion of this and further evidence, see Inderst and Ottaviani (2010).

¹⁰ Recent empirical research in household finance has made considerable progress in extending the range of explanatory variables for ownership of risky financial assets, including, for instance, fixed costs of information acquisition (e.g., Vissing-Jorgensen, 2004), peer effects (e.g., Hong, Kubik, and Stein, 2004), childhood experience with booms and recessions (e.g., Malmendier and Nagel, 2009), computer and Internet use (e.g., Bogan, 2008), awareness of financial assets (e.g., Guiso and Jappelli, 2005), or financial education and cognitive ability (e.g., Van Rooij, Alessie, and Lusardi, 2007; Christelis, Jappelli, and Padula, 2010). Hackethal, Inderst, and Meyer (2009) use data from a German bank to show how advice affects trading (“turnover”) in retail households’ portfolios. Hackethal, Haliassos, and Jappelli (2010) using administrative data find evidence that accounts managed by independent or bank advisors offer on average lower returns.

advantages. At the first stage of our model, $t = 1$, the household decides whether to participate in risky assets, e.g., through opening an investment account or opting for a particular pension plan.¹¹

How does the choice of strategy or of particular risky assets affect a household's expected return? Our modeling approach builds on Guiso, Sapienza, and Zingales (GSZ, 2008) and Inderst and Ottaviani (IO, 2009). We take from GSZ the specification that risky assets carry a higher likelihood that investors are defrauded, e.g., by those who ultimately undertake the security transactions, such as brokers and dealers, by those who manage the respective accounts, such as investment funds, or ultimately by companies' owners and managers. For simplicity, following GSZ, we stipulate that in this case, all funds invested are lost. Importantly, the risk of fraud depends on the legal environment - and perceived risk thus depends on the households' perception of the legal environment. Arguably, in a given class of assets, households and their advisors can not significantly reduce this risk by, say, judiciously selecting listed stock.

Investors and their advisors are not able to "beat the market" through picking assets.¹² Instead, the "task" of an investor or his advisor will be that of finding strategies or assets that, for given costs, derive the highest benefits given individual preferences and needs, e.g., in terms of risk attitude, liquidity preferences, or tax status. This follows the approach in IO. To be specific, the choice could be that between different company-sponsored retirement plans or different tax subsidized pension products. To make an informed choice, the investor himself has to be capable or he has to rely on the recommendation of a professional advisor. We next formalize this setting and derive, by way of comparative analysis, our empirical predictions.

¹¹ As we do not assume that there are (fixed) costs of information acquisition or search at the initial stage, $t = 1$, the decomposition of the decision process in our model serves mainly the purpose of clarifying the following analysis.

¹² Either on their own or intermediated through the fund that they invest in, retail investors should not be able to "beat the market", even when it is not strongly efficient. For instance, though there is some evidence of superior mutual-fund performance and persistence, driven by superior management ability and skill (e.g., Gruber, 1996; Kosowski, Timmermann, Wermers, and White, 2006; though more critical Carhart, 1997), the fraction of these funds seems to be very tiny, and superior performance may quickly be rolled over into higher fees (e.g., Barra, Scaillet, and Wermers, 2009).

Information and Choice Set

Our data only records whether households hold risky assets, but not the amount invested. In light of this restriction, we choose to keep the model equally simple, allowing the investor to choose in $t = 2$ between only two strategies (e.g., retirement plans), $n = a, b$. A priori, for a given investor both strategies can be equally suitable, though actually only one provides the best "fit". The expected utility from a "fitting" strategy is denoted by U_h and that from a "non-fitting" strategy by the strictly lower utility U_l . (Hence, note again that these utilities already comprise the optimal choice of investment size.) These utilities are, however, only realized when the investor is not defrauded, in which case he derives the lowest possible utility, which we always set to zero. We denote the investor's beliefs that he will not be defrauded by $\hat{\mu}$. Instead, with probability $1 - \hat{\mu}$ the investor expects to be defrauded and to then realize zero utility.

Denote the *a priori* likelihood that choice a is more suitable by $\pi_0 = 1/2$. Before making his choice, based on his own information or the recommendation of an advisor, beliefs about the suitability of either choice may change, which is captured by the posterior belief π with which choice a is more suitable.

We now set up a framework that then incorporates both the case of a self-reliant investor and the case of an investor who relies on an advisor's recommendation. For our binary choice between only a and b , a convenient and very general way how to model the precision of an agent's updating process is through an ordering of the distribution of the posterior belief π . The distribution of posterior beliefs is given by the CDF $F(\pi; \rho)$, where ρ denotes the precision. The distribution is symmetric around the mean $\pi = \pi_0 = 1/2$, and we stipulate that a higher precision leads to a *mean-preserving rotation* around the mean:¹³

$$\frac{dF(\pi; \rho)}{d\rho} > 0 \text{ for } \pi < \pi_0, \quad \frac{dF(\pi; \rho)}{d\rho} = 0 \text{ for } \pi = \pi_0, \text{ and } \frac{dF(\pi; \rho)}{d\rho} < 0 \text{ for } \pi > \pi_0. \quad (\text{MPR})$$

¹³ Cf. Ganuza and Penalva (2009).

For instance, when no new information is learnt, the posterior distribution would be degenerate with all mass on the prior π_0 . At the opposite extreme, when it is learnt precisely which choice is more suitable, the CDF is also degenerate, with mass points of equal size at the posterior beliefs $\pi = 0$ and $\pi = 1$. Compared to the case of the fully *uninformative* posterior, the case with the fully *informative* posterior thus represents a rotation of the CDF around the mean, as mass is shifted away from the prior π_0 and into the tails of the distribution of the posterior (here, more precisely into the degenerate beliefs $\pi = 0$ and $\pi = 1$). The specification in (MPR) generalizes this idea.

We next stipulate a particular choice rule, provided that the household chooses to hold risky assets at all. Depending on the posterior, we stipulate that choice a is made only when $\pi \geq \pi^*$, while choice b is made otherwise. As we show next, this decision rule, as captured by a simple threshold π^* , will apply both when professional advice is sought and followed, and when this is not the case, albeit the thresholds will differ.

Self-reliant Investors

We capture by $\hat{\rho}_I$ the investor's perception of how well he can choose between more or less suitable assets: his *financial capability*. We use the “hat” in the notation to stress that these are perceptions. We will use this below for our empirical strategy. Further, we denote the investor's own posterior belief by π_I . The investor's optimal decision rule is then to apply, given symmetry, the threshold $\pi_I^* = 1/2$. With

$$U_\emptyset := \frac{U_l + U_h}{2} \text{ and } \Delta U := U_h - U_l,$$

we have after partial integration for the household's *ex-ante* utility of investing in risky assets

$$U_I^* := \hat{\rho}_I \left[U_\emptyset + \Delta U \left[1 - 2 \int_{1/2}^1 F(\pi_I; \hat{\rho}_I) d\pi_I \right] \right]. \quad (1)$$

Note that this incorporates both the risk of being defrauded and the risk of not making the most suitable choice.¹⁴ When the investor cannot make an informed judgment, such that his posterior is equal to his prior and $F(\pi_I; \hat{\rho}_I)$ thus puts all mass on $\pi_I = 1/2$, then $U_I^* = \hat{\mu}U_\emptyset$. Instead, when the investor could fully learn which choice was most suitable, such that $\int_{1/2}^1 (2\pi_I - 1) dF(\pi_I; \hat{\rho}_I) = 1/2$, then $U_I^* = \hat{\mu}U_h$.

Relying on Advice

We now take the opposite case where the investor follows the advisor's recommendation. This requires both to model the game of advice and to model the advisor's preferences. The investor believes that with equal probability the advisor receives a (higher) payment (commission or "kickback") of size $\hat{z} \geq 0$ *either* when choice a is made *or* when choice b is made. In addition, the investor believes that when making a recommendation, the advisor puts weight $\hat{\gamma}$ on the investor's utility and weight $1 - \hat{\gamma}$ on his own payoff. We now denote the advisor's posterior of how suitable choice a is for a given investor by π_A . Provided that his recommendation is followed, when the advisor indeed receives a (higher) payment under choice a , he will recommend this choice in case his posterior belief π_A satisfies

$$\hat{\gamma}\pi_A\Delta_U + (1 - \hat{\gamma})\hat{z} \geq \hat{\gamma}(1 - \pi_A)\Delta_U.$$

When interior, this gives rise to the following cutoff rule for the advisor:

$$\pi_A \geq \pi_A^*(a) = \frac{1}{2} - \hat{\omega} \frac{1}{2\Delta_U} \text{ with } \hat{\omega} := \hat{z} \left(\frac{1 - \hat{\gamma}}{\hat{\gamma}} \right). \quad (2)$$

Hence as we presently assume that the advisor receives an additional payment for choice a , we have $\pi_A^*(a) < 1/2$, where the bias is larger the larger is $\hat{\omega}$. When, instead, the advisor receives a "kickback" for choice b , then we obtain, in analogy to (2), a symmetric decision rule:

He then recommends choice a if

$$\pi_A \geq \pi_A^*(b) = \frac{1}{2} + \hat{\omega} \frac{1}{2\Delta_U}. \quad (3)$$

¹⁴ We use here implicitly the assumption that the risk of being defrauded is independent from the likelihood that either choice is suitable.

When receiving a (higher) “kickback” for choice b , the advisor recommends choice a less often than he should, in the interest of the household. Recall that ex-ante the investor expects that the (higher) “kickback” is equally likely to be paid for a and b .

