Financial advice as a "credence" service: the role of investor competence

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Abstract

This paper studies the role of investor competence in a model where financial advice is assumed to be a "credence service" (Dulleck and Kerchmbamer (2006), Pesendorfer and Wolinsky (2003)). According to this view, only a professional advisor exerting high diagnostic effort can identify and recommend the financial service that meets the investor's needs the best. Every investor can, costly, consult multiple experts and/or directly verify the level of effort exerted by each of them. We empirically test the conjecture that financial advice can be framed within the "credence services approach" insofar as it is properly emended to account for the role of the investor's financial competence. Overall the data provide support of our conjecture. More specifically, we find that (i) more competent investors are able to discipline the advisors' activity through direct monitoring; (ii) search for second opinions is more intense among investors demanding for professional advice rather than among investors delegating their portfolio choice to an advisor; and (iii) the level of investors' competence affects the degree of their portfolio sophistication less when investors ask for advice than when they do not.

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1 Introduction

The menu of retail financial products has grown steadily over the last twenty years. At the same time, partly because of this augmented offer, the literature has recognized that investors are confronted with increasingly complex financial decisions that can be optimally solved only purchasing tailored financial products. The increase in the complexity on both sides of financial markets, supply and demand, poses a serious challenge to investors looking for the best possible product. In this context, professional advisors may play a crucial role: they can extract information about individual characteristics and objectives and then, relying on their knowledge of existing products, find the best match between customer's needs and the available products (Inderst and Ottaviani (2011); Inderst and Ottaviani (2012)). As an example, consider an investor who plans to start a private pension plan or to buy a life insurance. According to her age, current and expected income, her current wealth, financial portfolio and many other individual characteristics, the optimal pension plan is likely to have unique features which can be identified only by a professional advisor who carefully analyses her problem.[1] We conjecture therefore that financial products have some of the characteristics of *credence services*, or *credence goods*, defined as "goods and services where an expert knows more about the quality a consumer needs than the consumer himself" (Dulleck and Kerchmbamer (2006)).

In this paper we propose to analyze financial products as credence goods where the expert is a professional financial advisor: to identify the correct product, the investor needs to rely on advisors under the constraints that their effort in solving the problem is not observable and the final success of the service is not contractible (Dulleck and Kerchmbamer (2006), Pesendorfer and Wolinsky (2003); Wolinski (1993); Wolinski (1997); Fong (2005)). The expert's effort is costly and this creates moral hazard in the investor-advisor relation.

To analyze financial advice as a credence service, we rely on the model developed by Pesendorfer and Wolinsky (2003) where consumers can reduce moral hazard gathering multiple opinions insofar as they are ready to pay search costs. However, financial advice may also depart from the credence services studied in the industrial organization literature insofar as the degree of competence of the investor influences the expert's behavior. In presence of the misalignment of interests between advisors and investors extensively highlighted by the literature (Woodward and Hall (2012); Inderst and Ottaviani (2009); Inderst and Ottaviani (2011)), Bucher-Koenen and Koenen (2011) and Calcagno and Monticone (2015) show that investors with higher

[1] Many other examples can be made, illustrating different degrees of complexity. As a simple financial decision, consider for example an investor seeking an insurance for her house. She might use an insurance broker to find the cheapest offer on the market. On the other end of the spectrum of difficulty, consider an entrepreneur of a SME who needs to find products which hedge cash and net working capital, or the risk profile of its firm revenues.

financial literacy receive better advice, strongly suggesting that the role of the investor's financial literacy cannot be disregarded when investigating financial advice.

We extend therefore the framework in Pesendorfer and Wolinsky (2003) to include an alternative channel disciplining the advisor's choice of effort beyond the search for second opinions. When confronted with financial advice, we assume that the investor can also verify the accuracy of the expert's choice spending enough time monitoring the latter's activity directly. The monitoring costs are lower for more competent investors. Our stylized model predicts that more literate investors verify the advisor's activity rather than just relying on the search for second opinions. As in Pesendorfer and Wolinsky (2003), search for second opinions should be more correlated with the demand for advice than with the demand for delegation. Given that search costs are independent of investors competence, there should not be any significant relationship between the intensity of search activity and the level of financial literacy of the investor in the subsample of investors asking for advice.

We test these predictions on the 2007 Unicredit Investors Survey (UCS), conducted on a sample of 1,676 individuals with a current account in one of the banks of the largest Italian banking group. Before performing these tests, we empirically verify the basic rationale of the credence goods approach, i.e. that investors are not endowed with the knowledge necessary to find by themselves the optimal product because of its specificity. Given that complex problems are likely to be solved by complex products and that in the model equilibrium the investors asking for professional advice obtain the optimal product with positive probability, the correlation between the degree of financial literacy and the sophistication of an investor's portfolio should depend on the relationship between her degree of financial literacy and the complexity of her needs. Moreover, given that nowadays most of households are confronted with complex financial decisions, such as for example the choice of the best residential mortgage or private pension plan, there should not be an obvious relationship between the degree of financial literacy of the investor and the complexity of the decision she needs to take. Therefore, for investors relying upon professional advice, the correlation between the level of financial literacy and the portfolio sophistication should be null, or at least much weaker than the one concerning investors who do not ask for advice (van Rooij et al. (2011)).

Overall, we find evidence confirming the credence goods approach. For investors asking for professional advice the correlation between portfolio sophistication and the investors' degree of financial literacy is lower than in the subsample of investors not asking for advice. This finding is stronger if we analyze investors who declare to look for a tailored product when investing and it persists if we look at the most literate investors.

This last observation excludes that our result is driven by the fact that advisors sell to relatively illiterate investors overly sophisticated products.

While investors who ask for professional advice are more active in searching than the ones fully delegating their portfolio choice to advisors, we find that the level of financial literacy is positively correlated with the intensity of the search for second opinions. This last result is in contrast with the features of the standard credence goods model developed by Pesendorfer and Wolinsky (2003), in which search costs are not related to the degree of competence of the client. This finding suggests that the level of financial knowledge of the investor matters and it might affect how the investor monitors the expert's activity.

We then verify whether more literate investors consult with their advisors more frequently than the ones delegating the portfolio choice. First, using the frequency with which the investor uses her financial advisor as a source of information as a proxy measure of direct verification we find a strong positive correlation between demand for advice and direct monitoring. Then we perform a multivariate analysis and its results confirm our prediction that more literate investors are monitoring their advisors more. The result is robust to controls for the possible endogeneity of financial literacy.

2 Related literature

The *credence goods* approach, quite neglected in the finance literature up to now, is not new in the industrial organization one (Wolinski (1993); Wolinski (1997); Fong (2005)).[2] Pesendorfer and Wolinsky (2003) illustrate the effects of a mechanism that allows to discipline the moral hazard inherent to the customer-expert relation for credence goods, i.e. the search for a second opinion. They show that price competition is inefficient in the market for experts advice when clients search for second opinions and it may even reduce customers' welfare. This because such a search introduces a complementarity in experts' effort choice which is undermined if experts can compete in prices.

Our work aims to contribute to the vast literature that has recognized a significant impact of financial literacy on economic behavior (Lusardi and Mitchell (2007); Guiso and Jappelli (2009); van Rooij et al. (2011); van Rooij et al. (2012), among many others). Financial advice might represent a solution to the negative consequences of investor financial illiteracy: potentially, the knowledge of a professional advisor could work as a substitute for the lack of knowledge of the investor. However, the literature has provided

[2] For an exceptionally comprehensive review see Dulleck and Kerchmbamer (2006).

extensive evidence of the presence of misalignment of interests between advisors and investors. With reference to the mortgage market, Woodward and Hall (2000) underline the profound asymmetry between borrowers, who engage in this transaction only a few times in their lives, and mortgage originators who are experienced professionals. More specifically, Woodward and Hall (2012) emphasize that mortgage loans are leading examples of transactions where experts on one side of the market take advantage of consumers' lack of knowledge and experience. They find out that confused borrowers overpay for brokers' services and show that borrowers sacrifice at least $1000 by shopping from too few brokers. Inderst and Ottaviani (2009) and Inderst and Ottaviani (2011) extensively study biased advice and incentive to missell: in their setting, reputation and liability for misselling can work as disciplining devices.

Other contributions investigate the degree of substitutability between investor's financial knowledge and demand for professional advice, considering explicitly the potential conflict of interest in the investor-advisor relation. Overall this literature seems to conclude that investors who most need the financial advice are least likely to obtain it (Bhattacharya et al. (2012); Hacketal et al. (2012); Bucher-Koenen and Koenen (2011); Calcagno and Monticone (2015)). Bhattacharya et al. (2012) highlight that the mere availability of unbiased financial advice is a necessary but not sufficient condition for benefiting retail investors. Hacketal et al. (2012) study the investor's decision to follow a recommendation which is truthfully certified as unbiased. They find that the higher the investor financial knowledge and his perception of conflicts of interest the less the investor is likely to follow the expert's advice. This result is confirmed by Stolper and Walter (2014) who show that two thirds of the households under review ignore the unbiased advice completely, and this inefficient behaviour is driven mostly by financially literate investors. Works by Bucher-Koenen and Koenen (2011) and Calcagno and Monticone (2015) show that investors with higher financial literacy receive better advice.

We differ from the latter contributions precisely for our view of the nature of financial advice. While in the above papers the optimal recommendation does not depend on the characteristics of the investor, here we spouse the perspective of credence services, considering that financial advice is a tailored service which can be effective only if the advisor carefully studies every investor's financial decision problem (Dulleck and Kerchmbamer (2006)). Our view provides a different explanation to the evidence showing that investors with higher financial knowledge earn higher returns on their investments (Clark et al. (2014)); Deuflhard et al. (2014)). Our model shows that more knowledgeable investors use two disciplining mechanisms to control the quality of the expert's recommendation: they also directly monitor the latters' activity in addition to

searching for a second opinion. This allows them to obtain lower prices for the professional advice. Finally, considering financial advice as a credence service provides an additional potential explanation about the reason why knowledgeable investors do not follow unbiased advice, as shown in Bhattacharya et al. (2012) and Stolper and Walter (2014). Since they demand a tailored advice that considers all the dimensions of their financial decision problem, they may be more skeptical towards the advice computed by a computer algorithm.

