Discussion Paper Series – CRC TR 224

Discussion Paper No. 252
Project B 02

Limited Awareness and Financial Intermediation

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July 2022
(First version: December 2020)

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Funding by the Deutsche Forschungsgemeinschaft (DFG, German Research Foundation) through CRC TR 224 is gratefully acknowledged.

Limited Awareness and Financial Intermediation*

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July 2022

Abstract

We study the market interaction between financial intermediaries and retail investors, who have limited awareness of the available investment opportunities. Intermediaries compete for investors via the menu of investment options they offer. We show that, when facing investors with little prior knowledge, intermediaries restrict their offers to extreme options, e.g. very risky and very safe products. In the case where investors are privately informed about their awareness, the presence of sophisticated, fully aware investors can impose negative externalities on investors with limited awareness. Self-reported data from customers in the Italian retail investment sector support the key predictions of the model.

JEL Codes: D82, D83, G11, G20, G28.

*The authors thank Antonio Guarino, Lugi Guiso, Alessandro Pavan, and Ansgar Walther for very helpful comments, and Francesco Ferlenga, Jacopo Gambato, Francesco Conti and Matteo Cremonini for valuable research assistance. The present draft benefited from several comments received by the seminar participants at the Universitat Pompeu Fabra, Toulouse School of Economics, Collegio Carlo Alberto, University College London, EIEF in Rome, Bonn University and at the Max Plank Institute, at the University of Bristol, the University of Cardiff, at the Bocconi and Cattolica universities in Milan, at the University of Verona, University of Malaga and at the Oxford University. Nicola Pavoni acknowledges financial support from the Baffi Carefin Centre for applied research on international markets, banking, finance, and regulation, and from the MIUR-PRIN grant 20157NH5TP. Sarah Auster acknowledges funding from the German Research Foundation (DFG) through Germany's Excellence Strategy—EXC 2126/1—390838866 and CRC TR 224 (Project B02).

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1 Introduction

One of the many striking features of the last financial crisis was the extreme exposure of investors to risk. Both investment and commercial banks had been selling excessively risky assets to investors, sometimes hiding some of the asset characteristics and safer options (e.g., Gerardi et al. (2008)). At the same time, despite the impressive amount of new financial instruments and the rapidly changing financial world, since the 1950s a large fraction (of approx. 33% in the US) of investment demand has remained on 'safe' assets (Garcia, 2012).

Most financial investments are intermediated by professionals, who are non-neutral brokers and, as such, direct, influence, and distort the demand of assets in the economy. For instance, investment bankers commonly underwrite transactions of newly issued securities, whereby they raise investment capital from investors on behalf of corporations and governments both for equity and debt capital. Financial intermediaries may also operate on the supply side of the asset market (unloading). Such practices give rise to conflicts of interest, sometimes leading to investments that are not necessarily in the best interest of the client. At the same time, investors differ widely in their financial literacy. They not only face limits in their ability to assess the profitability of particular investments, but also have limited awareness of the available investment opportunities and must therefore rely on professional advice. For example, Guiso and Jappelli (2005) document the lack of awareness of financial assets among the 1995 and 1998 waves of the survey of Italian households (SHIW).[1] Although almost 95% of respondents in the dataset are aware of checking accounts and almost 90% are aware of saving accounts, only 65% of potential investors are aware of stocks and only 30% of investment accounts; mutual funds and corporate bonds are known by only 50% of the sample. Less than 30% of respondents are simultaneously aware of stocks, mutual funds and investment accounts.[2] These figures are roughly consistent with the 2016 survey conducted

[1]The surveys are representative samples of the Italian resident population, covering 8,135 households in 1995 and 7,147 households in 1998.

[2]The share of wealth in the hand of unaware agents is also substantial. The share of wealth owned by households that are not aware of corporate bonds is approximately 20%, and so is the share owned by those unaware of mutual funds. In 1995, the households that were unaware of investment accounts owned 40% of the total wealth (the fraction decreased to 32.5% in 1998).

by GfK Italy, documenting that 60% of Italian households report to be acquainted with deposits, government and bank bonds, but less than 40% report to be familiar with foreign stocks, foreign bonds, or portfolio management (CONSOB (2017)).

While the question of how financial advice affects outcomes in markets with heterogeneously sophisticated investors has spurred the interest of many policy makers and academics (see references in the literature review), the awareness asymmetry between professionals and retail investors regarding available assets in the market has so far received limited attention in the literature. The aim of this paper is to model and study the implications of such asymmetries by introducing unawareness into a market environment with imperfect competition. Specifically, we consider a setting with multiple financial intermediaries and investors. Each investor (she) wants to invest her savings and seeks advice from a financial intermediary (he), whose preferences are misaligned. A key feature in our model is that intermediaries have a superior understanding of the set of feasible investment opportunities. This dimension of asymmetry is captured by the assumption that investors are only *partially aware of the available investment products* and can only invest in options of which they are aware.

We assume that competition between intermediaries is limited and follow a search-based approach: meetings are bilateral and investors are matched with either one or two intermediaries. Intermediaries can expand the awareness of the investor they meet by revealing additional investment opportunities. They face however uncertainty about whether the investor simultaneously meets with a second intermediary. In this event, the investor learns from the disclosure of both intermediaries but contracts with only one of them. We assume that the investor chooses the intermediary that discloses more options, which implies that intermediaries compete for investors via the menu of investments they propose.

We characterize the market equilibrium in this setting and show that intermediaries tend to leave investors unaware of investment options with moderate features (e.g. products with intermediate levels of risk or liquidity). The lack of availability of intermediate investment options makes it optimal for investors to allow more extreme products. As a consequence, intermediaries can invest in financial products that would be precluded if investors were fully aware. An important determinant for the intermediaries' optimal disclosure is the investors' initial level of awareness. The key prediction of our model is that investors with little awareness of potential investment options are those likely to be offered few and rather extreme investments. The extent to which investors remain unaware in equilibrium further depends on the degree of competition intermediaries face. The higher is the probability that investors meet more than one intermediary, the more investment options (in a stochastic sense) are disclosed in equilibrium. For intermediate degrees of competition, markets are polarized, with some intermediaries disclosing all available investments and others leaving investors unaware of a significant number of moderate options.

Next, we consider the case where investors are privately informed about their awareness und study spillover effects between different types of investors. We show that when gains from intermediation are sufficiently large for intermediaries to make positive profits with all types of investors, the presence of sophisticated, fully aware types leads to more disclosure of investment options in equilibrium, thereby generating a positive externality on investors with lower levels of awareness. On the other hand, when investing on behalf of sophisticated investors is not profitable, increasing the share of such investors actually reduces the extent to which intermediaries reveal additional investments in equilibrium. Sophisticated investors thus impose a negative externality on investors with limited awareness and cross-subsidization between the different types of investors obtains in equilibrium.

In the empirical section, we provide evidence in line with our model's predictions based on self-reported data that we collected through an online survey. The data consists in approximately 1,400 investors reporting their experience in the retail investment sector during the years 2007-2017. We regress both the number of products offered and a measure of perceived 'extremeness' in *the menu of products* the investor received from the financial intermediary on an index of knowledge. The index is based on 17 questions eliciting investors' knowledge of the financial market and of the products available in the market. Consistent with the theory, our knowledge index is positively associated with the number of products offered and negatively associated with our measure of extremeness of the offered menu. In addition, we use information about *the actual product acquired* by the investor. We find that less knowledgeable investors buy on average less liquid, more risky and more exotic financial products, which are arguably more in line with banks' preferences. These findings are robust to introducing several controls, including proxies for the naivety of the investor, his/her wealth, income, education, and his/her self-reported propensity to take risk or to invest in long-term maturity assets.

Finally, we discuss the policy implications of our findings. Clearly, promoting financial literacy among investors improves their welfare in our model. Interestingly though, our results show that it is not necessary to educate investors about all possible investment options. Instead, we observe that making investors aware of a single (or very few) product(s) may give intermediaries incentives to reveal several other products as well. We therefore have an interesting complementarity between the regulator and the market, suggesting a surprisingly simple, yet powerful, policy intervention. Moreover, in terms of optimal financial literacy policies, we find that a soft training provided to a relatively large fraction of individuals is typically more effective than training intensively a small fraction of potential investors. Partially trained investors are more attractive to intermediaries than fully sophisticated ones and therefore induce intermediaries to compete against each other more fiercely. The competitive effect leads to a shift in the equilibrium awareness distribution, ultimately generating positive spillovers on the investors that remain unaware.

Related Literature: This paper is related to the literature on financial intermediation, which often sees banks as 'efficient brokers' who reduce transaction and information costs. The information based brokerage role of financial intermediaries has been studied by many authors starting from Leland and Pyle (1977); Ramakrishnan and Thakor (1984); Diamond (1984); Allen (1990). Our approach is tightly related to the 'financial advice' literature (e.g., Inderst and Ottaviani (2012), Gennaioli et al. (2015)), and our contribution here is to consider investors with limited awareness about the available financial products.

Empirical evidence on financial intermediaries' behavior from the US retail investment market includes Mullainathan et al. (2012), Woodward and Hall (2012), Egan et al. (2019)

and Egan (2019), while Sane and Halan (2017), Robles-Garcia (2022) and Fisher et al. (2022) analyze evidence from the UK. Our empirical analysis is based on the Italian financial market. Foà et al. (2019) and Guiso et al. (2022) use administrative data from the Italian Credit Register and Survey on Loan Interest Rates and document that Italian Banks provide distorted advice at the moment of counselling households between fixed and adjustable rate mortgages. Since our empirical investigation is based on the theoretical model in this paper, we focus on different aspects of the bank-investor relationship from those emphasized in earlier works. In particular, we study the relationship between the richness and extremity of the menu of products offered by financial intermediaries and the knowledge of the investor about financial products.

Our paper is also related to the (vast and policy relevant) literature on financial literacy (see Lusardi and Mitchel (2014) for a survey). In addition to the already mentioned work by Guiso and Jappelli (2005), the implications of financial literacy on market participation, portfolio diversification, and demand for advice is also studied—among others—in Van Rooij et al. (2011), Abreu and Mendes (2010), Calcagno and Monticone (2015), Malliaris and Malliaris (2021), and in the seminal work by Campbell (2006). We consider a specific limitation in the investors' knowledge with sound theoretical foundations within the unawareness literature, delivering precise implications regarding the (strategic) behavior of financial intermediaries.

Finally, the paper is related to the work on optimal delegation, initiated by Holmström (1978) and developed further by Melumad and Shibano (1991); Martimort and Semenov (2006); Alonso and Matouschek (2008); Kováč and Mylovanov (2009); Armstrong and Vickers (2010); Amador and Bagwell (2013), among others, as well as a relatively small literature on contract theory and unawareness, e.g., Von Thadden and Zhao (2012) and (2014); Zhao (2011); Filiz-Ozbay (2012); Auster (2013). The basic contracting model in this paper is a simplified version of the one in Auster and Pavoni (2021), where we introduce unawareness to the delegation problem of a monopolistic an agent (the intermediary here). On top of adding competition, the current paper introduces the (empirically relevant) case where the intermediary does not have the flexibility to modify the initial investment choice after the contracting stage. We also allow investors to be privately informed about their awareness and study the interaction of this feature with competition. Lei and Zhao (2021) adapt our monopolistic framework to study delegation between a financial expert and an investor, who is unaware of possible contingencies rather than actions.

The paper is organized as follows. The next section presents the model. In Section 3 we characterize the equilibrium and derive the main empirical prediction. Section 4 is devoted to the empirical analysis and Section 5 concludes with a few policy implications. All proofs are relegated to the Appendix.

2 Environment

We consider a model of imperfect competition that is based on the work of Burdett and Judd (1983). There are N intermediaries, indexed by $n = 1, 2, ..., N$, and many investors. Meetings between investors and intermediaries are bilateral, but investors can meet simultaneously more than one intermediary. For simplicity, we assume that a fraction of investors is matched with one intermediary, while the remaining investors are matched with two. We refer to investors that have access to only one intermediary as captive. Whether an investor is captive or non-captive is not observable to the intermediaries. Instead, from the viewpoint of an intermediary, conditional on meeting a particular investor, the investor is non-captive with some probability, denoted by π. The parameter π can be viewed as a measure of competitiveness in the market: if $\pi = 0$, intermediaries act as monopolists; if $\pi = 1$, they engage in Bertrand competition. We assume that intermediaries have no capacity constraints.

Intermediaries have access to a set of investment products, which differ according to their attributes such as return, riskiness, liquidity, maturity, etc. We assume that the different dimensions can be aggregated to a single index $y \in [y_{min}, y_{max}]$.[3] The return of each invest-

[3]The restriction to a single dimension is in line with the literature on optimal delegation. Note further that if the principal's choice is multi-demsional and the objective function is additively separable and identical across the different choice dimensions, then the optimal contract under full awareness replicates the solution of the one-dimensional problem on each dimension, as Koessler and Martimort (2012) show.

ment y depends on the state of the world. Let $\Theta = [0, 1]$ be the set of states and let $F(\theta)$ denote the cumulative distribution function on Θ, assumed to be twice differentiable on the support. Investors and intermediaries have von-Neumann-Morgenstern utility functions that take the quadratic form

$$u(y, \theta) = -(y - \theta)^2 \quad \text{and} \quad v(y, \theta) = -(y - (\theta - \beta))^2.$$

The intermediary's preferred policy is $y = \theta$, while the investor's preferred policy is $y = \theta - \beta$. We assume $\beta > 0$, hence the intermediary has an upward bias of size β. We view the bliss point to be the investment opportunity which generates the best combination between risk, liquidity, and return as a function of the state. The divergence between the investor's and intermediary's bliss point can be interpreted as financial professionals being less risk averse, having limited liability, having different liquidity needs, etc. For instance, if intermediaries receive a higher fee for less liquid assets, we can interpret low values of y in $[y_{min}, y_{max}]$ as relatively liquid investments and high values of y as relatively illiquid ones. Under this interpretation the investor chooses from different portfolios on the efficient frontier, trading off higher expected return against lower liquidity. The state of the economy determines the position of the frontier and therefore the optimal combination of expected return and liquidity for the investor. However, conditional on each θ, the intermediary prefers an investment with strictly higher expected return and lower liquidity than the investor.

While intermediaries are aware of all investment options in $[y_{min}, y_{max}]$, investors differ in their awareness of the available financial options. The set of investor types is denoted by $\mathcal{I}$. An investor of type $i \in \mathcal{I}$ is aware of a subset $Y_i \subseteq [y_{min}, y_{max}]$, which we assume is closed (we impose no restrictions otherwise). Upon meeting, intermediaries observe an investor's awareness and have the possibility to disclose additional investment products.[4] The investor fully understands the investment opportunities that are revealed to her and updates her awareness to the union of the set of newly revealed investment products and her initial awareness set.

[4]We relax the assumption of observable awareness in Section 3.3.

Each investor wants to hire one of the intermediaries to invest on her behalf. We will consider two cases, reflecting different types of investment situations: one where the intermediary privately observes the realization of the state of the world before investing and one where he does not. The second case is significantly simpler and will be analyzed in Section 3.2. Assuming now that each intermediary privately observes θ after contracting, investors optimally grant some flexibility to the intermediary. More specifically, having chosen an intermediary, the investor specifies a set of investment products from which the intermediary can choose once he observes the state of the world. In other words, the investor delegates the investment decision to the intermediary but imposes some constraints on the intermediary's choice. After the intermediary observes the state of the world, he chooses the investment from the delegation set that maximizes his own payoff given his information. The intermediaries' outside option is denoted by $\overline{U}$.

Given the updated awareness, each investor chooses a delegation set $D \in \mathcal{Y}$, where $\mathcal{Y}$ is the set of closed subsets of $[y_{min}, y_{max}]$. We assume that an investor can only delegate investment products that she can name explicitly. Hence, the delegation set must be a subset of the investor's updated awareness set.

We further assume that *if an investor meets with two intermediaries, she chooses the intermediary who discloses more investment products.* More specifically, if the set revealed by one intermediary is a strict subset of the set revealed by the other, the investor chooses the latter, and vice versa. If both intermediaries offer the same set of investments or if the sets cannot be ordered by inclusion, the investor chooses either intermediary with equal probability.

The timing of the game can be summarized as follows:

1. Each investor is matched with a set of intermediaries $\mathcal{N}$ (where the cardinality of $\mathcal{N}$ is either one or two).