For the advice stage, we now envisage a game of cheap talk (Crawford and Sobel, 1982) and focus on the informative equilibrium. Note that in equilibrium, when the investor decides to hold risky assets in the anticipation that he essentially delegates the choice to the advisor, then it *must* be optimal to subsequently indeed follow the advisor’s recommendation. Denoting by ρ_A the known precision of the advisor’s information, we then have for the investor’s *ex-ante* utility when he subsequently follows advice:

$$U_A^* = \hat{\mu} \left[U_\emptyset + \Delta U \frac{1}{2} \left(\int_{\pi_A^*(a)}^1 (2\pi_A - 1) dF(\pi_A; \rho_A) + \int_{\pi_A^*(b)}^1 (2\pi_A - 1) dF(\pi_A; \rho_A) \right) \right]. \quad (4)$$

Equilibrium of the Game

Working backwards, in $t = 2$ an investor who chose to hold risky assets can use both his own information, which leads to the posterior π_1 , and the advisor’s recommendation. Given that, at this stage, the decision is binary between a and b , the investor optimally either relies on his own judgment or chooses to rely on the advisor’s recommendation instead.¹⁵ Hence, when participating in risky assets, the investor’s expected utility is given by

$$U^* := \max\{U_A^*, U_1^*\}.$$

In $t = 1$, the investor compares U^* to his utility from not participating, which we denote by U_0 . We make two key assumptions. First, we stipulate that the impact of financial capability $\hat{\rho}_1$ on U_0 is smaller than the corresponding impact on U^* , at least when $U_1^* \geq U_A^*$. Precisely, we stipulate for simplicity that the value U_0 that is realized without risky assets is not directly affected

¹⁵ Note that this holds even though the advisor’s recommendation can be obtained for free. The result would clearly hold *a fortiori* when charges were raised.

by financial capability: $dU_0/d\rho_1 = 0$.¹⁶ Second, we stipulate that the risk of being defrauded affects U^* more strongly than U_0 . Precisely, we stipulate again for simplicity that the investor perceives this risk to be zero when he abstains from investing in risky assets: $dU_0/d\hat{\mu} = 0$.

Proposition 1. *In equilibrium, the perceived benefits from participating in risky assets are larger relative to those from non-participating (larger $U^* - U_0$) when perceived legal protection is higher (higher $\hat{\mu}$), perceived financial capability is higher (higher $\hat{\rho}_1$), or trust in advice is higher (lower $\hat{\omega}$). Conditional on participating in risky assets, a household will choose to rely on professional advice only when his own financial capability is sufficiently low (low $\hat{\rho}_1$) and his trust in the advisor is sufficiently high (low $\hat{\omega}$).*

The proof of Proposition 1 as well as that of the following Corollaries (Hypotheses) is relegated to the Appendix. Before proceeding to the comparative analysis, Figure 1 provides a graphical illustration of the equilibrium.

For a given level of perceived legal protection $\hat{\mu}$, the white rectangular in Figure 1 captures the range of values $\hat{\omega}$ and $\hat{\rho}_1$ for which a household will not hold risky assets. When his own financial capability is low, then participation is determined by the condition that $U_A^* \geq U_0$ (the horizontal line). When trust is low, as $\hat{\omega}$ is high, participation is determined by the condition that $U_I^* \geq U_0$ (the vertical line). Whether the household relies on advice or his own judgment is determined by the downward sloping curve, defined implicitly by $U_A^* = U_I^*$. Finally, when perceived consumer protection $\hat{\mu}$ decreases, the new equilibrium characterization is obtained from the dotted horizontal and vertical lines in Figure 1.

¹⁶ Clearly, to the extent that such knowledge and skills affect income and wealth, they would have an indirect effect also on U_0 . Note, however, that we also abstract from such an effect when considering U^* . (In fact, with risk neutrality this could be captured most simply by scaling up both U_0 and U^* by the same factor.)

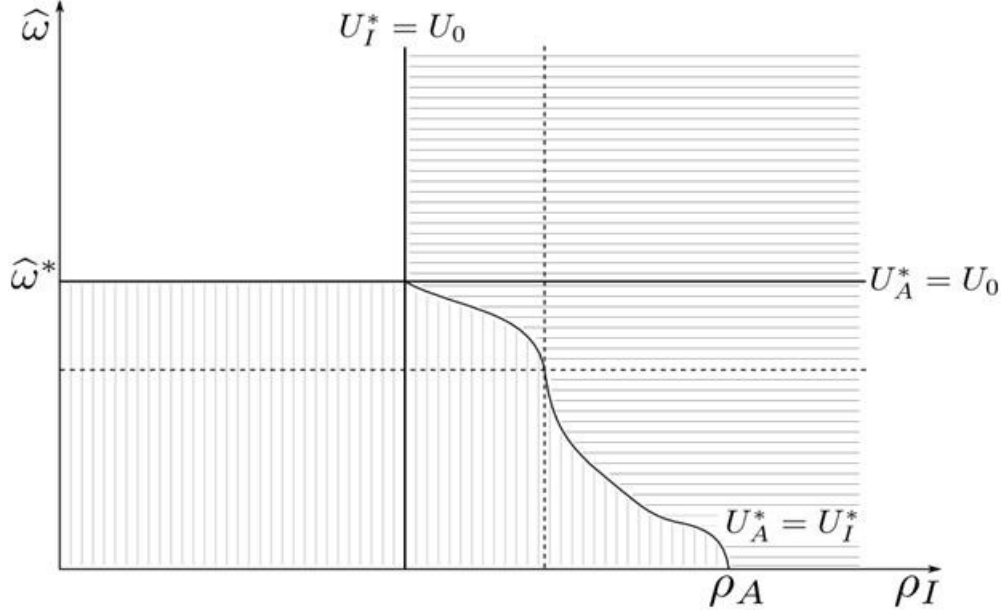


FIGURE 1: Equilibrium

Comparative Results

Note that the comparative results for $U^* - U_0$ in the first part of Proposition 1 do not hold *strictly* everywhere. Trust only affects U^* when the household is not sufficiently capable. This is our first hypothesis.

Corollary 1 (Hypothesis 1). *Trust in advice only affects the decision to participate in risky assets when the household's own capability is low (low $\hat{\rho}_I$). Instead, when $\hat{\rho}_I$ is high, only perceived legal protection $\hat{\mu}$ affects the participation decision.*

When the investor optimally chooses to rely on advice, provided that he invests in risky assets, then inspection of the respective utility U_A^* in (4) reveals that trust in advice and perceived legal protection are *complementary*: The marginal effect of trusting advice is higher when the investor feels more protected, while the marginal effect of perceived protection is higher when the investor has more trust in advice, or more formally:

$$\frac{dU^*}{d\hat{\mu}d\hat{\omega}} < 0 \text{ when } \hat{\rho}_I \text{ is low.} \quad (5)$$

We capture this in the following hypothesis.

Corollary 2 (Hypothesis 2). *When a household is less capable (low $\hat{\rho}_1$), he invests in risky assets only when he both perceives consumer protection to be sufficiently high (high $\hat{\mu}$) and sufficiently trusts advice (low $\hat{\omega}$).*

Households with high financial capability or households who do not trust financial advice choose to rely on their own judgment: $U^*=U_1^*$, such that $dU^*/d\rho_1 > 0$. Inspecting U_1^* from (1) reveals that now the investor's capability and perceived legal protection are *complementary*: The marginal effect of capability is higher when the investor feels more protected, while the marginal effect of perceived protection is higher when the investor is more capable, or more formally:

$$\frac{dU^*}{d\hat{\mu}d\hat{\rho}_1} > 0 \text{ when } \hat{\omega} \text{ is high or } \hat{\rho}_1 \text{ is high.} \quad (6)$$

We capture this in the following hypothesis.

Corollary 3 (Hypothesis 3). *Suppose a household does not rely on financial advice as he does not sufficiently trust advice (high $\hat{\omega}$). Then he invests in risky assets only when he both perceives consumer protection to be sufficiently high (high $\hat{\mu}$) and is sufficiently capable (high $\hat{\rho}_1$). Irrespective of the household's trust in advice, this complementarity between perceived protection ($\hat{\mu}$) and own financial capability ($\hat{\rho}_1$) also holds when the household relies on his own judgment as his financial capability is already sufficiently high (high $\hat{\rho}_1$).*

3 Empirical Analysis

We employ data from Eurobarometer surveys that are administered by the European Commission and are frequently conducted across EU member states to measure the views of European households on a broad range of values and norms and to collect information on their socio-economic status. More specifically, we use data from Eurobarometer 60.2: “Employment and Social Policies, Financial Services, Harmful Internet Content, and Product Safety”, which was carried out in the end of 2003 and interviewed a representative sample of European

households from 15 EU countries.¹⁷ A key feature of the survey is that it asks respondents to assess the quality of various financial services they make use of.

Eurobarometer collects information about specific trust to the advice given by financial institutions. In particular, respondents are asked to declare their agreement or disagreement with the following statement: *“I usually trust the advice given by financial institutions.”* In addition, the survey asks respondents to state explicitly whether they agree or not with the following statement: *“My rights as a consumer are adequately protected in relation to financial services.”*

Furthermore, the survey offers information on whether a respondent owns risky financial assets (i.e., stocks held directly or indirectly through mutual funds or pension plans). It also provides details on several socio-economic characteristics that existing empirical studies suggest as relevant for stock investing (see for example the empirical contributions in Guiso, Haliassos and Jappelli, 2002, and our discussion further below). These include age, gender, marital and occupation status, having children, education, as well as total household income. For the latter we use the most disaggregated information provided by the data, that is household classification in twelve income bands (details on variable definitions are provided in Appendix C). Table 1 presents summary statistics for the whole sample and by education group.

¹⁷ Eurobarometer 60.2: “Employment and Social Policies, Financial Services, Harmful Internet Content, and Product Safety”. November-December 2003 [Dataset]. Conducted by the European Opinion Research Group EEIG, Brussels, on request of the European Commission. GESIS - Zentralarchiv für Empirische Sozialforschung an der Universität zu Köln (ZA3939) [Producer and Distributor]. In each household a respondent was selected by a random procedure. The survey took place in the following countries: Finland, Sweden, UK, Ireland, Denmark, Germany, Netherlands, Belgium, Luxembourg, France, Austria, Italy, Spain, Portugal, and Greece.

