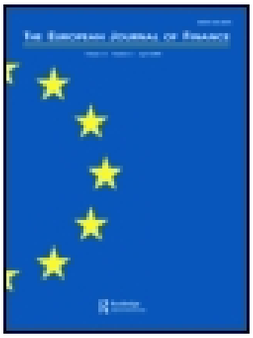

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How financial information disclosure affects risk perception. Evidence from Italian investors' behaviour

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ABSTRACT
This paper investigates how different representations of financial information may be appraised in terms of complexity and usefulness, and how financial disclosure influences individuals' risk perception. By using a consumer testing analytical approach, we run a survey on a sample of Italian investors: 254 bank customers were submitted 4 different templates, each combining a different typology of data (historical and prospective) and framing (words, numbers and charts) to indicate the same level of risk and return of four real-life financial instruments. Representation formats partially overlap with those mandated by regulators and used within the financial industry. Results show that the perceived riskiness of financial products is affected by the way information is disclosed. Perceived complexity of the financial information disclosure intensifies perception of riskiness of the product solicited. Gender, age, personal traits, behavioural biases and financial knowledge, do also play a role. Overall, given investors' heterogeneity and behavioural biases, neither simplifying disclosure nor a 'one-size-fits-all' approach may be sufficient to ensure correct risk perception and to prevent unbiased investment choices.

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1. Introduction

Transparency and disclosure are key regulatory tools aimed at reducing information asymmetries between investors and product manufacturers, thus enabling individuals to make informed decisions. However, as shown by several behavioural and experimental studies, risk preferences and financial decisions may be sensitive to framing, i.e. the way financial information is disclosed (Kahneman and Tversky 1974, 1979; Tversky and Kahneman 1981; Weber, Siebenmorgen, and Weber 2005; Vlaev, Chater, and Stewart 2009; Wang, Keller, and Siegrist 2011). In addition, several cases of mis-selling of financial instruments have supported the idea that removing information asymmetries through detailed disclosure may not be effective in protecting retail investors (House of Commons Committee of Public Accounts 2016; National Audit Office 2016).

This evidence has spurred a growing debate on how financial information can be best delivered to consumers (Driver et al. 2010; Kaufmann, Weber, and Haisley 2013). Scholars, on the one hand, are analysing interventions effective in changing behaviours towards responsible decisions (among others, Dolan et al. 2012) and regulators, on the other hand, are increasingly striving to refine disclosure by departing from the rational individual hypothesis and by referring to actual behaviours (Linciano 2010). The key investor information document (KIID) for European investment funds (IFF Research and YouGov 2009), as well as the key information document for the so-called pre-packaged retail investment and insurance products analysed by the European Supervisory Authorities – ESAs henceforth (ESAs JC 2015), are examples of how the representation of the characteristics of financial products can be designed on an evidence basis, i.e. by taking into account how consumers actually read and use financial disclosure.

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This research contributes to the on-going debate by analysing individuals' attitudes towards alternative disclosure formats (Information Sheets henceforth) of the characteristics of financial instruments, which partially overlap with those mandated by regulators and used by the financial industry (IFF Research and YouGov 2009; ESAs JC 2015; Driver et al. 2010; Gentile et al., 2015). Specifically, our research aims to investigate whether the way disclosure of financial information is delivered may influence the perception of riskiness of financial products.

We run an empirical analysis based on a consumer testing approach. We analyse reactions of a sample of 254 Italian investors, selected among 8 large Italian banks, and located across the national territory. Interviewees were submitted different representation formats of risk/return characteristics of four financial real-life instruments negotiated on Italian trading venues of various risk levels: an outstanding structured bond, a newly issued structured bond and two stocks. We alternatively submitted two templates based on historical risk/return information, respectively a visual template and a verbal template, and two templates based on prospective information, in a what-if and in a probabilistic modelling scheme.

For each representation mode, individuals were asked to appraise the format in terms of complexity and usefulness, as well as to rank their risk perception even if, within our consumer testing design, we were soliciting the *same* financial product, left anonymous but differently presented by Information Sheets. Therefore, any difference in risk perception can be claimed to be due to the format of the financial information disclosure.

Perceived complexity (PC) turns out to rise moving from the visual representation to the verbal one, and reaches its highest level for the performance scenarios (both what-if and probabilistic modelling). As for usefulness, both what-if and probabilistic modelling are perceived to be less useful than the visual and verbal representations. In fact, not surprisingly, PC and perceived usefulness of financial information are generally inversely related: the higher the complexity of the information, the lower the perceived usefulness.

Our findings show that risk perception results affected by PC of the information disclosure. In a multivariate estimation framework, we investigate the role of PC and many controlling factors. Indeed, PC turns out to be the main driver of the perceived risk. We also find an attention effect, i.e. perception of complexity lessens when the attention of investors is grabbed by some specific feature of the Information Sheet. This evidence indirectly signals that there is potential scope for steering risk perception.

Beyond socio-demographic variables, financial knowledge, personal traits such as self-assessed risk tolerance, impulsivity and behavioural biases were also found to play a role in the perception of complexity and risk. We note opposite individual profiles when comparing results for visual and verbal templates: some individuals perceive information in the opposite way compared to others, when solicited to invest through informational disclosure. In our results as an example, men perceive higher risk when solicited with visual templates than when they receive the verbal description. The opposite is true for women, who perceive higher risk when inspecting the verbal template compared to the visual frame. This heterogeneity in risk perception may suggest, on policy grounds, that neither simplifying disclosure nor a 'one-size-fits-all' approach may be sufficient to ensure correct risk perception and unbiased investment choices.

The paper is organised as follows. Section 2 surveys the empirical literature. The design of our consumer testing, the sampling procedure and the sample are detailed in Section 3. The model specification applied in the empirical analysis is illustrated in Section 4. Finally, Section 5 presents and discusses the main findings. Section 6 concludes. The appendix referred to in the text is available on request from the corresponding author.

2. Literature review

Since the seminal pieces of work introducing prospect theory (Kahneman and Tversky 1979; Tversky and Kahneman 1981), it has been shown that framing interacts with heuristics and emotional factors in orienting investors' judgement of the risk-return profile of financial products. With particular reference to financial risk perception, it is 'inherently subjective', emotional (Lucarelli et al. 2015), context-dependent and prone to an assessment process that relies upon assumptions and judgements (Slovic 1972, 2000; Olsen 1997; Vlaev, Chater, and Stewart 2009; MacGregor et al. 2000).

Among contributions on the effects of financial information representation, Weber, Siebenmorgen, and Weber (2005) carried out an experiment ascertaining the impact that the type and presentation format of

financial information has on investors' expectations about asset risk, returns and volatility. The authors find that knowledge of the name and the type of financial assets involved led to higher estimates of expected returns and to lower estimates of volatility and risk.

Some authors elicited individual preferences towards different representations capturing different dimensions of risk (volatility, probability of loss, etc.). Vlaev, Chater, and Stewart (2009), for example, asked participants in their experiment to rate eleven representation formats about the same financial products, according to three criteria: usefulness to make financial decisions, complexity and suitability of the product. All representations used a verbal (words and numbers) description of risk, apart from one, which relied on a graphical element. The information frame receiving the highest rating presents risk as the variation between minimum and maximum values with an average in between. This risk framing also prompts more stable risk preferences (over a three-month testing period) in comparison to standard measures of risk aversion.

Wang, Keller, and Siegrist (2011) show that when people rate certain assets as easier to understand (probably driven by a familiarity bias), they also perceive them as being less risky. Following the psychometric paradigm adopted by Fischhoff et al. (1978), the authors asked participants to rank 20 investment products on seven scales. The first three scales (understanding, expert knowledge, and prevalence) correspond to familiarity, and the last four scales (risk of capital loss, risk of lower-than-expected return, variation and chance of higher-than-inflation return) correspond to the different statistical measures of risk. Moreover, participants were asked to rate the perceived risk of each product. Results show a high degree of inter-correlation among the seven judgment scales and the overall perceived risk. In particular, the perceived risk is almost perfectly correlated with the scale 'risk of capital loss', 'risk of lower-than-expected-return', and 'variation of gains and losses', whereas the correlation between perceived risk and the 'chance of higher-than-inflation return' is the lowest, implying that the gain potential is less prominent than the loss potential and volatility for the risk judgment.