2. Intermediary $n \in \mathcal{N}$ reveals a set of investment products $X_n \in \mathcal{Y}$.

3. The investor updates her awareness to $Y = \left(\bigcup_{n \in \mathcal{N}} X_n\right) \cup Y_i$.

4. The investor chooses an intermediary in $\mathcal{N}$ and a delegation set $D \subseteq Y$.

5. The selected intermediary observes the state of world θ and chooses an action $y \in D$.

6. Payoffs are realized.

Remark 1: *There is an alternative reading of our model that does not involve unawareness. Instead, we can think of a situation where intermediaries, rather than just advising investors, actually provide access to the different investment options, e.g. by finding a counterparty. Each intermediary thus decides on the set of investment products he makes available to the investor and, as before, the investor delegates a subset of those investment options to the intermediary. By deciding on which investments to make accessible, the intermediary is given commitment power not to implement certain products.*

Remark 2: *Another important question is whether the investor, even if unaware of an interval (y_1, y_2), could replicate investment products in that interval by diversifying her investment across different products within her awareness. For instance, if y captures the riskiness of the different investment options, an investor who is aware of y_1 and y_2 might generate intermediate levels of risk by investing parts of her savings in y_1 and others in y_2. However, portfolios of products are often "lumpy," which imposes restrictions on investors' abilities to diversify. For example, many securities and funds, in particular mutual funds, require a sizable minimum investment. Further, riskiness is just one of the many dimensions that define an asset in our model. The value of y might, for instance, also capture the term to maturity of the investment or its liquidity. Clearly, splitting up the investment into short and long term funds will not replicate an investment option with an intermediate maturity date. The same applies to the liquidity dimension. Thus, in most situations unawareness will impose important restrictions on the payoffs an investor can achieve.*

3 Equilibrium Analysis

Having fixed an investor's selection strategy between intermediaries, a symmetric equilibrium is defined by three components: the intermediaries' (random) disclosure strategy is an investor-type dependent probability distribution $H_i, i \in \mathcal{I}$ over $\mathcal{Y}$; an investor's delegation strategy $D : \mathcal{Y} \to \mathcal{Y}$ assigns a delegation set to each updated awareness set; an intermediary's investment policy $y(D, \theta)$ describes the implemented action when the realized state is θ and the intermediary can choose from actions in D. A symmetric subgame perfect equilibrium is a tuple $((H_i)_{i\in\mathcal{I}}, D, y)$ such that for each $i \in \mathcal{I}$:

- all disclosure sets in the support of H_i maximize an intermediary's expected payoff, given that other intermediaries randomize according to H_i;
- for all $Y \in \mathcal{Y}$, $D(Y)$ solves the problem

$$\max_{D\subseteq\mathcal{Y}} \mathbb{E}[v(y(D, \theta), \theta)];$$

- for all $D \in \mathcal{Y}$, we have $y(D, \theta) = \arg\min_{y\in D} |y - \theta|$.

Throughout the analysis, we will adopt a regularity conditions on the distribution, which is common in the delegation literature, and assume that delegation is valuable for the investor. Furthermore, we will assume that in each state of the world both the investor's and the intermediary's ideal products are available.[5]

Assumption 1. *$f'(\theta)\beta + f(\theta) > 0$ for all $\theta \in (0, 1)$; and $\mathbb{E}[\theta - \beta] > 0$.*[6]

Assumption 2. *$y_{min} < -\beta$ and $y_{max} > 1$.*

We start the analysis by first describing the benchmark case of full awareness, $Y_i = [y_{min}, y_{max}]$ for all $i \in \mathcal{I}$. When investors are fully aware of all feasible investment options, an intermediary's choice of disclosure has no effect on the delegation set investors

[5]The sole purpose of the latter assumption is to reduce the number of cases we need to distinguish.

[6]All expectations are taken with respect to F.

choose. Provided that intermediation is profitable, this means that in equilibrium each intermediary $n = 1, 2, ..., N$ will reveal the set of all available investment products, that is, $X_n = [y_{min}, y_{max}]$. If matched with two intermediaries, an investor picks either intermediary with equal probability and chooses the optimal delegation set with respect to full awareness. The existing literature shows that if the density function $f(\theta) \equiv F'(\theta)$ satisfies the regularity condition in Assumption 1, the optimal delegation set in this case is an interval of the form $[y_{min}, \hat{y}]$ (Martimort and Semenov, 2006, and Alonso and Matouschek, 2008). The second condition in Assumption 1 guarantees that $\hat{y} > 0$ and solves:[7]

$$\hat{y} = \mathbb{E}[\theta - \beta | \theta \geq \hat{y}]. \tag{1}$$

Given this delegation set, the intermediary chooses his preferred product $y = \theta$ for all $\theta < \hat{y}$ and the product $\hat{y}$ in all remaining states. The investor effectively imposes an upper cap on the intermediary's choice. For instance, the investor might allow the intermediary to choose from all investments that are less risky than a certain threshold.

Delegation choice. If an investor remains unaware of some products in $[y_{min}, y_{max}]$, she must find the best delegation set within her awareness. The following result shows that, given the limits of her awareness, the investor chooses the closest approximation of the optimal delegation interval under full awareness. When the investor is aware of $\hat{y}$, this approximation consists of all products in the investor's awareness that are weakly smaller than $\hat{y}$. If the investor is unaware of $\hat{y}$, she uses as a threshold the closest product to $\hat{y}$ in her awareness set.

Proposition 1. *Let Assumptions 1 and 2 be satisfied. Given awareness set $Y \in \mathcal{Y}$, the investor's optimal delegation set is*

$$\left\{ y \in Y : y \leq \arg\min_{y' \in Y} \{ |y' - \hat{y}| \} \right\}.$$

[7]Otherwise, the optimal delegation set is $[y_{min}, \mathbb{E}[\theta - \beta]]$. In this case however, the intermediary will choose the upper bound of the set for all θ, so it is effectively the singleton $\{\mathbb{E}[\theta - \beta]\}$. Hence, delegation is valuable if and only if $\mathbb{E}[\theta - \beta] > 0$.

Although this description is a special case of the more general analysis in Auster and Pavoni (2021), for completeness we include a self-contained proof in the Appendix.

Disclosure choice.c Next we turn to the question of which investment products intermediaries want to reveal. Given the optimal principal's delegation policy, described in Proposition 1, it is not difficult to see that in the monopolistic case ($\pi = 0$), the intermediary optimally induces an awareness set that has a symmetric gap around the optimal threshold under full awareness, $\hat{y}$:

$$Y^*(\Delta) \equiv [y_{min}, \hat{y} - \Delta] \cup [\hat{y} + \Delta, y_{max}], \tag{2}$$

with $\Delta \geq 0$. In other words, a monopolistic intermediary optimally discloses investment products at the extreme (e.g. very risky and very safe options, very liquid and illiquid options, etc.) but leaves investors unaware of intermediate ones. An investor's initial awareness imposes constraints on the set of awareness sets the intermediary can induce. Letting $\bar{\Delta}(Y) \equiv \min_{y \in Y} |y - \hat{y}|$ be the distance between $\hat{y}$ and the closest product in Y to $\hat{y}$, an intermediary facing an investor of type $i \in \mathcal{I}$ with initial awareness set if Y_i might find it profitable to choose any awareness sets of the form $Y^*(\Delta)$, provided that $\Delta \leq \bar{\Delta}(Y_i)$ holds.

We now show that disclosing a set of actions parametrized by Δ is also a best response when intermediaries face competition.

Proposition 2. *Let Assumptions 1 and 2 be satisfied. For each $i \in \mathcal{I}$, disclosing a set of the form $Y^*(\Delta), \Delta \geq 0$, as defined in* (2)*, constitutes a best response for intermediaries when meeting an investor of type i.*

Proposition 2 states that—no matter what other intermediaries disclose—an intermediary's best response is always described by a set that is parameterized by Δ, the radius of a symmetric gap around $\hat{y}$. Since an investor permits all investment products smaller than the closest product to $\hat{y}$, an intermediary revealing a set that contains a product whose distance to $\hat{y}$ is Δ weakly prefers to disclose products with a distance greater than Δ: products greater than $\hat{y}+\Delta$ will not change the delegation set, products below $\hat{y}-\Delta$ will be permitted and thus expand the intermediary's choice.

Given that non-captive investors pick the intermediary that reveals more options, it follows that intermediaries compete over awareness gaps: a smaller value of Δ increases an intermediary's chances of attracting the investor. We define

$$U(\Delta) \equiv -\int_{\hat{y}-\Delta}^{\hat{y}} (\hat{y}-\Delta-\theta)^2 f(\theta)\mathrm{d}\theta - \int_{\hat{y}}^{1} (\hat{y}+\Delta-\theta)^2 f(\theta)\mathrm{d}\theta$$

as the intermediary's conditional payoff when being selected by the investor whose awareness set is $Y^*(\Delta)$. The following lemma establishes some properties of the function $U(\cdot)$.

Lemma 3. *The function $U(\cdot)$ is strictly concave on its domain and its unique maximizer, denoted by Δ^{opt}, is strictly positive.*

Lemma 3 shows that—ignoring the constraint imposed by the investor's initial awareness—an intermediary benefits from leaving the investor unaware of an interval of products. Moreover, the optimal size of the awareness gap is uniquely determined.

3.1 Equilibrium Characterization

With slight abuse of notation, let $H_i(\Delta)$ denote the probability with which an intermediary facing an investor of type i chooses an awareness set parametrized by a value smaller than Δ. An intermediary's expected payoff from disclosing set $Y^*(\Delta), \Delta \leq \bar{\Delta}(Y_i)$ is given by:

$$(1-\pi H_i(\Delta))U(\Delta) + \pi H_i(\Delta)\overline{U}. \tag{3}$$

The probability that the investor meets a second intermediary who discloses a larger set than $Y^*(\Delta)$ is $\pi H_i(\Delta)$. In this event the intermediary obtains his outside option. With the complementary probability, the intermediary is able to attract the investor. The investor's updated awareness set is then $Y^*(\Delta)$ and the intermediary's conditional expected payoff is $U(\Delta)$.

Let Δ_0 be such that $U(\Delta_0) = \bar{U}$ if $U(0) < \bar{U}$ and $\Delta_0 = 0$ otherwise. Awareness sets parameterized by values of Δ below Δ_0 are either not feasible or not profitable. For an upper bound, let $\Delta_i^* \equiv \min\{\Delta^{opt}, \bar{\Delta}(Y_i)\}$ be the gap parameter that maximizes an intermediary's payoff conditional on being selected by an investor—the monopoly solution. W.l.o.g we restrict attention to investors of type i such that $U(\Delta_i^*) > \bar{U}$ so that intermediation is profitable, at least for some feasible values of Δ. An intermediary would not choose a higher value of Δ than Δ_i^*, as this would reduce his chances of being selected and reduce his payoff conditional on being selected. For each $i \in \mathcal{I}$, the support of H_i is thus a subset of $[\Delta_0, \Delta_i^*]$.

A simple undercutting argument implies that H_i has no atoms on $(\Delta_0, \bar{\Delta}_i^*]$. If intermediaries were to choose a strictly positive value of Δ with strictly positive probability, an awareness set with a slightly smaller gap would lead to a discrete increase in the probability of attracting the investor and thus to a strict increase in the intermediary's expected payoff. Hence, in equilibrium intermediaries either disclose the maximum ($\Delta = \Delta_0$) or randomize over a continuum of values of Δ. We show the following.

Proposition 4. *Let Assumptions 1 and 2 be satisfied. There exists an equilibrium, characterized by $(H_i)_{i\in\mathcal{I}}$, with the following properties:*

- *if $\pi \leq \underline{\pi}_i$, the support of H_i is $[\widehat{\Delta}_i, \Delta_i^*]$ for some $\widehat{\Delta}_i \geq 0$;*
- *if $\underline{\pi}_i < \pi \leq \overline{\pi}_i$, the support of H_i is $\{0\} \cup [\widehat{\Delta}_i, \Delta_i^*]$ for some $\widehat{\Delta}_i > 0$;*
- *if $\overline{\pi}_i < \pi$, the support of H_i is $\{0\}$.*

from some $(\underline{\pi}_i, \overline{\pi}_i) \in (0, 1]^2$. For each $i \in \mathcal{I}$, we have $\underline{\pi}_i = \overline{\pi}_i = 1$ if $U(0) \leq \overline{U}$ and $0 < \underline{\pi}_i < \overline{\pi}_i < 1$ otherwise.

Proposition 4 shows that if $U(0) > \overline{U}$, so that intermediation is profitable even when investors are fully aware, there are three parameter regions to be distinguished. If the degree of competition is sufficiently small, then intermediaries choose awareness gaps parameterized by values of Δ in the interval $[\widehat{\Delta}_i, \Delta_i^*]$. As we show in the proof of Proposition 4, the lower bound of this interval is strictly decreasing in the competition parameter π. At the threshold $\underline{\pi}_i$, we have $\widehat{\Delta}_i = 0$, implying that intermediaries randomize over all values of Δ

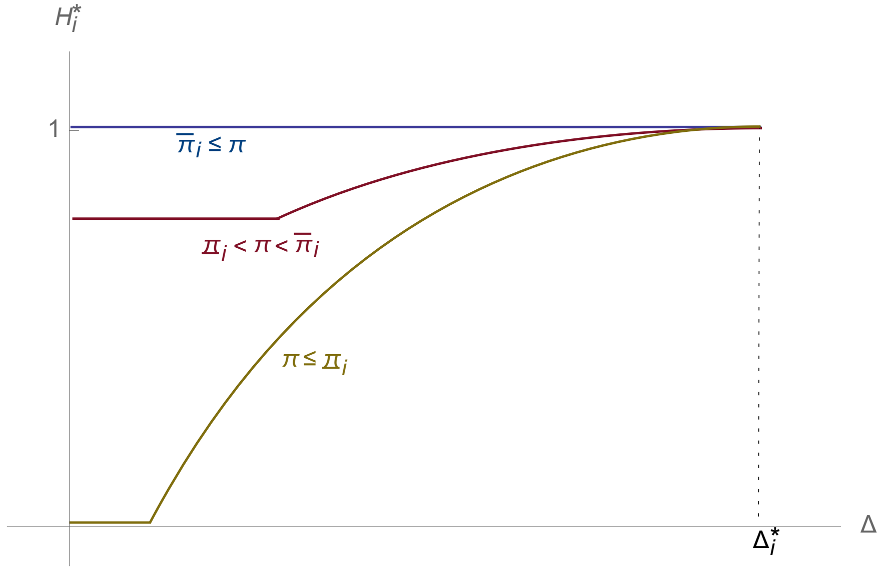

Figure 1: Equilibrium distribution H_i under imperfect competition. The figure displays three possible equilibrium distributions H_i over awareness gaps Δ, as reported in Proposition 4.

in the interval $[0, \Delta_i^*]$. When π increases further we observe polarization: there is a strictly positive probability that intermediaries disclose everything ($\Delta = 0$), while otherwise they leave the investor unaware of a significant part of the available investment opportunities. The probability that intermediaries reveal everything increases in the parameter π, up to the point where this probability is one, which happens at the second threshold $\overline{\pi}_i$. For all values of π greater than this threshold, investors are made fully aware in equilibrium. Figure 1 depicts the equilibrium distribution for the different regimes of π. When $U(0) \leq \overline{U}$ only the first parameter region exists, that is, intermediaries always leave the investor unaware of some products.

Key prediction. How much intermediaries reveal in equilibrium depends on an investor's awareness type. In particular, it depends on the closest product in the investor's awareness set Y_i to $\hat{y}$. Considering two awareness sets Y_i and Y_j with $Y_i \subset Y_j$, the monopoly solution Δ_i^* is (weakly) larger than Δ_j^*. When there is competition, the monotonicity still holds in a stochastic sense, as the following proposition shows.

Proposition 5. *Let Assumption 1 and 2 be satisfied and let $Y_i \subset Y_j$. The equilibrium distribution H_i first-order stochastically dominates H_j.*

When faced with an investor who is aware of fewer products, the intermediary has more to gain by leaving the investor unaware of more intermediate investment options. Hence, an investor who has little knowledge of the financial market—in particular, is unaware of most investment options—is likely to be offered few and rather extreme investments by the intermediary. In Section 4, we provide empirical evidence in line with this prediction.

Other comparative statics. The equilibrium distribution of induced awareness sets not only depends on the investor's initial awareness but also on the degree of competition in the market and the intermediary's outside option. The discussion following Proposition 4 suggests that competition promotes awareness. In fact we can show that equilibrium awareness is stochastically monotonic in the competition parameter π.

Proposition 6. *Let Assumption 1 and 2 be satisfied and let $0 \leq \pi < \pi' \leq 1$. For each $i \in \mathcal{I}$, the equilibrium distribution $H_i(\,\cdot\,;\pi)$ first-order stochastically dominates $H_i(\,\cdot\,;\pi')$.*

In our environment, the disclosure of available investment opportunities is an instrument to compete for costumers. As the probability of meeting a second intermediary π increases, competition gets tougher and the equilibrium distribution becomes more concentrated towards small awareness gaps. When $U(0) > \bar{U}$ and competition is sufficiently intense, there is a positive probability with which intermediaries disclose everything. In particular, if $\pi \geq \bar{\pi}_i$ for all $i \in \mathcal{I}$, market competition generates full awareness.