TABLE 1: Sample Descriptive Statistics

	Total Sample	College Graduates	Less than College Education
Total Stocks	0.27	0.35	0.18
Trust in financial advice	0.60	0.62	0.59
Consumer rights are protected	0.51	0.51	0.51
Age	45.79	41.60	50.90
Male	0.51	0.52	0.49
Couple	0.61	0.61	0.61
Single	0.21	0.25	0.15
Divorced	0.10	0.09	0.10
Children	0.31	0.34	0.26
Self Employed	0.10	0.11	0.08
Retired	0.26	0.17	0.37
Unemployed	0.09	0.10	0.08
High School	0.28	-	-
College	0.55	-	-
Median Income band	7	7	6
Number of observations	7527	4146	3381

Note: Weighted statistics. Average is shown for age and median band for income. The figures for the remaining variables denote prevalence.

In what follows, we work with different proxies for a household's (perceived) financial capability. In our main analysis, we use the respondents' age when they completed full time education to distinguish between those with pre-college and those with longer full-time education (i.e. older than 17 years old when completed full time education). We believe that, besides having the advantage of not being determined by stock market participation, this is a good proxy for financial capability for the following reasons. Using data from the DNB Household Survey, van Roji, Lusardi, and Alessie (2007) document that education, most notably higher-level education, is very strongly associated with both basic and advanced financial literacy, as measured by households' knowledge and understanding of basic financial concepts. Others have found that more educated people tend to have higher cognitive ability (cf. Cole and Shastry, 2009) and to make fewer investment mistakes (cf. Calvet, Campbell, and Sodini, 2009, who use it as a main factor for an index of financial literacy).

Below we derive comparable results when we use other proxies for financial capability, such as households' perceived complexity of finances. Further, as education could be positively related to present or anticipated future resources, we show below how effects differ when we use, instead, a more direct proxy for resources, namely total household income. Finally, in our subsequent analysis we will further discuss other variables from the survey that we use for our endogeneity tests and for robustness analysis.

3.1 Baseline Analysis: The Role of Trust in Advice and Perceived Legal Protection

Table 2 reports average marginal effects and associated standard errors from probit regressions of the following form:

$$y_i = x_i' \beta + \gamma_1 trust_adv_i + \gamma_2 protect_rights_i + \gamma_3 trust_adv_i * protect_rights_i + \varepsilon_i \quad (6)$$

$$\text{where } y_i = \begin{cases} 1 & \text{if } U^* > U_0 \\ 0 & \text{otherwise} \end{cases}, \text{ and } \varepsilon_i \sim N(0,1)$$

That is, y_i is a dichotomous variable taking the value 1 if household i owns risky financial assets (i.e., utility from stock market participation, as described in Section 2, is greater than utility in case of no-participation) and 0 otherwise. We include under x_i an array of socio-economic characteristics as well as country dummies that serve to capture any country wide differences (e.g., in development, policies, institutions, legal provisions, and aggregate beliefs). With reference to the model in Section 2 we adopt a flexible empirical specification that takes into account households' trust in financial advice, the perceived legal protection, and an interaction term allowing for interdependence between the two indicators. Estimated average marginal effects on the two indicators of interest that incorporate the influence of their interaction term are shown in the upper part of Table 2.¹⁸

¹⁸ See Ai and Norton (2003) for the importance of taking account of both uninteracted and interacted terms when calculating marginal effects in nonlinear models. In addition, Brambor, Clark, and Golder (2005) point to some frequent problems in the empirical literature due to misspecification of binary choice models that include interaction terms.

We first present results from the full sample of observations (in the left panel of the table). To test Hypothesis 1, we distinguish between those with less than college and college education as a proxy for households' financial capability and show results in the right panel of Table 2.

TABLE 2: Impact of Trust in Financial Advice and Perceived Rights

	Total Sample		Less than College Education			
	Marg. Eff.	z-stat	College Graduates			
	Marg. Eff.	z-stat	Marg. Eff.	z-stat	Marg. Eff.	z-stat
Trust in financial advice	0.0259	2.45 **	0.0152	1.04	0.0400	3.07 ***
Consumer rights are protected	0.0324	3.49 ***	0.0509	3.60 ***	0.0122	0.96
Age	0.0029	7.23 ***	0.0052	8.84 ***	0.0010	1.68 *
Male	0.0682	7.12 ***	0.0656	4.57 ***	0.0684	5.27 ***
Couple	-0.0520	-2.75 ***	-0.0343	-0.94	-0.0629	-2.63 ***
Single	-0.0214	-0.97	0.0230	0.57	-0.0709	-2.39 **
Divorced	-0.0884	-3.92 ***	-0.0876	-2.23 **	-0.0804	-2.96 ***
Children	-0.0135	-1.13	-0.0070	-0.41	-0.0251	-1.59
Self Employed	0.0718	4.27 ***	0.0656	2.90 ***	0.0817	3.05 ***
Retired	0.0180	1.14	0.0353	1.27	-0.0015	-0.08
Unemployed	0.0197	1.07	0.0455	1.64	-0.0175	-0.72
High School	0.0191	1.24				
College	0.1049	6.62 ***				
Income band: 2	0.0232	1.16	-0.0156	-0.44	0.0486	2.25 **
Income band: 3	0.0323	1.48	-0.0288	-0.79	0.0742	3.11 ***
Income band: 4	0.0555	2.45 **	-0.0067	-0.18	0.0953	4.15 ***
Income band: 5	0.1018	4.73 ***	0.0663	1.78 *	0.1134	4.78 ***
Income band: 6	0.1067	4.96 ***	0.1041	2.77 ***	0.0877	3.76 ***
Income band: 7	0.1516	6.70 ***	0.1600	3.73 ***	0.1212	5.01 ***
Income band: 8	0.1418	6.28 ***	0.1029	2.56 **	0.1653	5.66 ***
Income band: 9	0.2131	8.50 ***	0.1915	4.78 ***	0.2103	6.97 ***
Income band: 10	0.2573	9.52 ***	0.2294	5.32 ***	0.2718	7.37 ***
Income band: 11	0.2465	8.53 ***	0.2305	5.51 ***	0.2376	5.25 ***
Income band: 12	0.3229	13.71 ***	0.3036	7.71 ***	0.3263	9.15 ***
Country Dummies		yes		yes		yes
Log likelihood		-3562.7		-2216.8		-1311.3
Number of Observations		7527		4146		3381

Note: Probit regressions. The specifications account for an interaction term between trust in advice and perceptions about consumer rights. Age is controlled for through a 2nd order polynomial. Marginal effects are averaged across households using survey weights. ***, **, * denote significance at 1%, 5%, and 10%, respectively.

While across the whole sample both trust in advice and the perception of rights have a significant influence on households' propensity to hold risky financial assets, when splitting the sample along education, we see that trust in advice only matters for households with less than college education. This is consistent with Hypothesis 1. For households with less than college education, trust in advice increases the probability of holding risky assets by 4 percentage points (pp), compared to a sample mean of 18 per cent among households with less than college education. Put differently, among households with less than college education, those who trust financial advice have a probability of investing in risky assets that is almost 20 per cent higher in relation to the unconditional mean in this subgroup. Trust in advice has, instead, no significant effect for households with college education. For these households, their perceived legal rights matter, instead. The marginal effect is equal to 5 pp when we consider college graduates. Given that 35 per cent of all college graduates hold risky assets, a high perception of their legal rights thus increases their likelihood of participating in risky assets by more than 10 per cent.

Note also that the fractions of respondents who have a high perception of their legal rights are not different between households with and without college education. Precisely, according to summary statistics presented in Table 1, 51 per cent of college graduates and also 51 per cent of non-college graduates perceive their rights to be protected. In addition, 62 per cent of college graduates and 59 of those with less than college education trust advice.

Estimated effects on the remaining covariates are in line with findings from the extant empirical literature on household portfolios. Male respondents are more likely to invest in risky financial assets, consistent with the documented propensity of women to assume lower risks (see for example, Jianakopoulos and Bernasek, 1998, and Powell and Ansic, 1997). Those who have experienced a divorce are significantly less likely compared to widows (i.e., the omitted category for family status) to invest in risky financial instruments, while the self-employed, who are typically overrepresented in the upper part of the wealth distribution, are more likely to invest in stocks. We also estimate sizeable significant effects of having a college degree and for total

household income, which become progressively stronger at higher parts of the income distribution (cf. Guiso, Haliassos, and Jappelli, 2002).

3.2 Complementarity

According to Hypothesis 2, trust in advice and the perception of rights have a complementary impact on households' propensity to hold risky assets, provided that they have low own financial capability. To examine this hypothesis we evaluate average marginal effects and associated standards errors of the two indicators of interest over the relevant subgroups of households.¹⁹

We have already shown that across all households with below college education, it is only trust in advice that has a significant effect on their propensity to hold risky assets (Table 2). However, once we evaluate average marginal effects only among those non-graduate households who report to trust financial advice, then also perceived legal protection becomes significant. Furthermore, among non-graduates we find that trust in financial advice has only a significant impact when households also report that they perceive their rights to be adequately protected. These results are reported in Table 3 (panel B) and taken together are consistent with Hypothesis 2.

The results from Table 3, where we provide a finer analysis of the marginal effects, support also Hypothesis 1. The marginal effect that the perception of rights has for college graduates is almost the same irrespective of whether they trust advice or not (namely, 4.98 pp compared to 5.26 pp). Also, trust in advice has no significant impact for college graduates, irrespective of whether we consider those who have a high perception of their legal rights and

¹⁹ It should be noted that the current hypothesis cannot be tested by examining the sign and significance of the interaction term between the two indicators of interest. In nonlinear models, the interaction effect conditions on the remaining covariates and its magnitude, sign, and significance can vary for different values of the independent variables. Thus one has to calculate marginal effects and associated standard errors of trust in advice and perception of rights over the relevant subgroups of observations. For a detailed discussion on these issues see Ai and Norton (2003).

those who do not. Taken together, Table 3 thus further supports the picture of two groups of investors: those who need to rely on advice and those who rely on their own judgment.

Recall next that Hypothesis 3 asserts a complementarity between households' perception of rights and their financial capability, either when they can rely on their own judgment, as their own financial capability is sufficiently high, or when they must do so, as they do not trust financial advice. This is confirmed when we evaluate average marginal effects over the subsample of those households who do not trust advice and who, therefore, must arguably rely on their own financial capability (Table 3).