A number of experiments have examined visual framing effects and behavioural biases linked to various presentation formats, data aggregation and lexico-graphic elements (Ibrekk and Morgan 1987; Unser 1999; Célérier and Vallée 2013).

Simplifying information formats may not be sufficient, as shown by the available empirical evidence. Wilcox (2003) and Beshears et al. (2009) find that the summary prospectus of mutual funds, introduced by the Securities and Exchange Commission to simplify information, did not enhance the quality of investors' portfolio choices, as one might expect. Barber, Odean, and Zheng (2005) find that investors are more sensitive to salient information, such as onetime fees, front-end loads and commissions that are generally larger and therefore more noticeable than operating expenses, which are smaller, ongoing and easily masked by the volatility of equity returns.

Therefore, information disclosure needs to be not only simple, but also salient (i.e. noticeable, capable of drawing attention and to appear important in decision-making). Properly designed graphs (Desanctis and Jarvenpaa 1989) and visual priming techniques (Wang and Dowding 2010) can increase the effectiveness of disclosure. However, presentation modes need to be carefully assessed, given that they may be highly misleading if improperly designed (Penrose 2008) or may prompt some biases – although that can be 'resilient' to others. For instance, while representing costs in percentage terms could encourage the use of simplifying heuristics, using absolute values could evoke a different reference context and induce subjective evaluation (Weathers, Swain, and Carlson 2012).

3. Methods and sample

3.1. Representation format design

Our research followed an explicit mandate to verify the appreciation of financial information disclosed during real-life investment decisions. This motivates the selection of four representation formats (templates) that are typically used by financial intermediaries to introduce investment products to their customers, and which also partially overlap with those envisioned by European regulation (IFF Research and YouGov 2009; ESAs JC 2015).

As shown in Table 1, the first two templates are based on past information on risk and return (backward-looking templates: Templates 1 and 2), while the remaining two deliver prospective information (forward-looking templates: Templates 3 and 4). Table 1 also shows the distinctive features of each template against the

Table 1. Design of templates.

	Backward-looking templates		Forward-looking templates	
	Template 1 *Visual* Sheets A, D and F	Template 2 *Verbal* Sheets B and G	Template 3 *What if* Sheet C	Template 4 *Probabilistic modelling* Sheet E
Past information*	1	1	0	0
Comparative information (benchmarking)*	1	1	0	0
Score on a risk scale*	1	0	0	0
Presence of a chart*	1 or 0 (in D)	0	0	0
Counting of numbers (1)	1	10	8	6
Counting of words	228	314	312	214
Specialistic words counting (2)	19	23	10	11
What-if scenario Information*	0	0	1	0
Probalistic Modelling Information*	0	0	0	1

Note: *indicates a dichotomic variable: yes = 1; no = 0. (1): counting of numbers with risk/return content. Accessory numbers excluded, i.e. numbers of dates, numbers of risk thermometer and numbers of ratings. (2): counting of words from financial jargon, here assumed to be included in the Investopedia dictionary.

others. It is evident that our representation formats use multiple and frequently overlapping disclosure vehicles (such as words and numbers) because in real life it is quite unlikely to receive formats based uniquely on a single informational vehicle (e.g. only words, only numbers, only charts, etc.). In other words, we acknowledge that, contrary to what would be recommendable in an in-laboratory setting, our adherence to real-life informational sheets impeded us to isolate disclosure vehicles in a simplified framing, i.e. to characterise each template with a distinctive and unique disclosure format.

The first two templates deliver the same (past) information on risk and return of financial products, i.e. details on the three main sources of risk (liquidity, credit and market risk) that are typically used by financial intermediaries' software in Italy to check adequacy of investment choices to customers' risk profile. This is also in line with European regulatory framework (ESAs JC 2015). Both templates, similar to the real-life investment decision-process, offer risk/return information on the solicited product compared to a benchmark portfolio.[1] Given that the financial information processed in the two templates is rigorously identical, they differ only in terms of framing layouts: the Template 1 (or T1, henceforth) is a visual template, with risk presented as a score aggregating information on market, liquidity and credit risks. The score is portrayed on a risk scale, that resembles a type of thermometer, ranging from 1 (low risk) to 5 (high risk), and is in line with existing research on synthetic risk indicators (Driver et al. 2010). Return information is delivered through a bar-chart. Thanks to T1, we expect to collect evidence on the impact of visual framing on the understanding of financial information, as numbers and words are used considerably less than in the other templates.

In contrast, Template 2 (or T2, henceforth) is a verbal template without any graphical support, with the highest number of words, specialist terms and numbers in comparison to the other templates. It separately and analytically discloses measures of market risk (volatility and value at risk), liquidity risk (turnover ratio) and credit risk (Moody's official rating and expected default probability).

As far the other two templates dispatching prospective information (on the same product) are concerned, Template 3 (or T3, henceforth) delivers what-if (i.e. deterministic) scenarios, while Template 4 (T4, henceforth) delivers probabilistic scenarios, mainly inspired by the regulatory debate (ESAs JC 2015). T3 lists the product's return under three alternative hypothetical situations (i.e. low, medium or high return corresponding respectively to three different settings for asset prices and other underlying market conditions that determine the product's performance), according to the approach mandated for structured UCITS by the European legislator (ESAs JC 2015).

Conversely, T4 offers prospective information on the likelihood of outcomes, where likelihood is estimated through probabilistic modelling. The Template reports returns under a worst-case, average and best-case scenario, respectively. The worst-case scenario corresponds to the 10th percentile of the expected rates of return, thus indicating an estimated a 10% probability that the rate of return is likely to be less than that stated. The average-case scenario corresponds to the mean of the expected rates of return, thus indicating an estimated 50% probability that the rate of return is likely to be less than that stated. The best-case scenario corresponds to the

90th percentile of the expected rates of return, indicating an estimated a 90% probability that the rate of return is likely to be less than that stated.

3.2. Matching financial products and representation formats

To understand the impact of financial disclosure on risk perception we considered four financial products: two structured bonds, one outstanding and the other newly issued, and two stocks. Note that the two stocks have been selected according to the method of matched samples (Davies and Kim 2009), in order to assume them to be strictly comparable.

Coherently with the aim of sticking to real-life investment behaviours, the selected financial instruments are negotiated on actual Italian trading venues: the bonds are traded on the Italian retail bond market, while the stocks are included in the FTSEMIB index. The time-to-maturity of the selected bonds was approximately equal to 3–4 years.

We ranked the four financial products by their effective risk, as gauged through the aggregation of different types of risk used in the analysis (market, liquidity and credit risk). According to our methodology, the newly issued structured bond and stocks are the riskiest products (risk level 4, or 3 on a 1–5 range), the outstanding structured bond (risk level 2 on 5).

The characteristics of the financial products were represented through the templates described above. In particular, the templates T1–T4 have been alternatively embedded into seven different Information Sheets (from Information A to Information Sheet F), as presented in Appendix – Table A.3.[2]

Table 2 summarises matching of Templates with financial products and Information Sheets as used during the consumer testing.

A full-factorial experimental design was not applicable to our research due to the fact that templates characterised by prospective information (Templates 3 and 4) are applicable to structured products *only* (here, structured bonds) – this is in line with similar experiments of European Authorities (ESAs JC 2015). Furthermore, the newly issued bond by definition lacks past performance track records, i.e. lacks data to be exploited by backward-looking templates (Templates 1 and 2).

3.3. The consumer testing design

Information Sheets were presented and explained to interviewees by two researchers, specifically trained to run the consumer testing consistently among all interviewees. Interviewers followed a binding administration process described in Table 3.

As regards information surveyed on interviewees, individuals' appraisal of different Templates, as well as risk perception and investment decisions, were investigated through a four-section questionnaire (Questionnaire A, or QA henceforth, reported in Appendix – Table A.1.). Our researchers supported respondents in filling in the whole Questionnaire A. They asked respondents to rate the representations according to the perceived utility

Table 2. Matching of financial products, Information Sheets and Templates.

Financial products	Effective risk level (1–5 range)	Information sheet	Template
Outstanding structured bond	Level 2	A	T1 – Visual template
		B	T2 – Verbal template
		C	T3 – What-if template
Newly issued structured bond	Level 4	D	T1 – Visual template
		E	T4 – Probabilistic modelling template
Stock 1	Level 3	F	T1 – Visual template
Stock 2	Level 4	G	T2 – Verbal template

Note: the risk level was assigned to each financial product according to a methodology described at http://risktolerance.univpm.it/consobCT/eng#. During the consumer testing, the same financial product has been disclosed showing alternative templates, in order to understand if the same informational content (referring to the same product) is differently perceived as a consequence of different representation formats. Stocks 1 and 2 have different risk levels but similar price level and market values, which are the characteristics used to select them through the matching sample technique.