An interesting question is how the extent to which investors are left unaware of certain investment opportunities varies over the business cycle. In our framework the state of the economy might be captured by the profitability of investments: when the economy is doing well, financial market investments yield particularly high returns, some of which are appropriated by the financial intermediaries. In our model, we thus interpret good times as an upward shift of $U(\Delta)$ relative to $\overline{U}$. In Proposition 7 we show that as the difference between

$U(\Delta)$ and $\overline{U}$ increases, the equilibrium distribution shifts towards smaller values of Δ. That is, when the gains from intermediation increase, investors become aware of more investment opportunities in equilibrium. Intuitively, as the value of attracting an investor becomes larger, competition for investors increases and this results in smaller awareness gaps. Vice versa, when times are bad and gains from intermediation are small, intermediaries worry less about loosing investors to competitors and hence behave more predatory. Our model thus suggests that in bad times we will observe more banks taking advantage of costumers by hiding certain investment opportunities than in good times.

Proposition 7. *Let Assumption 1 and 2 be satisfies and let $\overline{U}' < \overline{U}$. For each $i \in \mathcal{I}$, the equilibrium distribution $H_i(\,\cdot\,;\overline{U}')$ first-order stochastically dominates $H_i(\,\cdot\,;\overline{U})$.*

3.2 Investment without Flexibility

Our analysis so far relied on the assumption that giving flexibility to the intermediary is valuable for the principal. This assumption captures situations where there is sufficient uncertainty about the suitability of the different investment options, where the expert's signal about the state is sufficiently precise, and where the contracting space is sufficiently rich to tailor the flexibility given to the intermediary. It should be noted, however, that the main forces we describe in the analysis are present even if we relax these assumptions sufficiently, so that the investor picks a single investment option from the intermediary's menu.

To illustrate this, let us modify the baseline model and *assume that intermediaries do not learn the state before the investment takes place.* In this case, investors and intermediaries remain symmetrically informed, so there is no gain from granting flexibility to intermediaries. Given awareness set Y, an investor then optimally chooses investment $y \in Y$ so as to maximize

$$\bar{V}(y) = \int_0^1 -(y - (\theta - \beta))^2 dF(\theta).$$

It can be verified that $\bar{V}$ is strictly concave.[8] With slight abuse of notation, let $\hat{y} := \mathbb{E}[\theta] - \beta$

[8]Differentiation yields $\bar{V}''(y) = -2 < 0$ for all y.

denote again unrestricted maximizer.

Suppose then the investor is initially unaware of $\hat{y}$. In this case, an intermediary can make it optimal for the investor to choose an option strictly higher than $\hat{y}$ by leaving the investor unaware of a gap around $\hat{y}$. The intermediary simply needs to assure that the closest investment to $\hat{y}$ below $\hat{y}$ in the investor's awareness set yields a weakly lower payoff than the closest investment to $\hat{y}$ above $\hat{y}$. To formalize this, let us define for each Δ,

$$\bar{Y}^*(\Delta) = \{y \in [y_{min}, y_{max}] : V(y) \leq V(\hat{y} + \Delta)\}$$

as the largest awareness set under which the investor optimally chooses investment $\hat{y} + \Delta$. Concavity of $\bar{V}$ directly implies that each $\bar{Y}^*(\Delta)$ has a single gap around $\hat{y}$, which becomes larger as Δ increases. In the case where F is uniform, the investor's payoff $\bar{V}$ is symmetric around $\hat{y}$, so optimal awareness gaps are symmetric as well. In this case, $\bar{Y}^*(\Delta)$ coincides with $Y^*(\Delta)$, as defined in (2). Summarizing this, we have the following.

Proposition 8. *Let Assumption 2 be satisfied and assume the intermediary receives no private information. For each type $i \in \mathcal{I}$, disclosing a set of the form $\bar{Y}^*(\Delta), \Delta \geq 0$ constitutes a best response for intermediaries when meeting an investor of type i. The intermediaries' payoff*

$$\bar{U}(\Delta) := \int_0^1 -(\hat{y} + \Delta - \theta)^2 dF(\theta)$$

is strictly concave with maximizer $\Delta^* = \beta > 0$.

Proposition 8 is the analogue of Proposition 2 and Lemma 3 for the case of symmetric information. Building on these properties, one can solve for the equilibrium distribution of disclosures by following the steps of the proof of Proposition 4. The comparative statics results similarly follow.

Summing up, we showed that in the case where intermediaries do not receive a private signal before investment, they face the same qualitative tradeoff as in the case where delegation is valuable. Our key empirical prediction thus extends to investment situations where the investor does not gain from granting flexibility to the intermediary and simply chooses one of the available investment options.

3.3 Unobservable Awareness

In the preceding analysis, we assumed that an investor's awareness is observable for the intermediaries she meets. In some situations, intermediaries may only have limited information about an investor's sophistication, if any at all. Moreover, even if intermediaries have a good understanding of an investor's awareness, they may not be able to perfectly differentiate their disclosure in response. For instance, banks may rely on brochures to advertise certain financial products, which are printed well before a customer comes in for a meeting. In this section, we explore the case where intermediaries cannot differentiate their disclosure between different types of investors. In contrast to the previous section, the presence of any given type of investor in the market may then have externalities on the intermediaries' equilibrium disclosure to other types, for instance those with more limited awareness.

We focus on the main case where the intermediaries observe the state before investment. To address this problem in the simplest fashion, we assume that there are only two types of investors $\mathcal{I} = \{s, n\}$, more sophisticated ones (s) that are aware of all investment opportunities and less sophisticated ones (n) that are unaware of some. We denote the fraction of sophisticated investors by μ and assume that each investor is privately informed about her type. Upon meeting an investor, an intermediary is then confronted with two unknowns. He does not know whether the investor has access to the second intermediary, i.e. whether or not she is captive, and he does not know the investor's level of awareness. If the investor is fully aware, she delegates the interval $[0, \hat{y}]$, no matter what the intermediary reveals. Nevertheless, she still rewards an intermediary for disclosure by choosing the one that reveals more. If the investor is unaware of some alternatives, everything remains as above.

We show that our equilibrium characterization for observable types in Proposition 4 continues to hold when investors are privately informed about their awareness (see Appendix A.4). In particular, intermediaries choose an awareness gap Δ so as to solve the tradeoff between increasing the probability of attracting the investor and maximizing the payoff with the unaware type. An intermediary's expected payoff as a function of Δ is now given by[9]

$$(1 - \pi H(\Delta))[\mu U(0) + (1 - \mu)U(\Delta)] + \pi H(\Delta)\overline{U}. \tag{4}$$

We assume $\mu U(0) + (1 - \mu)U(\Delta^*) > \bar{U}$, so that *on average* intermediaries make positive profits for some values of Δ.

The equilibrium distribution of Δ naturally depends on the distribution of awareness among investors. The following proposition shows that whether an increase in the fraction of sophisticated investors leads intermediaries to disclose more or less investment opportunities in equilibrium depends on the profits they make with those investors.

Proposition 9. *Let Assumption 1 and 2 be satisfied and let* $0 \leq \mu < \mu' \leq 1$*.*

- *If* $\overline{U} \leq U(0)$*, then* $H(\,\cdot\,;\mu)$ *first-order stochastically dominates* $H(\,\cdot\,;\mu')$*.*
- *If* $\overline{U} > U(0)$*, then* $H(\,\cdot\,;\mu)$ *is first-order stochastically dominated by* $H(\,\cdot\,;\mu')$*.*

Whenever an intermediary meets an investor who is aware of all investment opportunities, revealing additional products does not affect the delegation set the investor chooses but increases the probability with which the intermediary is selected. If $\overline{U} \leq U(0)$, intermediaries make weakly positive profits with fully aware investors, thus, conditional on meeting such investor, it is optimal to reveal everything. By implication, the larger the probability an intermediary attaches to that event is, the more attractive disclosing additional products becomes. The presence of *more sophisticated investors in the market consequently leads to more disclosure* and thereby benefits the unaware ones.

Suppose instead that the outside option $\overline{U}$ is greater than $U(0)$, so that intermediaries can make positive profits with unaware investors but not with those that are fully aware. If intermediaries can reject the latter investors, the equilibrium is as if they did not exist. There are, however, situations where it is reasonable to assume that intermediaries cannot avoid negative profits with some types of investors. For example, advising and setting up

[9] Since intermediaries can no longer condition on the type, we write H rather than H_i.

a contract may imply certain fixed costs. If the investor's type is initially unknown and if the expected profits with fully aware investors do not compensate these costs, intermediaries make losses with such investors. As long as these losses are compensated by the profits with other investors, intermediaries may still find it worthwhile to enter the market.

In our framework this situation is captured by the specification $U(0) < \bar{U} < \mu U(\Delta^*)+(1-\mu)U(0)$ and the assumption that intermediaries cannot reject any delegation sets. In contrast to the previous case, intermediaries are no longer interested in attracting fully aware investors but would rather have them go to competitors. Proposition 9 shows that in this situation, *a larger share of sophisticated investors leads to more unawareness among the other investors.* Given $U(0) < \underline{U}$, there is no 'full awareness' equilibrium. Instead, intermediaries randomize across an interval of values of Δ bounded away from zero. The losses intermediaries make with sophisticates are compensated by the profits they make with unaware investors. The larger the share of sophisticated investors is, the larger this compensation has to be. Hence, as μ increases, the equilibrium distribution shifts towards higher values of Δ. The presence of sophisticated investors in the market thus reduces awareness and, by implication, welfare of the unsophisticated ones.

The feature that there is unawareness in equilibrium—no matter how intense competition is—with cross-subsidization towards sophisticated investors is reminiscent of the shrouding equilibrium in Gabaix and Laibson (2006). In their work, firms hide costly add-ons, which in equilibrium will be purchased by naive customers only.[10] Cross-subsidization in financial markets has been theoretically analyzed also by Armstrong and Vickers (2012), while Fisher et al. (2022) quantify the welfare implications of cross-subsidization implied by household refinancing behavior in UK mortgage market.

[10]In contrast to our model, Gabaix and Laibson (2006) consider a market with perfect competition where firms compete over prices and customers have access to all firms.

4 Empirical Analysis

In this section, we bring empirical support to our model of financial intermediation with limited awareness. Building on the insights provided by the theoretical framework, we constructed a survey to collect evidence about the 'shape' of menus offered by financial intermediaries to small investors as well as the characteristics of the products acquired by investors with different levels of awareness.

Our main model captures situations where after signing the contract the financial intermediary retains some flexibility in the asset choice. This is, for example, the case of investment funds, pension funds, managed real estates and delegated portfolio management. In a less literal interpretation of the model, we can also think of situations where the investor first becomes a 'client' of the intermediary/broker. At this stage, he/she already narrows down the set of potential investments by looking at the offered menu. Then, in a second stage, the investor finalizes his/her choice by following the advisor's recommendation.

Situations where uncertainty about the suitability of the different investment options is limited or the intermediary cannot operate after the initial contracting stage—either due to technological limitations or due to legal restrictions—are better described by the case analyzed in Section 3.2, where the investor picks a single investment option from the intermediary's menu. This case captures, for instance, the mortgage market, the acquisition of a specific bond or share, insurance contracts, or investments in real estates. As we argue in Section 3.2, the economic tradeoff that shapes the optimal disclosure by the intermediaries and the qualitative equilibrium predictions apply to these situations as well.

4.1 The Italian Retail Investment Market

According to the national balance sheets, Italian households are among the wealthiest and least indebted among the rich economies. About half of the gross wealth of the Italian households is composed of housing and land assets. In 2016, roughly half of the remaining wealth (25%) was held in equities, investment funds and indirect holdings of financial securities via life insurance and private pension funds. This share has been growing over the last two decades. In the same year, saving and current accounts, cash, and bonds constituted 17% of the total wealth (decreasing over time); business assets and other non-financial assets constituted roughly 4% of 2016 household wealth (Acciari et al., 2021). Despite the widespread home ownership, according to the SHIW, only 12% of Italian households had a mortgage in 2016, and financial liabilities represented less than 5% of gross wealth.

Participation in financial markets (as proxied by the ratio of capital market instruments and liquidity in household portfolio) has been increasing since 2008 and leveled off in 2015. At the end of 2016, the share of households that owned financial assets rose to 84 per cent from a low of 79 per cent in 2012, returning to pre-crisis levels. The Italian assets under management industry has also been growing steadily over the last decade (BancaD'Italia, 2018).

The Italian retail banking system is characterized by a tight relationship between customers and their home banks,[11] with banks constituting the main provider of financial information for Italian households.

4.2 Data

The data is based on a 30-40 minutes survey we administered online to Italian retail investors. The survey enquires about their experience with the financial intermediary at the moment of taking the investment decision, which occurred between 2007 and 2017.[12] On top of demographics (such as wealth, income, sex, age, education, occupation, etc.) we elicited proxies for the investor's cognitive abilities, tastes, and other behavioural factors. The survey also contains several questions regarding the knowledge of the investor about the financial sector and the products available in the market. We also asked the respondents how carefully they compiled the MiFiD form. Italian commercial banks are required to propose such questionnaire to potential investors in order to assess some of the client's

[11] Data from the SHIW show that over 80% of the households carry out all of their financial transactions at a single bank. For nearly 60% of them the relationship with their main bank has been ongoing for more than 10 years (Guiso et al., 2022).

[12] An english translation of the complete survey is reported in the Online Appendix.

Table 1: **Main Descriptive Statistics**

Variable		Full Sample N = 1362	Exogenous Intermed. Choice N = 443	Non-Econ. Triggers N=698
Gender (S0.2)	Male	47.06	46.95	47.13
	Female	52.94	53.05	52.87
Education (Distribution %) (S2.3)	Elementary	0.22	0	0.14
	Middle School	6.09	4.97	5.87
	High School	51.25	51.69	49.00
	University	33.26	36.12	34.10
	Master/PhD	9.18	7.22	10.89
Sophistication (S2.12)	Naive	21.15	23.48	23.78
	Sophisticated	78.85	76.52	76.22
Risk Propensity (Distribution %) (S2.28)	No Risk	37.96	5.64	32.66
	Middle Risk	32.42	35.67	31.66
	High Risk	15.35	31.38	20.20
	Very High	6.61	17.83	8.60
	No Answer	7.64	9.48	6.88
Long Term Propensity (Distribution %) (S2.22)	Only Short-Term prod.	13.58	16.25	14.33
	Mostly Short-Term	29.00	30.93	29.94
	Half-Wealth Short-Term	25.26	23.25	26.79
	Mostly Long Term	11.89	12.87	10.74
	Only Long term	2.57	3.16	3.01
	No Answer	17.69	13.54	15.19
Number of Products Offered (Distribution %) (S1.3)	1-5 Products	92.44	93.45	91.69
	5-20 Products	5.87	5.19	6.59
	20-100 Products	0.66	0.45	1.00
	100+ Products	1.03	0.90	0.72
Financial Wealth (Distribution %) (S2.20)	No Wealth	21.29	18.74	20.06
	< 20,000 Euro	18.72	17.83	21.63
	20,000 - 50,000 Euro	16.81	17.16	17.19
	50,000 - 150,000 Euro	16.15	17.38	16.62
	150,000 - 300,000 Euro	8.44	10.16	9.31
	> 300,000 Euro	2.94	4.06	2.87
	No Answer	15.64	14.67	12.32
Year of Purchase (Distribution %) (S1.1a)	2017	19.16	23.93	16.05
	2016	12.70	15.35	12.46
	2015	14.54	15.35	16.33
	2014	13.80	12.64	13.75
	2013	7.20	6.32	7.31
	2012	8.88	8.35	9.89
	2011	3.96	2.03	4.30
	2010	4.41	2.48	4.73
	2009	3.89	3.61	4.58
	2008	1.84	0.68	1.86
	2007	9.62	9.26	8.74
Age (S0.1)	Mean	45.61	46.00	43.82
	Std. Dev.	11.03	11.14	10.29
	Min; Max	26; 90	26; 80	26;75
Income (in Euro) (S0.3.1)	Median	32,000	34,000	30,000
	Std. Dev.	42,730.14	35,072.14	51,673.74
	Min; Max	0; 1,000,000	800; 350,000	0;1,000,000
	No Answ. (%)	25.77	20.3	17.77

characteristics (such as his/her propensity to take risk) and, in principle, should 'modulate' the offer in line with the investor's preferences. An accurately compiled MiFiD however, might also give important information to the intermediary about the level of the investor's prior knowledge/awareness.