TABLE 3: Marginal Effects for Different Segments of Households

A. College Graduates						
	<i>All</i>		<i>Consumer Rights Protected subsample</i>		<i>Consumer Rights Not Protected subsample</i>	
	<u>Marg. Eff.</u>	<u>z-stat</u>	<u>Marg. Eff.</u>	<u>z-stat</u>	<u>Marg. Eff.</u>	<u>z-stat</u>
Trust in financial advice	0.0152	1.04	0.0122	0.53	0.0183	1.05
	<i>All</i>		<i>Trust in Advice subsample</i>		<i>No Trust in Advice subsample</i>	
	<u>Marg. Eff.</u>	<u>z-stat</u>	<u>Marg. Eff.</u>	<u>z-stat</u>	<u>Marg. Eff.</u>	<u>z-stat</u>
Consumer rights are protected	0.0509	3.60 ***	0.0498	2.85 ***	0.0526	2.32 **
B. Less than College Education						
	<i>All</i>		<i>Consumer Rights Protected subsample</i>		<i>Consumer Rights Not Protected subsample</i>	
	<u>Marg. Eff.</u>	<u>z-stat</u>	<u>Marg. Eff.</u>	<u>z-stat</u>	<u>Marg. Eff.</u>	<u>z-stat</u>
Trust in financial advice	0.0400	3.07 ***	0.0670	3.61 ***	0.0121	0.74
	<i>All</i>		<i>Trust in Advice subsample</i>		<i>No Trust in Advice subsample</i>	
	<u>Marg. Eff.</u>	<u>z-stat</u>	<u>Marg. Eff.</u>	<u>z-stat</u>	<u>Marg. Eff.</u>	<u>z-stat</u>
Consumer rights are protected	0.0122	0.96	0.0343	2.02 **	-0.0192	-1.11

Note: Probit regressions in the samples of households with college education and with less-than-college education. (For the full set of results see the right panel in Table 2.) Marginal effects are averaged across the relevant subsamples using survey weights. ***, **, * denote significance at 1%, 5%, and 10%, respectively.

According to the results in Table 3, households' perception of legal rights only has a significant impact for stockholding among college graduates (5.26 pp), but not among those with lower educational attainment. We use next, for a second test of Hypothesis 3, another question from the survey. Respondents were asked whether they agree or not with the following statement: "*I expect financial institutions to give me advice.*" Roughly, 80 per cent of respondents answered that they expect to receive advice. Those who do *not* expect to receive advice from financial institutions arguably should not rely on it. Hence, their decision whether to invest in risky financial assets or not is then made essentially in the absence of advice.

We estimate a bivariate probit specification of the following form that jointly models the probability of a household to own stocks and to report that he does not expect financial advice:

$$y_{1i}^* = x'_{1i}\beta_1 + \varepsilon_{1i}, \quad y_{1i} = 1 \quad \text{if } y_{1i}^* > 0, \quad 0 \text{ otherwise}$$

$$y_{2i}^* = x'_{2i}\beta_2 + \varepsilon_{2i}, \quad y_{2i} = 1 \quad \text{if } y_{2i}^* > 0, \quad 0 \text{ otherwise}$$

$$\text{where: } E[\varepsilon_{1i}] = E[\varepsilon_{2i}] = 0$$

$$\text{Var}[\varepsilon_{1i}] = \text{Var}[\varepsilon_{2i}] = 1$$

$$\text{Cov}[\varepsilon_{1i}, \varepsilon_{2i}] = \rho.$$

That is, y_{1i} and y_{2i} are two binary indicators taking the value one if household i owns risky financial assets and does not expect advice, respectively. We include under \mathbf{x}_{1i} and \mathbf{x}_{2i} the same set of covariates and country dummies used in earlier specifications, and we allow for an interaction term between college degree and perceived consumer protection. The model allows unobserved heterogeneity to influence the two outcomes and each observable characteristic to have potentially different effects for each outcome. A key feature of the model is that it allows the evaluation of marginal effects of the conditional mean function:

$$E[y_{1i}|y_{2i} = 1, \mathbf{x}] = \frac{\Phi_2(x'_{1i}\beta_1, x'_{2i}\beta_2)}{\Phi(x'_{2i}\beta_2)},$$

where Φ_2 and Φ denote the bivariate and univariate normal CDF, respectively. With reference to Hypothesis 3, we evaluate marginal effects on the probability to invest in stocks *conditional* on reporting that advice is not expected.²⁰

TABLE 4: Households not Expecting Advice

	<i>Consumer Rights Protected subsample</i>		<i>Consumer Rights Not Protected subsample</i>	
	<u>Marg. Eff.</u>	<u>z-stat</u>	<u>Marg. Eff.</u>	<u>z-stat</u>
College	0.0895	6.23 ***	0.0628	4.66 ***

	<i>College Graduates subsample</i>		<i>Less than College Education subsample</i>	
	<u>Marg. Eff.</u>	<u>z-stat</u>	<u>Marg. Eff.</u>	<u>z-stat</u>
Consumer rights are protected	0.0530	2.84 ***	0.0099	1.23

Note: Bivariate Probit regression. Conditional marginal effects, averaged across relevant subsamples of households who do not expect advice using survey weights. They refer to changes in the conditional bivariate probability of owning risky financial assets given that advice is not expected, caused by changes in regressors. ***, **, * denote significance at 1%, 5%, and 10%, respectively.

In Table 4 we present selected conditional marginal effects for college degree and perceived consumer rights, averaged over individuals in the subgroups of interest. These results further confirm the asserted complementarity of perceived legal rights and education, provided that households can or need to rely on their own judgment. Education has a relatively stronger effect when households perceive their rights to be protected (8.95 pp vs. 6.28 pp). In addition, conditional on not expecting advice, the perception of legal rights has a significant impact on the probability to invest in risky assets only among households with a college degree (5.3 pp).

²⁰ For a complete set of formulae of conditional marginal effects out of a bivariate probit model, see Greene (2002).

3.3 Endogeneity and Identification

It could be argued that trusting advice is not exogenous with respect to ownership of risky financial assets, e.g., as households who hold risky assets presumably have more frequent contact with their financial advisor. Though we shortly report on the outcome of a formal test which speaks against this hypothesis, note also that it is not clear how this could be supported by economic theory. In particular, in “supergames” with repeated (infinite) interaction, where threats of punishment support less self-interested behavior, it is the expectation of continued *future* interaction rather than past interaction that is essential. Also, when investors learn over time about some characteristics of the respective financial institution or the respective advisor that they trust, compared to their prior beliefs, they may be equally likely to become more optimistic or more pessimistic. To the extent that those who learn *not* to trust advice then cease to hold risky assets, this would be consistent with our theory. The same logic applies with respect to households’ perceived legal rights.

We utilize information from other survey questions that serve as instruments in order to examine the potential endogeneity of the indicators of interest: trust in advice and perceived legal protection (and their interaction term). Eurobarometer surveyed respondents’ behavior and attitudes with respect to both financial and non-financial products. With respect to households’ trust in advice, we use as an instrumental variable their response to questions asking how frequently they make use of instructions on labels for household products. In particular, we employ questions asking for the attention paid to user instructions for detergent and toiletry products with emphasis on the recommended amount of use. Economically, we may conjecture that households that more frequently pay attention to user instructions and recommended amount of use are more willing to receive and make use of such information and have also a higher

propensity to trust advice given by corporations and thus, notably, financial advice.²¹ On the other hand, there should be no direct relationship with their propensity to hold risky financial assets.

With respect to households' perceived protection as consumers of *financial* products and services, we use as an instrument their perceived consumer rights for *insurance* products. Households that find it relatively easy to win a dispute against an insurance company, possibly because they believe that the legal institutions of their home country work fairly and efficiently, should on average perceive their consumer rights as adequately protected in relation to financial services (cf. also the discussion in Section 4). Finally, we use the product of the two aforementioned instruments as an instrument of the interaction term between trust in advice and perceptions about consumer rights. In Appendix A we provide details on the relevant tests suggesting that the instruments we utilize are strong and that, based on them, we fail to reject the null hypothesis of no endogeneity of the parameters of interest at any conventional level of statistical significance.

Guiso, Sapienza, and Zingales (2008) provide some detailed arguments for why their measures of generalized trust, though they are correlated with stated willingness to assume higher financial risks, are not simply derivatives of risk aversion. In Appendix A we report that the results from Table 2 are all virtually unchanged when we include, as an additional control, the respondents' answer to questions which we use as proxies for their attitude towards risk. These questions come from the part of the survey that asks about attitudes and behavior with respect to non-financial products and have the advantage of being exogenous to asset investing. Specifically, households are asked how they deal with safety instructions and how important they consider various safety features of household products to be.

²¹ For example, households may choose not to pay attention to the recommended amount of use because they think that the company recommends a higher dose of the product than what they consider to be sufficient. In auxiliary regressions we find indeed a strong association between this instrument indicator and trust in advice suggesting that the less frequently people use instructions on household products the less likely they are to trust financial advice, net of various characteristics.

As reported in Appendix A (Tables A2I and A2II), in the various regressions, the variables are either not significant or the thereby measured willingness to avoid risks affects negatively the propensity to hold risky financial assets. Further, note again that our hypotheses and the obtained results relate not so much to the impact that trust in advice and households' perceptions of their rights have on households' overall propensity to hold risky assets. Instead, our results relate to the interaction with households' financial capability.

3.4 Alternative Proxies for Financial Capability

Respondents in the survey were asked whether they perceive thinking about finances to be complicated. Table 5 reports, in the left panel, the results when we use this as an alternative proxy for financial capability, instead of college education, as in Table 2. While these results confirm those reported in Table 2, they are more contained in terms of the size of the marginal effects as well as their significance. One reason for this could be the potential endogeneity of perceived complexity. Households who hold riskier, information-intensive financial assets may regard their financial matters to be relatively more complex compared to a situation where the same households would not hold such assets.