Table 3. Design of the consumer testing.

Phase:	Step 1	Step 2	Step 3	Step 4	Step 5	Finally
Information Sheet disclosed	A, B, C	D, E	F, G		–	Interviewees are told the typology of financial products disclosed in various Information Sheets
Templates disclosed	T1 T2 T3	T1 T4	T1 T2	T1 T2		
Initialisation	Random[a]	Random[a]	Random[a]			
Solicited product	Outstanding structured bond	Newly issued structured bond	Stocks	Stocks		
Anonymity of the product	Totally blind[b]	Totally blind[b]	Totally blind[b]	Partially blind[b]		
Direct appreciation	0–10 Likert scale for: • Complexity • Informativeness • Usefulness	0–10 Likert scale for: • Complexity • Informativeness • Usefulness	–	Relative appreciation of perceived comprehensibility and usefulness		
Engagement	Declared attention on a list of items	Declared attention on a list of items	Open response on items that grabbed attention			
Indirect appreciation of risk perception with the question:	Which of the three Information sheets refers to the riskiest financial product (*trick: it was the same product*)	Which of the three Information sheets refers to the riskiest financial product (*trick: it was the same product*)	Which of the three Information sheets refers to the riskiest financial product (*trick: it was the same product*)		Ranking of products by Information sheets (B, C, E and G) from most to least risky	

Note: Steps of the CT are analytically shown in Questionnaire A available at http://risktolerance.univpm.it/consobCT/#eng.
[a] Randomness ensures that the answers do not depend on the sequence in which the presentation options are disclosed. This sequence is recorded and matched with the answers.
[b] *Totally blind* means that interviewees did not know that the solicited product was the same for the different Information Sheets, or the typology of product. *Partially blind* means that interviewees were informed that the solicited product was the same for the different Information Sheets, but interviewees did not know the product typology.

and complexity (appraisal), and to rate the products represented in the Information Sheets according to the perceived risk (risk perception).

Three main rules constitute the frame of our experimental design and were strictly followed during the consumer testing (see Table 3). Firstly, for almost the whole test, researchers did not communicate the typology of financial products disclosed; thus, any information collected on appraisal, risk perception an investment choice can be assumed to be free from framing induced by the nature of the financial contracts (Ganzach 2000; Weber, Siebenmorgen, and Weber 2005).

Secondly, different Information Sheets were disclosed and explained, but they referred to the *same* financial product: Information Sheets A, B and C, referred to the outstanding structured bond; Information Sheets D and E, referred to the newly issued structured bond; Information Sheets F and G, referred to the 'equivalent' stocks. During the consumer testing interviewees uniquely received the financial information via Information Sheets, missing any clue on both the kind of financial products solicited, and on the fact that the Information Sheets may relate to the same/different product.

Thirdly, when a sequence of Information Sheets was disclosed that referred to the same financial product (the first A-B-C set; the second D-E set, and the last F-G set) interviewees were asked to randomly select among letters. The selection order was not pre-defined, in order to avoid bias of the appraisal with a 'first impression' effect, or a pre-defined 'comparison effect'. The order of selection has been recorded by researchers and used as a control variable in multivariate estimations.

Table 3 also indicates that data on PC, completeness and usefulness of the disclosed information was obtained with a direct evaluation of interviewees within a [0–10] Likert scale. Given our aim was to detect the influence of risk disclosure on risk perception we could not directly ask risk appreciation from the Information Sheets. In some cases, it would have been nonsensical (e.g. for all the Visual Templates-T1 interviewees directly received

a risk score on a [1–5] scale). Therefore, perceived riskiness has been elicited *indirectly*, and in *relative, and not absolute terms*, by asking: (i) to pick the riskiest (perceived) financial product among those solicited at each phase (even if the effective level of risk *was the same*, because it was the *same product*) and (ii) to rank a selected sub-group of Information Sheets by perceived risk (see the last row of Table 3).

Finally, we collected data on socio-demographic characteristics, investment habits and experience, financial knowledge, some individual characteristics such as risk tolerance, attitude towards behavioural biases and impulsivity through a four-section questionnaire filled in autonomously by respondents (Questionnaire B or QB, henceforth reported in Appendix – Table A.2.).

Each interview lasted from 40 to 60 minutes. On average, one-third of the time was spent answering Questionnaire B while two-thirds of the time was dedicated to face-to-face Consumer Testing, based on Steps and questions described in Questionnaire A.

3.4. Sample and rewarding scheme

Our final sample includes 254 individuals, selected among the customers of 8 Italian banks that satisfy the following requisites: they held securities in their portfolios; they shuffled their investments at least once in the previous year; they were under 70 years old. These criteria aimed to filter out individuals completely inexperienced or extraneous to any investment decision. As expected, our sample consists of individuals whose age, education and level of wealth (illustrated in more details below) are higher than the Italian population average.[3]

The sampling was realised through a two-step procedure. The first step involved obtaining a stratification of geographical areas/cities which could be representative of the Italian territory. The second step consisted of a random selection of individuals among the population of customers of each bank/city previously extracted.

Participation in the experiment was rewarded by a 50 euro compensation that was paid by the hosting banks. As shown in Table 4, that presents summary socio-demographic features of the sample, participants are mainly

Table 4. Socio-demographic characteristics of the consumer testing participants.

Item	Percentage/ mean	Question number	Item	Percentage/ mean	Question number
Age (average)	56	1.1 QB	Financial situation		1.39 QB
Residence		1.2 QB	*Monthly family income < 2000 euros*	26%	
North	39%		*Monthly family income in the range 2000–5000 euros*	51%	
Centre	33%		*Monthly family income > 5000 euros*	15%	
South	27%		Expectation about family income		1.8 QB
Gender		1.3 QB	*Declining*	20%	
Female	37%		*Remaining stable*	63%	
Male	63%		*Increasing*	14%	
Marital status		1.4 QB	Family total financial wealth		1.40 QB
Unmarried	18%		*< 50,000 euros*	22%	
Married/cohabitee	67%		*in the range 50,000 to 500,000 euros*	46%	
Separated or divorced	9%		*> 500,000 euros*	20%	
Widow	3%		Real estate properties		1.11 QB
Family		1.5 QB	*0*	10%	
Average no. of people	2.6		*1*	35%	
Average no. of children	0.4		*2*	22%	
Highest level of education completed		1.6 QB	*3*	13%	
Less than high school	11%		*More than 3*	15%	
High school	41%				
Bachelor's degree or completed masters or Ph.D..	46%				
Current employment status		1.7 QB			
Fixed term contract employee	5%				
Open-ended contract employee	20%				
Bank employee or financial agent	3%				
Retired	32%				
Manager	4%				
Self-employed	18%				
Entrepreneur	8%				

Table 5. Financial literacy and mathematical attitudes of the consumer testing participants.

Item	Percentage of correct answers	Question number
Portfolio diversification[a]	27%	2.2 and 2.5 QB
Risk/return relation[a]	54%	2.1 and 2.6 QB
Inflation	74%	2.3 QB
Market risk	31%	2.4 QB
Liquidity risk	50%	2.7 QB
Credit risk	56%	2.8 QB
Internal rate of return[a]	56%	2.11 QB
Net investment yield/nominal yield/investment value[a]	10%	1.26 QB
Mathematical question	44%	2.12 QB
Capitalisation[a]	28%	2.9 and 2.10 QB
Gap between self-assessed and objective knowledge	Mismatch among the declared and the actual knowledge within the [−1;+1] bounce: +1 if respondents declared in QA to hold financial knowledge, and then choose the *wrong* answers in QB; −1 if respondents declared in QA NOT to hold financial knowledge, and then choose the *right* answers in QB	Obs Mean Min Max 254 0.13 −.75 1

[a]Figures refer to the percentage of respondents that answered correctly to all of the questions concerning the specific item.

Table 6. Personal traits and behavioral biases of the consumer testing participants.