Some of the main descriptive statistics are summarized in Table 1. The first column reports the statistics for the full sample. The second column displays the same summary statistics of the data restricting the sample to investors that reported having chosen the financial intermediary because of its geographical proximity or because it was the institution where he/she usually conducted other financial transactions. We consider the latter as a relatively 'exogenous' choice of the intermediary. The last column displays the summary statistics for the sample restricted to investors that declared to have received important shocks (such as divorce, layoff, acquisition of new house, etc.) that might have triggered the choice to invest or borrow in the first place. We indicate them as 'non-economic triggers' and the main aim here is to exclude investment decisions made mainly for speculative motives.[13] Most variables and statistics are self-explanatory. To construct the dummy variable 'sophistication' the respondents were asked to state wether a discount of 10% over a 600 Euro TV was larger, equal, of smaller than a 55 Euro discount. The discrete variable 'risk propensity' is obtained from the respondent's reported attitude towards taking risk in exchange for higher returns; the variable 'long term propensity' measures the attitude towards investing a larger fraction of wealth in long term versus short term products. Both these variables take increasing numerical integer values starting from the value of 1 for the entries 'No Risk' and 'Only Short-Term products', respectively.

The only notable difference regards the distribution of the risk propensity for the 'exogenous choice' subsample. The full sample and the 'non-economic triggers' subsample have similar distributions of such index. Within the 'exogenous choice' subsample instead, the proportion of individuals classified into 'high' or 'very high' risk propensity is much larger

[13]Investors subject to 'non-economic triggers' are detected using question S1.10 (*'Did any of the following events happen in the 3-4 months prior to arranging or making your investment?'*), where we exclude from the sample all investors that either did not select any of the listed triggers or indicated triggers S1.10.07 (changed job) or S1.10.12 (changed account provider).

compared to the other sample selections, while a much smaller fraction of individuals declare to be unwilling to take any risk. Moreover, the individuals in the 'exogenous choice' subsample are on average wealthier and earn more compared to the other samples.

The first panel in Figure 3 in Appendix B reports the distribution of products acquired in our sample. The two most popular products in the sample are mortgages and deposit accounts, followed by personal loans and investment in stocks and shares. These 4 products alone, cover almost 60% of investors.

Knowledge index. At the beginning of Appendix B, we list the 17 dummy variables used to construct our index of the investor's knowledge of available financial products. In the index, all dummies have equal weight. In the total sample, the index ranges between 0 and 16 with a mean of 5.98 and a standard deviation of 3.25. We divided the variables constituting our index into 5 main categories. In the first category—indicated in the appendix with (P)—we find dummies associated to the investor's 'perception' about his/her knowledge. Variables indicated by (U) refer to the investor's self-reported 'understanding' of the financial products; while the variables indicated by (S) capture knowledge obtained from more intensive market 'search' activities. The last two blocks of variables are associated to harder information. The variables indicated by (B) refer to the investor's 'background' relevant for financial decisions, while the dummies (T) are obtained by directly 'testing' the knowledge of the investor: they are based on multiple choice questions with only one correct answer out of four.

Dependent variable I: 'Number of Products' The first dependent variable we analyze provides a basic measure of the richness of the menu offered by the intermediaries. In question S1.3, the survey elicits an ordered categorical variable on the number of products offered. The distribution of this variable is reported in the sixth entry of Table 1. It includes the following bins: 1 to 5; 5 to 20; 20 to 100; 100 and more.

According to (a finite interpretation of) the model, *less knowledgeable investors receive on average offers with a lower number of products*; they are kept in the dark of more financial opportunities.

Dependent variable II: 'Extremeness of the Offer' The second dependent variable measures extremeness of the offered menu as perceived by the investor. The variable ranges between 1 and 5 and is the linear aggregation of two discrete variables obtained from questions asking the respondent to indicate how much he/she agrees with the indicated statement. The two statements with associated potential answers are reported below.

S1.37.4 *I was offered very few products with an intermediate levels of risk and return; I would have liked to see more products of this kind.*

Strongly Disagree		Neither Agree nor Disagree		Strongly Agree
O	O	O	O	O

S1.37.10 *I believe that the intermediary or online interface offered me only "extreme" products: either standard/safe products or very risky/exotic products.*

Strongly Disagree		Neither Agree nor Disagree		Strongly Agree
O	O	O	O	O

These are the questions in the survey that most directly ask about the general extremeness of the offered menu.[14] The empirical implication of our model is that *less knowledgeable investors receive, on average, offers that contain products more at the extremes* since they tend to face a larger gap Δ around $\hat{y}$.

Dependent variable III: 'Liquidity (and Other Characteristics) of the Purchased Product' The last dependent variable we consider aims at providing some harder evidence on investor's choice. In our dataset, we elicit the liquidity of the purchased product by asking the agent to answer to the following question: *'What is the minimum time after opening the investment that you could withdraw some or all your money without being penalized by the investment provider?'*.[15] Possible answers range from *'I can withdraw my money at any time'*

[14]The two questions are connected to the dimensions of return, riskiness and exoticity of the investment. In questions S1.31 to S1.38 we also elicited information about the content of the proposed menu along more dimensions of the investment products. These were however only indirectly linked to the extremeness of the menu.

[15]For brevity, we report here the (English translated) question asked to clients who bought an investment product (Question S1.8a). The corresponding question asked to the borrowers is reported in the Online Appendix as S1.8b

to *'I have to invest for more than 10 years'* and *'I can only withdraw my money at the end of the investment'* with 10 levels of increasing liquidity. As a final option, we have also included the liquidity lever *'I can never withdraw my money'* to capture pure annuities.[16]

Given the difficulty in proposing an uncontroversial 'objective' measure of extremeness for the level of liquidity, especially since we are unable to identify the investors' preferences and level of bias, we consider another broader prediction of our model. The key motivation for the intermediary to leave investors unaware of some opportunities is to induce them to buy products desirable to the financial intermediary that would not have been purchased otherwise. It seems then intuitive that banks are able to induce unaware investors—*certeris paribus*—to buy on average less liquid products. Such a monotonicity prediction is a less ambiguous investigation in the data and is of independent empirical interest.

While the monotonic relationship between the investor's initial awareness set and the chosen investment is always implied by the simpler version of the model with fixed investment choice (Section 3.2), a sufficient condition for monotonicity to hold in the main version with flexibility is a strengthening of our Assumption 1 to $f'(\theta) \geq 0$, that is, a non-decreasing density (e.g., the uniform distribution). This assumption also guarantees the optimality of interval delegation under full awareness, allowing for any symmetric concave utility function (possibly different from the quadratic) and any positive bias. We also investigate monotonicity on two other characteristics of the purchased product, which are however self-reported: its riskiness and to what extent the purchased product is considered traditional or more exotic.

The expected empirical findings are then that *less knowledgeable investors should buy financial products that are on average more illiquid, riskier and more exotic* compared to those purchased by more knowledgeable investors.

[16] We excluded observations from investors who answered *'I do not know'* or *'The question is not pertinent'*.

Table 2: Number of Products Offered: Full Sample

	(1)	(2)	(3)	(4)	(5)	(6)
	No Control	With Controls	Controls & Products	No Controls	With Controls	Controls & Products
	Poisson	Poisson	Poisson	Ord. Probit	Ord. Probit	Ord. Probit
KnowIndex_total (Std. Deviations)	0.305***	0.230***	0.189***	0.239***	0.212**	0.186**
	(0.0118)	(0.0152)	(0.0154)	(0.0485)	(0.0660)	(0.0679)
Sophisticated Respondent	0.0167	0.0453	-0.0552	0.0627	0.189	0.123
	(0.0310)	(0.0423)	(0.0430)	(0.130)	(0.186)	(0.192)
Female Respondent		-0.226***	-0.196***		-0.160	-0.142
		(0.0354)	(0.0355)		(0.144)	(0.149)
Financial Wealth (Std. Dev.)		0.102***	0.0855***		0.0630	0.0557
		(0.0181)	(0.0186)		(0.0791)	(0.0840)
Risk Propensity (Std. Dev.)		0.224***	0.185***		0.263***	0.244***
		(0.0159)	(0.0163)		(0.0676)	(0.0710)
Long Term Propensity (Std. Dev.)		0.0631***	0.0729***		0.00752	0.00484
		(0.0153)	(0.0156)		(0.0671)	(0.0702)
MiFiD Responsiveness (Std. Dev.)		0.0513**	0.0419*		-0.0406	-0.0554
		(0.0176)	(0.0176)		(0.0708)	(0.0726)
Additional Socio-Economic Controls		YES	YES		YES	YES
Year of Purchase		YES	YES		YES	YES
Product Purchased		NO	YES		NO	YES
_cons	1.534***	-0.781*	0.203			
	(0.0277)	(0.321)	(0.344)			
cut1						
_cons				1.525***	3.913**	3.326*
				(0.117)	(1.379)	(1.550)
cut2						
_cons				2.238***	4.741***	4.190**
				(0.136)	(1.387)	(1.556)
cut3						
_cons				2.445***	5.089***	4.551**
				(0.149)	(1.393)	(1.560)
N	1362	868†	868†	1362	868†	868†
adj. R^2						

Standard errors in parentheses

$^{+}p < 0.1$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

† sample decreases since some individuals refused report some relevant information.

4.3 Empirical Findings

Number of products offered. Table 2 reports the results of Poisson and ordered Probit regressions where the dependent variable is the increasing category of the number of products offered to the investor.[17] In the first three columns we report the results for the Poisson regressions, while the results of the ordered Probit are reported in the last three columns. Consistently with the main idea of the paper, an investor with higher knowledge receives on average a richer menu. This remains true, even after controlling for a number of variables, including the year of purchase, the risk propensity of the investor, the propensity to invest in long term assets, a proxy for his/her level of naivety, and the product acquired. Moreover, male, richer, and more risk-loving investors tend to receive a richer menu of products. The results are confirmed in Tables 6, 7, 8 and 9 in Appendix B. Table 6 presents the results of the same exercises as in Table 2 with errors clustered at product level. Although, as expected, in most cases the significance is reduced compared to the baseline specification, it is never lost. In Table 7 we use a 'hard' version of the knowledge index. The hard version of the index is constituted by dummies only belonging to the (B) and (T) blocks, that is, variables that tend to provide harder information on investor's knowledge.[18] Table 8 reports the results for the sample restricted to investors that made an 'exogenous choice' of intermediary as described above. In Table 9, the sample is restricted to investors who had 'non-economic triggers' to investment. By conditioning to the different samples we find no noticeable differences in the empirical results.

Extremeness of the offer. Tables 3 reports the results of our main regressions, where the dependent variable is the perceived extremeness of the offer. In all regressions, a higher level of reported knowledge is associated to menus with a lower level of perceived 'extremeness'. The coefficient associated to the total knowledge index is remarkably stable across specifications, including the last column where we control for the type of product purchased. Since we

[17] In the Poisson regressions, we associated to each category the number of products resulting from the arithmetic average of the extremes.

[18] Only in the very last column of Table 7 the coefficient associated to (the hard version of) the knowledge index looses significance. While keeping the right sign, in that case, the p-value is 11.8%.

normalized both the dependent variable and the index, a coefficient of -0.25 means that an increase in the knowledge index by one standard deviation reduces the level of extremeness by one fourth of its standard deviation. Furthermore, in all specifications, risk propensity is positively correlated with offer extremeness, while female and more sophisticated investors receive less extreme menus.

In addition to the variables explicitly shown in the tables, we have some recurrent socio-demographic and economic control variables. In particular: age of the respondent and age squared, neither of which is significant; education of the respondent, always negatively correlated with extremeness but not always significantly so; reported income, which is never significant; a series of dummies on the occupation of the respondent, the majority of which result not to be significant. When introducing time dummies we find that, in the year 2014, investment retailers increased the extremeness of their menus.[19]

In Tables 10, 11, 12 and 13 in Appendix B we report the results of the same robustness exercises as we performed for the regressions with the number of offered products. Table 10 reports the results for the errors clustered at the product level and we have no noticeable differences to report compared to the baseline regressions. Table 11 considers the 'hard' version of the index. Although the coefficient decreases compared to the total index and is a bit less stable across specifications, it always remains significantly larger than zero with a p-value of 1% or lower. In Tables 12 and 13 we restrict the sample according to the 'exogenous choice' of the intermediary (Table 12) and the presence of 'non-speculative triggers' to investment (Table 13). Our result are again fully confirmed for the different sample selections.

Liquidity of the chosen product. The negative coefficient reported in the first row of Table 4 confirms our empirical hypothesis: less knowledgeable investors end up purchasing on average less liquid financial products. To save space, in the last three columns of the table, we

[19]In 2014, the BCE started the quantity easing program, drastically reducing the spread between Italian and German bonds. Moreover, in Italy, in July 2014 the taxation of capital gains increased from 20% to 26%. In January 2015, the taxation on pension funds almost doubled, from 11% to 20%. One might conjecture that such changes (or the expectation of them) might have reduced net expected returns, perhaps increasing the investors' propensity towards more risky and less traditional (and/or less liquid) investments.

Table 3: Extremeness of Offer (Std. Deviations)

	(1) No Controls	(2) With Controls	(3) Controls & Years	(4) Controls & Products	(5) All
KnowIndex_total (Std. Deviations)	-0.264***	-0.262***	-0.251***	-0.266***	-0.257***
	(0.0261)	(0.0326)	(0.0323)	(0.0324)	(0.0321)
Sophisticated Respondent	-0.256***	-0.207*	-0.198*	-0.190*	-0.186*
	(0.0639)	(0.0853)	(0.0844)	(0.0854)	(0.0848)
Female Respondent		-0.100+	-0.0989+	-0.105+	-0.104+
		(0.0718)	(0.0711)	(0.0710)	(0.0706)
Financial Wealth (Std. Dev.)		-0.0463	-0.0314	-0.0286	-0.0170
		(0.0361)	(0.0359)	(0.0359)	(0.0358)
Risk Propensity (Std. Dev.)		0.252***	0.243***	0.249***	0.238***
		(0.0335)	(0.0332)	(0.0336)	(0.0334)
Long Term Propensity (Std. Dev.)		-0.0356	-0.0392	-0.0204	-0.0252
		(0.0329)	(0.0325)	(0.0327)	(0.0324)
MiFiD Responsiveness (Std. Dev.)		0.00627	0.00723	0.0183	0.0197
		(0.0344)	(0.0340)	(0.0341)	(0.0338)
Additional Socio-Economic Controls	NO	YES	YES	YES	YES
Product Purchased	NO	NO	NO	YES	YES
Year of Purchase: 2017			-0.183+		-0.121+
			(0.133)		(0.136)
Year of Purchase: 2016			0.196+		0.192+
			(0.145)		(0.146)
Year of Purchase: 2015			0.212+		0.208+
			(0.143)		(0.145)
Year of Purchase: 2014			0.406**		0.397**
			(0.142)		(0.143)
Year of Purchase: 2013			0.0634		0.0707
			(0.166)		(0.166)
Year of Purchase: 2012			0.0462		0.0209
			(0.152)		(0.152)
Year of Purchase: 2011			-0.0408		-0.0133
			(0.201)		(0.201)
Year of Purchase: 2010			-0.177		-0.167
			(0.196)		(0.195)
Year of Purchase: 2009			0.144		0.119
			(0.205)		(0.205)
Year of Purchase: 2008			-0.169		-0.183
			(0.266)		(0.265)
_cons	0.202***	0.944+	0.608	0.444	0.188
	(0.0566)	(0.656)	(0.668)	(0.707)	(0.721)
N	1362	868†	868†	868†	868†
adj. R^2	0.086	0.180	0.206	0.207	0.226

Standard errors in parentheses

$^{+}$ $p < 0.1$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

† sample decreases since some individuals refused report some relevant information.