Table 5 (right panel) also reports the outcome when we group according to gender. Van Rooij, Lusardi, and Alessie (2007) document, with data from the DNB Households Survey, that gender is strongly associated with both basic and advanced financial literacy. For instance, 37.2 per cent of male but only 12.1 per cent of female are in the highest quartile in terms of advanced literacy, while the ratio is reversed for the lowest quartile. Also, in terms of *perceived* financial capability, gender-specific trading behavior has sometimes been associated with male overconfidence (cf. Barber and Odean 2001).

TABLE 5: Households Grouped by Perceived Complexity of Finances and by Gender

	Think Finances: Not Complicated		Think Finances: Complicated		Male Respondent		Female Respondent	
	Marg. Eff.	z-stat	Marg. Eff.	z-stat	Marg. Eff.	z-stat	Marg. Eff.	z-stat
Trust in financial advice	0.0186	1.56	0.0414	2.23 **	0.0145	0.93	0.0326	2.38 **
Consumer rights are protected	0.0419	3.74 ***	0.0135	0.70	0.0533	3.66 ***	0.0157	1.28
Age	0.0022	5.26 ***	0.0032	4.10 ***	0.0024	4.19 ***	0.0021	3.98 ***
Male	0.0731	6.23 ***	0.0507	2.63 ***				
Couple	-0.0362	-1.58	-0.1044	-2.44 **	-0.0554	-1.56	-0.0553	-2.16 **
Single	-0.0004	-0.02	-0.0387	-0.77	-0.0335	-0.91	0.0116	0.41
Divorced	-0.0932	-3.93 ***	-0.0485	-0.98	-0.1196	-3.16 ***	-0.0600	-2.33 **
Children	-0.0153	-1.07	0.0005	0.02	-0.0148	-0.78	-0.0122	-0.80
Self Employed	0.0697	3.36 ***	0.0652	2.24 **	0.0928	3.92 ***	0.0539	2.29 **
Retired	0.0193	1.05	-0.0016	-0.05	0.0158	0.71	0.0213	1.03
Unemployed	0.0216	0.96	0.0424	1.17	0.0215	0.76	0.0281	1.08
Income band: 2	-0.0092	-0.37	0.0753	2.36 **	0.0400	1.19	-0.0009	-0.04
Income band: 3	0.0099	0.39	0.0773	2.20 **	0.0358	1.09	0.0242	0.97
Income band: 4	0.0341	1.29	0.0929	2.77 ***	0.0274	0.82	0.0751	2.99 ***
Income band: 5	0.0873	3.34 ***	0.1550	4.67 ***	0.0995	2.95 ***	0.1025	3.99 ***
Income band: 6	0.0867	3.29 ***	0.1832	4.51 ***	0.1101	3.06 ***	0.1175	4.26 ***
Income band: 7	0.1343	4.82 ***	0.2219	5.77 ***	0.1483	4.16 ***	0.1737	6.16 ***
Income band: 8	0.1074	3.77 ***	0.2915	6.59 ***	0.1573	4.47 ***	0.1460	4.63 ***
Income band: 9	0.2121	7.08 ***	0.2492	5.93 ***	0.2551	6.33 ***	0.1910	5.65 ***
Income band: 10	0.2388	7.70 ***	0.3707	7.19 ***	0.2898	7.09 ***	0.2591	7.29 ***
Income band: 11	0.2406	6.99 ***	0.3563	6.70 ***	0.2987	7.10 ***	0.2374	6.16 ***
Income band: 12	0.3339	11.23 ***	0.4095	9.49 ***	0.3426	8.95 ***	0.3710	11.45 ***
Country Dummies		yes		yes		yes		yes
Log likelihood		-2727.1		-815.7		-1984.0		-1597.3
Number of Observations		5611		1822		3786		3747

Note: Probit regressions. The specifications account for an interaction term between trust in advice and perceptions about consumer rights. Age is controlled for through a 2nd order polynomial. Marginal effects are averaged across households using survey weights. ***, **, * denote significance at 1%, 5%, and 10%, respectively.

While, as we noted, the use of perceived complexity as a proxy for financial capability may suffer from endogeneity, it seems instructive to use both education and financial capability together for a further, finer segmentation of households. This is reported in Table 6. Trust in financial advice thus has the strongest effect on households' propensity to hold risky assets when they have less than college education and perceive financial matters to be complicated. At the other extreme, the effect of perceived legal protection is strongest for households who are college graduates and do not perceive financial matters to be complicated. To the extent that these are the

households with the highest level of financial capability, this adds further support to the complementary asserted in Hypothesis 3.

TABLE 6: Households Grouped by Perceived Complexity and Education

		College Education				
		Yes		No		
		Marg. Eff.	z-stat	Marg. Eff.	z-stat	
Think Finances	No	Trust in financial advice	0.0082	0.47	0.0393	2.45 **
		Consumer rights are protected	0.0680	4.24 ***	0.0131	0.87
Complicated	Yes	Trust in financial advice	0.0340	1.18	0.0483	2.13 **
		Consumer rights are protected	0.0124	0.45	0.0003	0.01

Note: Probit regressions estimated over the subsamples defined by college (yes/ no) and think about finances complicated (yes/ no). Each specification accounts for an interaction term between trust in advice and perceptions about consumer rights and the set of regressors shown in Table 5. Marginal effects are averaged across households using survey weights. ***, **, * denote significance at 1%, 5%, and 10%, respectively.

The preceding analysis for different proxies of financial capability, and their combined use, confirms the robustness of our main analysis, suggesting that households fall indeed into two different groups according to the use that they make of financial advice. We conclude this section by providing some more evidence that for our analysis of the differences in marginal effects, our main proxy education indeed captures financial capability rather than the effect of differences in resources. To see this, note first that we always include a set of dummies representing household income bands as controls. Further, we find that when we split the sample according to income, then results are markedly different compared to when we split according to education. Precisely, we find that both trust in advice and perceived legal rights are only significant (and highly so) for the subsample of households with above-median income, while they are both insignificant for households with below-median income. This suggests that resources, when measured through total household income, simply amplifies the marginal effects that trust in advice and perceived rights have on stock market participation. This is confirmed when, following the analysis in Table 3 and 4, we analyze how marginal effects of trust in advice and perceived legal protection change

with income when we further split either according to education or according to whether households expect advice. To streamline the exposition in the main text, we collect the respective tables in Appendix A (Tables A3I-A3III).²²

4 Discussion: The Role of Perceptions

By using individual households' reported attitudes, in our regressions we can extensively control for institutional differences that may exist at the country level, simply by introducing country fixed effects. Still, it could be argued that even for households that live in the same country, the *objective* level of legal protection with respect to financial services may differ. For instance, households with different income or education levels may have different access to attorney services. Note, however, that we control for these variables in our regressions. For countries such as Italy, the extant literature further suggests that there may be regional differences in people's access to justice, e.g., due to regional differences in corruption or the efficiency of the judicial system (e.g., Guiso, Sapienza, and Zingales, 2004; Bianco, Jappelli, and Pagano, 2005).

In Appendix A (Table A4, model I), we show that across the whole sample the impact of trust in advice and perceived legal rights stays virtually the same when we also include in our baseline specification a full set of regional dummies that absorb any of the aforementioned regional disparities. Table A4 (model II) also reports the results when we account directly for average generalized trust on a regional level.²³ While the regional average of generalized trust is marginally significant, the significance of trust in financial advice and perceived legal protection, both at an individual level, is not affected and also the size of the effects is virtually unchanged.

²² Also, it is straightforward to extend our formal model in Section 2 to account for this amplifying effect that wealth has on the estimated marginal effects.

²³ The measure of generalized trust is obtained from the World Value Survey (WVS). The following question is asked: "Generally speaking, would you say that most people can be trusted or that you need to be very careful in dealing with people?" and respondents can choose between 1-"most people can be trusted" and 0-"can't be too careful". In both Eurobarometer and WVS the region of residence of respondents is known. Thus, we first calculate region-level averages based on responses to the above trust indicator from WVS (using survey weights) and then assign the relevant average to each corresponding region in Eurobarometer sample (in total 134 regions are distinguished).

Overall, even when controlling further for differences in socio-economic circumstances that could affect, in particular, legal protection and access to legal institutions, differences in households' *perceptions* of their legal rights still matter significantly. To further stress the importance of differences in individual perceptions, rather than differences in legal institutions, we report in Table A4 (model III) also the outcome of a linear regression performed on regional averages alone and country fixed effects (134 observations). Then, only generalized trust is significant, while regional averages of trust in financial advice and households' perceptions of their rights have no significant impact on the prevalence of stockholding by region.

We may think of the reported level of legal protection as being determined by the prevailing *objective* legal standards and by deviations that can be attributed to individual differences in *perceptions*. In Appendix A (Figure A1), we finally show how, on a country level, consumer protection with respect to financial products compares to a well-established index of investor protection that was introduced by La Porta, Lopes de Silvana, Shleifer, and Vishny (1998): the Antidirector Rights Index (ADRI).²⁴ The index has been extensively used in many cross-country empirical applications. For example, Giannetti and Koskinen (2010), using aggregate data from 26 countries, document a positive association between ADRI and average stock market participation. According to our figures, while predictably the legal protection of households in our survey has a positive, albeit small, relationship with ADRI, there seems to be no such relationship between ADRI and trust in advice.

²⁴ The index is formed by adding 1 when: (1) the country allows shareholders to mail their proxy vote to the firm; (2) shareholders are not required to deposit their shares prior to the General Shareholders' Meeting; (3) cumulative voting or proportional representation of minorities in the board of directors is allowed; (4) an oppressed minorities mechanism is in place; (5) the minimum percentage of share capital that entitles a shareholder to call for an Extraordinary Shareholders' Meeting is less than or equal to 10 percent (the sample median); or (6) shareholders have preemptive rights that can only be waived by a shareholders' vote.

5 Concluding Remarks

The evidence presented in this paper suggests that different households need to rely on financial advice to a different degree, depending on their own financial capability. For households who need to rely on advice, trust in advice becomes a key determinant of their willingness to hold risky assets. Empirically, this holds when financial capability is proxied by education or perceived financial complexity. For more educated households or those who do not perceive financial decisions to be complicated, what matters for their willingness to hold risky assets is, instead, the perception of how well their rights as consumers of financial services are protected. In our model, we capture this by specifying that households run a higher risk of being defrauded when they invest in more risky assets.