The remainder of this paper is structured as follows. Section 3 presents the main characteristics of our model, Section 4 illustrates the empirical analysis and Section 5 concludes. The formal analytical framework and its results are presented in Appendix A, while proofs of these results are collected in Appendix B. Appendix C collects detailed information about the dataset and the main variables used in our empirical analysis.

3 A stylized model of financial advice as "credence good"

We rely on the model developed by Pesendorfer and Wolinsky (2003) (PW in the following) and accommodate it in order to account for heterogeneity in the degree of investors' financial competence.[3] The economy is populated by investors (principals) and a continuum of financial advisors (agents, or experts), all risk neutral. The investor-principal is confronted with a financial decision. The financial markets provide a continuum of financial products, so that the investor is uncertain as to which product solves optimally her needs. Advisors-agents who are asked to study the investor's problem can either exert effort at a positive cost or zero effort (at no cost). The investor cannot observe whether advisors exerted effort or not. Only advisors exerting effort identify the optimal financial product solving the investor's problem. The investor derives a positive utility only if she buys the optimal product, otherwise she obtains a utility normalized to zero. Up to this point, our model corresponds to PW.

We extend PW by introducing a factor of heterogeneity among investors, that is their degree of financial literacy. In order to check whether the advisor has exerted effort or not in studying her problem, we allow investors to directly verify his activity at a cost k. We assume that k is lower for investors with higher financial literacy. As to motivate our modification of PW setup, consider for example the case of an investor who wants to plan an adequate level of savings for retirement through the purchase of a life insurance and

[3] Refert to Appendix A for a full specification of the model and its solution and to Appendix B for all the formal proofs.

who demands advice for choosing one. The direct verification strategy may correspond to the following behaviour: the investor carefully analyses the various offers which have been proposed by the advisor at a first meeting, then consult with him several more times to better specify her needs and dissipate doubts concerning the received offers. This activity is time consuming for the investor and it probably requires enough competence from her side to identify potential problems related to the advisor's offers.

We also make the following assumption (Assumption 1): as for the general "credence goods" approach, investors cannot find by themselves the optimal product.[4,5] and therefore the degree of complexity of the investors' need does not depend on their level of financial literacy.

Investors can follow two strategies in order to verify whether an advisor has exerted effort or not: either they can search for a second opinion (at cost s) that confirms one of the previous recommendations, or they can verify directly every recommendation (at cost k) they receive in the sense explained above.[6]

Therefore the game looks as follows. The expert proposes a recommendation at a given price, and he selects the level of effort. The investor strategy consists of the choice among the following options:

- quit the game without purchase;
- stop at the first recommendation and buy the recommended product, whatever this is;[7]
- sample $n > 1$ experts and buy from any of them at the lowest price proposed;[8]
- sample $n > 1$ experts and verify them until an advisor making effort is found.[9]

[Insert here Fig. 1 - the stylized model]

In Appendix A we characterize symmetric perfect Bayesian equilibria of this game where investors form beliefs on advisors' effort and advisors form beliefs over the set of possible histories followed by the investor conditional on being sampled by the latter. In equilibrium, the investors' beliefs must coincide with the effort probability of the advisor and the advisors' beliefs must coincide with the probability distribution over the investor's history along the equilibrium path.

[4] Alternatively, one can assume that is comparatively too expensive for investors to do so rather than to demand for advice from financial experts.

[5] As a corollary of this, it is immediate to verify that an investor never buys a product which has not been recommended by any advisor.

[6] Notice that the latter does not exclude that the investor asks for a recommendation to other advisors if she has verified that the first advisor did not exert effort.

[7] We denote this strategy as $\{SB\}$ in the Appendix A.

[8] Strategy $\{S\}$ in the formal model.

[9] Strategy $\{V\}$ in the formal model.

We first solve the game fixing the price of the offer the advisor makes and analyzing the fixed-price game, and then proceeding backward we study price competition among advisors.

In the fixed-price game, as in PW, the only equilibria in which the advisor recommends the optimal product with positive probability are those when the investor either searches for a second opinion or she monitors the advisor's activity (see Proposition 1). Also, in equilibrium the advisor obtains a positive expected profit only if the investor stops and buys from the first advisor the recommended product with positive probability. In these equilibria the investor is more likely, ex-ante, to buy an optimal product that a sub-optimal one. When the cost of directly monitoring the expert's activity is lower than the search cost of sampling another expert, investors chose the first strategy. Thus our stylized model implies that more competent investors verify their advisor's activity.

Once we introduce price competition among advisors, all equilibria at which the advisor earns zero expected profits collapse. Concerning the other equilibria with a positive expected profit for the advisor, only equilibria with prices higher than the marginal cost of effort exist. At these equilibria investors with low level of financial literacy search for a second opinion while investors with high financial literacy verify each recommendation (see Proposition 2). Direct monitoring, when credible, has a stronger effect on price than search for a second opinion.

To summarize, our stylized model provides a number of empirical implications. The empirical analysis in Section 3 is based on these implications:

1. The "credence goods" approach postulates that an investor cannot identify the product that optimally solves her financial needs without the advice of a professional expert. As in PW, if the professional advisor exerts effort and identifies the optimal product, he recommends it to the investor and in equilibrium the latter is more likely to buy the optimal product than a sub-optimal one (Proposition 1). To bring this result to data, we first observe that it is reasonable to assume that complex financial needs require sophisticated financial products as solutions. If this is the case, the "credence good" approach predicts a positive relationship between the degree of complexity of the investor's problem and the sophistication of the portfolio she holds, conditional on the fact that the investor has demanded professional advice. As a corollary, the correlation between the degree of financial literacy of an investor who demands advice and the sophistication of her portfolio depends on the relationship between her degree of financial literacy and the complexity of her needs.

2. As in PW, our stylized model predicts that in equilibrium investors asking for advice search for a second opinion with positive probability. The investors search for a second opinion that matches one of the recommendations already obtained, confirming in this way the optimality of the recommended product. Notice that investors would not search for a second opinion if they chose to fully delegate to an expert their portfolio choice at the beginning of the game. The "credence goods" approach as it is modelled in PW predicts then a stronger correlation between the search activity with the demand for advice than with the demand for delegation. Notice that in PW the search costs summarize the investor's opportunity cost of time, her ability to contact a professional advisor, her reluctance to compare offers and other similar elements. A priori, there is no clear cut relationship between the level of search costs and the degree of financial literacy of the investor. The traditional "credence goods" approach as in PW predicts then no significant relationship between the intensity of search activity and the level of financial literacy of an investor.

3. We conjecture that the departure from the canonical setting of "credence goods" as modelled in PW may be due to some peculiarities of financial advice which are related to the role of investor competence. Our stylized model then extends PW framework by including an alternative verification channel, beyond the search for a second opinion. We argue that for some services, such as financial advice, the consumer might be able to verify the accuracy of the expert's choice, i.e. the quality of his recommendation, directly monitoring the expert's activity at a cost. If we refer to financial advice as the "credence service" under study, it is likely that this direct monitoring cost is lower for more competent investors. Proposition 1 shows that in equilibrium more competent investors choose to directly verify whether the expert exerted effort or not. According to our Proposition 1 then we should observe a positive relationship between the investor's degree of financial literacy and the intensity of her monitoring activity.

4 Empirical analysis

In order to investigate the interaction between advice and investor competence, we rely on the 2007 Unicredit Investors Survey (UCS), which draws from the population of clients of one of the three largest European banking groups. The 2007 wave interviewed 1,676 individuals with a current account in one of the banks that are part of the Unicredit Group based in Italy.[10] The UCS goal is to study retail customers' financial

[10]The sample consists of clients in the age group 21-75 years, holding a current account and at least 10 thousands euros.

behaviour and their expectations towards the bank. The survey provides detailed information on households demographic structure, individual financial assets holding (both within and outside the bank), real wealth components and income. Furthermore, it contains data on attitudes towards saving and financial investment, risk propensity and, more importantly, it collects information on the degree of financial literacy of households and their relationship with banks and financial advisors.[11]

4.1 First prediction: general "credence goods" approach

The first step of our analysis tests the basic rationale of the credence goods approach, which claims that the optimal good or service is not universal but tailored on the customer's needs. Applying this reasoning to financial decisions, we conjecture that, because of the specificity of the optimal product, investors are not endowed with the knowledge necessary to find by themselves the optimal product.[12] The model sketched in Section 2 relies on this fundamental assumption.

If this approach is correct, we should observe that, within the subsample of investors relying upon professional advice, the correlation between the degree of financial literacy and the sophistication of an investor's portfolio depends on the relationship between her degree of financial literacy and the complexity of her needs, as explained in Section 2. Nowadays most of households are confronted with quite complex financial decisions, such as for example characterizing an optimal savings plan for retirement[13], or stipulating a residential mortgage. Therefore, for investors relying upon professional advice, there should not be an obvious relationship between the degree of financial literacy of the individual investor and the complexity of the decision she needs to take:[14] this is the rationale behind our Assumption 1. Studying all investors together, the existing literature on financial literacy highlights how more literate investors tend to participate in risky markets (van Rooij et al. (2011)) and to hold more sophisticated products. Thus, if the "credence goods" approach holds, we predict the correlation between the degree of financial literacy and the complexity of the portfolio to be weaker for households asking for professional advice than for those not asking for it.