Table 4: Illiquidity and Knowledge

	(1) No Controls	(2) With Controls	(3) Controls & Years	(4) Controls & Products	(5) All
KnowIndex_total (Std. Deviations)	-0.229**	-0.300**	-0.265**	-0.266**	-0.246**
	(0.0806)	(0.0949)	(0.0942)	(0.0903)	(0.0901)
Sophisticated Respondent	-0.451*	-0.472+	-0.469+	-0.343+	-0.373+
	(0.211)	(0.267)	(0.266)	(0.255)	(0.255)
Female Respondent		-0.433*	-0.449*	-0.417*	-0.438*
		(0.211)	(0.209)	(0.201)	(0.200)
Financial Wealth (Std. Dev.)		-0.0500	-0.0204	-0.0934	-0.0787
		(0.111)	(0.110)	(0.106)	(0.106)
Risk Propensity (Std. Dev.)		-0.115	-0.109	-0.0203	-0.0305
		(0.101)	(0.0999)	(0.0970)	(0.0967)
Long Term Propensity (Std. Dev.)		0.123	0.125	0.0720	0.0718
		(0.101)	(0.0995)	(0.0959)	(0.0954)
Constant	4.048***	2.849+	2.529+	4.510*	4.394*
	(0.191)	(1.949)	(1.979)	(2.018)	(2.060)
Observations	1035	695	695	695	695
Adjusted R^2	0.011	0.046	0.075	0.145	0.162

Standard errors in parentheses $^{+}$ $p < 0.10$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 5: Illiquidity on Perceived Extremeness and Knowledge Index

	(1) No Controls	(2) With Knowledge	(3) Basic Controls	(4) Controls & Products	(5) All
Extremeness of Offer (Std. Deviations)	0.281***	0.236**	0.233*	0.197*	0.156+
	(0.0797)	(0.0831)	(0.101)	(0.0986)	(0.0997)
Sophisticated Respondent	-0.426*	-0.398+	-0.424+	-0.307	-0.346+
	(0.211)	(0.211)	(0.267)	(0.255)	(0.255)
KnowIndex_total (Std. Deviations)		-0.160+	-0.235*	-0.210*	-0.204*
		(0.0838)	(0.0988)	(0.0944)	(0.0939)
Female Respondent			-0.406+	-0.394*	-0.420*
			(0.211)	(0.201)	(0.200)
Financial Wealth (Std. Dev.)			-0.0488	-0.0958	-0.0825
			(0.111)	(0.106)	(0.106)
Risk Propensity (Std. Dev.)			-0.176+	-0.0716	-0.0697
			(0.104)	(0.100)	(0.0998)
Long Term Propensity (Std. Dev.)			0.125	0.0712	0.0720
			(0.100)	(0.0957)	(0.0952)
Constant	4.009***	4.001***	2.628+	4.243*	4.253*
	(0.191)	(0.191)	(1.945)	(2.018)	(2.059)
Observations	1035	1035	695	695	695
Adjusted R^2	0.016	0.018	0.052	0.149	0.164

Standard errors in parentheses
$^{+}$ $p < 0.1$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

do not report the coefficients associated to the year and product fixed effects. Neither do we report the (insignificant) coefficient on the MiFiD. Tables 14 and 15 in Appendix B report the same qualitative findings for the other two product characteristics we have information about, namely riskiness and the extent to which the purchased product is considered traditional or exotic.

Finally, in Table 5 we report the results of a prediction exercise we performed, where we relate the 'objective' measure of liquidity of the purchased product to our measures of perceived extremeness and knowledge. The table shows that both the reported extremeness of the offer and the knowledge of the respondent predict the level of illiquidity of the purchased product. In particular, even conditional on the investor's level of knowledge, the more extreme the offer is, the lower is the liquidity of the product acquired.

5 Policy Implications and Conclusion

We studied a financial market with imperfect competition and investors who have limited awareness of the available investment opportunities. We showed that intermediaries may find it optimal to leave investors unaware of intermediate investment options. We further demonstrated that competition between intermediaries can increase awareness in the market and found that, when investors' are not easily distinguishable, the coexistence of investors with different levels of awareness might generate positive or negative externalities on the other agents, depending on the profitability of intermediation with very sophisticated investors. We collected self-reported data from customers in the Italian retail investment sector and found results in line with the predictions of the theoretical model. The menus offered to less knowledgable investors contained fewer products than those offered to sophisticated investors. At the same time, agents with a lower knowledge index perceived more strongly that their menu contained products at the extremes and ended up investing in products that were arguably closer to the intermediaries' preferences.

The paper has implications for bank regulation and brokerage practices. Assuming that small investors are those more likely to have limited awareness, our results show that, when interacting with such investors, financial professionals may have incentives to eliminate certain investment opportunities so as to induce investments they prefer. Of course educating investors about available investment options, thereby expanding the awareness set, benefits them in our environment. In reality, however, promoting full awareness in that way might not be feasible or might be very expensive.

Advertising specific assets. Our model suggests that there could exist a much simpler and equally effective intervention. We have seen that—apart from the intensity of competition—what determines the final awareness of investors is not the number of investment products of which investors are initially aware but rather how close to the optimal cap under full awareness these products are. In our stylized model, it is sufficient that an investor is aware of $\hat{y}$ and intermediaries will make him fully aware. This in turn implies that all a regulator must do is promoting awareness of exactly that product, e.g. by issuing and publicly propagating a financial product with the characteristics of $\hat{y}$. An intermediary will then find it in his best interest to educate the investor about the remaining investment opportunities. It is not crucial however, that the regulator promotes exactly $\hat{y}$. As long as the issued product is relatively close, the set of investment opportunities of which the investor remains unaware is very small, as we illustrate in Figure 2. Our findings thus point to an important complementarity between the regulator and private actors, suggesting that a relatively simple policy intervention can lead banks to reveal investment opportunities more suitable to the needs of investors.

Financial education. The results of our paper further indicate, that when full awareness for the whole population is unfeasible, the optimal financial training policy is often characterized by a widespread moderate training as opposed to an intensive training policy to a small fraction of potential investors. In particular, consider the equilibrium with unobservable awareness under the assumption $U(0) < \overline{U}$. Under this specification, trained individuals remain attractive to intermediaries only if they retain some unawareness. Competition for (partially) trained individuals may generate then positive spillovers for those that remain

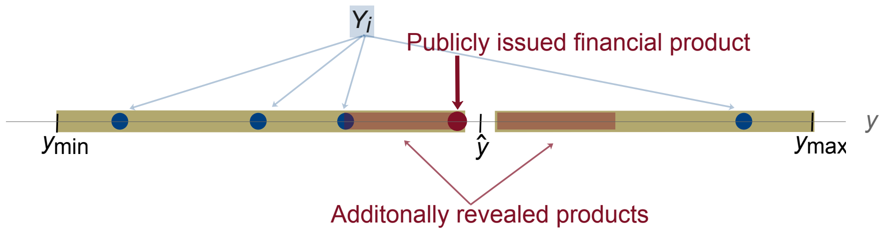

Figure 2: Policy intervention and equilibrium awareness. The yellow area at the extremes represents the equilibrium awareness set when the investor has initial awareness set Y_i, represented by the blue bullets, and intermediaries face no competition ($\pi = 0$). The red subset is added to the yellow set whenever the investor is also aware of the publicly issued financial product indicated by the red bullet near $\hat{y}$.

unaware, along the lines of Proposition 9. In contrast, an intensive training policy that only affects a fraction of individuals (with, say, full awareness after training) generates a negative market externality on investors with limited awareness.

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Appendix

A Proofs

A.1 Proof of Proposition 1

Proof. For the proof of this and the following proposition, it is useful to introduce the terms

$$T(y) := F(y)\left(y - \mathbb{E}[\theta - \beta|\theta \leq y]\right), \quad S(y) := (1 - F(y))\left(y - \mathbb{E}[\theta - \beta|\theta \geq y]\right),$$

in the literature referred to as, respectively, backward bias and forward bias (see Alonso and Matouschek 2008). By condition (1) we have

$$T''(y) = \beta f'(y) + f(y) > 0 \quad \text{and} \quad S''(y) = -(\beta f'(y) + f(y)) < 0 \quad \text{for all } y \in [0,1]$$

Note first that—since $\beta > 0$—we have $T(y) \geq 0$ for all $y \in [0,1]$ and $T(y) > 0$ for $y \geq 0$. The variable S may change sign. Noticing however, that $S(\hat{y}) = S(1) = 0$, strict concavity of S implies that $S(y) > 0$ for all $y \in (\hat{y}, 1)$.

Having introduced these terms, we are ready to prove Proposition 1. This proof is presented via three lemmas.

Lemma 10. *Let Assumptions 1 and 2 be satisfied. Consider $y_1, y_2 \in Y$ with $y_1 < y_2$. If $y_1, y_2 \in D^*(Y)$, then all $y \in (Y \cap (y_1, y_2))$ belong to $D^*(Y)$.*

Proof. Towards a contradiction suppose there is some $y \in Y$ such that $y \notin D^*(Y)$ and $D^*(Y) \cap [y_{min}, y] \neq \emptyset$, $D^*(Y) \cap [y, y_{max}] \neq \emptyset$. Further, let y^- be the largest element of $D^*(Y)$ strictly smaller than y and let y^+ be the smallest element of $D^*(Y)$ strictly greater than y, that is $y^- = \max\{y' \in D^*(Y) : y' < y\}$ and $y^- = \min\{y' \in D^*(Y) : y' > y\}$. Define $s := \frac{y^- + y^+}{2}$ to be the state at which the agent is indifferent between choosing action y^- and action y^+, and similarly define $r := \frac{y + y^-}{2}$ and $t := \frac{y^+ + y}{2}$ as the states in which the agent is indifferent, respectively, between choosing y^- and y and between y^+ and y.

Following Alonso and Matouschek (2008), we can write the change in the principal's expected payoff when including action y into the delegation set. The agent changes his choice of action only in states $[r, t]$. In states $[r, s]$ he switches from y^- to y, while in the remaining states $(s, t]$ he switches from y^+ to y. The change in the principal's expected payoff is thus given by

$$\begin{aligned}
& -\int_r^t (y - \theta + \beta)^2 f(\theta)\mathrm{d}\theta + \int_r^s (y^- - \theta + \beta)^2 f(\theta)\mathrm{d}\theta + \int_s^t (y^+ - \theta + \beta)^2 f(\theta)\mathrm{d}\theta, \\
= \quad & 2(y - y^-)\underbrace{F(r)\left[r - \mathbb{E}\left[\theta - \beta|\theta \leq r\right]\right]}_{=T(r)} + 2(y^+ - y)\underbrace{F(t)\left[t - \mathbb{E}\left[\theta - \beta|\theta \leq t\right]\right]}_{=T(t)} \\
& -2(y^+ - y^-)\underbrace{F(s)\left[s - \mathbb{E}\left[\theta - \beta|\theta \leq s\right]\right]}_{=T(s)}.
\end{aligned}$$

Letting $y = \lambda y^+ + (1-\lambda)y^-$ for some $\lambda \in (0,1)$ so that $y - y^- = \lambda(y^+ - y^-)$, $y^+ - y = (1-\lambda)(y^+ - y^-)$ and $s = \lambda r + (1-\lambda)t$, the payoff difference can be written as

$$2(y^+ - y^-)\left[\lambda T(r) + (1-\lambda)T(t) - T(\lambda r + (1-\lambda)t)\right].$$

From the strict convexity of T, it then follows that the payoff difference is strictly positive. A contradiction. $\square$

Lemma 11. *The optimal delegation set satisfies* $\min D^*(Y) = \min Y$.

Proof. Consider delegation set D with $\min D(Y) > \min Y$. Letting $y = \min Y$ and $\underline{y} = \min D(\widehat{y})$, the state at which the agent is indifferent between the two actions is given by $t = (y + \underline{y})/2$. If the principal includes y in the delegation set, the agent switches from $\underline{y}$ to y in all states $\theta \leq t$. The principal's change in expected payoff when including y is hence given by

$$-\int_0^t (y - \theta + \beta)^2 f(\theta)\mathrm{d}\theta + \int_0^t (\underline{y} - \theta + \beta)^2 f(\theta)\mathrm{d}\theta = 2(\underline{y} - y)T(t) > 0$$

Including y in the delegation set therefore strictly increases the principal's payoff, which implies $\min D^*(Y) = \min Y$. $\square$

Lemma 12. *Let Assumptions 1 and 2 be satisfied. The optimal delegation set is such that*

$$\max D^*(Y) = \arg\min_{y \in Y} |y - \hat{y}|.$$

Proof. Consider delegation set D and suppose $\max D < \max Y$. Let $\overline{y} = \max D$ and consider action $y > \overline{y}, y \in Y$. Let $t = \frac{y + \overline{y}}{2}$ denote the state at which the agent is indifferent between the two actions. The change in the principal's payoff when including action y is given by

$$-\int_t^1 (y - \theta + \beta)^2 f(\theta)\mathrm{d}\theta + \int_t^1 (\overline{y} - \theta + \beta)^2 f(\theta)\mathrm{d}\theta = -2(y - \overline{y})S(t).$$

This change is weakly positive if and only if $S(t) \leq 0$ and hence if and only if $t \leq \hat{y}$. Since t is the midpoint of $\overline{y}$ and y, this condition holds if and only if the distance between $\overline{y}$ and $\hat{y}$ is weakly greater than the distance between y and $\hat{y}$, i.e. $|\overline{y} - \hat{y}| \geq |y - \hat{y}|$. $\square$

The previous results together conclude the first part of the proof. The second part of the argument, namely the agent's optimal disclosure, is described in the main text. $\square$

A.2 Proof of Proposition 2

Consider a general disclosure set Y and let $\tilde{Y} = Y \cup Y_i$. Define $\tilde{\Delta}$ to be the largest value of Δ such that $\tilde{Y} \subseteq [y_{min}, \hat{y} - \Delta] \cup [\hat{y} + \Delta, y_{max}]$. By the selection rule, the awareness set $[y_{min}, \hat{y} - \tilde{\Delta}] \cup [\hat{y} + \tilde{\Delta}, y_{max}]$ yields a weakly larger probability for the intermediary to attract an investor. Consider then the intermediary's expected payoff conditional on attracting a non-captive investor who meets another intermediary revealing set Y. The induced delegation sets from revealing, respectively, $\tilde{Y}$ and $[y_{min}, \hat{y} - \tilde{\Delta}] \cup [\hat{y} + \tilde{\Delta}, y_{max}]$ are then

$$D^*(\tilde{Y} \cup Y) \quad \text{and} \quad D^*([y_{min}, \hat{y} - \tilde{\Delta}] \cup [\hat{y} + \tilde{\Delta}, y_{max}] \cup Y).$$

Towards a contradiction, assume $D^*(\tilde{Y} \cup Y)$ yields a strictly higher payoff for the intermediary than $D^*([y_{min}, \hat{y} - \tilde{\Delta}] \cup [\hat{y} + \tilde{\Delta}, y_{max}] \cup Y)$. Then there must exist an element $y \in D^*(\tilde{Y} \cup Y)$ that does not belong to $D^*([y_{min}, \hat{y} - \tilde{\Delta}] \cup [\hat{y} + \tilde{\Delta}, y_{max}] \cup Y)$. Suppose this is the case. By Proposition 1, we know that $D^*([y_{min}, \hat{y} - \tilde{\Delta}] \cup [\hat{y} + \tilde{\Delta}, y_{max}] \cup Y)$ includes all products in the interval $[y_{min}, \hat{y} - \tilde{\Delta}]$ and all products in Y weakly smaller than $\hat{y}$. We therefore have $y > \hat{y}$. The proposition further tells us that the optimal delegation set includes at most one product strictly greater than $\hat{y}$. Next, by definition of $\tilde{\Delta}$, the set $\tilde{Y}$ includes a product whose distance to $\hat{y}$ is $\tilde{\Delta}$. This implies that the largest product in $D^*(\tilde{Y} \cup Y)$ is weakly smaller than $\hat{y} + \tilde{\Delta}$, so we have $y \leq \hat{y} + \tilde{\Delta}$. Also, since y belongs to $D^*(\tilde{Y} \cup Y)$, we know that there is no product in Y strictly closer to $\hat{y}$ than y. However, the facts that the distance between y and $\hat{y}$ is smaller than $\tilde{\Delta}$ and that there is no product in Y that is closer to $\hat{y}$ than y imply that y must also belong to $D^*([y_{min}, \hat{y} - \tilde{\Delta}] \cup [\hat{y} + \tilde{\Delta}, y_{max}] \cup Y)$. A contradiction. Hence, the awareness set $[y_{min}, \hat{y} - \tilde{\Delta}] \cup [\hat{y} + \tilde{\Delta}, y_{max}]$ yields a weakly larger expected payoff than $\tilde{Y}$. Choosing an awareness set of the form $[y_{min}, \hat{y} - \Delta] \cup [\hat{y} + \Delta, y_{max}]$ for some $\Delta \geq 0$ therefore constitutes a best response.