Even when controlling for objective differences in the legal environment and in legal enforcement, both through country and regional dummies and through households' socio-economic characteristics, households have different perceptions of their rights. These differences in perceptions have a significant impact on their willingness to hold risky assets, both when they rely on advice and when they rely on their own judgment. Households' perception of their rights and their confidence to make informed asset allocation decisions are complements. To generate a large effect on their propensity to hold risky assets, households with low financial capability must put trust both in advice and in legal protection. For households with higher capability or households who do not trust advice, high financial capability and a high perception of their legal rights jointly produce a high willingness to hold risky assets.

As discussed in detail in the Introduction, financial advice is pervasive. Our empirical analysis suggests that it is a key determinant of households' willingness to invest in risky assets. Our model and empirical results suggest, however, that advice matters most for households with low own financial capability, and only when they trust advice. But even then households must, at the same time, have sufficient faith in legal institutions that govern financial markets. Our results may have some bearing on the current discussion on how to restore confidence in financial

markets. Our findings suggest that to foster stockholding among households with low own financial capability, trust in advice is a key prerequisite. The observed economically significant differences in households' perception of legal protection could suggest a further avenue to improve efficiency. In this respect, future work should consider whether a given household's reservation or confidence with respect to consumer protection is indeed warranted, given key legal and socio-economic indicators.

References

- Aghion, Philippe, Algan, Yann, Cahuc, Pierre, and Andrei Shleifer. 2009. Regulation and Distrust. *Quarterly Journal of Economics*, forthcoming.
- Ai, Chunrong, and Edward C. Norton. 2003. Interaction Terms in Logit and Probit Models. *Economics Letters* 80, 123-29.
- Barber, Brad M., and Terrance Odean. 2001. Boys will be Boys: Gender, Overconfidence, and Common Stock Investment, *Quarterly Journal of Economics* 141, 261-92.
- Barras, Laurent, Scaillet, Olivier, and Russ Wermers. 2009. False Discoveries in Mutual Fund Performance: Measuring Luck in Estimated Alphas. *Journal of Finance*, forthcoming.
- Bergstresser Daniel B., Chalmers, John, and Peter Tufano. 2007. Assessing the Costs and Benefits of Brokers in the Mutual Fund Industry. *Review of Financial Studies*, forthcoming.
- Bianco, Magda, Jappelli, Tullio, and Marco Pagano. 2005. Courts and Banks: Effects of Judicial Enforcement on Credit Markets. *Journal of Money, Credit and Banking* 37, 223-44.
- Bogan, Vicki. 2008. Stock Market Participation and the Internet. *Journal of Financial and Quantitative Analysis* 43, 191-212.
- Bolton, Patrick, Freixas, Xavier, and Joel Shapiro. 2007. Conflicts of Interest, Information Provision, and Competition in Banking. *Journal of Financial Economics* 85, 297-330.
- Brambor, Thomas, Clark, William, and Matt Golder. 2006. Understanding Interaction Models: Improving Empirical Analyses. *Political Analysis* 14, 1, 63-82.
- Butler, Jeffrey, Guiliano, Paola, and Luigi Guiso. 2009. The Right Amount of Trust. *Quarterly Journal of Economics*, forthcoming.
- Calvet, Laurent E., Campbell, John Y., and Paolo Sodini. 2009. Measuring the Sophistication of Households. *American Economic Review* 99, 393-98.
- Campbell, John Y. 2006. Household Finance. *Journal of Finance* 61, 1553-1604.
- Carhart, Mark M. 1997. On Persistence in Mutual Fund Performance. *Journal of Finance* 52, 57-82.
- Carlin, Bruce, and Simon Gervais. 2009. Legal Protection in Retail Financial Markets. Mimeo.
- Carlin, Bruce, Chowdhry, Bhagwan, and Mark Garmaise. 2007. Investment in Organization Capital. *Journal of Finance*, forthcoming.
- Chen, Joseph, Hong, Harrison G., and Jeffrey D. Kubik. 2006. Outsourcing Mutual Fund Management: Firm Boundaries, Incentives, and Performance. Mimeo.
- Christensen, Céline, van Els, Peter and Maarten van Rooij. 2006. Dutch Households' Perceptions of Economic Growth and Inflation. Mimeo.
- Christelis, Dimitris, Jappelli, Tullio, and Mario Padula. 2010. Cognitive Abilities and Portfolio Choice. *European Economic Review* 54, 1, 18-38.
- Coco, João F., Gomes, Francisco J., and Pascal J. Maenhout. 2005. Consumption and Portfolio Choice over the Life-Cycle. *Review of Financial Studies* 18, 490-533.
- Cole, Shawn, and Gauri K. Shastri. 2009. Smart Money: The Effect of Education, Cognitive Ability, and Financial Literacy on Financial Market Participation. HBS Working Paper 09-071.

- Collins, M. Michael, 2010, A Review of Financial Advice Models and the Take-Up of Financial Advice, University of Wisconsin-Madison, mimeo.
- Crawford, Vincent P., and Joel Sobel. 1982. Strategic Information Transmission. *Econometrica* 50, 1431-1451.
- Dominitz, Jeff, and Charles Manski. 2005. Measuring and Interpreting Expectations of Equity Returns. Mimeo.
- Edelen, Roger M., Evans, Richard, and Gregory B. Kadelec. 2008. What Do Soft-dollars Buy? Performance, Expense Shifting, Agency Costs. Mimeo.
- FSA. 2008. Consumer Purchasing and Outcomes Survey. Consumer Research Report 76.
- Ganuzza, Juan-José, and José Penalva. 2009. Signal Orderings Based on Dispersion and the Supply of Private Information in Auctions. *Econometrica*, forthcoming.
- Giannetti, Mariassunta, and Yrjo, Koskinen. 2010. Investor Protection, Equity Returns, and Financial Globalization. *Journal of Financial and Quantitative Analysis* 45, 135-168.
- Goldstein, Daniel G., Johnson, Eric J., and William F. Sharpe. 2008. Choosing Outcomes versus Choosing Products: Consumer-Focused Retirement Investment Advice. *Journal of Consumer Research* 35, 440-55.
- Greene, William H. 2002. *Econometric Analysis*, New York: Macmillan.
- Gruber, Martin J. 1996. Another Puzzle: The Growth in Actively Managed Mutual Funds. *Journal of Finance* 51, 783-810.
- Guiso, Luigi. 2010. A Trust-Driven Financial Crisis. Implications for the Future of Financial Markets. Mimeo.
- Guiso, Luigi, Haliassos, Michalis, and Tullio Jappelli. 2001. *Household Portfolios*. MIT Press, Boston.
- Guiso Luigi, and Tullio Jappelli. 2005. Awareness and Stock Market Participation. *Review of Finance* 9, 537-567.
- Guiso, Luigi, Sapienza, Paola, and Luigi Zingales. 2004. The Role of Social Capital in Financial Development. *American Economic Review* 94, 526-556.
- Guiso, Luigi, Sapienza, Paola, and Luigi Zingales. 2008. Trusting the Stock Market. *Journal of Finance* 63, 2557-2600.
- Guiso, Luigi, Sapienza, Paola, and Luigi Zingales. 2009. Trust and the Fragility of Financial Markets. Mimeo.
- Hackethal, Andreas, Haliassos, Michael, and Tullio Jappelli. 2010. Financial Advisors: A Case of Babysitters? Mimeo.
- Hackethal, Andreas, Inderst, Roman, and Steffen Meyer. 2009. Trading on Advice. Mimeo.
- Hong, Harrison, Kubik, Jeffrey D., and Jeremy C. Stein. 2004. Social Interaction and Stock Market Participation. *Journal of Finance* 59, 137-163.
- Huberman, Gur, and Wei Jiang. 2006. Offering vs. Choice by 401(K) Plan Participants: Equity Exposure and Number of Funds. *Journal of Finance* 61, 763-801.
- Inderst, Roman, and Marco Ottaviani. 2009. Misselling through Agents. *American Economic Review* 99, 883-908.

- Inderst, Roman, and Marco Ottaviani. 2010. Consumer Protection in Markets with Advice. Competition Policy International. April Issue.
- Jianakoplos, Nancy A., and Alexandra Bernasek. 1998. Are Women More Risk Averse? *Economic Inquiry* 36, 620-630.
- Kézdi, Gábor and Robert J. Willis. 2009. Stock Market Expectations and Portfolio Choice of American Households. Mimeo.
- Knell, Markus and Helmut Stix. 2009. Trust in Banks? Evidence from Normal Times and from Times of Crises. Österreichische Nationalbank. Mimeo
- Kosowski, Robert, Timmermann, Allan G., Wermers, Russ, and Halbert L. White, Jr. 2006. Can Mutual Fund “Stars” Really Pick Stocks? New Evidence from a Bootstrap Analysis. *Journal of Finance* 61, 2551-95.
- Malmendier, Ulrike, and Stefan Nagel. 2009. Depression Babies: Do Macroeconomic Experiences Affect Risk-Taking?, *Quarterly Journal of Economics*, forthcoming.
- Osili, Okonkwo, and Anna Paulson. 2008. What Can We Learn about Financial Access from U.S. Immigrants? The Role of Country of Origin Institutions and Immigrant Beliefs. *The World Bank Review*, 1- 25.
- Pinotti, Paolo. 2008. Trust, Honesty, and Regulations. MPRA Paper 7740.
- Powell, Melanie, and David Ansic. 1997. Gender Differences in Risk Behavior in Financial Decision-Making: An Experimental Analysis. *Journal of Economic Psychology* 18, 6, 605-628.
- Rivers, Douglas, and Quang H. Vuong. 1988. Limited Information Estimators and Exogeneity Tests for Simultaneous Probit Models. *Journal of Econometrics* 39, 3, 347-366.
- Tufano, Peter. 2009. Consumer Finance. *Annual Review of Financial Economics* 1, 227-247.
- Van Rooij, Marten, Rob Alessie, and Annamaria Lusardi. 2007. Financial Literacy and Stock Market Participation. *Journal of Financial Economics*, forthcoming.
- Vissing-Jorgensen, Annette. 2004. Perspectives on Behavioral Finance: Does Irrationality Disappear with Wealth? Evidence from Expectations and Actions, *NBER Macroeconomics Annual*, MIT Press, Cambridge.
- Wooldridge, Jeffrey. 2002. *Econometric Analysis of Cross Section and Panel Data*. MIT Press.