The measure we adopt to capture the degree of investor competence is a financial literacy measure (0-8), constructed as in Guiso and Jappelli (2009), and related to the correct answer to eight questions

[11] For further details on the dataset and the relevant variables, see Appendix C.

[12] Alternatively, one can think that it may be comparatively too expensive for investors to identify the optimal product by themselves rather than to demand for advice from financial experts.

[13] This issue has become particularly relevant in Italy in the nineties, when pension reforms made the social security system less generous.

[14] For example, all employees are concerned by the new rules affecting the pension system and would need to adjust their lifetime saving behaviour accordingly.

regarding inflation, interest rate compounding, risk diversification and products' riskiness.[15] Table 1 reports the frequency distribution of our measure of financial literacy. The table shows that about 40 percent of the respondents answers correctly to 2-3 questions and three quarters of the respondents to 2-5 questions.

[Insert Table 1 approximately here]

Table 2 displays some descriptive statistics on the measure of portfolio sophistication across investors who seek or do not seek for advice. We measure portfolio sophistication as the share of household's portfolio invested in the class of sophisticated products, i.e. all financial products except liquid assets, national and foreign bonds. Table 2 shows that among those who hold some financial assets, approximately 80.7% hold assets that we define as sophisticated, and this proportion is significantly higher among respondents who seek financial advice (84.9%) compared to those who don't (74.2%). The average share of sophisticated assets in the households portfolio approximates 43.5%, and again it is significantly higher among respondents who use financial advisers (45.7%) than among those who don't (40.0%).

[Insert Table 2 approximately here]

We then investigate the multivariate relationship between our measure of portfolio sophistication and the investor's degree of financial literacy. We collect the results in Table 3.

[Insert Table 3 approximately here]

The model considered in column I includes as regressors the index measuring financial literacy, the logarithm of the household head income, her financial wealth and a measure of risk tolerance[16], beyond standard individual controls[17]. The coefficients for income and wealth are positive and statistically significant as expected.[18] Crucially, the coefficient of our main regressor, i.e. financial literacy, is positive and statistically significant. The size of the coefficient is also significant in economic terms: one additional correct answer increases the share invested in sophisticated assets by 4.5 percent. In column II of table

[15] See Appendix C for further details on the construction of the variable.

[16] See Appendix C for additional details on the definition of income, wealth and risk tolerance.

[17] More specifically, all regression specifications include, though not explicitly reported, standard controls such as age (and age-squared), dummies for gender, marital status, educational level, area of residence.

[18] In particular, the positive and statistically significant coefficients of wealth, computed relative to the excluded wealth bracket (below 50 k), confirm that more sophisticated portfolio are associated with wealthier investors. Also the results on the measure of risk tolerance are in line with the predictions: portfolio sophistication is less strongly associated to medium or low risk tolerance, as confirmed by the negative coefficient computed relative to the excluded high risk tolerance level.

3, we regress the level of portfolio sophistication on the binary choice advice/no advice, obtained from the answer to a question asking if the household head or her family rely on the advice of a financial consultant to make their investment choices. We find again a positive and statistically significant coefficient, which suggests that asking for professional advisors is associated with an average increase by 3.7 percent of the portfolio share invested in sophisticated assets. In column III we regress portfolio sophistication on financial literacy, the dummy for financial advice and their interaction. The first two variables display a positive coefficient while the third shows a negative and statistically different from zero coefficient (-0.019). This finding corroborates our Assumption 1 because the presence of professional advisors weakens the linkage between sophistication and investor competence.[19]

In columns IV and V of Table 3, we provide two additional tests in order to check the robustness of these preliminary findings. In column IV we restrict the sample to those investors who are actually in search of a tailored product, since for these investors financial advice is more clearly a "credence service". We therefore exclude those investors who reveal an undirected investment goal, i.e. who just aim to increase the return of their saving without any particular objective.[20] We expect the results to be even stronger in the restricted sample. Indeed, we find that the negative coefficient of the interaction term becomes three times larger than in the full sample, thus further reinforcing our Assumption 1.

One might argue that these previous findings are due to the fact that advisors induce low-literacy investors to hold overly sophisticated (and more profitable) products in comparison to their needs. To exclude this alternative explanation, we test whether the lower correlation between the degree of financial literacy and the portfolio sophistication survives also among the most literate investors. In column V, we restrict the sample of individuals to the more literate ones (those endowed with a financial literacy index higher or equal to 5). We find that the negative coefficient of the interaction term showed in column III not only persists but becomes almost five times larger. Overall, these findings seem to confirm that financial advice can be considered as a credence service.

However, the positive and statistically significant correlation of sophistication with financial literacy persists. This may simply reveal a positive correlation between investor competence and complexity of her needs, with no particular direct implication for the validity of the credence goods approach. Alternatively, it may instead suggests that financial advice, on the one hand, shares some basic features with credence

[19] Notice that, at this stage, we are merely interested in testing the correlation (and its significance) among the variables of interest rather than any relation of causality between them.

[20] Variable labeled "MOTVR_K", in the UCS survey.

services but, on the other hand, is likely to possess a peculiar trait represented by the unavoidable role of investor competence. Further research is necessary to disentangle between these two possible explanations.

4.2 Second Prediction: financial literacy and search for second opinion

According to PW, in equilibrium, advisors make effort with positive probability and investors asking for advice search for a second opinion with positive probability. As a first testable implication, data should confirm that the search activity is more strongly associated with the demand for advice than with full delegation. As a proxy for the intensity of search, we exploit a (binary) question in the UCS survey asking investors if they ever asked their bank about products managed by other banks or financial institutions.[21] We interpret a positive answer as a sign that the client was searching for a second opinion. In order to distinguish full delegation from the demand for advice within the relationship with the advisor, we rely on a question asking the investor to specify precisely her different attitudes when approaching an advisor.[22]

In Table 4 we report the correlation between two binary variables: search for second opinion, measured as above and the choice of full delegation versus ask for advice. The correlation coefficient (Pearson-Chi-squared = 37.932) is positive and statistically different from zero, thus confirming that the searching for second opinion is positively related to the demand for advice, in line with our stylized model and PW.

[Insert Table 4 approximately here]

The PW model also predicts that equilibrium effort and search activity should depend on the investor's search costs. A priori, we cannot associate a higher or lower level of search costs to investors endowed with a high financial literacy because in PW these costs summarize opportunity cost of time, ability to find advisors, reluctance to compare offers and other similar elements. Thus, according to the PW model, we should not observe any particular association between search and financial literacy.

To test this prediction against the data, we first plot the search dummy variable for investors endowed with high (5-8) or low (0-4) literacy. In Figure 1, we observe that highly literate investors (financial literacy 5-8) are more likely to search for different recommendations, evidence which goes against our prediction. We proceed then performing a multivariate regression where we control for all potentially correlated factors. The results are summarized in Table 5.

[21] Variable labeled "MARCHE", in the UCS survey.
[22] Variable labeled "MODINV", in the UCS survey.

[Insert Table 5 approximately here]

The coefficient of financial literacy appears positive and statistically different from zero, both in the OLS regression (column I) and in the Probit regression (column III): investors with higher financial literacy are more active in the searching activity in financial markets. While this finding is consistent with some existing empirical evidence (Bucher-Koenen and Koenen (2011)) on the role of financial literacy, it appears in sharp contrast with the features of the standard credence goods model developed by PW. As far as other controls are concerned, income seems to affect positively the search for more recommendations, while on the contrary the level of wealth has no significant role. More risk averse individuals are shown to be less involved in the search activity.

The positive relation between financial literacy and the search activity might be due to reverse causality because the search process might have a positive effect on the accumulation of financial knowledge. We therefore instrument financial literacy in order to account for its potential endogeneity. For this purpose, we use two instruments: the regional level of financial literacy derived from the Bank of Italy's Survey on Household Income and Wealth (SHIW) and a dummy variable indicating whether the head of household was in the group of best students when attending school when 11-14 years old.[23] In columns II and IV of Table 5 we report the results of the 2SLS and IV-Probit estimations, respectively. The relation between the degree of financial literacy and the intensity of search activity is still positive and statistically significant, larger in size and the two instrument pass the standard validity tests.

The evidence of such a robust linkage between search activity and financial literacy severely undermines the plausibility of the PW model in the market for financial advice. Investors' financial competence matters and is likely to drive the way they exert control on the experts' effort. The objective of the model sketched in Section 2 is precisely to properly frame the role of investor competence within the standard "credence goods" model. Our stylized extension to the PW model addresses exactly this issue.

4.3 Third Prediction: direct monitoring as a disciplining mechanism

Our stylized model introduces direct monitoring as an alternative disciplining device of the advisors' activity. As a proxy measure of direct monitoring we use the (ordinal) frequency of meetings between the investor and his or her advisor.[24] If direct monitoring is used to verify the activity of an advisor, it should be used more

[23] Variable labeled "SCHOOL", in the UCS survey.
[24] Variable labeled ADVFREQ, in the UCS survey.

frequently by investors asking for advice than by investors who fully delegates to their advisor the portfolio choice. In Table 6 we report the correlation between the zero/one variable demand for advice/full delegation and the variable measuring direct monitoring. We observe that the correlation coefficient (Pearson-Chi square = 293.406) is positive, statistically different from zero and very large, confirming a strong positive association between demand for advice and direct monitoring. As predicted, investors are more prone to directly verify the experts' effort when they receive a recommendation than when their intention is to fully delegate their investment choices.

According to our Proposition 1, we predict that investors with a higher level of financial literacy are more likely to directly monitor the advisor's activity in order to verify whether he has exerted effort when studying their financial problem or not. As a preliminary test of this correlation, Figure 2 plots our measure of direct monitoring for investors endowed with high (5-8) and low (0-4) financial literacy. The graph provides some suggestion in the expected direction: more literate investors seem to be more prone to direct verification. However, to derive more conclusive evidence we need to run a regression in a multivariate setting, which we report in Table 7.