Item	Definition	Percentage of participants	Question number	Value of the dummy used in the multivariate analysis
Reflection effect[a]	The reversing of risk aversion/risk seeking in case of gains or losses	2%	1.21, 1.23 QB	n.a.
Disposition effect	The attitude of investors to sell too quickly securities with positive performance and hold securities with negative performance for too long	62%	1.19, 1.20 QB	= 1 if respondents choose the 3rd or the 4th alternative answer in 1.19 and the 1st, the 2nd or the 3rd in 1.20 QB
Volatility aversion[a]	The attitude of investors to avoid variability of returns in the domain of both losses and gains	32%	1.21, 1.23 QB	= 1 if respondents prefer ± 20% both in 1.21 and 1.23 QB
Loss aversion	The maximum loss on a financial investment an individual would accept before deciding to sell	45%[b]	1.18	= 1 if respondents answer 'I can't invest at a loss' or 'Even very little'
Optimism	Individuals believe that the outcomes of events are better for them than for others	54%	1.38 QB	= 1 if respondents answer 'yes'
Self-representation	Confidence in making financial decisions	9%	1.37 QB	= 1 if respondents answer 'very' or 'completely'
Market risk		*48%*[c]	*0.0.2 QA, 2.4 QB*	
Liquidity risk		*25%*[c]	*0.0.3 QA, 2.7 QB*	
Credit risk		*8%*[c]	*0.0.4 QA, 2.8 QB*	
IRR		*13%*[c]	*0.0.5 QA, 2.11 QB*	
Volatility seeking[a]	The attitude of investors towards variability of returns in the domain of both losses and gains	9%	1.21, 1.23 QB	= 1 if respondents prefer ± 40% both in 1.21 and 1.23 QB
Thrill seeking	Seeking well-being through thrill	9%	1.17 QB	= 1 if respondents answer 'yes'
Risk tolerance	Willingness to take financial risk	52%[d]	section 3 QB	= 1 if respondents' scores are higher than the median of the sample
Impulsivity	Predisposition towards rapid, unplanned reactions to internal or external stimuli without regard to the negative consequences of these	52%[d]	section 4 QB	= 1 if respondents' scores are higher than the median of the sample

[a]About 30% of interviewees did not answer questions 1.21 and 1.23.
[b]Figure refers to question 1.18 QB; according to question 1.31 QB the percentage of loss averse individuals is equal to 48%.
[c]Figures refer to the percentage of respondents who state to know what market risk, liquidity risk, credit risk and internal rate of return mean and then failed to correctly define them.
[d]Figures refer to respondents whose scores are higher than the median of the sample.

men (63%), aged 56 on average and generally well educated (more than 40% completed high school and more than 45% earned a bachelor's degree or a post-graduate degree). As for the professional status group, 32% of the respondents are retired, 20% are open-ended employees, and 18% self-employed. The vast majority of the interviewees are high-income earners and wealthy (the monthly family income falls in the range 2000–5000 euros in 51% of the cases, while 46% report a financial wealth ranging from 50,000 to 500,000 euros).

A large part of respondents are used to making their investment decisions after having consulted with a financial expert (43%), while 33% of people make decisions on their own. As for financial knowledge, half of the respondents might be defined as being 'high financially literate', with a percentage of correct answers reported in Questionnaire B above the median of the sample distribution. Despite showing a high level of education and familiarity with investment decisions on average, only half of the respondents show a high level of financial literacy. Performances of interviewees at responding explicit financial knowledge questions are reported in Table 5.

Respondents' personal traits were elicited with respect to risk attitude, optimism, impulsivity and detection of some behavioural biases, in particular with regard to the disposition effect (Shefrin and Statman 1985). Among the several indicators of risk attitude gauged in our survey, we focused on volatility aversion (shown by 32% of respondents), loss aversion (45% of the cases) and risk propensity as measured by the Grable and Lytton (2003) financial risk tolerance test (52% of individuals may be deemed risk lovers). Impulsivity, i.e. the predisposition towards rapid and unplanned reactions to internal or external stimuli with no regard to the negative consequences of these, seems to be a relevant personal trait for 52% of the respondents (Impulsivity Test, Patton, Stanford, and Barratt 1995). Sixty-two per cent of respondents exhibit an attitude towards the disposition effect. Summary information on personal traits and behavioural biases of participants to the consumer testing are offered in Table 6.

Note that in our sample, individuals characterised by a higher level of financial knowledge are also prone to behavioural biases, as we find a significant positive correlation (0.3036) between the attitude towards the disposition effect and our proxy of financial literacy. Moreover, the inclination towards the disposition effect also reveals a positive correlation with risk propensity (0.2655), as measured through the Grable and Lytton test.

4. Models and variables

In order to investigate our research question, we model the relation of informational disclosure and risk perception as a function of complexity, as we need to cater for an endogeneity bias, since complexity and the dependent variable are reasonably affected by the same set of (latent) variables. In order to control and correct for this potential endogeneity, we estimate a multivariate probit model, simultaneously running two equations referring, respectively, to the determinants of our dependent variable (risk perception) and complexity.

We prefer to treat endogeneity by estimating a multivariate model rather than an instrumental variable model, as is common in the literature, because the identification of instruments can be arbitrary, discretionary and difficult to validate. In our multivariate framework instead, endogeneity can be easily detected by testing the statistical significance of the correlation between equations and can be consequently treated through the simultaneous estimation of the equations themselves. If correlation is not significant, the null hypothesis of endogeneity can be rejected and a univariate model (i.e. regressing risk perception on PC) can be estimated.

Our bivariate model specification analyses risk perception for each template separately (visual, verbal, what-if and probabilistic modelling). We do not analyse Informational Sheets A and B because the percentage of respondents perceiving these Sheets as representing risky products was too low to produce reliable estimates (see the following Figure 1). For visual templates, we analyse responses obtained from both Informational Sheets (D and F) because they refer to slightly different formats (D relates to a newly issued bond and does not show any charting of returns).

In summation, our model investigates the interaction between financial information lay-outing and risk perception, by applying a recursive simultaneous bivariate probit model that estimates the determinants of risk perception and complexity perception, as appraised by the respondents in intra-product comparisons. For each Information Sheet submitted to the interviewees we specify a risk perception model that is conditioned on PC and treated as an endogenous variable. We define Risk Perception (RP) as a binary variable equal to one if,

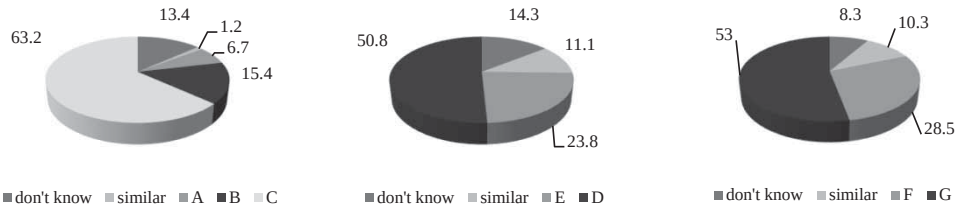

Figure 1. Representation and perceived risk in the intra-product comparison. *Which of these Information Sheets refers to the riskiest financial product?* Note: Please refer to questions 1.1.14, 1.2.10 and 1.3.6 QA. In the left box: A received 17 responses, B 39 responses and C 160 responses (35 and 3, to 'don't know' and 'similar risk', respectively). In the central box: D received 128 responses and E 60 responses (36 and 28, to 'don't know' and 'similar risk', respectively. In the right box: F received 72 responses and G 134 responses (22 and 26, to 'don't know' and 'similar risk', respectively.

following the intra-product comparison, a given Information Sheet was thought to refer to the riskiest product (answers to questions of Steps 1, 2 and 3 of the experiment, summarised in the last row of Table 3). PC is defined as a binary variable equal to one if it recorded a score greater than 7 on the 10-point Likert range. For Sheets F and G, PC is replaced by a dichotomous variable, equal to one when individuals appraised the Sheet as incomprehensible.

The bivariate probit estimating the perceived risk (RP) conditioned on PC is the following:

$$\mathrm{RP}_{i,k} = 1(\alpha_{1i} + \beta_i PC_{i,k} + X'_{1k}\gamma_{1i} + \varepsilon_{1i,k} > 0), \tag{1}$$

$$\mathrm{PC}_{i,k} = 1(\alpha_{2i} + X'_{2k}\gamma_{2i} + \varepsilon_{2i,k} > 0),$$

$$\begin{pmatrix} \varepsilon_{1i,k} \\ \varepsilon_{2i,k} \end{pmatrix} \Bigg| X_{1k}, X_{2k} \Bigg) \sim N\left[\begin{pmatrix} 0 \\ 0 \end{pmatrix}, \begin{pmatrix} 1 & \rho_i \\ \rho_i & 1 \end{pmatrix}\right],$$

where $1(\cdot)$ is the indicator function taking value 1 if the statement in the brackets is true; k indicates the interviewee; X1 is the matrix of independent variable observations in the perceived risk equation and X2 the matrix of the independent variable observations in the PC equation; i stands for Information Sheets C, D, E, F and G.