Appendix A: Additional Empirical Results

A1 Endogeneity Tests

We estimate a probit model that conditions on three potentially endogenous explanatory variables: trust in advice, the perception of rights, and their interaction term. Endogeneity is of potential concern not only due to reverse causality considerations but also because one or more of the aforementioned covariates may be measured with error or there are perhaps (unobserved) variables that are omitted from the empirical model and correlate with the indicators of interest. We utilize information from the part of the survey that asks respondents about their attitudes with respect to nonfinancial products to test formally for endogeneity bias.

We utilize as an instrument of trust in advice how often households pay attention to instructions of use of detergent and toiletry products. Precisely, we construct the indicator that we employ as an instrument by taking the average of responses to the following questions: “*When you are about to buy [detergents/ toiletries] do you always, some times, rarely or never pay attention to the following on the packaging: [pictures/ text on how to use it] and [instructions on how much to use].*” We instrument perceived rights for financial services with perceived difficulties to win a dispute with insurance companies in particular. (Households were asked whether they think that it is *very easy, fairly easy, difficult or very difficult to win a dispute with an insurance company.*) Finally, the interaction term is instrumented by the product of the two aforementioned instruments.

Given that we estimate a non-linear binary choice model, it is quite standard to test for exogeneity of the aforementioned covariates by using the two-step procedure of Rivers and Vuong (1988). This approach is typically employed to test for exogeneity in binary response models with continuous endogenous explanatory variables and can be also used in the presence of binary endogenous regressors (see Wooldridge, 2002). The procedure is as follows:

a) First, we estimate three auxiliary OLS regressions of each of the three potentially endogenous covariates on the set of the three instruments and the remaining explanatory variables (x_i). Then we compute from each of these three regressions the associated residuals.

b) We estimate the probit model in Table 2 of the main text adding as explanatory variables the three residual series obtained from (a). Given that this probit model conditions on a set of generated regressors, we use parametric bootstrap to evaluate the standard errors. Under the null hypothesis of exogeneity, the *chi2* statistic of the joint significance of the three residual series should not exceed standard critical values.

We report *chi2* statistics and associated p-values from the Rivers/Vuong procedure for the total sample as well as for the subgroups of college graduates and households with less than

college education (Table A1, right panel). In all cases, and with p-values exceeding .7, there is not any evidence against the null hypothesis that the three covariates under investigation are exogenous. This conclusion is based on the assumption that the instruments used are themselves exogenous. A formal test for instrument validity is derived by an F-test on their joint significance in each of the auxiliary OLS regressions estimated in the first stage of the Rivers/Vuong procedure. F-tests and associated p-values from each of the three regression equations and for each sample under consideration are presented in the left panel of Table A1. In all cases the instruments we employ are jointly highly significant at 1%.

TABLE A1: Tests for Endogenous Covariates

	Auxiliary regressions			Rivers Vuong test for exogeneity
	eq1: trust_advice	eq2: protect_rights	eq3: trust_protect	H0: no endogeneity
	F-test <i>p-value</i>	F-test <i>p-value</i>	F-test <i>p-value</i>	Chi 2 <i>p-value</i>
Model estimated in:				
Total Sample	19.924 *** 0.00	43.952 *** 0.00	25.442 *** 0.00	1.131 0.77
College Graduates	10.121 *** 0.00	23.543 *** 0.00	15.670 *** 0.00	0.703 0.87
Less than College Education	9.851 *** 0.00	20.390 *** 0.00	9.437 *** 0.00	1.446 0.69

A2 Attitudes Towards Risk

We utilize information from the part of the survey that asks respondents about attitudes and behavior with respect to non-financial products to construct indicators that are likely to proxy for their attitudes towards risk. More specifically, we first include in our specifications a binary indicator for respondents' reply to whether safety of detergent or toiletry products is not important or not very important. Selected marginal effects and associated standard errors on the indicators of interest are presented in Table A2(I). The remaining covariates are the same as those presented in Table 2 in the main text. In addition, respondents are asked to indicate separately how important are each of the following characteristics for a detergent or toiletry product:

It is safe.

It tells me how to protect myself.

It tells me what to do in case of accident, injuries or health problems.

There are clear symbols or pictures of risks and dangers.

Answers are given in a 1 to 4 scale, ranging from ‘very important’ to ‘not at all important’. We construct an average aggregate indicator of responses to the importance of the aforementioned product features that we include as an additional regressor in our specifications. Results are presented in Table A2(II). This indicator is categorical and its estimated marginal effect is based on an assumed one standard deviation increase of the underlying variable. Due to some missing values in the aforementioned indicators, the number of observations is significantly lower compared to our baseline models presented in Table 2. Yet our key findings presented in Table 2 appear robust to the inclusion of different indicators that are likely to capture household attitudes towards risk.

TABLE A2(I): Impact of Attitudes Towards Product Safety

	Total Sample		College Graduates		Less than College Education	
	Marg. Eff.	z-stat	Marg. Eff.	z-stat	Marg. Eff.	z-stat
Trust in financial advice	0.0271	2.26 **	0.0141	0.84	0.0444	3.06 ***
Consumer rights are protected	0.0326	2.94 ***	0.0500	3.13 ***	0.0152	1.03
Product safety not important	-0.0008	-0.13	-0.0096	-1.31	0.0114	1.50
Socio-economic characteristics		yes		yes		yes
Country Dummies		yes		yes		yes
Number of Observations		5699		3228		2471

Note: Probit regressions. The specifications are the same to those presented in Table 2 augmented by a binary indicator of product safety importance. Marginal effects are averaged across households using survey weights. ***, **, * denote significance at 1%, 5% ,and 10% ,respectively.

TABLE A2(II): Impact of Attitudes Towards Product Safety

	Total Sample		College Graduates		Less than College Education	
	Marg. Eff.	z-stat	Marg. Eff.	z-stat	Marg. Eff.	z-stat
Trust in financial advice	0.0267	2.18 **	0.0125	0.73	0.0467	3.06 ***
Consumer rights are protected	0.0290	2.54 **	0.0450	2.80 ***	0.0131	0.83
Product safety not important	0.0014	0.25	-0.0104	-1.43	0.0176	2.30 **
Socio-economic characteristics		yes		yes		yes
Country Dummies		yes		yes		yes
Number of Observations		5576		3164		2412

Note: Probit regressions. The specifications are the same to those presented in Table 2 augmented by an average aggregate indicator of product safety importance. Marginal effects are averaged across households using survey weights. ***, **, * denote significance at 1%, 5%, and 10%, respectively.

TABLE A3(I): Households Grouped by Income

	More than Median Income			Less than Median Income		
	Marg. Eff.	z-stat		Marg. Eff.	z-stat	
Trust in financial advice	0.0387	2.69	***	0.0142	1.14	
Consumer rights are protected	0.0460	3.37	***	0.0184	1.58	
Age	0.0048	6.84	***	0.0013	2.69	***
Male	0.0800	5.95	***	0.0537	4.66	***
Couple	-0.0596	-1.30		-0.0474	-2.20	**
Single	-0.0307	-0.59		-0.0217	-0.90	
Divorced	-0.0534	-1.01		-0.0855	-3.64	***
Children	-0.0046	-0.27		-0.0264	-1.72	*
Self Employed	0.0777	3.59	***	0.0679	2.33	**
Retired	0.0240	0.85		0.0234	1.32	
Unemployed	-0.0345	-0.80		0.0191	1.00	
High School	0.0259	0.98		0.0178	1.08	
College	0.1205	4.70	***	0.0885	4.92	***
Income band: 2				0.0304	1.61	
Income band: 3				0.0409	2.09	**
Income band: 4				0.0661	3.56	***
Income band: 5				0.1125	5.11	***
Income band: 6				0.1187	5.96	***
Income band: 8	-0.0087	-0.41				
Income band: 9	0.0663	2.90	***			
Income band: 10	0.1112	4.28	***			
Income band: 11	0.1003	4.26	***			
Income band: 12	0.1825	8.09	***			
Country Dummies		yes			yes	
Log likelihood		-2045.4			-1495.7	
Number of Observations		3756			3771	

Note: Probit regressions. The specifications account for an interaction term between trust in advice and perceptions about consumer rights. Age is controlled for through a 2nd order polynomial. Marginal effects are averaged across households using survey weights. ***, **, * denote significance at 1%, 5%, and 10%, respectively.

TABLE A3(II): Marginal Effects for High - Low Income Households

A. College Graduates						
	All		High Income band		Low Income band	
	Marg. Eff.	z-stat	Marg. Eff.	z-stat	Marg. Eff.	z-stat
Trust in financial advice	0.0152	1.04	0.0171	1.04	0.0121	1.02
Consumer rights are protected	0.0509	3.60 ***	0.0572	3.60 ***	0.0408	3.55 ***
B. Less than College Education						
	All		High Income band		Low Income band	
	Marg. Eff.	z-stat	Marg. Eff.	z-stat	Marg. Eff.	z-stat
Trust in financial advice	0.0400	3.07 ***	0.0576	3.07 ***	0.0301	3.09 ***
Consumer rights are protected	0.0122	0.96	0.0171	0.93	0.0099	1.04

Note: Probit regressions in the samples of households with college education and with less-than-college educations. (For the full set of results see the right panel in Table 2.) Marginal effects are averaged across the subsamples of high income (income bands 9-12) and low income (income bands 1-4) households using survey weights. ***, **, * denote significance at 1%, 5%, and 10%, respectively.