[Insert Table 7 approximately here]

There we run both a standard OLS regression (column I) and Order Probit regression (column II). In both specifications the coefficients of financial literacy are positive and statistically significant: more literate investors are those more frequently consulting with their advisors, an attitude that we interpret as a signal of direct verification. This positive correlation might be due, however, to the reverse effect exerted on the investor's financial knowledge by frequent consultations with professional advisors. To control for this possible reverse causality, we again instrument the level of financial literacy with the two variables above-mentioned. As it is shown in column III of Table 7, the relationship between the degree of financial literacy and the monitoring activity persists, it is again positive and statistically significant, while our two instruments are confirmed to be valid according to standard tests.

5 Conclusions

We test whether financial advice can be considered as a "credence service", in the sense of Dulleck and Kerchmbamer (2006), Pesendorfer and Wolinsky (2003). We build on the model developed by Pesendorfer

and Wolinsky (2003) in which the search for second opinions works as a disciplining device of the advisor's unobservable effort. In order to accommodate the traditional credence goods approach to fit the features of financial advice, we introduce an alternative disciplining device of the advisor activity, i.e. direct monitoring of his effort. Given that the costs of direct monitoring are likely to be inversely related to the degree of investor's financial competence, our model introduces a factor of heterogeneity on the investor's side and enriches the strategic interaction between investors and advisors. Relying on the 2007 Unicredit Investors Survey (UCS), we test some predictions of the model. We find supporting evidence to the hypothesis of a credence service model for financial advice and to the fact that financial literacy plays an important role on the disciplining activity chosen by the investor. Our work potentially contributes to the existing literature on several dimensions. First, it adds to the literature on credence goods an alternative monitoring mechanism which depends on the degree of investor competence. Second, it contributes to the literature on financial literacy by investigating its role when the optimal financial product is tailored to the specific needs of an investor and the latter cannot identify it without the advice of an expert.

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Tables

Table 1. Distribution of Financial Literacy

	Frequency	Percentage
No correct answers	66	3.9%
1	168	10.0%
2	294	17.4%
3	379	22.5%
4	366	21.7%
5	263	15.6%
6	118	7.0%
7	27	1.6%
All correct	5	0.3%
Total	1,686	100.0%

Table 2: Portfolio sophistication and search for financial advice.

	Seeks financial advice	Does not seek financial advice	Total
Proportion with sophisticated assets	84.9%	74.2%	80.7%
Share of sophisticated assets	45.7%	40.0%	43.5%
# obs	770	435	1,205

Table 3. Portfolio sophistication, financial literacy and advice

	OLS				
	I	**II**	**III**	**IV**	**V**
FL (0-8)	0.045***		0.043***	0.063***	0.072**
	(0.004)		(0.009)	(0.015)	(0.034)
Advice		0.037**	0.111**	0.273***	0.532**
		(0.019)	(0.045)	(0.076)	(0.248)
FL*Advice			-0.019*	-0.063***	-0.090**
			(0.011)	(0.020)	(0.044)
Log HH income	0.041***	0.036***	0.034***	0.059***	0.019
	(0.010)	(0.013)	(0.012)	(0.022)	(0.025)
Wealth brackets					
50-100 k	0.076***	0.050*	0.050*	0.086*	0.076
	(0.022)	(0.030)	(0.030)	(0.050)	(0.054)
100-150 k	0.079***	0.040	0.037	0.061	0.099*
	(0.023)	(0.030)	(0.030)	(0.054)	(0.053)
150-250 k	0.075***	0.017	0.013	0.027	0.074
	(0.024)	(0.030)	(0.030)	(0.054)	(0.054)
250-500 k	0.142***	0.088***	0.087***	0.065	0.127**
	(0.026)	(0.032)	(0.031)	(0.054)	(0.058)
>500k	0.171***	0.100**	0.088**	0.070	0.182***
	(0.036)	(0.040)	(0.039)	(0.093)	(0.065)
Risk tolerance					
medium	-0.089***	-0.078*	-0.087*	-0.047	0.076
	(0.018)	(0.020)	(0.019)	(0.036)	(0.054)
low	-0.225***	-0.210*	-0.206*	-0.218***	0.076
	(0.021)	(0.030)	(0.029)	(0.046)	(0.054)
Demographics	YES	YES	YES	YES	YES
Macroarea	YES	YES	YES	YES	YES
# obs	1,686	1,205	1,205	391	349
R^2	0.212	0.104	0.128	0.217	0.184
*Robust standard errors in parentheses; * p<0.01, ** p<0.005, *** p<0.001*					

Notes: all models include standard controls such as age and age squared, dummy for gender, dummies for marital status, dummies for educational level.

Table 4: Correlation between search for second opinion and choice delegation/advice.

	delegation	**ask for advice**	**total**
no search	702	735	1,437
(%)	(97.36%)	(89.43%)	(93.13%)
search	19	87	106
(%)	(2.64%)	(10.58%)	(6.87)
Total	721	822	1,543
(%)	(100%)	(100%)	(100%)

Notes: test on correlation coefficient, Pearson chi2(1) = 37.932 (p-value= 0.000)

Table 5. Search for second opinion and financial literacy (conditional on advice)

	OLS	2SLS	Probit	IV Probit
	I	II	III	IV
FL (0-8)	0.018**	0.158**	0.103**	0.585***
	(0.007)	(0.070)	(0.043)	(0.099)
Log HH income	0.037**	0.005	0.208**	0.019
	(0.017)	(0.025)	(0.087)	(0.095)
Wealth brackets				
50-100 k	-0.020	-0.003	-0.206	-0.06
	(0.038)	(0.045)	(0.251)	(0.189)
100-150 k	0.004	-0.006	-0.025	-0.052
	(0.039)	(0.046)	(0.229)	(0.175)
150-250 k	-0.018	-0.038	-0.131	-0.147
	(0.037)	(0.047)	(0.243)	(0.187)
250-500 k	0.017	-0.006	0.056	-0.05
	(0.043)	(0.051)	(0.237)	(0.185)
>500 k	0.106	0.057	0.372	0.058
	(0.066)	(0.074)	(0.273)	(0.230)
Risk tolerance				
medium	-0.023	-0.070*	-0.118	-0.248**
	(0.026)	(0.038)	(0.139)	(0.112)
low	-0.061**	-0.097**	-0.646**	-0.559**
	(0.031)	(0.044)	(0.317)	(0.239)
Demographics	YES	YES	YES	YES
Macroarea	YES	YES	YES	YES
# obs	770	760	770	760
R^2/Pseudo R^2	0.079	-	0.116	-
F-test/Chi-stat		6.935		15.050
p-value Sargan/Wald test		0.692		0.007

*Robust standard errors in parentheses; * p<0.01, ** p<0.005, *** p<0.001*

Notes: all models include standard control variables such as age and age squared, dummy for gender, dummies for marital status, dummies for educational level.

Table 6: Correlation between direct monitoring (frequency of meeting investor-consultant) and choice delegation/advice.

	delegation	Ask for advice	total
Never	544	265	809
(%)	(75.66%)	(32.24%)	(52.50%)
hardly ever	24	68	92
(%)	(3.34%)	(8.27%)	(5.97%)
occasionally	105	302	407
(%)	(14.60%)	(36.74%)	(26.41%)
quite often	43	162	205
(%)	(5.98%)	(19.71%)	(13.30%)
very often	3	25	28
(%)	(0.42%)	(3.04%)	(1.82%)
total	719	822	1,541
(%)	(100%)	(100%)	(100%)

Notes: test on correlation coefficient, Pearson chi2(1) = 293.406 (p-value= 0.000)

Table 7. Direct monitoring and financial literacy (conditional on advice)

	OLS	Ordered Probit	2SLS
	I	**II**	**III**
FL (0-8)	0.063***	0.061***	0.202**
	(0.017)	(0.018)	(0.112)
Log HH income	0.004	0.010	-0.018
	(0.045)	(0.047)	(0.048)
Wealth brackets			
50-100 k	0.220***	0.253***	0.221***
	(0.082)	(0.096)	(0.085)
100-150 k	0.277***	0.317***	0.220**
	(0.089)	(0.100)	(0.093)
150-250 k	0.359***	0.392***	0.316***
	(0.094)	(0.103)	(0.099)
250-500 k	0.469***	0.510***	0.445***
	(0.104)	(0.111)	(0.108)
>500 k	0.952***	0.925***	0.848***
	(0.171)	(0.161)	(0.189)
Risk tolerance			
medium	-0.157**	-0.167**	-0.211
	(0.071)	(0.068)	(0.078)
low	-0.612***	-0.709***	-0.597***
	(0.080)	(0.094)	(0.085)
Demographics	YES	YES	YES
Macroarea	YES	YES	YES
# obs	1686	1686	1653
R^2/Pseudo R^2	0.121	0.056	0.091
F-test			25.373
p-value Sargan test			0.122
*Robust standard errors in parentheses; * p<0.01, ** p<0.005, *** p<0.001*			

Notes: all models include the following control variables: age and age squared, dummy for gender, dummies for marital status, dummies for educational level.