In particular, the perceived risk equation and the PC equation include as explanatory variables: (i) individual characteristics; (ii) financial knowledge proxies; (iii) investment habits; (iv) socio-demo characteristics and (v) financial capability variables.

Some individual characteristics, like volatility aversion, loss aversion, G&L risk attitude, optimism, and impulsivity, may affect risk perception given that risk may mean different things to different people and since several risk dimensions may be equally relevant to the same individual. For some subjects, risk may be mainly related to the probability of loss, to its potential maximum value or to the possibility of achieving a below target return, while others may be more sensitive to the overall variability of returns (Duxbury and Summers 2004). Risk measures may trigger subjective assessments that differ across individuals depending on the risk dimension they are more sensitive to. When down-side risks are more relevant to investors, asymmetric risk measures (i.e. the ValueatRisk) may be more appreciated than symmetric measures (i.e. the volatility of returns). We also checked whether being prone towards the disposition effect may play a role, although we do not have any a-priori knowledge on its significance and on the direction of its impact.

As for financial literacy, we consider two alternative indicators that generate two different model specifications. We analysed responses to questions of Questionnaire B about basic financial notions of some financial concepts, such as market risk, liquidity risk, credit risk, the internal rate of return, inflation, diversification as previously shown in Table 5. We run a principal component analysis on missing values (no answer), weighted by the inverse of the easiness of the question, thus obtaining a *missing-values* variable.[4] We also alternatively used the variable *gap*, accounting for the mismatch between respondents' self-assessed knowledge and their actual knowledge, which could be considered as a proxy for overconfidence (see Table 5, last row). The comparison between self-perceptions and actual literacy has long been explored by academics (among others, see also Van Rooij, Lusardi, and Alessie 2011). For instance, Anderson, Baker, and Robinson (2015) found that financial

participation is mostly driven by perceived rather than actual financial literacy. Marginally, further items related to financial knowledge (level of education and frequency of financial readings) are added among explanatory variables.

Additional control variables used in model (1) are socio-demographic characteristics, such as gender and marital status. Indeed, women generally are more prudent when making investment decisions (Eckel and Grossman 2002). In married couples, however, gender differences seem to influence and balance each other according to dynamics depending on the distribution of financial wealth within the family, profession and the financial literacy of individuals (Gilliam, Chatterjee, and Grable 2010).

Moreover, the appraisal of the Information Sheets and risk perception might be driven also by the presence of specific risk measures, or by a specific 'piece' of information that draws individuals' attention because of its perceived salience, so called the 'attention effect'; a proxy of this effect is included in the regressions.

Lastly, we add a variable accounting for the selection order by which a given Information Sheet has been extracted during the testing, to control for a possible 'first impression', 'learning effect' or 'comparison effect'. This variable ranges from 1 to 3 for Sheets A, B and C, and either 1 or 2 for Sheets D-E and F-G, as is evident from Table 3.

5. Results and discussion

Before presenting findings of the multivariate estimations, we describe the relationships between PC and perceived risk. Table 7 (left side) depicts the average scoring of PC, which rises moving from the visual representation (A and D, i.e. Template 1) to the verbal one (B, i.e. Template 2) and reaches its highest for the performance scenarios (both what-if and probabilistic modelling, respectively C and E, Templates 3 and 4). This evidence is consistent with the respondents' opinions on Information Sheets F and G (Table 7 – right side), which have been compared in pairs, rather than assessed separately on a 10-point Likert range. Overall, the visual template is considered more understandable (less complex) than other ones.

Correlation between PC and perceived utility is significantly negative as shown in Table 8: this implies that the higher the information complexity, the lower the perceived usefulness is.

5.1. Risk representation and risk perception: descriptive statistics

In order to elicit products' risk ranking by interviewees we went through two rounds of comparisons: intra-product and inter-products comparisons, respectively, as shown in the last row of Table 3 for consumer testing design.

In intra-product comparison, respondents assessed the risk related to the *same* product represented alternatively through different Information Sheets (i.e. risk was constant across Templates referring to the same product). As shown in Table 3, at this stage participants did not know either about the matching or about the type of products corresponding to the Sheets. In this phase of consumer testing, the type of product was not disclosed to prevent familiarity effects. Indeed, familiarity could stimulate an emotional reaction of appreciation

Table 7. PC of the Information Sheets.

	Complexity average scoring (Likert range)						*According to you, which of the two Information Sheets is the most understandable? (number of respondents)*	
	Obs	Mean	Std. Dev.	Min	Max		Freq.	Per cent
A	254	4.665	2.615	0	10	F	162	63.78
B	254	5.256	2.868	0	10	G	81	31.89
C	253	4.960	3.181	0	10	Similar	7	2.76
D	253	3.862	2.806	0	10	Don't know	3	1.18
E	252	4.298	3.064	0	10	na	1	0.39
						Total	254	100

Note: Table on the left side collects answers to the following: 'Please consider the [. . .] Information Sheets one at a time and assess their simplicity [. . .] on a 0–10 scale', questions 1.1.1 and 1.2.1, QA. Table on the right side refers to question 1.4.1 QA. The selection order of the Information Sheets is not taken into account.

Table 8. Correlation between PC and perceived utility.

Product	Information sheet	Complexity and usefulness
Outstanding structured bond	A (T1 – visual)	−0.2**
	B (T2 – verbal)	−0.4**
	C (T3 – what-if)	−0.4**
Newly issued structured bond	D (T1 – visual)	−0.2**
	E (T4 – probabilistic modelling)	−0.4**

Note: **indicates that the correlation coefficient is significant at 5%. We did not test the correlation between PC and usefulness of Information Sheets F and G since for these Templates we did not submitted a Likert scale, but we asked only which of the two documents was regarded as the most understandable and which was the most useful. The correlation between comprehensibility and usefulness is significant at the 5% level and equal to 0.4 for both Information Sheets F and G.

that could prevail over the 'rational' assessment of risk. As shown by several experimental studies, this could drive the investors' global attitude towards assets on which they have no information but to which they have been 'exposed' in some way (see among others, Statman, Fisher, and Anginer 2008 and Ganzach 2000).

In details, participants were asked to rank the Information Sheets according to their perceived risk levels, ignoring whether information referred to the same or to different products. We would expect that, if representation did not affect risk perception, on average respondents should be able to assess the same level of risk for the same product across the different Templates inspected.

On the contrary, interviewees' answers about risk ranking show that representation does matter. Only a few respondents (1% when comparing Information Sheets A, B and C and 11% when comparing Information Sheets D and E) were able to appraise the same risk level across Information Sheets related to equally risky products (or more precisely, to the same product; see Figure 1). When inspecting F (T1), referring to Stock 1, and G (T2), referring to Stock 2, 53% of the participants answered properly by indicating G as the Information Sheet of the riskiest product (in fact, stock G is riskier than stock F).

An inter-product perspective followed in the second round of comparison that was undertaken by using only a sub-set of Templates, that is the verbal variant (reporting quantitative measures of different types of risks) and the performance scenario representations (both what-if and probabilistic modelling). In particular, in this phase (see Step 5 of Table 3) respondents were shown Information Sheets B (verbal), C (what-if), E (probabilistic modelling) and G (verbal) and were asked to rank them from the most (I) to the least risky (IV). This risk ranking exercise is not applicable to visual templates since they directly score risk.

Comparison across verbal and performance scenario Templates confirms the impact of the representation of financial information on risk perception and gives insights on how this relationship may bias risk assessment. More specifically, the verbal Templates (i.e. embedded in Information Sheets B and G) record the highest percentage of correct answers (respectively, 30% and 41%) and the lowest percentage of hesitant individuals (6% in both cases). The performance scenarios (i.e. embedded in Information Sheets C and E) show the lowest percentages of correct answers (respectively, 16% and 17%) and the highest percentages of uncertain respondents (respectively, 12% and 15%). The what-if Template (embedded in C) is associated to a higher percentage of people over estimating risk, whereas the probabilistic Template (embedded in E) is associated with a higher percentage of people under estimating risk. This evidence is consistent with the experimental findings of previous studies, highlighting that perceived risk is negatively associated with PC (Wang, Keller, and Siegrist 2011).