A.3 Proof of Lemma 3

The first and second derivative of $U(\Delta)$ are

$$U'(\Delta) = 2 \int_{\hat{y}-\Delta}^{\hat{y}} [\hat{y} - \Delta - \theta] f(\theta) \mathrm{d}\theta - 2 \int_{\hat{y}}^{1} [\hat{y} + \Delta - \theta] f(\theta) \mathrm{d}\theta, \tag{5}$$

$$U''(\Delta) = -2[1 - F(\hat{y} - \Delta)] < 0. \tag{6}$$

The function $U(\Delta)$ is strictly concave in Δ. It is easy to see that $U'(\Delta) < 0$ for all $\Delta \geq 1 - \hat{y}$. Hence, $U(\Delta)$ has a unique maximizer on $[0, 1 - \hat{y})$. Recalling that $\hat{y} = \mathbb{E}[\theta - \beta | \theta \geq \hat{y}]$, the first derivative when evaluated at $\Delta = 0$ can be written as

$$U'(0) = 2(1 - F(\hat{y}))\beta > 0.$$

The derivative is strictly positive, which implies that the maximizer of $U(\Delta)$, characterized by the first-order condition $U'(\Delta) = 0$, is strictly positive.

A.4 Proof of Proposition 4

We will prove the statement for the more general case, where for each $i \in \mathcal{I}$ intermediaries attach probability $\mu \in [0, 1)$ to the investor being fully aware and probability $1 - \mu$ to the investor being aware of Y_i. To this end, we will maintain the assumption $\mu U(0) + (1-\mu)U(\Delta^*) > \bar{U}$, which we introduce in Section 3.3. Each intermediary chooses a disclosure set parametrized by some Δ in $[\Delta_0, \Delta_i^*]$. Standard arguments imply that the equilibrium distribution H_i cannot have any atoms, except possibly at Δ_0 (Burdett and Judd, 1983). Moreover, if there is some $\widehat{\Delta}_i > \Delta_0$ that belongs to the support of H_i, all values in the interval $[\widehat{\Delta}_i, \Delta_i^*]$ belong to the support as well. Suppose instead there exists an interval $(\Delta_1, \Delta_2) \subseteq (\widehat{\Delta}_i, \Delta_i^*]$ such that Δ_1 belongs to the support of H_i and the values of Δ in the interval (Δ_1, Δ_2) do not. Then choosing an awareness gap parametrized by $\Delta \in (\Delta_1, \Delta_2)$ would yield the same probability of being selected by the investor as Δ_1 but a strictly higher conditional payoff and would, hence, be profitable for the intermediary.

When $\pi = 0$, an intermediary faces no competition and chooses Δ_i^* so as to maximize his conditional expected payoff. On the other hand, when $\pi = 1$, intermediaries engage in Bertrand competition, hence investors extract all the surplus. If $\bar{U} \leq U(0)$, this implies that intermediaries reveal all products in $[y_{min}, y_{max}]$ with probability one. Otherwise ($\bar{U} > U(0)$) intermediaries choose a disclosure set parametrized by Δ_0. For $\pi \in (0,1)$, we distinguish the following cases:

i.) Consider first the possibility where $H_i(\Delta_0) = 1$ so that both intermediaries reveal the maximal number of products with probability one. Since Δ_0 maximizes the investors' payoff conditional on the intermediary not making losses, any deviating offer that generates a positive profit ($\Delta > \Delta_0$) will only be accepted if the investor is captive. The best deviating offer is thus characterized by Δ_i^*. This deviation is not profitable if

$$\pi\bar{U} + (1-\pi)[\mu U(0) + (1-\mu)U(\Delta_i^*)] \leq \left(1 - \frac{1}{2}\pi\right) U(\Delta_0) + \frac{1}{2}\pi\bar{U}. \tag{7}$$

If condition (7) is satisfied, the described equilibrium exists. If $\Delta_0 > 0$, the right-hand side of this condition is $\bar{U}$, while the left hand side is strictly greater than $\bar{U}$ by the assumption $\bar{U} < \mu U(0) + (1-\mu)U(\Delta_i^*)$. Hence, (7) is always violated. If instead $\bar{U} \leq U(0)$ so that $\Delta_0 = 0$, it is satisfied by some values of $\pi \leq 1$ if $U(0) \geq \bar{U}$. Let $\underline{\pi}_i$ denote the value of π satisfying (7) as an equality and set $\underline{\pi}_i = 1$ if $\Delta_0 > 0$.

ii.) Consider now the possibility where intermediaries choose a gap larger than Δ_0 with probability one ($H_i(\Delta_0) = 0$). Then the support of H_i is an interval $[\widehat{\Delta}_i, \Delta_i^*]$. Indifference requires that an intermediary's expected payoff is constant across the values of Δ in the interval. Differentiation of (3) yields the following first order conditions:

$$(1 - \pi H_i(\Delta))(1-\mu)U'(\Delta) = \pi H_i'(\Delta)(\mu U(0) + (1-\mu)U(\Delta) - \bar{U}) \quad \text{for} \quad \Delta > \Delta_0.$$

Let $\widehat{H}_i(\Delta)$ be the solution of the differential equation defined by the first order condition with boundary value $\widehat{H}_i(\Delta_i^*) = 1$. We obtain

$$\widehat{H}_i(\Delta) = \frac{(1-\mu)U(\Delta) - [\pi\bar{U} - \pi\mu U(0) + (1-\pi)(1-\mu)U(\Delta_i^*)]}{\pi[\mu U(0) + (1-\mu)U(\Delta) - \bar{U}]}. \tag{8}$$

We further need $\widehat{H}_i(\widehat{\Delta}_i) = 0$ for some $\widehat{\Delta}_i \geq \Delta_0$ (to not have an atom at Δ_0). Since $\widehat{H}_i(\Delta)$ increases in Δ, this requires $\widehat{H}_i(\Delta_0) \leq 0$. For $U(0) \leq \bar{U}$, we have $U(\Delta_0) = \bar{U}$, so $\widehat{H}_i(\Delta_0) \leq 0$ requires that

$$\begin{aligned} & (1-\mu)\bar{U} - [\pi\bar{U} - \pi\mu U(0) + (1-\pi)(1-\mu)U(\Delta_i^*)] \\ = \quad & -(1-\mu)(1-\pi)(U(\Delta_i^*) - \bar{U}) - \mu\pi(\bar{U} - U(0)) \end{aligned}$$

is negative, which is satisfied for all π. If $U(0) > \bar{U}$, then $\Delta_0 = 0$ and $\widehat{H}_i(\Delta_0) \leq 0$ requires

$$\pi(U(0) - \bar{U}) \leq (1-\pi)(1-\mu)(U(\Delta_i^*) - U(0)). \tag{9}$$

Let $\overline{\pi}_i$ be the value of π at which (9) holds as an equality. Then (9) is satisfied for all $\pi \in [\overline{\pi}_i, 1]$. In this case, the equilibrium distribution is given by

$$H_i(\Delta) = \begin{cases} 0 & \text{if} \quad \Delta < \widehat{\Delta}_i \\ \widehat{H}_i(\Delta) & \text{if} \quad \widehat{\Delta}_i \leq \Delta < \Delta_i^* \\ 1 & \text{if} \quad \Delta \geq \Delta_i^* \end{cases} \tag{10}$$

with $\widehat{\Delta}_i$ such that $(1-\mu)U(\widehat{\Delta}_i) = [\pi\bar{U} - \pi\mu U(0) + (1-\pi)(1-\mu)U(\Delta_i^*)]$. Deviating to some Δ strictly smaller than $\widehat{\Delta}_i$ yields the same probability of attracting the investor as $\widehat{\Delta}_i$ but a strictly lower conditional payoff and is hence not profitable.

iii.) Finally, we consider an equilibrium where $H_i(\Delta_0) \in (0,1)$. Of course this requires $U(0) > \bar{U}$, so $\Delta_0 = 0$. We can first show that the intermediaries' strategy cannot have a mass point at zero and at the same time positive density arbitrarily close to zero. This follows from the fact that an intermediary's probability of being selected by an investor drops discontinuously at $\Delta = 0$ (there is a strictly positive probability that the other intermediary chooses $\Delta = 0$). The support of $H_i(\Delta)$ thus has a gap and is described by $\{0\} \cup [\widehat{\Delta}_i, \Delta_i^*]$ for some $\widehat{\Delta}_i$ strictly positive. On the interval $[\widehat{\Delta}_i, \Delta_i^*]$ indifference requires $H_i(\Delta) = \widehat{H}_i(\Delta)$ as before. Moreover, the intermediary must be indifferent between disclosure sets parametrized by $\widehat{\Delta}_i$ and $\Delta = 0$. That is:

$$\left(1 - \pi\widehat{H}_i(\widehat{\Delta}_i)\right)[\mu U(0) + (1-\mu)U(\widehat{\Delta}_i)] + \pi\widehat{H}_i(\widehat{\Delta}_i)\bar{U} = \left(1 - \pi\frac{1}{2}\widehat{H}_i(\widehat{\Delta}_i)\right)U(0) + \pi\frac{1}{2}\widehat{H}_i(\widehat{\Delta}_i)\bar{U} \tag{11}$$

The left hand side is equal to $(1-\pi)[\mu U(0) + (1-\mu)U(\Delta_i^*)] + \pi\bar{U}$ and thus constant in $\widehat{\Delta}_i$, while the right hand side is strictly decreasing in $\widehat{\Delta}_i$. At $\widehat{\Delta}_i = 0$ the left hand side is strictly larger than the right hand side when condition (9) is violated and at $\widehat{\Delta}_i = \Delta_i^*$ the left hand side is strictly smaller than the right hand side when condition (7) is violated. Hence, whenever neither of the above equilibria exists, condition (11) has a unique solution on $(0, \Delta_i^*)$. In that case the equilibrium is characterized by

$$H_i(\Delta) = \begin{cases} \widehat{H}_i(\widehat{\Delta}_i) & \text{if} \quad 0 \le \Delta < \widehat{\Delta}_i \\ \widehat{H}_i(\Delta) & \text{if} \quad \widehat{\Delta}_i \le \Delta < \Delta_i^* \\ 1 & \text{if} \quad \Delta \ge \Delta_i^* \end{cases}$$

where $\widehat{\Delta}_i$ is defined by (11).

A.5 Proof of Proposition 5

Given $Y_i \subset Y_j$, we have $\bar{\Delta}(Y_i) \ge \bar{\Delta}(Y_j)$. Let $\Delta_i^* \equiv \min\{\Delta^{opt}, \bar{\Delta}(Y_i)\}$ and $\Delta_j^* \equiv \min\{\Delta^{opt}, \bar{\Delta}(Y_j)\}$ denote, respectively, the monopoly solutions for initial awareness sets Y_i and Y_j. When $\Delta_i^* = \Delta_j^*$, the equilibrium distribution H_i and H_j are the same, so we are interested in the case $\Delta_i^* > \Delta_j^*$. Setting $\mu = 0$, we can write (8) as

$$\widehat{H}_i(\Delta) = \frac{U(\Delta) - [\pi\bar{U} + (1-\pi)U(\Delta_i^*)]}{\pi(U(\Delta) - \bar{U})}. \tag{12}$$

It is easy to see that the right-hand side is decreasing in Δ_i^*, which implies $H_i(\Delta) < H_j(\Delta)$ for strictly positive values of Δ in the support of $H_i(\Delta)$. It then remains to show $H_i(\Delta_0) \le H_j(\Delta_0)$ (notice that Δ_0 is not effected by Δ^*). When $U(0) \le \bar{U}$, $H_i(\Delta_0) = H_j(\Delta_0) = 0$. For the case $U(0) > \bar{U}$, we have then $\Delta_0 = 0$. Consider $H_i(\widehat{\Delta}_i)$ with $\widehat{\Delta}_i$ determined by (11). The condition pinning down $\widehat{\Delta}_i$ can be written as

$$(1-\pi)U(\Delta_i^*) + \pi\overline{U} = \left(1 - \pi/2 \cdot \widehat{H}_i(\widehat{\Delta}_i)\right) U(0) + \pi/2 \cdot \widehat{H}_i(\widehat{\Delta}_i)\bar{U}, \tag{13}$$

The left-hand side is strictly increasing in Δ_i^* on $[0, \Delta^{opt}]$ and independent of $\widehat{H}_i(\widehat{\Delta}_i)$, while the right-hand side is decreasing in $\widehat{H}_i(\widehat{\Delta}_i)$ (recall $U(0) > \bar{U}$) and independent of Δ_i^*. This implies that for $\Delta_i^* \ge \Delta_j^*$, we must have $\widehat{H}_i(\widehat{\Delta}_i) \le H_j(\widehat{\Delta}_j)$ and, hence, $H_i(0) \le H_j(0)$. $\square$

A.6 Proof of Proposition 6

For $\pi > \overline{\pi}_i$, we have $H_i(\Delta; \pi) = 1$ for all $\Delta \ge \Delta_0$, so a marginal change in π does not affect the equilibrium distribution. For the case $\pi \le \bar{\pi}$, we will show that both the function $\widehat{H}_i(\Delta; \pi)$, as specified in (12), as well as $\widehat{H}_i(\Delta_0; \pi)$ are increasing in π. The first property can be seen by taking the first derivative of $\widehat{H}_i$ with respect to π:

$$\frac{\partial \widehat{H}_i(\Delta; \pi)}{\partial \pi} = \frac{U(\Delta_i^*) - U(\Delta)}{\pi^2[U(\Delta) - \bar{U}]}. \tag{14}$$

Notice that for all values of Δ in the support of H_i the expected payoff for the intermediary is equal to the payoff at Δ_i^* and thus equal to $\pi\bar{U} + (1-\pi)U(\Delta_i^*)$. Since this payoff is strictly greater than $\bar{U}$ for all $\pi < 1$, we have $U(\Delta) > \overline{U}$ for all Δ in the support of H_i, so $\widehat{H}_i$ is increasing in π for positive values of Δ belonging to the support. Next, we consider $H_i(\Delta_0; \pi)$. Again, when $U(0) \leq \bar{U}$, $H_i(\Delta_0) = H_j(\Delta_0) = 0$ and there is nothing more to show. Consider hence the case where $U(0) > \bar{U}$ and Δ_0. Given that for $\pi \leq \underline{\pi}_i$, $H_i(0; \pi)$ equals zero, what remains to show is that $H_i(0; \pi)$ is increasing on $(\underline{\pi}_i, \overline{\pi}_i)$. Setting $\mu = 0$, we can solve the intermediary's indifference condition (11) for $U(\widehat{\Delta}_i)$:

$$U(\widehat{\Delta}_i; \pi) = \frac{\frac{1}{2}(\pi\overline{U} + (1-\pi)U(\Delta_i^*))(U(0) + \overline{U}) - U(0)\overline{U}}{\pi\overline{U} + (1-\pi)U(\Delta_i^*) - \frac{1}{2}(\overline{U} + U(0))}.$$

The first derivative with respect to π is given by

$$\frac{\partial U(\widehat{\Delta}_i; \pi)}{\partial \pi} = \frac{\frac{1}{4}(U(\Delta_i^*) - \overline{U})(U(0) - \overline{U})^2}{(\pi\overline{U} + (1-\pi)U(\Delta_i^*) - \frac{1}{2}(\overline{U} + U(0)))^2} > 0.$$

Since U strictly increases in Δ on $[0, \Delta^{opt}]$, it follows that $\widehat{\Delta}_i$ strictly increases in π. This, together with the fact that $H_i(\Delta; \pi)$ increases in π and Δ, implies that $H_i(0; \pi) = \widehat{H}_i(\widehat{\Delta}_i; \pi)$ increases in π. □

A.7 Proof of Proposition 7

To prove the statement we start by showing that $\widehat{H}_i(\Delta)$, as specified in (12), is decreasing in $\overline{U}$ for all Δ. Differentiating $\widehat{H}_i$ with respect to $\overline{U}$ yields:

$$\frac{\partial \widehat{H}_i(\Delta; \overline{U})}{\partial \overline{U}} = -\frac{1}{U(\Delta) - \overline{U}} - \frac{(U(\Delta_i^*) - U(\Delta))\left(U(\Delta_i^*) - \overline{U}\right)}{\pi[U(\Delta) - \bar{U}]^2}. \tag{15}$$

As we argue above, we have $U(\Delta) > \bar{U}$ for all positive values of Δ belonging to the support of H_i. This, together with $U(\Delta_i^*) > U(\Delta) > \overline{U}$, implies that the derivative is negative. Next we need to show that $\widehat{H}_i(\Delta_0; \overline{U})$ is weakly decreasing in $\overline{U}$. We can again concentrate to the case where $\Delta_0 = 0$ and $U(0) > \bar{U}$. In this case, $\widehat{H}_i(0; \overline{U})$ is constant for values of π below $\underline{\pi}_i$ and above $\overline{\pi}_i$. Consider now $\pi \in (\underline{\pi}_i, \overline{\pi}_i)$. Rewriting (11) as in (13), we take the total derivative and obtain

$$\frac{\mathrm{d}\widehat{H}_i(\widehat{\Delta}_i)}{\mathrm{d}\overline{U}} = -\frac{\pi\left(1 - H_i(\widehat{\Delta}_i)/2\right)}{\pi/2\left(U(0) - \bar{U}\right)}. \tag{16}$$

Recalling that we have $U(0) > \overline{U}$, the derivative is strictly negative. Hence, $H_i(0; \overline{U})$ is weakly decreasing in μ. □

A.8 Proof of Proposition 8

Consider a disclosure set Y and let Δ be such that $\bar{V}(\hat{y}+\Delta) = \max_{y\in(Y\cup Y_i)} \bar{V}(y)$. Strict concavity of $\bar{V}$ then implies $(Y \cup Y_i) \subseteq \bar{Y}^*(\Delta)$. Letting $y^* = \arg\max_{y\in(Y\cup Y_i)} V(y)$, we either have $y^* = \hat{y}+\Delta$ or $y^* < \hat{y}$. In either case, the intermediary's expected payoff from $\hat{y}+\Delta$ is weakly greater than from y^*. Conditional on the investor being captive, disclosing $\bar{Y}^*(\Delta)$ thus weakly dominates disclosing Y. Conditional on the investor being non-captive, we can distinguish two cases.