Figure 1. Search for second opinion and financial literacy (high vs. low)

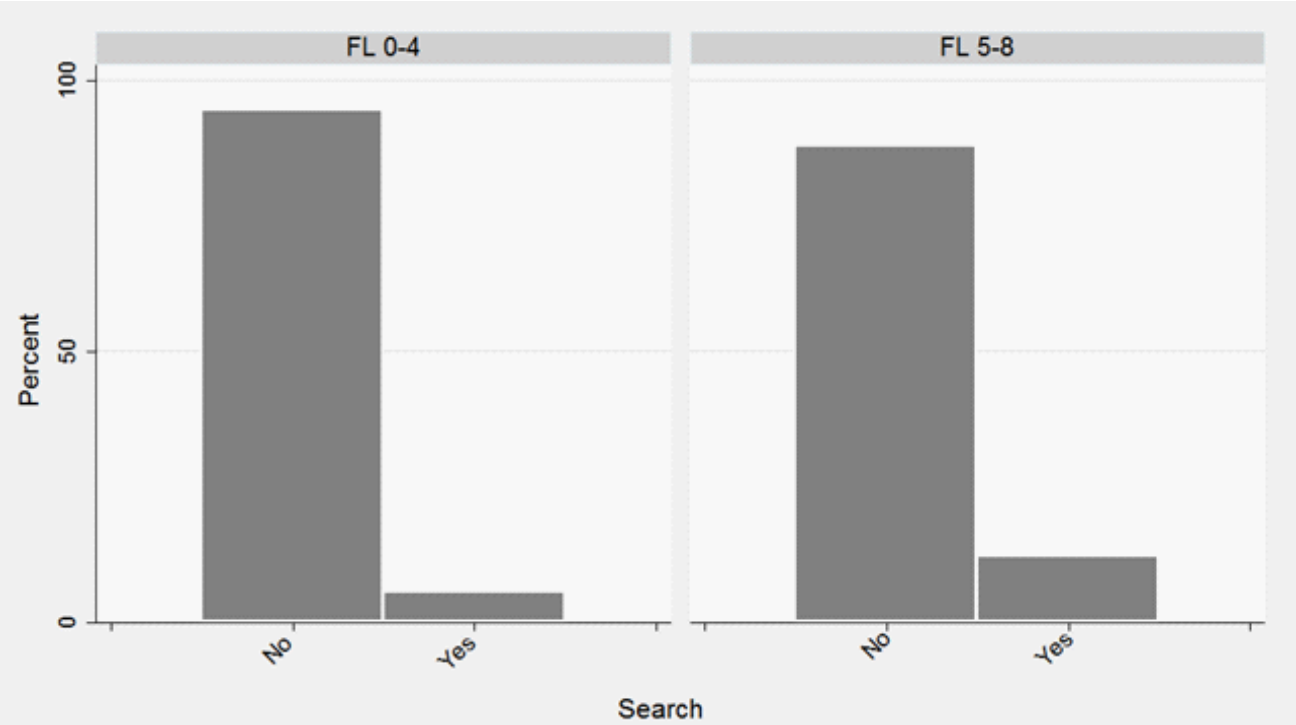
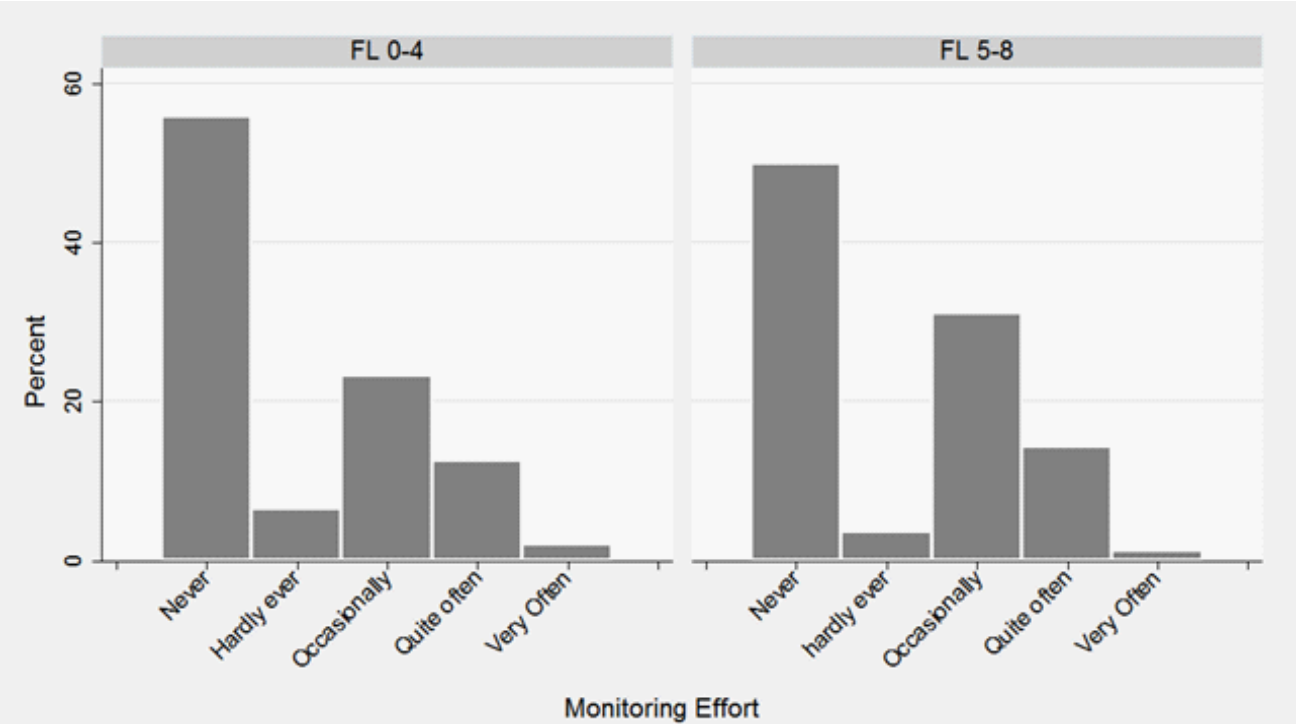


Figure 2. Direct monitoring and financial literacy (high vs. low)



Appendix

A The formal model

The economy is populated by investors (principals) I and a continuum of financial advisors (agents, or experts) A, all risk neutral. The principal is in need of a financial product but is uncertain as to which of a continuum of possible products matches his need. The financial markets provide a continuum of financial products $a \in [0,1]$.[25]The individual characteristics parameter $\theta \in [0,1]$ is unknown ex-ante both to advisors and investors. Advisors can either exert high effort ($e = 1$) at cost $c > 0$ or no effort ($e = 0$) and the level of effort is unobservable to investors. We allow the experts to randomize between the two effort levels and denote with $x \in \{0,1\}$ the probability of high diagnostic effort. Only advisors exerting high effort observe the (true) profile θ of the individual investor. Such profile θ univocally maps the utility U the investor i obtains from every financial product a.

We assume that the principal derives a positive utility from the product a only if $a = a^*(\theta)$, the product that matches her characteristics θ, while the non-matching utility is equal to zero:

$$U_I = \begin{cases} V & \text{if } a = a^*(\theta) \\ 0 & \text{if } a \neq a^*(\theta) \end{cases}$$

Investors are endowed with a different degree of financial literacy, inversely related to a parameter k which captures the cost suffered by the investor to directly verify the effort put by the advisor.

We assume the following: a) V is the same for all investors; b) Investors are not endowed with the knowledge to find by themselves the optimal product. c) Investor always buys the recommended security; d) Investors can follow two strategies to verify the effort of the advisor: either through an indirect channel of second opinion (at cost s) or through a direct channel of verification (at cost $k + s$).

There is an infinite population of identical experts. Each expert recommends a product. Each time an investor consults an expert, she pays a search cost s while if she chooses to directly verify the effort of the advisor she pays a verification cost k. If the expert makes a high diagnostic effort he identifies the only security $a^*(\theta)$ providing the investor the utility V, and his recommendation will be correct. If the expert does not make high diagnostic effort, the recommendation is randomly drawn from a uniform distribution $[0,1]$.[26] The strategy of the expert therefore consists of a contract offer at price p, and an effort choice should the principal accept the contract offer.

The principal-investor seeks to maximize her expected utility while the expert seeks to maximize his expected profits.

The strategic choice of the expert consists of the choice between $e = 0$ and $e = 1$, where x is the probability of high diagnostic effort. Investors cannot observe the experts' effort unless they pay the additional cost k and experts do not observe the history of the principal.

The investor strategy consists of the choice among the following options:

(i) quit the game without purchase: $\{Q\}$;

(ii) stop at the first recommendation and buy the recommended product, whatever this is: $\{SB\}$;

(iii) verify the effort exerted by the advisor and buy the recommended product only if the effort was high, and otherwise quit the game without purchase: $\{VQ\}$;

(iv) verify the effort of an advisor n and, after having inferred that $e_n = 0$, buy from any precedent expert at the lowest price proposed: $\{VSB\}$;

[25] As in Pesendorfer and Wolinsky (2003), the set of possible products is modelled as a continuum to assure that an unguided guess will not yield the right choice with positive probability.

[26] We follow PW in limiting the discretion of the experts over their reporting in order to avoid dealing with uninteresting multiplicities in the communication between expert and principal.

(v) sample $n > 1$ experts and buy from any of them at the lowest price proposed: $\{S\}$;

(vi) sample $n > 1$ experts and verify them until an advisor making effort is found: $\{V\}$.

Lemma 1 shows that the value of the game is not affected by the verified recommendations that the investor is sure are not correct.[27]

Lemma 1 *Irrelevance of uncorrected verified recommendations. Let W_i^n be the value of the game at time n after the investor has received n distinct recommendations $a_1, ..., a_n$ among which i have been verified and $e_i = 0$, $i < n$. Then*

$$W_i^n = W_0^{n-i}$$

We analyze symmetric perfect Bayesian equilibria where investors form beliefs on experts' effort and experts form beliefs over the set of possible histories of the principal conditional on being sampled by the principal. In equilibrium, the investors' beliefs must coincide with the effort probability of the advisor and the experts' beliefs must coincide with the probability distribution over the investor's history along the equilibrium path.

The agents' best responses

We start analyzing the optimal strategy of the investor, given the strategy profile of experts and the associated probability of high diagnostic effort. We can show that the optimal behavior for the principal is characterized by a stopping rule applied to sequences of recommendations and is described in Lemma 2.