5.2. Multivariate approach: determinants of risk perception

In this section, we inspect the relationship through perceived risk and PC through the estimation of the bivariate probit model (1). Table 9 reports estimation results of the first equation for the information sheets from D to G, i.e. for the visual Template T1 (Information Sheets D and F), the verbal Template T2 (Information Sheet G) and the two prospective information-based templates T3 and T4 (information sheets C and E).[5]

Recall that the dependent variable RP is a binary variable equal to one if, following the intra-product comparisons, a given Information Sheet was thought to refer to the riskiest product.

Table 9. Bivariate probit estimation of perceived risk (RP) conditioned on PC.

Dependent variable: perceived riskiness of the financial product	T1 VISUAL (D)		T1 VISUAL (F)		T2 VERBAL (G)		T3 WHAT-IF (C)		T4 PROB. MODELLING (E)	
	a)	b)	a)	b)	a)	b)	a)	b)	a)	b)
PC	1.872***	1.892***					1.609***	1.613***	1.530***	1.582***
Perceived comprehensibility			−0.494***	−0.481**	−0.661***	−0.640***				
Attention effect	0.247	0.232	0.119	0.101	0.052	0.023	0.428***	0.396**	0.335*	0.344*
Individual characteristics										
Disposition effect	−0.065	0.019	0.271	0.246	−0.333	−0.348*	0.125	0.102	−0.335*	−0.451**
Volatility aversion	0.040	0.113	−0.394*	−0.412**	0.733***	0.691***	0.275	0.245	0.422**	0.425**
Loss aversion	−0.282	−0.261	0.269	0.258	−0.380*	−0.376*	−0.126	−0.120	0.099	0.055
Risk tolerance	0.010	0.011	−0.041*	−0.040*	0.076***	0.070***	0.011	0.009	0.029	0.032
Optimism	0.161	0.175	0.023	0.026	0.301	0.289	0.155	0.140	0.284	0.297
Impulsivity	−0.025**	−0.026**	0.004	0.004	−0.007	−0.007	−0.014	−0.013	0.002	0.001
Financial knowledge										
Missing values in financial literacy indicator	−0.108		−0.008		0.135		0.071		0.010	
Gap between self-assessed and objective knowledge		−0.634**		0.278		−0.014		0.174		0.724***
Education	0.100	0.080	0.117	0.141	−0.076	−0.100	−0.097	−0.100	−0.263	−0.221
Frequency financial readings	0.051	0.168	0.112	0.069	0.035	0.025	0.302	0.272	−0.082	−0.189
Investment habits										
Frequent investment decisions	−0.209	−0.127	−0.065	−0.102	0.051	0.072	−0.001	−0.020	−0.235	−0.354*
Being solicited to invest	−0.266	−0.217	0.341*	0.335*	−0.324*	−0.345*	0.150	0.135	0.541***	0.503***
Trust in advice	0.215	0.135	0.145	0.158	−0.665***	−0.640**	0.176	0.206	−0.067	−0.009
Frequently delegated investment decisions	0.033	0.075	0.119	0.133	0.088	0.057	0.151	0.146	−0.073	−0.023

(*continued*).

Table 9. Continued.

Dependent variable: perceived riskiness of the financial product	T1 VISUAL (D)		T1 VISUAL (F)		T2 VERBAL (G)		T3 WHAT-IF (C)		T4 PROB. MODELLING (E)	
	a)	b)	a)	b)	a)	b)	a)	b)	a)	b)
Socio-demo characteristics										
Man	0.139	0.080	0.410*	0.428**	−0.468**	−0.447**	−0.073	−0.063	−0.037	−0.010
Age	0.000	0.002	0.003	0.002	−0.003	−0.003	−0.025***	−0.026***	−0.013	−0.015
Being self-employed	0.556**	0.571**	−0.060	−0.060	0.012	0.010	−0.283	−0.281	−0.424	−0.417
Open-ended contract employed	0.351	0.355	0.140	0.145	−0.392*	−0.385*	−0.188	−0.182	−0.402	−0.412
Resident in the centre	0.669***	0.726***	0.120	0.101	0.312	0.302	−0.251	−0.268	−0.455**	−0.514**
Resident in the south	0.081	0.107	−0.009	−0.035	0.315	0.351	0.194	0.192	−0.405*	−0.491**
Financial situation										
Financial wealth	−0.400*	−0.474**	−0.115	−0.108	0.097	0.096	−0.108	−0.097	0.239	0.290
Income	−0.371**	−0.345*	0.013	0.002	−0.257	−0.253	−0.314*	−0.318*	−0.082	−0.122
Real estate	−0.017	−0.011	−0.049	−0.033	0.000	−0.025	0.077	0.070	−0.016	−0.010
Positive expectations on future income	0.229	0.250	0.335**	0.327**	−0.517***	−0.515***	0.129	0.117	−0.266*	−0.284
Adverse events in the last 12 months	−0.212	−0.243	0.002	0.001	−0.031	−0.005	0.325*	0.340*	−0.172	−0.174
Constant	0.499	0.366	−1.307	−1.279	0.965	1.126	0.697	0.868	−0.447	−0.273
N	254	254	254	254	254	254	254	254	254	254
Rho	693***	104***					52***	8**	893***	315***
Pseudo R^2			0.09	0.09	0.17	0.17				

Note: This Table reports estimates of the risk equation, i.e. the first equation in the bivariate probit model [1]. For each Template, we present two model specifications: in a), financial literacy is proxied by the '*missing values in financial literacy indicator*', in b) it is proxied by the '*gap between self-assessed and objective knowledge*'. ***, ** and * denote significance at the 1%, 5% and 10% level, respectively. Endogeneity is detected by testing the statistical significance of the correlation between equations of model [1] (row Rho at the bottom of the Table). If correlation is not significant, the null hypothesis of endogeneity can be rejected, and we run a univariate probit model estimation, showing the Pseudo R^2.

Note that 3 out of the 5 templates reveal an endogeneity condition between perceived risk and PC – last rows of Table 9 reports correlation (rho) between equations, when significant) – while endogeneity is not significant in the equations referred to information sheets F (visual template) and G (verbal template).

Existing studies have already uncovered that specific presentation formats and ways of communicating risk may increase risk taking, such as the graphical display of distributions, as in Benartzi and Thaler (1999) and Beshears et al. (2011); or with regard to sampling and combination of formats in a 'risk tool', as in Kaufmann, Weber, and Haisley (2013). Our work can contribute further to this evidence through the study results in three ways.

Firstly, we believe that the most important evidence in our research is that the main driver of the perceived risk is the PC, as this variable always contributes to an increase in perceived risk. This result is consistent across specifications and templates, i.e. regardless of whether financial disclosure relies on a visual or verbal layout, or on past information or, alternatively, on prospective information. This effect holds across all risk levels, as it applies to the disclosure of both low-risk products (step 1), and high-risk products (step 2 or 3). When a format is perceived as complex, the appraisal of products' riskiness rises. This result appears to be in line with those of Wang, Keller, and Siegrist (2011) even if in their research, complexity is related to a dimension of familiarity, and they find that the more people feel confident/familiar/able to understand a product, the lower they perceive it as being risky. In our case, the perception of complexity seems to stimulate a defensive behaviour due to a wide concept of 'ambiguity intolerance' (Dermer 1973), that advocates an *adverse selection premium*. Individuals that do not feel confident with the disclosure of the financial information received, either because they do not understand it, or because they think it is too difficult, transfer their opinion from the packaging (the template) to the content (the product). Therefore, they conclude that the more complicated the disclosure of the information is, the riskier the product is.

The second finding is related to the salience of information as proxied by what we have called the 'attention effect', captured by a dichotomous variable equal to one when individuals declared that their attention was drawn by at least one element of the inspected Sheets. Since the original research of Barber and Odean (Barber, Odean, and Zheng 2005; Barber and Odean 2008), financial scholars have largely agreed that investors' attention is grabbed by 'glittering pieces' of information. Further research by Weber, Siebenmorgen, and Weber (2005), focusing on the effect of financial disclosure, revealed that returns presented through a distribution graph, rather than a bar graph, leads to greater estimates of asset risk, because the density function format makes the end-points (extreme values) perceptually more salient, thus inducing an anchoring effect that eventually intensifies the perceived risk.