1) The other intermediary discloses a set X such that $\max_{y\in(X\cup Y_i)} \bar{V}(y) > \bar{V}(\hat{y}+\Delta)$. In this case, $\bar{Y}^*(\Delta)$ and Y yield the same probability of being chosen and the same expected payoff conditional on being chosen.

2) The other intermediary discloses a set X such that $\max_{y\in(X\cup Y_i)} \bar{V}(y) \leq \bar{V}(\hat{y}+\Delta)$. In this case, disclosure $\bar{Y}^*(\Delta)$ yields a weakly higher probability of being chosen and a weakly higher expected payoff conditional on being chosen than Y. Hence, disclosing a set $\bar{Y}^*(\Delta)$ for some $\Delta \geq 0$ is always a best-response.

For the second part of the statement, note that

$$\bar{U}'(\Delta) = -2(\hat{y}+\Delta-\mathbb{E}[\theta]),$$

so the first-order condition yields $\Delta^* = \mathbb{E}[\theta] - \hat{y} = \beta$, and $\bar{U}''(\Delta) = -2 < 0,\ \forall\Delta$.

A.9 Proof of Proposition 9

Consider the derivative of $\widehat{H}_i$ with respect to μ:

$$\frac{\partial \widehat{H}_i(\Delta;\mu)}{\partial\mu} = -\frac{(1-\pi)(U(\Delta_i^*)-U(\Delta))(U(0)-\bar{U})}{\pi[\mu U(0)+(1-\mu)U(\Delta)-\bar{U}]^2}. \tag{17}$$

Given $U(\Delta_i^*) > U(\Delta)$ for $\Delta < \Delta_i^*$, this derivative is positive if $\bar{U} > U(0)$ and negative if $\bar{U} < U(0)$. When $\bar{U} > U(0)$, intermediaries never choose a zero gap. Hence, for $\bar{U} > U(0)$, the property $\partial\widehat{H}_i(\Delta;\mu)/\partial\mu > 0$ is sufficient to prove the claim.

For $\bar{U} < U(0)$, we need to consider a potential mass point at $\Delta = 0$. We want to show that when $\bar{U} < U(0)$ and $\pi \in (\underline{\pi}_i, \overline{\pi}_i)$, the probability $H_i(0;\mu)$ increases in μ. We can now rewrite the intermediary's indifference condition (11) as follows:

$$(1-\pi)[\mu U(0)+(1-\mu)U(\Delta_i^*)] + \pi\bar{U} = \left(1-\pi\frac{1}{2}\widehat{H}_i(\widehat{\Delta}_i;\mu)\right)U(0) + \pi\frac{1}{2}\widehat{H}_i(\widehat{\Delta}_i;\mu)\bar{U}.$$

The left-hand side is decreasing in μ and independent of $\widehat{\Delta}_i$. Hence, as μ increases, both sides of the equality must decrease. Since the right-hand side does not depend on μ, this requires that $H_i(\widehat{\Delta}_i;\mu)$ increases, as required.

Finally, when $U(0) = \underline{U}$, a change in μ does not affect the equilibrium distribution. $\square$

B Additional Tables and Knowledge Index Variables

In this section, we report some of the the descriptive statistics and a few robustness checks. Before that, we list the 17 variables constituting our 'knowledge index' with a brief description. For each dummy we also indicate the location of the question within the survey.[20]

(P) S1.13: investor reports to be well informed on financial products

(P) S1.44.9: investor says s/he knew what product was best for her/him

(P) S1.44.10: investor reports to knew well the products available on the market

(P) S2.11.15: investor likes to be informed on every option before taking any decision

(P) S1.45.8: investor says s/he did not only consider types of product suggested by others

(U) S1.44.12: investor had no troubles understanding what the products were

(U) S1.44.13: investor understood the terminology in products' description

(U) S1.44.16: investor understood the information on the products offered

(U) S1.52: investor understood all the aspects of the operation

(S) S1.15: investor visited 3 or more institutions

(S) S1.44.6: investor has been searching with care before choosing

(S) S1.47.1: investor independently (from the intermediary) collected information

(B) S1.12.8: investor is a professional in financial sector

(B) S1.12.9: investor attended courses on financial sector

(T) S2.14: investor knows which financial instruments is less liquid

(T) S2.15: investor knows that the return of a financial instrument in foreign currency depends on the exchange rate

(T) S2.16: investor knows what is a derivative product

[20] An english translation of the complete survey is reported in the online appendix.

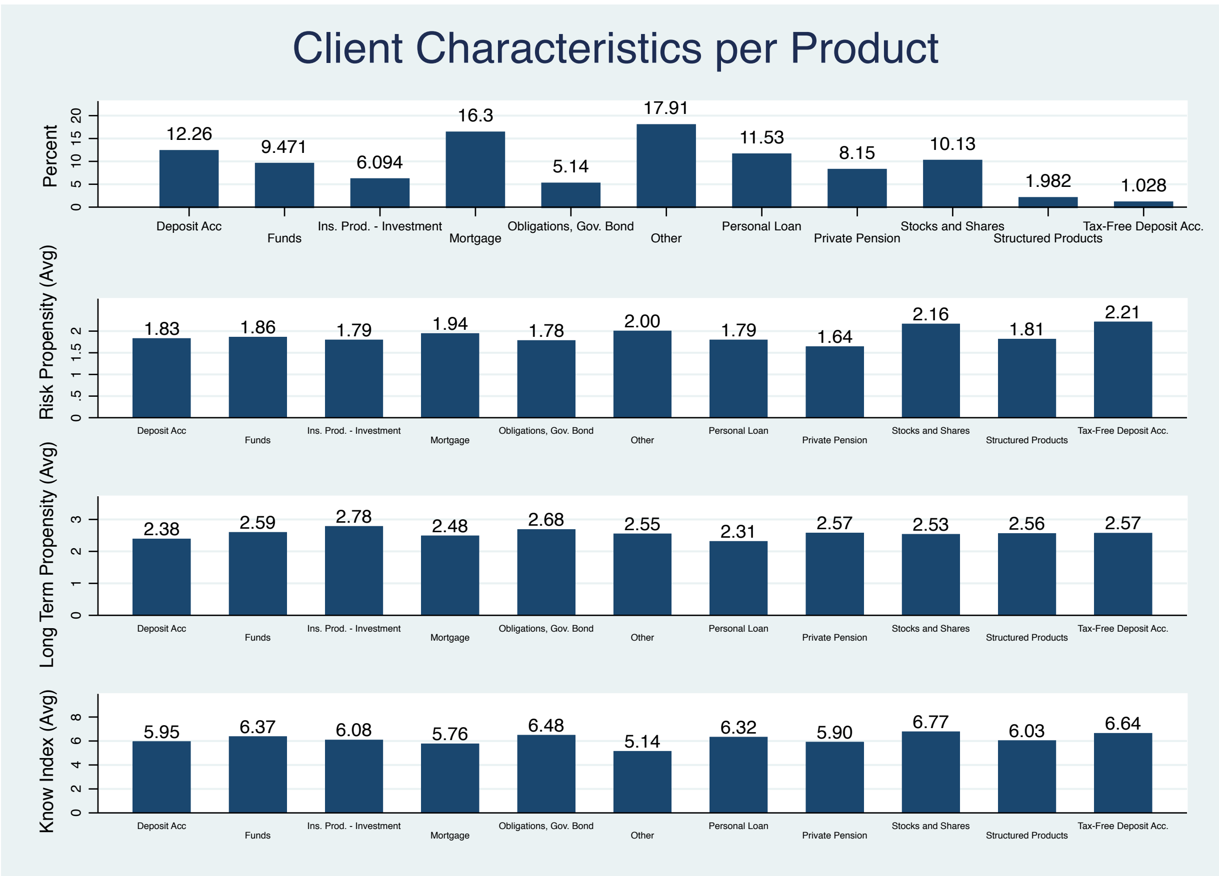

Figure 3: The figure summarizes the average investors' characteristics by products. The first panel reports the distribution of products acquired in our sample. The second panel reports the average index of risk aversion of the investors who purchased the products indicated in the first panel. The index has mean 1.898 and standard deviation 0.924. The third panel reports the average values of the index measuring the attitude of the investor towards investing in long term products. The index has mean 2.524 and standard deviation 1.028. The last panel reports the average values of our knowledge index. The index has mean 5.98 and standard deviation 3.25.

Table 6: Number of Products Offered: Full Sample—Cluster(Product)

	(1) No Control Poisson	(2) With Controls Poisson	(3) Controls & Products Poisson	(4) No Controls Ord. Probit	(5) With Controls Ord. Probit	(6) Controls & Products Ord. Probit
KnowIndex_total (Std. Deviations)	0.305*	0.230**	0.189**	0.239*	0.212*	0.186+
	(0.145)	(0.0700)	(0.0674)	(0.112)	(0.0992)	(0.104)
Sophisticated Respondent	0.0167	0.0453	-0.0552	0.0627	0.189	0.123
	(0.163)	(0.228)	(0.224)	(0.150)	(0.241)	(0.244)
Female Respondent		-0.226	-0.196		-0.160	-0.142
		(0.151)	(0.153)		(0.176)	(0.185)
Financial Wealth (Std. Dev.)		0.102*	0.0855*		0.0630	0.0557
		(0.0466)	(0.0419)		(0.0642)	(0.0666)
Risk Propensity (Std. Dev.)		0.224**	0.185***		0.263***	0.244***
		(0.0717)	(0.0536)		(0.0447)	(0.0446)
Long Term Propensity (Std. Dev.)		0.0631	0.0729		0.00752	0.00484
		(0.0577)	(0.0584)		(0.0578)	(0.0627)
MiFiD Responsiveness (Std. Dev.)		0.0513	0.0419		-0.0406	-0.0554
		(0.0689)	(0.0691)		(0.0595)	(0.0619)
Additional Socio-Economic Controls		YES	YES		YES	YES
Year of Purchase		YES	YES		YES	YES
Product Purchased		NO	YES		NO	YES
_cons	1.534***	-0.781	0.203			
	(0.0976)	(1.057)	(1.113)			
cut1						
_cons				1.525***	3.913***	3.326**
				(0.108)	(1.122)	(1.147)
cut2						
_cons				2.238***	4.741***	4.190***
				(0.126)	(1.121)	(1.145)
cut3						
_cons				2.445***	5.089***	4.551***
				(0.107)	(1.134)	(1.149)
N	1362	868†	868†	1362	868†	868†
adj. R^2						

Standard errors in parentheses

$^{+}p < 0.1$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

† sample decreases since some individuals refused report some relevant information.

Table 7: Number of Products Offered: Hard Index

	(1)	(2)	(3)	(4)	(5)	(6)
	No Control	With Controls	Controls & Products	No Controls	With Controls	Controls & Products
	Poisson	Poisson	Poisson	(Ord. Probit)	(Ord. Probit)	(Ord. Probit)
KnowIndex_hard (Std. Deviations)	0.234***	0.201***	0.157***	0.156**	0.151*	0.115
	(0.0121)	(0.0161)	(0.0164)	(0.0493)	(0.0704)	(0.0737)
Sophisticated Respondent	-0.00154	0.0401	-0.0586	0.0581	0.173	0.110
	(0.0314)	(0.0423)	(0.0431)	(0.130)	(0.184)	(0.191)
Female Respondent		-0.207***	-0.189***		-0.149	-0.137
		(0.0354)	(0.0355)		(0.144)	(0.148)
Financial Wealth (Std. Dev.)		0.111***	0.0912***		0.0729	0.0600
		(0.0180)	(0.0185)		(0.0785)	(0.0835)
Risk Propensity (Std. Dev.)		0.228***	0.189***		0.261***	0.243***
		(0.0158)	(0.0162)		(0.0673)	(0.0707)
Long Term Propensity (Std. Dev.)		0.0485**	0.0654***		0.00263	0.00244
		(0.0155)	(0.0158)		(0.0674)	(0.0703)
MiFiD Responsiveness (Std. Dev.)		0.0511**	0.0452*		-0.0352	-0.0473
		(0.0182)	(0.0181)		(0.0727)	(0.0746)
Additional Socio-Economic Controls		YES	YES		YES	YES
Year of Purchase		YES	YES		YES	YES
Product Purchased		NO	YES		NO	YES
_cons	1.569***	-0.723*	0.413			
	(0.0277)	(0.319)	(0.342)			
cut1						
_cons				1.498***	3.713**	2.957
				(0.116)	(1.364)	(1.529)
cut2						
_cons				2.198***	4.529***	3.808*
				(0.134)	(1.371)	(1.534)
cut3						
_cons				2.398***	4.873***	4.165**
				(0.146)	(1.377)	(1.538)
N	1362	868†	868†	1362	868†	868†
adj. R^2						

Standard errors in parentheses

$^{+}p < 0.1$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

† sample decreases since some individuals refused report some relevant information.

Table 8: Number of Products Offered: Sample Restricted to Exogenous Choice of Intermediary

	(1) No Control Poisson	(2) With Controls Poisson	(3) Controls & Products Poisson	(4) No Controls Ord. Probit	(5) With Controls Ord. Probit	(6) Controls & Products Ord. Probit
KnowIndex_total (Std. Deviations)	0.293***	0.338***	0.215***	0.334***	0.552**	0.525**
	(0.0225)	(0.0303)	(0.0330)	(0.0953)	(0.177)	(0.197)
Sophisticated Respondent	-0.185***	0.168*	-0.0920	0.0779	0.878+	0.615
	(0.0504)	(0.0738)	(0.0794)	(0.234)	(0.492)	(0.636)
Female Respondent		-0.114+	-0.108+		-0.268	-0.245
		(0.0626)	(0.0642)		(0.301)	(0.321)
Financial Wealth (Std. Dev.)		0.214***	0.198***		0.427*	0.461*
		(0.0342)	(0.0358)		(0.189)	(0.212)
Risk Propensity (Std. Dev.)		0.162***	0.0902**		0.342*	0.269
		(0.0269)	(0.0285)		(0.137)	(0.153)
Long Term Propensity (Std. Dev.)		-0.141***	-0.0854**		-0.236	-0.217
		(0.0289)	(0.0295)		(0.147)	(0.157)
MiFiD Responsiveness (Std. Dev.)		0.0666+	0.0725+		0.0449	0.0948
		(0.0367)	(0.0387)		(0.189)	(0.206)
Additional Socio-Economic Controls		YES	YES		YES	YES
Year of Purchase		YES	YES		YES	YES
Product Purchased		NO	YES		NO	YES
_cons	1.623***	0.188	2.821***			
	(0.0435)	(0.569)	(0.743)			
cut1						
_cons				1.660***	4.871	-12.29
				(0.211)	(3.079)	(2817.2)
cut2						
_cons				2.396***	5.813	-11.21
				(0.250)	(3.093)	(2817.2)
cut3						
_cons				2.558***	6.109*	-10.82
				(0.267)	(3.102)	(2817.2)
N	443	304†	304†	443	304†	304†
adj. R^2						

Standard errors in parentheses

$^{+}p < 0.1$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

† sample decreases since some individuals refused report some relevant information.