Lemma 2 *Every pure best response to (p, x) is one of the following strategies: (i) stop at the first step choosing the best stopping strategy σ^*_{stop};(ii) sample advisors until two recommendations match; then purchase from one of the two experts who provided the matching recommendations; (iii) sample advisors verifying all of them until the investor finds that one of them has exerted high effort.*[28]

Lemma 2 shows that I's optimal strategy is always a closed-loop one. If the investor asks for advice, then she can either choose to stop at the first recommendation or to search for the optimal product. In the first case, she either verifies the first advisor and then eventually quits or buys after the first recommendation. In the second case the investor either keeps on verifying sequentially all the advisors until she finds that one of them made high effort and buys the offered product or she searches for a matching pair of recommendations and buys from one of the two experts making that recommendation.

The intuition behind Lemma 2 is that the principal continues to search (with or without verifying each advisor's recommendation) after two or more conflicting recommendations: since the probability that any given recommendation is correct is revised downward after receiving an additional, conflicting recommendation, then this probability reduces with time. This in turn implies that the expected benefit from stopping and buying after $n > 1$ recommendation is lower than the benefit from stopping after the first recommendation. A second implication of Lemma 2 is that the principal purchases the service after receiving two matching recommendations or after having verified a correct recommendation.

If the investor enters the advice market that is, if she does not quit at the beginning of the game, then by Lemma 2 her best response can be described by the parameter vector $\mathbf{f} = (f_1, f_2, f_3, f_4)'$, where f_1 denotes the probability that the principal stops after the first recommendation (strategy SB), f_2 is the probability that the principal stops after having verified the first recommendation (strategy VQ), f_3 is the probability that the principal sequentially sample and verify multiple advisors (strategy V) and finally f_4

[27] All the proofs are collected in the Appendix B.

[28] The proof of Lemma 2 is available upon request.

$(= 1 - f_1 - f_2 - f_3)$, that is the probability that the principal searches for two matching recommendations (strategy S).

If I stops after the first recommendation (SB) her payoff is

$$xV - p - s$$

while the payoff if I stops after having verified the first recommendation (VQ) is

$$x(V - p) - (s + k)$$

A randomly sampled expert makes the correct recommendation with probability x so that the expected duration of the search for one correct recommendation is $\frac{1}{x}$ and for two correct recommendations is $\frac{2}{x}$. Therefore, in case the principal follows the strategy of search until two matching recommendations are found (S) the expected search cost is $\frac{2s}{x}$ while when the strategy chosen is the one of verifying every sampled expert (VS) the expected search cost is $\frac{k+s}{x}$.

The principal's payoff when the $\{S\}$ strategy is followed is

$$V - p - \frac{2s}{x}$$

while when the $\{V\}$ strategy is followed the payoff is

$$V - p - \frac{k + s}{x}$$

Lemma 3 *There exists a unique, non-dominated stopping strategy* (SB)[29]. *According to Lemma 2 any stopping strategy is eventually chosen at step one: this implies that* (VSB) *coincides with* (VQ). *Moreover, the strategy* (VQ) *is dominated for any value of* k *in the region of parameters ensuring a positive investor utility: for* $k < s$ *the strategy* (VQ) *is dominated by the strategy* (V) *while for* $k > s$ *is dominated by the strategy* (SB) *or* (S).

The set of non-dominated strategies therefore shrinks to $(SB) \cup (S)$ for $k > s$ and to $(SB) \cup (V)$ for $k < s$.

The optimal behavior of the advisor hinges on his beliefs about the principal's history. The probability B denotes the expert's belief that the principal has not been previously diagnosed by other advisors.

The advisor's expected profits under low or high diagnostic effort vary across different strategies and are specified in the next section together with the characterization of the fixed price equilibria.

Equilibria in the game with fixed prices

We start by characterizing the Nash equilibria of the game when prices are fixed in order to focus on the advisor's choice of diagnostic effort.

Let us denote with B the advisor's belief that the investor has not visited another expert before sampling him. The profile $(p, x, \mathbf{f})$ is a *fixed price equilibrium* if (i) the principal's strategy $\mathbf{f}$ is optimal given (p, x); (ii) the advisor's diagnostic effort $x \in [0, 1]$ is optimal given $(p, \mathbf{f})$ and given that the belief B is consistent with the search behavior of the principal and the effort choice of the agent. An equilibrium is *degenerate* if the probability of high diagnostic effort is null ($x = 0$) while it is *non-degenerate* if the probability advisors choose high diagnostic effort is $x > 0$.

Lemma 4 shows that B is equal to the inverse of the expected duration of search which varies along with the different investor strategies. Whenever a mixed strategy prevails the value of B is equal to the inverse

[29] The proof of Lemma 3 is available upon request.

of the expected duration of search associated to each of the two pure strategies weighted according to their respective probability (the corresponding elements in the $\mathbf{f}$ vector).

Lemma 4 *The expert's beliefs are consistent with $(p, x, \mathbf{f})$ if and only if B is the inverse of the expected duration of search.*[30]

B is therefore equal to one if I follows the strategy $\{SB\}$; it is equal to $\frac{2}{x}$ (resp. $\frac{1}{x}$) if I plays $\{S\}$ (resp. $\{V\}$). It is a weighted average of these values if I follows mixed strategies.

There always exist degenerate fixed price equilibria in which the probability the expert makes high diagnostic effort is zero and the principal quits immediately.

Let us now describe in detail the different types of potential non-degenerate equilibria. Since the strategies choice at $t = 0$ of investor and advisor is contemporaneous and the investor's optimal strategy is closed-loop (by Lemma 1), the game can be represented in its normal form

	not verify	*verify*
stop	SB (f_1)	VQ (f_2)
search	S (f_4)	V (f_3)

Following Lemma 3 the strategy (VQ) is dominated in the relevant domain, that is $f_2 = 0$. We are therefore left with three potential pure strategies equilibria and two mixed strategies ones. We can exclude the pure strategy SB as it does not satisfy the necessary condition to have a non-degenerate equilibrium: if $f_1 = 1$ in fact, the advisor will choose $e = 0$. We are therefore left with two potential pure strategies equilibria and two potential mixed strategies.

The following two parameter restrictions apply:

$$x > \frac{p}{V};\ p \geq c$$

simply reflecting the participation constraints of the investor and advisor, respectively. We characterize below all potential equilibria in the fixed price game.

We can easily notice using Lemma 2 that for $k = s$ the pure strategies (S) and (V) coincide while for $k > s$ the pure strategy (S) dominates the pure strategy (V). We can therefore characterize the investor utility of the non-stopping strategy generically as

$$V - p - \frac{k+s}{x} \tag{1}$$

where k is replaced by s whenever the verification cost is above the search cost $(k > s)$.

Proposition 1: *If $k > s$ then the following strategy profiles form Nash equilibria in the fixed price game:*

1) A mixed-strategy $\{SB, S\}$ if $p > 2c$ such that

$$\begin{aligned}
\sigma^*_{ADV} &: \Pr(e = 1) = \underline{x}_1 \\
\sigma^*_{INV} &= \begin{cases} \Pr(SB) = f_1 = \frac{p-2c}{p-2c+\underline{x}_1 c} \\ \Pr(S) = 1 - f_1 \end{cases} \\
\Pi^*_{ADV} &= 2p - c > 0 \\
\Pi^*_{INV} &= \underline{x}_1 V - p - s \geq 0
\end{aligned}$$

where $\underline{x}_1$ is the lowest solution of the equation $V - p - 2\frac{s}{x} = xV - p - s$.

[30] The proof of Lemma 4 is analogous to the one reported in the appendix of PW (for their Lemma 2).

2) A pure-strategy $\{S\}$ if $p = 2c$ such that

$$\begin{aligned}
\sigma^*_{ADV} &: \Pr(e=1) = x, x \in [\underline{x}_1, \overline{x}_1] \\
\Pi^*_{ADV} &= 0 \\
\Pi^*_{INV} &= V - p - \frac{2s}{x} \geq 0
\end{aligned}$$

If $k < s$ then the following strategy profiles are Nash equilibria in the fixed price game:
3) A mixed-strategy $\{SB, V\}$ if $p > c$ such that

$$\begin{aligned}
\sigma^*_{ADV} &: \Pr(e=1) = \underline{x}_2 \\
\sigma^*_{INV} &= \begin{cases} \Pr(SB) = f_1 = \frac{p-c}{p-c+\underline{x}_2 c} \\ \Pr(V) = 1 - f_1 \end{cases} \\
\Pi^*_{ADV} &= f_1 B p > 0 \\
\Pi^*_{INV} &= \underline{x}_2 (V - p) - k - s \geq 0
\end{aligned}$$

where $\underline{x}_2$ is the lowest solution of $xV - p - s = V - p - \frac{k+s}{x}$
4) A pure strategy $\{V\}$ if $p = c$ such that

$$\begin{aligned}
\sigma^*_{ADV} &: \Pr(e=1) = x, x \in [\underline{x}_2, \overline{x}_2] \\
\Pi^*_{ADV} &= 0 \\
\Pi^*_{INV} &= V - p - \frac{k+s}{\underline{x}_2} \geq 0
\end{aligned}$$

when $\underline{x}_2 \geq \frac{k+s}{V-p}$.

From Proposition 1 we can draw some preliminary conclusions. First, if I decides to search for a second recommendation, she always verifies the advice she receives when $k < s$, vice versa for $k > s$ she simply searches for a second opinion without verifying any of them. Thus, we do not have equilibria in the fixed price game where I mixes the two strategies $\{S\}$ and $\{V\}$ except for the (non-generic) case $k = s$.