In line with these studies, the 'attention effect' shown in Table 9 has a directly positive impact on risk perception for T3 and T4. However, the estimation results of the second equation of model (1) that refers to PC (Table 10), show that this variable is negatively correlated with the PC for all templates (except T1-F). Therefore, in light of the joint interpretation of the results shown in Tables 9 and 10, the overall impact of the so-called attention effect on risk perception might be negative. This evidence highlights a possible channel through which risk perception may be (at least) guided, or (in the worst case) manipulated.

Thirdly, perceived risk is affected by a number of variables whose impact and significance change across templates. This heterogeneity is consistent with the hypothesis that risk perception is context-dependent and is mainly determined by the framing effect, i.e. by the way financial information is disclosed. Indeed, framing makes the impact of individual characteristics, financial knowledge, and investment habits unstable, even if some features appear interesting when comparing different templates.

For example, the simplest format disclosed, i.e. the visual format T1 of Information Sheet D displaying the risk score on a scale, triggers the perception of a moderate riskiness to individuals who are deemed to be impulsive and for subjects with high income/financial wealth, while self-employed individuals and those resident in the centre of Italy perceive a higher risk.

Interestingly, we note opposite individual profiles when comparing results for visual (sheet F), and verbal (sheet G) templates, submitted within the same phase of the consumer testing – these are therefore immediately comparable to each other. Individual features triggering a higher risk perception under the visual template seem to act in the opposite direction under the verbal template, i.e. reducing = risk perception significantly: this is the case, as for personal traits, for volatility aversion and risk tolerance, as well as some habits (having experience

Table 10. Determinants of PC.

Dependent variable:	T1 VISUAL (D)		T1 VISUAL (F)		T2 VERBAL (G)		T3 WHAT-IF (C)		T4 PROB. MODELLING (E)	
PC	a)	b)	a)	b)	a)	b)	a)	b)	a)	b)
Attention effect	−0.539**	−0.646**	0.136	−0.001	−1.115***	−0.833***	−0.573***	−0.581***	−0.924***	−0.927***
Sheet selection order	0.017	−0.022					0.282***	0.230**	0.455**	0.425**
Individual characteristics										
Disposition effect	0.956***	1.013***	0.237	0.120	−0.179	−0.059	−0.233	−0.226	0.176	0.184
Volatility aversion	−0.974***	−1.166***	−0.057	−0.187	−0.054	0.134	−0.232	−0.194	−0.193	−0.134
Loss aversion	1.125***	1.042***	0.285	0.114	−0.428**	−0.211	0.126	0.129	−0.013	0.010
Risk tolerance	−0.093***	−0.084***	0.022	0.006	−0.033	−0.011	−0.037*	−0.031	−0.052**	−0.055**
Optimism	−0.323	−0.259	−0.218	0.001	0.153	−0.052	0.020	0.039	−0.289	−0.271
Impulsivity	0.036**	0.040**	−0.002	−0.005			0.005	0.003	0.014	0.012
Financial knowledge										
Missing values in financial literacy indicator	−0.127		−0.004		−0.107		−0.158		−0.023	
Gap between self-assessed and objective knowledge		0.725**		1.646***		−1.614***		0.082		−0.324
Education	−0.494*	−0.486*	0.128	0.192	−0.276	−0.280*	0.259	0.266	−0.025	−0.049
Frequency financial readings	0.520*	0.375	0.252	−0.062	−0.201	0.077	−0.198	−0.197	−0.176	−0.127
Investment habits										
Frequent investment decisions	−0.359	−0.559**	0.055	−0.268	0.031	0.328*	0.099	0.074	0.433**	0.488**
Being solicited to invest	−0.034	−0.015	0.135	0.041	−0.020	0.043	0.043	0.094	−0.284	−0.274
Trust in advice	−0.183	−0.122	0.183	0.186	−0.146	−0.175	−0.259	−0.377	−0.081	−0.122
Frequently delegated investment decisions	−0.118	0.064	−0.201	−0.002	0.175	−0.010	−0.280	−0.163	−0.081	−0.028

Socio-demo characteristics										
Man	0.031	0.035	0.137	0.185	−0.273	−0.269	0.236	0.243	−0.046	−0.080
Age	−0.033***	−0.036***	−0.023**	−0.028***	0.025**	0.028***	0.032***	0.030***	0.004	0.004
Being self-employed	−0.457	−0.466	−0.159	−0.339*	0.166	0.334*	0.392	0.351	−0.134	−0.132
Open-ended contract employed	−0.396	−0.579	−0.292	−0.315	0.365	0.362	0.055	0.103	−0.086	−0.096
Resident in the centre	−0.259	−0.361	−0.368*	−0.309	0.313	0.272	0.212	0.162	0.161	0.175
Resident in the south	−0.031	−0.069	0.110	0.136	−0.011	−0.086	−0.264	−0.327	0.171	0.192
Financial situation										
Financial wealth	0.299	0.205	0.297	0.293	−0.409*	−0.358**	0.638***	0.680***	−0.275	−0.280
Income	0.533**	0.531**	0.040	−0.063	−0.025	0.071	0.014	0.037	0.272	0.297
Real estate	0.627*	0.736**	0.077	0.081	−0.055	−0.037	−0.213	−0.191	0.338	0.334
Positive expectations on future income	0.189	0.212	−0.233	−0.218	0.216	0.179	0.076	0.034	−0.175	−0.164
Adverse events in the last 12 months	0.684**	0.587**	−0.057	−0.043	−0.042	−0.064	−0.368*	−0.352*	0.597***	0.598***
Constant	−1.084	−1.386	0.231	0.822	1.306	0.483	−1.942	−1.676	−0.650	−0.456
N			254	254	254	254				
Pseudo R^2			0.09		0.16					

Note: This Table reports estimates of the complexity equation, i.e. the second equation in the bivariate probit model [1]. For each Template, we present two model specifications: in a), financial literacy is proxied by the 'missing values in financial literacy indicator', in b) it is proxied by the 'gap between self-assessed and objective knowledge'. For sake of simplicity, for Information Sheets F and G, we used the 'opposite' (in sign) of the *comprehensibility* variable as the *complexity* variable. ***, ** and * denote significance at the 1%, 5% and 10% level, respectively. When endogeneity was excluded, from Table 9 (T1-F and T2), we run a univariate probit model estimation, showing the Pseudo R^2.

of being solicited to invest) or holding positive expectations on future income. This evidence might suggest that some individuals perceive information in the opposite way compared to others, depending on the informational disclosure inspected. As an example, our results highlight that men perceive higher risk when solicited with a visual template relative to the risk appraised when they receive a verbal description. For women, the opposite is true, whereby perceived risk from the verbal template was found to be higher than that was appraised after inspecting the visual frame – this may be due to gender differences in cognitive processes, as shown in Rocha et al. (2015) and Zaidi (2010).

Finally, we note that a direct effect of financial literacy on risk perception is seldom significant. Significant results occur only within b) specifications, that have regressors with the 'gap between self-assessed and objective knowledge'. This proxy of a sort of overconfidence in literacy is associated with a lower risk perception for the visual template T1 and a higher risk perception for probabilistic modelling T4.

5.3. Multivariate approach: determinants of PC

Evaluation of Information Sheets may be compared to a laboratory task submitted towards interviewees. Thus, we are allowed to exploit the theoretical frame for the concept of task complexity (Campbell 1988); we conceive an approach of complexity as a 'person-task interaction'. Coherently, directly from interviewees we collected the evaluation of PC of various Information Sheets, and then investigated which personal features of interviewees affected this evaluation. Our two-step econometric model is just addressed to account for the expected moderating role of complexity in risk perception. Estimates confirm the well-known phenomenon in the literature of task complexity, as we find that the information processing leading to decisions varies as a function of complexity (Payne 1976).

Determinants of PC, resulting from estimations of model (1) are shown in Table 10. Table 11 reports a robustness test where the dependent variable is the PC score obtained on the [0–10] Likert scale. Note that this further estimation is not applicable for Information Sheets F and G because comprehensibility is a native binary variable.[6] Results of the two estimations (Table 10, binary variable of complexity that is 1 if complexity is higher than 7, in the Likert scale; Table 11 scores on this Likert scale) are basically the same.