TABLE A3(III): High-Low Income Households not Expecting Advice

	<i>High Income band</i>		<i>Low Income band</i>	
	<u>Marg. Eff.</u>	<u>z-stat</u>	<u>Marg. Eff.</u>	<u>z-stat</u>
College	0.1003	5.94 ***	0.0489	5.42 ***
Consumer rights are protected	0.0473	3.39 ***	0.0166	3.52 ***

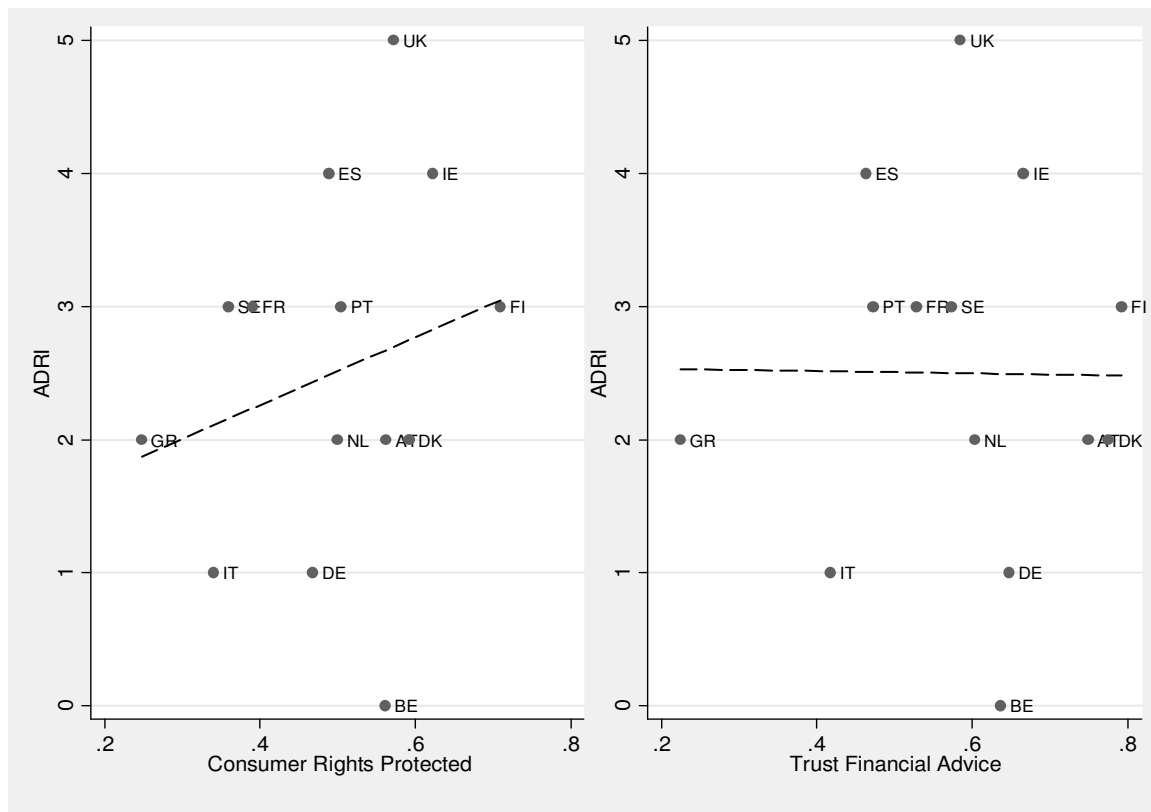
Note: Bivariate Probit regression. Conditional marginal effects, averaged across the subsamples of high income (income bands 9-12) and low income (income bands 1-4) households who do not expect advice using survey weights. They refer to changes in the conditional bivariate probability of owning risky financial assets given that advice is not expected, caused by changes in regressors. ***, **, * denote significance at 1%, 5%, and 10%, respectively.

TABLE A4: Regressions with Regional Averages

	I. Probit model			II. Probit model			III. Linear regression	
	<u>Marg. Eff.</u>	<u>z-stat</u>		<u>Marg. Eff.</u>	<u>z-stat</u>		<u>Coeff. Est.</u>	<u>t-stat</u>
Trust in financial advice	0.0260	2.27	**	0.0226	2.13	**	0.0458	0.64
Consumer rights are protected	0.0332	3.17	***	0.0324	3.31	***	-0.0978	-1.25
Trust other people (regional average)				0.0212	1.89	*	0.3104	2.50 **
Socio-economic characteristics		yes			yes			
Regional Dummies		yes						
Country Dummies		yes			yes			yes
Number of Observations		7420			7527			134

Note: The set of socio-economic characteristics is the same with that employed in the baseline specification in Table 2. Marginal effects in models I and II are averaged across households using survey weights. Standard errors in model II have been adjusted for clustering to take into account that trust to other people is region-specific. ***, **, * denote significance at 1%, 5%, and 10%, respectively.

FIGURE A1: ADRI vs. Trust in Advice and Perceived Consumer Protection by Country



Appendix B: Omitted Proof of Proposition 1 and Corollaries (Hypothesis 1 - 3)

We first rewrite $U_I^* = \hat{\mu}u_I^*$ with

$$u_I^* := U_\emptyset + \Delta U \left[1 - 2 \int_{1/2}^1 F(\pi_I; \hat{\rho}_I) d\pi_I \right].$$

and $U_A^* = \hat{\mu}u_A^*$ with

$$u_A^* := U_\emptyset + \Delta U \frac{1}{2} \left(\int_{\pi_A^*(a)}^1 (2\pi - 1) dF(\pi_A; \rho_A) + \int_{\pi_A^*(b)}^1 (2\pi - 1) dF(\pi_A; \rho_A) \right).$$

From this we have that

$$\frac{dU_I^*}{d\hat{\mu}} = u_I^* > 0,$$

$$\frac{dU_A^*}{d\hat{\mu}} = u_A^* > 0.$$

Next, after observing that

$$\int_{1/2}^1 (2\pi - 1) dF(\pi_I; \hat{\rho}_I) = 2 \left[1 - \int_{1/2}^1 F(\pi_I; \hat{\rho}_I) d\pi_I \right],$$

we have from (MPR) that

$$\frac{dU_I^*}{d\hat{\rho}_I} = -2\hat{\mu}\Delta U \int_{1/2}^1 \frac{dF(\pi_I; \hat{\rho}_I)}{d\hat{\rho}_I} d\pi_I > 0$$

and thus also that

$$\frac{dU_I^*}{d\hat{\rho}_I d\hat{\mu}} > 0.$$

With regards to U_A^* , observe that

$$\frac{d\pi_A^*(a)}{d\hat{\omega}} = -\frac{1}{2\Delta U} < 0,$$

$$\frac{d\pi_A^*(b)}{d\hat{\omega}} = \frac{1}{2\Delta U} > 0,$$

while from $\pi_A^*(a) < 1/2$ and $\pi_A^*(b) > 1/2$, provided that $\hat{z} > 0$, we have that

$$\frac{dU_A^*}{d\pi_A^*(a)} = \frac{1}{2} \hat{\mu} \Delta U [1 - 2\pi_A^*(a)] f(\pi_A^*(a); \rho_A) > 0,$$

$$\frac{dU_A^*}{d\pi_A^*(b)} = \frac{1}{2} \hat{\mu} \Delta U [1 - 2\pi_A^*(b)] f(\pi_A^*(b); \rho_A) < 0.$$

Hence, taking together these derivatives, we have that

$$\frac{dU_A^*}{d\hat{\omega}} = \frac{1}{4} \hat{\mu} \left[[1 - 2\pi_A^*(b)] f(\pi_A^*(b); \rho_A) - [1 - 2\pi_A^*(a)] f(\pi_A^*(a); \rho_A) \right] < 0,$$

such that finally

$$\frac{dU_A^*}{d\hat{\omega}d\hat{\mu}} < 0.$$

The comparative statics results in Corollaries 1-3 follow then immediately from the obtained first and second derivatives of U_I^* and U_A^* with respect to $\hat{\omega}$, $\hat{\mu}$, and $\hat{\rho}_I$.

Appendix C: Definitions of variables

Trust in financial advice: I usually trust the advice given by financial institutions (v211=1).

Consumer rights are protected: My rights as a consumer are adequately protected in relation to financial services (v201=1).

Age: v501.

Male: v500=1.

Marital status.

Couple: married or currently living with partner (v497==1 or v497==2 or v497==3).

Single: living alone, never married (v497==4 or v497==5).

Divorced: divorced/ separated v497==6 or v497==7).

Widowed (omitted variable): v497=8.

Children: has at least one child under the age of 18 living in the household (v221=0).

Occupation status.

If respondent is the person who contributes most to the household income (v506=1 or v506=3):

Employed (omitted variable): v504>=10 & v504<=18.

Self Employed: v504>=5 & v504<=9.

Retired: v504==4.

Unemployed (or temporarily laid off): v504>=1 & v504<=3.

If respondent is not the person who contributes most to the household income (v506=2), employment status of the person who contributes the most:

Employed (omitted variable): (v507>=10 & v507<=18).

Self Employed: v507>=5 & v507<=9.

Retired: v507==4.

Unemployed (or temporarily laid off): v507>=1 & v507<=3.

Education.

Less than high school (omitted variable): younger than 15 years old when full time education completed (v498<=15).

High School: between 15 and 17 years old when full time education completed (v498>15 & v498<=17).

College: more than 17 years old when full time education completed (v498>17).

If respondent is still in full time education (v498=98) then the education level corresponding to his/ her current age is assumed.

Household income band: v527. Respondents are asked the following question: “Please count the total wages and salaries per month of all members of this household; all pensions and all social insurance benefits; child allowances and any other income like rents, etc. Please give me the letter of the income group your household falls into before tax and other deductions.” They have to choose among twelve income bands with limits that are country-specific and classify the population in each country into roughly equal cell-sizes. For example, for Germany the following income bands are provided: 1. <750 euro; 2. 751-875 euro; 3. 876-1.000 euro; 4. 1.001-1.125 euro; 5. 1.126-1.250 euro; 6. 1.251-1.375 euro; 7. 1.376-1.500 euro; 8. 1.501-1.750 euro; 9. 1.751-2.000 euro; 10. 2.001-2.250 euro; 11. 2.251-2.500 euro; 12. 2.501 euro or more.

Think finances - complicated: I find complicated thinking about my finances and financial services (v107=1).