Both direct monitoring and search for a second opinion, if used with probability one, are able to reduce the advisor's payoff to zero. Notice however that the two disciplining methods have different effects on the price: if I monitors for sure, all the non-degenerate equilibria in the fixed price game are such that $p = c$. More generally, if investors *cannot commit not to verify*, e.g. in an equilibrium with $\{V\}$, search for second opinion does not work anymore as a collusive mechanism to sustain high prices as in PW, and the possible equilibrium prices are $p \geq c$. Instead, searching with probability one reduces the price at $p = 2c$, as in PW. Thus direct monitoring, when credible, has a stronger effect on price than search for a second opinion.

The advisor obtains a positive expected profit at equilibrium only if he induces I to play $\{SB\}$ with positive probability. Since I plays $\{SB\}$ with probability f_1 and she is sure to buy the optimal product if she searches for second opinion or verifies the advisor, the ex-ante probability of buying a^* is then equal to $1 - f_1 + f_1 x > 0$. Hence it is more likely to buy the optimal product rather than when she chooses by herself.

Equilibria with price competition

If we allow for price competition among experts we are able to characterize the equilibria of the full game. Every degenerate fixed price equilibrium is also an equilibrium in the full game.[31] Non-degenerate equilibria exist for a smaller region of the parameter space than do non-degenerate fixed price equilibria because they have to satisfy both the conditions of non-degenerate fixed price equilibria in Proposition 1 and the non-existence of any profitable price deviation by the experts. The profile $(p, x, \mathbf{f})$ is a (Bayesian-Nash) equilibrium in the full game if (i) the strategies ($\mathbf{f}$,x) are a Nash equilibrium of the fixed-price game starting with price p and (ii) the advisor's pricing strategy $p \in [0, V]$ is optimal given that the profile $(\mathbf{f}, x)$ is a Nash equilibrium in the fixed-price game following p.

Proposition 2: *A profile (p, x, f) is an equilibrium in the full game if:*

(a) for $k > s$

$$\begin{aligned} \sigma^*_{ADV} &: \Pr(e=1) = \underline{x}_1 \\ \sigma^*_{INV} &= \begin{cases} \Pr(SB) = f_1 = \frac{p-2c}{p-2c+\underline{x}_1 c} \\ \Pr(S) = 1 - f_1 \end{cases} \\ p &\in [2c, V - \tfrac{2s}{\underline{x}_1}] \\ \Pi^*_{ADV} &> 0 \end{aligned}$$

(b) for $k < s$

$$\begin{aligned} \sigma^*_{ADV} &: \Pr(e=1) = \underline{x}_2 \\ \sigma^*_{INV} &= \begin{cases} \Pr(SB) = f_1 = \frac{p-c}{p-c+\underline{x}_2 c} \\ \Pr(VS) = 1 - f_1 \end{cases} \\ p &\in [c, V - \tfrac{k+s}{\underline{x}_2}] \\ \Pi^*_{ADV} &> 0 \end{aligned}$$

where $\underline{x}_1$ is the lowest root solving of the equation $xV - p - s = V - p - \frac{2s}{x}$ and $\underline{x}_2$ is the lowest root solving of the equation $xV - p - s = V - p - \frac{(s+k)}{x}$

The intuition that allows to exclude some of the equilibria of the fixed price game once we analyze the full game is different if we consider fixed price equilibria paying zero expected profits to the advisor or other ones paying a positive expected profit.

For zero-profit fixed-price equilibria in Proposition 1, either a decrease in price signals higher effort from the advisor (equilibrium with the investor playing $\{S\}$ with probability one), or viceversa an increase in price signals a higher effort from the advisor which more than offset the price effect, so that the investor is better off sampling the deviating expert.

For the equilibria in Proposition 1 with positive expected profit for the advisor, we can easily follow the same reasoning of PW, by simply replacing $2s$ with $(k + s)$ in the investor's utility function searching for a second opinion. All proofs are otherwise identical as in PW.

[31] Indeed, the advisor's profit in any degenerate equilibrium is null independently of the price.

B Proofs

Proof of Lemma 1: Available upon request.

Proof of Lemma 2: Available upon request.

Proof of Lemma 3: Available upon request.

Proof of Lemma 4: See the proof of Lemma 2 in PW (pp. 433-434).

Proof of Proposition 1: Investor's payoff function at $t = 0$ given Lemma 1 and 2 is given by:

$$\begin{aligned} \Pi_{INV}(SB) &= xV - p - s \\ \Pi_{INV}(S) &= V - p - 2\frac{s}{x} \\ \Pi_{INV}(V) &= V - p - \frac{k+s}{x} \end{aligned}$$

and I can choose among two pure strategies, $\{S\}$ and $\{V\}$,and two mixed-strategies, $\{SB, S\}$ and $\{SB, V\}$:[32]

There cannot exist a pure-strategy equilibrium with I playing $\{SB\}$ with probability one.[33]

Now we proceed verifying whether there equilibria at which I searches for a second opinion. There are three possible Nash equilibria with these characteristics:

(i) one in which I plays $\{S\}$;

(ii) one in mixed strategies $\{VS, \}$;

(iii) one in which I plays $\{V\}$;

For all three profiles, necessary condition for $x > 0$ is $\Pi_{ADV}(e = 1) = \Pi_{ADV}(e = 0)$:

$$I \to V \ (prob..\ f_3) \begin{cases} \Pi(e=0) & 0 \\ \Pi(e=1) & p-c \end{cases} \quad I \to S \ (prob..\ f_4 = 1 - f_3) \begin{cases} \Pi(e=0) & 0 \\ \Pi(e=1) & \frac{p}{2} - c \end{cases}$$

i.e. $f_3 = \frac{2c}{p} - 1$, which in turn guarantees that, at all these candidate equilibria, for any $x \in [0, 1]$: $0 \leq \frac{2c}{p} - 1 \leq 1$

$$\Pi^*_{ADV} = 0$$

and

$$c \leq p \leq 2c$$

Notice the two special cases:

$$\begin{aligned} p &= 2c \Rightarrow f_3 = 0 : NE \text{ with } \{S\} \\ p &= c \Rightarrow f_3 = 1 : NE \text{ with } \{V\} \end{aligned}$$

We start from (i), i.e. I plays $\{S\}$. This profile is an equilibrium only if $S \succeq_{INV} V \Rightarrow k > s$. Candidate equilibrium payoff for I is then $\Pi_{INV}(S) = V - p - 2\frac{s}{x} \geq 0$ for $x \geq \frac{2s}{V-p}$. Also, the profile is an equilibrium only if

$$S \succeq_{INV} SB \Rightarrow V - p - 2\frac{s}{x} > xV - p - s \tag{2}$$

Thus $\{S\}$ is a Nash equilibrium of the game in fixed price only if $k > s$, $p = 2c$ and (2) holds.

Now we move to (ii), $\{V\}$. To have $\Pi_{ADV}(e = 1) = \Pi_{ADV}(e = 0)$ with $f_3 = 1$ we need $p = c$. Notice that advisor obtains then a zero expected profit at this candidate equilibrium.

[32] It is easy to rule out equilibria in mixed strategies where three or four pure strategies belong to the equilibrium support. Only one value $Pr(e = 1) = x$ generically cannot guarantee I is indifferent among more than two strategies.

[33] With $v = 0$ and $f = 1$ it is optimal for the advisor to chose $x = 0$. But then for the investor is optimal not to stop and buy.

This is an equilibrium only if $VS \succeq_{INV} S \Rightarrow k < s$. Also, $\{VS\}$ provides higher payoff than the best "stopping" strategy:

$$VS \succeq_{INV} SB \quad x > 1 - k/p : V - p - \frac{k+s}{x} > xV - p - s \tag{3}$$

hence $x \geq \frac{k+s}{V-p}$: I obtains the expected payoff $V - p - \frac{k+s}{x} \geq 0$.

$\{V\}$ is a Nash equilibrium of the fixed price game if $k < s$, $p = c, x \geq \frac{k+s}{V-p}$ (2) holds.

Finally, let us consider (iii), whether $\{V, S\}$ can be an equilibrium. Also in this case, $\Pi^*_{ADV} = 0$. I mixes $\{V, S\}$ only if:

$$V - p - \frac{k+s}{x} = V - p - 2\frac{s}{x}$$

that gives

$$k = s$$

Since this condition generically does not hold in the space of parameters (k, s) we leave aside this candidate equilibrium for the moment.

Finally, we turn to candidate equilibria in the fixed-price game at which I mixes between stopping at the first advisor and searching for a second opinion. There are two possible profiles to analyze:

(i) a mixed-strategy $\{SB, S\}$

(ii) a mixed strategy $\{SB, V\}$

(i) The necessary condition for $x > 0$ becomes

$$I \to SB \ (prob..\ f_1) \begin{cases} \Pi(e=0) & 0 \\ \Pi(e=1) & p-c \end{cases} \quad I \to S \ (prob..\ f_4 = 1 - f_1) \begin{cases} \Pi(e=0) & 0 \\ \Pi(e=1) & \frac{p}{2} - c \end{cases}$$

hence

$$(1 - f_1 B)\frac{p}{2} - c = 0$$

Substituting for $B = \frac{x}{f_1 x + 2(1-f_1)}$ we obtain:

$$f_1 = \frac{p - 2c}{p - 2c + x_1 c}$$

which implies

$$p > 2c \text{ because } f_1 > 0$$

This corresponds to the equilibrium in the fixed-price game of PW.

Necessary condition for $f_1 \in (0, 1)$ is $\Pi_{INV}(SB) = \Pi_{INV}(S)$:

$$V - p - 2\frac{s}{x} = xV - p - s$$

that provides the two roots $\underline{x}_1$ and $\overline{x}_1$. Selecting $\underline{x}_1$ we have $\Pi^*_{INV} = \underline{x}_1 V - p - s \geq 0$.