Table 9: Number of Products Offered: Sample Restricted to non-economic triggers to invest/borrow

	(1) No Control Poisson	(2) With Controls Poisson	(3) Controls & Products Poisson	(4) No Controls Ord. Probit	(5) With Controls Ord. Probit	(6) Controls & Products Ord. Probit
KnowIndex_total (Std. Deviations)	0.259***	0.269***	0.229***	0.168*	0.194*	0.160+
	(0.0173)	(0.0216)	(0.0219)	(0.0693)	(0.0921)	(0.0970)
Sophisticated Respondent	-0.00354	-0.0989+	-0.179***	0.158	0.163	0.111
	(0.0411)	(0.0529)	(0.0540)	(0.171)	(0.230)	(0.242)
Female Respondent		-0.0551	-0.0160		-0.0152	0.0581
		(0.0470)	(0.0475)		(0.189)	(0.201)
Financial Wealth (Std. Dev.)		0.0930***	0.0636*		0.115	0.123
		(0.0246)	(0.0257)		(0.108)	(0.117)
Risk Propensity (Std. Dev.)		0.132***	0.116***		0.173+	0.185+
		(0.0218)	(0.0223)		(0.0927)	(0.0987)
Long Term Propensity (Std. Dev.)		0.00758	0.0266		-0.0381	-0.0125
		(0.0209)	(0.0214)		(0.0948)	(0.102)
MiFiD Responsiveness (Std. Dev.)		-0.0587**	-0.0852***		-0.184*	-0.223*
		(0.0225)	(0.0229)		(0.0914)	(0.0953)
Additional Socio-Economic Controls		YES	YES		YES	YES
Year of Purchase		YES	YES		YES	YES
Product Purchased		NO	YES		NO	YES
_cons	1.570***	-0.582	0.736			
	(0.0359)	(0.440)	(0.467)			
cut1						
_cons				1.518***	2.692	1.436
				(0.153)	(1.819)	(2.031)
cut2						
_cons				2.263***	3.538	2.349
				(0.180)	(1.827)	(2.036)
cut3						
_cons				2.611***	4.095*	2.941
				(0.214)	(1.841)	(2.046)
N	698	475	475	698	475	475
adj. R^2						

Standard errors in parentheses

$^{+}p < 0.1$, $^{*}\ p < 0.05$, $^{**}\ p < 0.01$, $^{***}\ p < 0.001$

† sample decreases since some individuals refused report some relevant information.

Table 10: Extremeness of Offer (Std. Deviations)—Cluster(Product)

	(1) No Controls	(2) With Controls	(3) Controls & Years	(4) Controls & Products	(5) All
KnowIndex_total (Std. Deviations)	-0.264***	-0.262***	-0.251***	-0.266***	-0.257***
	(0.0272)	(0.0344)	(0.0306)	(0.0356)	(0.0333)
Sophisticated Respondent	-0.256**	-0.207*	-0.198*	-0.190*	-0.186*
	(0.0753)	(0.0745)	(0.0648)	(0.0759)	(0.0698)
Female Respondent		-0.100+	-0.0989*	-0.105+	-0.104*
		(0.0460)	(0.0379)	(0.0488)	(0.0418)
Financial Wealth (Std. Dev.)		-0.0463	-0.0314	-0.0286	-0.0170
		(0.0387)	(0.0342)	(0.0375)	(0.0331)
Risk Propensity (Std. Dev.)		0.252***	0.243***	0.249***	0.238***
		(0.0194)	(0.0207)	(0.0191)	(0.0204)
Long Term Propensity (Std. Dev.)		-0.0356	-0.0392	-0.0204	-0.0252
		(0.0261)	(0.0242)	(0.0285)	(0.0268)
MiFiD Responsiveness (Std. Dev.)		0.00627	0.00723	0.0183	0.0197
		(0.0358)	(0.0381)	(0.0367)	(0.0384)
Additional Socio-Economic Controls	NO	YES	YES	YES	YES
Product Purchased	NO	NO	NO	YES	YES
Year of Purchase: 2017			-0.183		-0.121
			(0.144)		(0.101)
Year of Purchase: 2016			0.196		0.192
			(0.146)		(0.126)
Year of Purchase: 2015			0.212		0.208
			(0.123)		(0.114)
Year of Purchase: 2014			0.406**		0.397**
			(0.117)		(0.0986)
Year of Purchase: 2013			0.0634		0.0707
			(0.139)		(0.148)
Year of Purchase: 2012			0.0462		0.0209
			(0.177)		(0.172)
Year of Purchase: 2011			-0.0408		-0.0133
			(0.271)		(0.270)
Year of Purchase: 2010			-0.177		-0.167
			(0.112)		(0.121)
Year of Purchase: 2009			0.144		0.119
			(0.199)		(0.184)
Year of Purchase: 2008			-0.169		-0.183
			(0.310)		(0.313)
_cons	0.202**	0.944	0.608	0.444	0.188
	(0.0650)	(0.606)	(0.649)	(0.631)	(0.687)
N	1362	868†	868†	868†	868†
adj. R^2	0.086	0.180	0.206	0.207	0.226

Standard errors in parentheses

$^{+}$ $p < 0.1$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

† sample decreases since some individuals refused report some relevant information.

Table 11: Extremeness of Offer: Hard Index (Std. Deviation)

	(1) No Controls	(2) With Controls	(3) Controls & Years	(4) Controls & Products	(5) All
KnowIndex_hard (Std. Deviations)	-0.152***	-0.194***	-0.174***	-0.183***	-0.169***
	(0.0270)	(0.0350)	(0.0348)	(0.0352)	(0.0351)
Sophisticated Respondent	-0.263***	-0.184*	-0.176*	-0.173*	-0.169+
	(0.0662)	(0.0872)	(0.0863)	(0.0875)	(0.0869)
Female Respondent		-0.139+	-0.134+	-0.143+	-0.139+
		(0.0736)	(0.0730)	(0.0730)	(0.0726)
Financial Wealth (Std. Dev.)		-0.0559	-0.0396	-0.0393	-0.0261
		(0.0368)	(0.0367)	(0.0368)	(0.0368)
Risk Propensity (Std. Dev.)		0.254***	0.246***	0.249***	0.240***
		(0.0341)	(0.0338)	(0.0344)	(0.0342)
Long Term Propensity (Std. Dev.)		-0.0201	-0.0258	-0.00815	-0.0144
		(0.0336)	(0.0332)	(0.0335)	(0.0332)
MiFiD Responsiveness (Std. Dev.)		0.00615	0.00479	0.0152	0.0150
		(0.0352)	(0.0348)	(0.0350)	(0.0347)
Additional Socio-Economic Controls	NO	YES	YES	YES	YES
Product Purchased	NO	NO	NO	YES	YES
Year of Purchase: 2017			-0.199		-0.152
			(0.136)		(0.139)
Year of Purchase: 2016			0.174		0.164
			(0.148)		(0.149)
Year of Purchase: 2015			0.165		0.157
			(0.146)		(0.149)
Year of Purchase: 2014			0.405**		0.394**
			(0.145)		(0.147)
Year of Purchase: 2013			0.0615		0.0634
			(0.169)		(0.170)
Year of Purchase: 2012			0.0128		-0.0155
			(0.155)		(0.156)
Year of Purchase: 2011			-0.0384		-0.0138
			(0.205)		(0.206)
Year of Purchase: 2010			-0.170		-0.163
			(0.200)		(0.200)
Year of Purchase: 2009			0.0771		0.0474
			(0.209)		(0.209)
Year of Purchase: 2008			-0.190		-0.209
			(0.272)		(0.271)
_cons	0.207***	1.018	0.699	0.636	0.383
	(0.0585)	(0.668)	(0.682)	(0.724)	(0.738)
N	1362	868†	868†	868†	868†
adj. R^2	0.039	0.148	0.174	0.169	0.189

Standard errors in parentheses

$^{+}$ $p < 0.1$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

† sample decreases since some individuals refused report some relevant information.

Table 12: Extremeness of Offer : Exogenous Selection (Std. Deviations)

	(1) No Controls	(2) With Controls	(3) Controls & Years	(4) Controls & Products	(5) All
KnowIndex_total (Std. Deviations)	-0.188***	-0.215***	-0.181**	-0.208***	-0.181**
	(0.0488)	(0.0552)	(0.0559)	(0.0542)	(0.0554)
Sophisticated Respondent	-0.513***	-0.363**	-0.322**	-0.299*	-0.264*
	(0.109)	(0.124)	(0.124)	(0.122)	(0.124)
Female Respondent		-0.270*	-0.262*	-0.186	-0.184
		(0.113)	(0.115)	(0.111)	(0.113)
Financial Wealth		-0.0637	-0.0471	-0.0271	-0.0154
(Std. Dev.)		(0.0543)	(0.0546)	(0.0539)	(0.0545)
Risk Propensity (Std. Dev.)		0.236***	0.240***	0.228***	0.225***
		(0.0505)	(0.0507)	(0.0505)	(0.0511)
Long Term Propensity		-0.114*	-0.112*	-0.0950	-0.0954*
(Std. Dev.)		(0.0501)	(0.0498)	(0.0483)	(0.0484)
MiFiD Responsiveness		0.102^{+}	0.106^{+}	0.105^{+}	0.108^{+}
(Std. Dev.)		(0.0589)	(0.0590)	(0.0573)	(0.0579)
Additional Socio-Economic Controls	NO	YES	YES	YES	YES
Product Purchased	NO	NO	NO	YES	YES
Year of Purchase: 2017			-0.0719		0.0528
			(0.213)		(0.214)
Year of Purchase: 2016			0.337		0.357
			(0.220)		(0.217)
Year of Purchase: 2015			0.498*		0.514*
			(0.227)		(0.225)
Year of Purchase: 2014			0.343		0.331
			(0.234)		(0.231)
Year of Purchase: 2013			0.282		0.193
			(0.271)		(0.269)
Year of Purchase: 2012			0.157		0.106
			(0.251)		(0.247)
Year of Purchase: 2011			0.246		0.341
			(0.404)		(0.395)
Year of Purchase: 2010			0.155		0.152
			(0.353)		(0.348)
Year of Purchase: 2009			0.246		0.205
			(0.323)		(0.315)
Year of Purchase: 2008			-0.293		-0.0404
			(0.693)		(0.673)
_cons	0.481***	0.103	-0.364	-2.232^{+}	-2.419^{+}
	(0.0954)	(1.104)	(1.120)	(1.257)	(1.265)
N	443	362†	362†	362†	362†
adj. R^2	0.078	0.196	0.211	0.265	0.270

Standard errors in parentheses

$^{+}$ $p < 0.1$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

† sample decreases since some individuals refused report some relevant information.

Table 13: Extremeness of Offer : Trigger Selection (Std. Deviations)

	(1) No Controls	(2) With Controls	(3) Controls & Years	(4) Controls & Products	(5) All
KnowIndex_total (Std. Deviations)	-0.208***	-0.226***	-0.217***	-0.224***	-0.216***
	(0.0390)	(0.0439)	(0.0437)	(0.0436)	(0.0434)
Sophisticated Respondent	-0.269**	-0.191+	-0.207*	-0.150	-0.160
	(0.0874)	(0.0990)	(0.0995)	(0.0988)	(0.0995)
Female Respondent		-0.0697	-0.0676	-0.0910	-0.0929
		(0.0917)	(0.0917)	(0.0915)	(0.0916)
Financial Wealth (Std. Dev.)		-0.0111	-0.00778	-0.00906	-0.00448
		(0.0445)	(0.0445)	(0.0446)	(0.0446)
Risk Propensity (Std. Dev.)		0.295***	0.277***	0.291***	0.270***
		(0.0420)	(0.0421)	(0.0423)	(0.0426)
Long Term Propensity (Std. Dev.)		0.0264	0.0350	0.0322	0.0372
		(0.0418)	(0.0417)	(0.0419)	(0.0417)
MiFiD Responsiveness (Std. Dev.)		-0.0135	-0.0144	-0.0310	-0.0305
		(0.0477)	(0.0474)	(0.0475)	(0.0472)
Additional Socio-Economic Controls	NO	YES	YES	YES	YES
Product Purchased	NO	NO	NO	YES	YES
Year of Purchase: 2017			-0.0414		0.0546
			(0.183)		(0.188)
Year of Purchase: 2016			0.398*		0.445*
			(0.191)		(0.196)
Year of Purchase: 2015			0.372*		0.444*
			(0.184)		(0.190)
Year of Purchase: 2014			0.320+		0.381*
			(0.186)		(0.191)
Year of Purchase: 2013			0.0540		0.0907
			(0.210)		(0.214)
Year of Purchase: 2012			0.112		0.194
			(0.196)		(0.201)
Year of Purchase: 2011			-0.0354		0.0258
			(0.256)		(0.262)
Year of Purchase: 2010			-0.0582		-0.00759
			(0.254)		(0.256)
Year of Purchase: 2009			0.285		0.280
			(0.259)		(0.260)
Year of Purchase: 2008			-0.220		-0.200
			(0.352)		(0.352)
_cons	0.345***	0.586	0.329	1.136	0.0599
	(0.0764)	(0.870)	(0.896)	(0.919)	(0.933)
N	698	545†	545†	545†	545†
adj. R^2	0.054	0.163	0.179	0.185	0.200

Standard errors in parentheses

$^{+}$ $p < 0.1$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

† sample decreases since some individuals refused report some relevant information.

Table 14: *Risk vs knowledge*

	(1) No Controls	(2) With Controls	(3) Controls & Years	(4) Controls & Products	(5) All
KnowIndex_total (Std. Deviations)	-0.0622	-0.0979**	-0.0971*	-0.0807*	-0.0805*
	(0.0321)	(0.0372)	(0.0376)	(0.0355)	(0.0360)
Sophisticated Respondent	0.0535	-0.130	-0.125	-0.104	-0.0989
	(0.0847)	(0.104)	(0.105)	(0.0997)	(0.101)
Female Respondent		0.0576	0.0486	0.0344	0.0271
		(0.0811)	(0.0818)	(0.0774)	(0.0782)
Financial Wealth (Std. Dev.)		0.0385	0.0459	0.0376	0.0433
		(0.0428)	(0.0433)	(0.0410)	(0.0416)
Risk Propensity (Std. Dev.)		-0.395***	-0.398***	-0.340***	-0.343***
		(0.0392)	(0.0396)	(0.0380)	(0.0384)
Long Term Propensity (Std. Dev.)		0.0135	0.0169	0.00389	0.00563
		(0.0396)	(0.0398)	(0.0378)	(0.0381)
MiFiD Responsiveness (Std. Dev.)		-0.00231	-0.00372	-0.0160	-0.0179
		(0.0408)	(0.0411)	(0.0390)	(0.0394)
Constant	3.411***	2.788***	2.688***	2.038**	1.988*
	(0.0766)	(0.758)	(0.783)	(0.785)	(0.812)
Socio-Economic Controls	No	Yes	Yes	Yes	Yes
Product Purchased	No	No	No	Yes	Yes
Year of purchase	No	No	Yes	No	Yes
Observations	1009	677	677	677	677
Adjusted R^2	0.002	0.144	0.141	0.227	0.222

Standard errors in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Dependent variable: answer to S1.7a or S1.7b, from which the answers 'The question is not pertinent' have been eliminated.

Table 15: *Exotic vs knowledge*

	(1) No Controls	(2) With Controls	(3) Controls & Years	(4) Controls & Products	(5) All
KnowIndex_total (Std. Deviations)	-0.0584**	-0.0854***	-0.0907***	-0.0912***	-0.0947***
	(0.0195)	(0.0246)	(0.0247)	(0.0245)	(0.0246)
Sophisticated Respondent	0.0131	0.0372	0.0281	0.0118	0.00765
	(0.0476)	(0.0642)	(0.0644)	(0.0644)	(0.0648)
Female Respondent		-0.102	-0.113*	-0.0897	-0.102
		(0.0543)	(0.0546)	(0.0539)	(0.0543)
Financial Wealth (Std. Dev.)		0.00839	0.00834	-0.00704	-0.00612
		(0.0272)	(0.0275)	(0.0272)	(0.0275)
Risk Propensity (Std. Dev.)		0.0978***	0.0935***	0.103***	0.0992***
		(0.0252)	(0.0253)	(0.0253)	(0.0255)
Long Term Propensity (Std. Dev.)		0.0418	0.0434	0.0300	0.0324
		(0.0248)	(0.0249)	(0.0247)	(0.0248)
MiFiD Responsiveness (Std. Dev.)		-0.0113	-0.0127	-0.0250	-0.0258
		(0.0259)	(0.0259)	(0.0257)	(0.0258)
Constant	1.894***	1.907***	1.625**	2.570***	2.309***
	(0.0422)	(0.493)	(0.510)	(0.545)	(0.564)
Socio-Economic Controls	No	Yes	Yes	Yes	Yes
Product Purchased	No	No	No	Yes	Yes
Year of purchase	No	No	Yes	No	Yes
Observations	1326	856	856	856	856
Adjusted R^2	0.005	0.038	0.042	0.066	0.066

Standard errors in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Dependent variable: answer to S1.9 or S1.9, from which the answers 'The question is not pertinent' have been eliminated.