Necessary condition for $f_3 = 0$ is now that $\Pi^*_{INV}(\underline{x}) \geq \Pi_{INV}(VS)$, that we can rewrite as

$$\Pi_{INV}(S) \geq \Pi_{INV}(V) \Leftrightarrow k > s$$

The strategies $\{SB, S\}$ with probability $\left(\frac{p-2c}{p-2c+\underline{x}_1 c}, 1 - \frac{p-2c}{p-2c+\underline{x}_1 c}\right)$ where $\underline{x}_1$ is the lowest solution of $V - p - 2\frac{s}{x} = xV - p - s$ and $\Pr(e = 1) = \underline{x}_1$ are a Nash equilibrium of the fixed price game if and only if $p > 2c$, $k > s$.

(ii) Two necessary conditions have to be verified in this case: (a) $\Pi_{INV}(SB) = \Pi_{INV}(V) = \Pi^*$, (b) $\Pi^*(V) > \Pi_{INV}(S)$ (a) requires

$$xV - p - s = V - p - \frac{k+s}{x}$$

whose solutions are $\underline{x}_2$ and $\overline{x}_2$. (b) implies $k < s$ by Lemma 2.

Given that I plays $\Pr(SB) = f_1$ and $\Pr(V) = 1 - f_1$, the sampled advisor payoff is equal to

$$\begin{aligned} \Pi_{ADV}(e &= 1) = f_1 Bp + (1 - f_1)\left[Bp + (1 - B)p\right] - c = f_1 Bp + (1 - f_1)p - c \\ \Pi_{ADV}(e &= 0) = f_1 Bp \end{aligned}$$

hence

$$(1 - f_1 B)\frac{p}{2} - c = 0$$

Substituting for $B = \frac{x}{f_1 x + (1 - f_1)}$ we obtain:

$$f_1 = \frac{p - c}{p - c + x_1 c}$$

which implies

$$p > c \text{ because } 0 < f_1 < 1$$

Necessary condition for $f_1 \in (0, 1)$ is $\Pi_{INV}(SB) = \Pi_{INV}(V)$:

$$V - p - \frac{k+s}{x} = xV - p - s$$

that provides the two roots $\underline{x}_2$ and $\overline{x}_2$. Selecting $\underline{x}_2$ we have $\Pi^*_{INV} = \underline{x}_2 V - p - s \geq 0$.

Necessary condition for $f_4 = 0$ is now that $\Pi^*_{INV}(\underline{x}) \geq \Pi_{INV}(S)$, that we can rewrite as

$$\Pi_{INV}(V) \geq \Pi_{INV}(S) \Leftrightarrow k < s$$

The strategies $\{SB, V\}$ with probability $\left(\frac{p-c}{p-c+\underline{x}_1 c}, 1 - \frac{p-c}{p-c+\underline{x}_1 c}\right)$ where $\underline{x}_2$ is the lowest solution of $V - p - \frac{s+k}{x} = xV - p - s$ and $\Pr(e = 1) = \underline{x}_2$ are a Nash equilibrium of the fixed price game if and only if $p > c$, $k < s$.

■

Proof of Proposition 2: See the proof of Proposition 1 in PW (pp. 434-436), replacing $2s$ with $(k+s)$ in the analysis of the fixed-price equilibrium $\{SB, V\}, \{p > c, \underline{x}_2\}$.

■

C Unicredit Investors Survey: description of the main variables

The 2007 Unicredit Investors Survey (UCS),which draws from the population of clients of one of the three largest European banking groups, with over 4 million accounts in Italy. The 2007 wave interviewed 1,676 individuals with a current account in one of the banks that are part of the Unicredit Group based in Italy. The sample is representative of the eligible population of customers, excluding younger than 20 or older than 75, and those who hold accounts of less than 10,000 euro or more than 2.5 million euro.

The sample selection is based on individual clients of Unicredit, however the survey contains detailed information also on the head of household – defined as the person responsible for the financial matters of the family – and spouse, if present. As for the financial variables, they are elicited both at the respondent and household level.[34]

Below we list all variables included (except demographic variables) and report the survey variable label in brackets.

Financial Literacy Index

The respondent is awarded one point for answering correctly questions 1 to 8.

1. Inflation (label: INFLATION)

Suppose a bank account yields a 2% interest per annum (after expenses and taxes). If actual inflation is 2% per year (assuming you did not access your account) after two years, the amount deposited can buy you (select one answer):

a) More than it can buy today; b) less than it can buy today; c) the same as it can buy today (correct); and d) cannot answer/cannot understand.

2. Interest rates (label: INTEREST)

Imagine having a 'tip' and knowing for certain that in six months interest rates will rise. Do you think it is appropriate to purchase fixed rate bonds today?

a) Yes; b) no (correct); c) I do not know.

3. Diversification 1 (label: DIVERSIF1)

In relation to investments, people often talk about diversification. In your opinion, to have proper diversification of one's investments means (select one response):

a) To have in one's investment portfolio bonds and shares; b) not to invest for too long in the same financial product; c) to invest in the greatest possible number of financial products; d) to invest simultaneously in multiple financial products to limit exposure to the risks associated with individual products (correct); e) to not invest in high-risk instruments; f) I do not know/cannot understand.

4. Diversification 2 (label: DIVERSIF2)

Which of these portfolios is better diversified?

a) 70% T-bills, 15% European equity fund, 15% in 2-3 Italian stocks ; b) 70% T-bills, 30% European equity fund; c) 70% T-bills, 30% in 2-3 Italian stocks; d) 70% T-bills, 30% in stocks of companies I know well; e) Do not know

Four other financial literacy indicators are based on the question: How risky do you think these products are?

The answers range from 1=Not risky at all, to 5=Very risky, and 'Do not know' is always an option. One point is given if the respondent can correctly state that:

5. : Private bonds are risker than deposits (label: RISK1)

6. : Stocks at least are riskier than government bonds (label: RISK2)

7. : Stocks mutual funds are riskier than bonds mutual funds (label: RISK3)

[34] Notice that the Unicredit sample is older, more educated, more likely to live in the North and with higher family income than the SHIW sample.

8.: Housing is riskier than deposits (label: RISK4)

Advice (label: ADVICE)

Binary variable based on the answer (YES/NO) to following question "Considering all banks/financial institutions you and your family have relationship with, do you rely on the advice of a financial consultant to make your investment choices?"

Portfolio Sophistication (label: QT)

The UCS contains detailed information on respondents' portfolio composition, reporting the share invested in:

1. Liquid assets, such as deposits, savings account, repo bonds;
2. National and foreign bonds;
3. National and foreign stocks, futures, derivatives, warrants, options;
4. National and foreign mutual funds, including ETF and hedge funds;
5. Segregated accounts;
6. Unit linked and Index linked life insurance.

We build a measure of "portfolio sophistication" by summing up the share of assets invested in 3-6 and obtain an index ranging from 0 to 1, where 0 represents he whole portfolio invested in liquid and other non sophisticated assets.

Search (label: MARCHE)

Binary variable based on the answer (YES/NO) to following question:

"Have you ever asked your advisor products sold by other banks or financial intermediaries"

Monitoring (label: ADVFREQ)

This measure is based on the following question "How often do you use your financial advisor as a source of financial information/ financial advice?"

We awarded 1 point to respondents who "never" use any source of financial information, 2 to those who use their financial advisor "rarely", 3 to those who use their financial advisor "sometimes", 4 to those who use their financial advisor "often" and 5 to those who use their financial advisor "very often".Proxy for monitoring

Dummy Delegation/Ask for Advice (label: MODINV)

This variable separates, within the consulting activity, the role of advice and that of delegation. The measure adopted is based on the question "In managing your financial investment, which of these statements better describes your attitude? A: I prefer to decide autonomously: the bank just executes my dispositions; B: I discuss with my bank/advisor my intentions and ask an advice before taking a decision; C: I evaluate my bank's/advisor's proposals before taking a decision; D: I mainly rely on my bank/advisor for my investment decisions; E: I allow my bank (advisor) decide everything".

We construct a dummy "delegation" if the answers are D-E and a variable "ask for advice" if the answers are B-C.

in advD= modinv 1=., modinv 2,3= 1 (advice) modinv 4,5=0 delegates.

Investment driver (label: MOTVR=K)

This variable is based on the question "How important is the following motivation as a driver for your investment? To increase wealth, regardless of what it is accumulated for" The answers range from 1 (=not at all) to 5 (=very important). We consider a dummy variable taking value 1 if answers are below 4 and 0 otherwise, in order to check the robustness of our findings to the subset of investors who have a more precise goal in their investment activity (and then in their search for the correct advice).

Wealth (label: FPATRIM)

The wealth refers to the respondent's holdings at Unicredit (2006, 30th June) and is defined in brackets (1: 10k-50k; 2: 50k-100k; 3: 100k-150k; 4: 150k-250k; 5: 250k-500k; 6: 500k-5000k). Note that the sample includes clients with a financial wealth in Unicredit at least equal to 10 thousands euros.

Income (label: YL+YCF)

This variable comprises labour and capital income perceived by the respondent's family at the end of year 2006.

Risk tolerance (label:PROPRISK)

The variable is based on the question "In managing your financial investment which of these attitudes do you usually have? When I invest I usually look for Very high returns, even with a high risk of losing part of my principal (HIGH); High returns with a fair degree of principal safety and Fair returns with high safety for my principal (MEDIUM); Low returns without risk of losing my principal (LOW)". We re-code this variable in three levels of risk tolerance (HIGH, MEDIUM, LOW).

Average regional financial literacy (from SHIW)

This variable is average financial literacy at the regional level taken from the Bank of Italy's Survey on Household Income and Wealth (SHIW)

School performance (label: SCHOOL)

The variable is based on the question "Where were you placed as a pupil when you attended junior high school?

1: in the group of best students; 2: above the median; 3: about at median; 4: below the median".

Our variable is constructed as a binary variable taking value 1 if the client belongs to the group 1 and 0 otherwise.