Given its role of moderating risk perception, PC should also be carefully considered for its impact in real-life choices, provided that financial institutions may make a strategic use of it. Indeed as highlighted by Célérier and Vallée (2014), some financial product providers, such as savings banks targeting low-income investors, increase product complexity to make their pricing or design harder to understand.

As far as determinants of PC are concerned, we remark that, as already mentioned in the previous section, the salience of a particular feature of the Information Sheet (attention effect) seems to be relevant. Interviewees reporting an attention effect judge the corresponding Information Sheet as less complicated. This is not surprising, given that salience probably helps respondents to rank large amounts of information also by importance, thus facilitating the use of information. This evidence is consistent for all the four template typologies.

Interestingly, the selection order of the Information Sheets was found to have a significant effect on PC. Indeed, PC rises when sheets C and E (i.e. the what-if and probabilistic modelling representations) are shown after the other templates that refer to the same product (visual and verbal ones), thus pointing out that the 'comparison effect' goes beyond any possible 'learning effect'. This evidence can be easily explained by the differences across templates (visual and verbal, on the one hand, and performance scenarios, on the other hand). When templates based on prospective information are received after having received a visual or a verbal frame, they appear more complicated.

Individual characteristics were also found to have an impact on complexity, although their significance and sign direction exhibit a certain amount of variability across templates. This heterogeneity is not surprising, given that we are modelling the relationship between human behaviour and subjective characteristics, and given the great role played by a possible individual frame by which financial information is delivered.

Note that age appears to be the most consistently significant socio-demographic feature among the various templates. Older interviewees judged an inferior complexity in the visual templates (T1), used in sheet D and F; conversely, they found an increased complexity in the verbal (T2) and what-if (T3) templates.

Table 11. Determinants of PC: robustness test with original [0–1] Likert scale complexity score.

	T1 VISUAL (D)		T2 WHAT-IF (C)		T4 PROB MODELLING (E)	
	a)	b)	a)	b)	a)	b)
Attention effect	−0.084	−0.079	−1.01***	−1.01***	−1.387***	−1.38
Sheet selection order	0.002	−0.004	0.44**	0.41*	0.394	0.39***
Individual characteristics						
Disposition effect	0.325	0.209	−0.13	−0.13	0.700	0.73*
Volatility aversion	−0.658*	−0.723**	−0.99***	−0.90	−0.873**	−0.86**
Loss aversion	0.333	0.269	0.15	0.10**	0.421	0.44
Risk tolerance	−0.047	−0.042	−0.08**	−0.06	−0.099**	−0.10*
Optimism	0.083	0.094	−0.09	−0.03	−0.398	−0.40
Impulsivity	0.020	0.020	0.03*	0.03	0.035	0.03
Financial knowledge						
Missing values in financial literacy indicator	−0.012		−0.39*		0.001	
Gap between self-assessed and objective knowledge		0.982**		0.45		−0.26
Education	0.039	0.112	0.60*	0.70**	−0.242	−0.26
Frequency financial readings	−0.519	−0.680*	0.15	0.11	−0.189	−0.15
investment habits						
Frequent investment decisions	−0.100	−0.231	−0.41	−0.51	0.661	0.70*
Being solicited to invest	−0.179	−0.216	−0.09	−0.04	−0.393	−0.39
Trust in advice	0.625	0.709	−0.84*	−0.89*	0.448	0.43
Frequently delegated investment decisions	−0.790*	−0.760*	−0.13	−0.03	0.064	0.06
Socio-demo characteristics						
Man	−0.340	−0.269	0.12	0.09	−0.284	−0.30
Age	0.034*	0.031	0.05***	0.05**	0.010	0.01
Being self-employed	0.547	0.542	0.18	0.18	−0.608	−0.60
Open-ended contract employed	0.564	0.563	0.54	0.54	0.151	0.15
Resident in the centre	0.454	0.401	0.67*	0.66*	−0.110	−0.10
Resident in the south	0.670	0.602	0.05	−0.07	0.538	0.56
Financial situation						
Financial wealth	0.326	0.369	0.82**	0.84**	−0.832*	−0.84*
Income	−0.080	−0.044	−0.59	−0.51	0.766	0.76
Real estate	0.720	0.662*	0.24	0.20	0.893**	0.91**
Positive expectations on future income	−0.056	−0.08	0.44	0.43	0.037	0.04
Adverse events in the last 12 months	0.915**	0.91**	−0.25	−0.31	1.274***	1.28***
Constant	0.457	0.55	2.58	2.40	3.690	3.67
R^2	0.150	0.170	0.23	0.23	0.220	0.22

Note: This table reports estimates of the complexity equation, in an OLS estimate where the dependent variable is the PC score obtained within the [0–10] Likert scale. For each Template, we present two model specifications: in a), financial literacy is proxied by the 'missing values in financial literacy indicator', in b) it is proxied by the 'gap between self-assessed and objective knowledge'. Note that this estimation is not applicable for Information Sheets F and G because comprehensibility is a native binary variable. ***, ** and * denote significance at the 1%, 5% and 10% level, respectively.

The financial knowledge variables are seldom significant. An exception is the gap variable that acts as a proxies for overconfidence in financial literacy, even if its significance is limited to past information-based templates (T1 and T2) only. 'Overconfident' individuals (i.e. those who self-assed themselves as literate but in fact are not) tend to perceive high complexity in visual templates (T1) and less in verbal templates (T2). Conversely, the level of education, as measured by graduate and undergraduate education achievements, triggers a lower PC for both the visual and verbal frames.

6. Conclusions

Corresponding with existing findings of behavioural studies, this paper shows that risk preferences and financial decisions are sensitive to the way that financial information is disclosed. Moreover, individual characteristics, gender, age, financial literacy and the investment habits of investors may strengthen framing effects further, leading to a biased risk perception and to prejudiced investment decisions. This evidence, collected for a sample of

highly educated individuals experienced in making financial decisions, is also likely to hold for less experienced consumers. The evidence supports the claim for careful consideration of how financial disclosure and investor education programmes might be designed to strengthen investor protection. Gaining insights on how different representation modes may influence risk perception, regardless of the typology of financial products, is the main aim of this research. Although the results are particularly interesting for the Italian financial landscape where stocks and structured bank bonds are among the most widely held instruments (Linciano, Gentile, and Soccorso 2016).

As for financial disclosure, our analysis highlights that simplification may not be sufficient to ensure correct risk perception and unbiased investment choices. Moreover, interaction among investors' heterogeneity, behavioural biases and risk perception questions the existence of an 'optimal' level of disclosure, according to a 'one-size-fits-all' approach. These doubts confirm what is already known in literature: 'the utility of a particular type of information cannot be effectively evaluated apart from the users of that information' (Dermer 1973, 518). Providing more than one representation of the same risk/return characteristics of a financial product may be a virtuous solution, as suggested by some scholars (Diacon and Hasseldine 2005). Indeed this is the approach followed by the European legislator in the KIID regulation for the UCITS.

Moreover, evidence on investors' appraisal of financial information, and on the relationship between financial disclosure and risk perception provides useful insights on how financial knowledge could be strengthened in order to improve the decision-making process. As an example from the literature, we know that graphs may enjoy the status of being 'worth a thousand words' but this is true only if graphical tools are employed for transparent risk communications (Kurz-Milcke, Gigerenzer, and Martignon 2008).

We definitively find evidence of a serious endogeneity issue that interlinks the perception of financial product riskiness, motivated by the exterior layout and the moderating role of PC.

Implications of the research appear to be two-fold: firstly, educational programmes should also be focused on the documents that are envisaged by regulators to empower investors. Secondly, provided that (as shown by our results) financial knowledge does not necessarily free investors from the inclination towards behavioural biases or misperception of risk, financial education initiatives should also be attuned to debiasing programmes.

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Notes

1. The benchmark portfolio for bonds was defined by including financial instruments listed on DomesticMot and that are as similar as possible to the selected bond with respect to coupon structure, time to maturity (approximately equal to 3–4 years), issuer sector, and lot size (1000 euro). As for stocks, the benchmark portfolio was defined by using the matching sample technique (Davies and Kim 2009; O'Hara and Yee 2011), i.e. the matching of the criteria price level and market value.
2. A detailed description of the consumer testing design and material used (Information Sheets, Templates, Questionnaires, Map of Interviewees) is available at http://risktolerance.univpm.it/consobCT/#eng.
3. According to GfK Eurisko – Multifinanziaria Retail Market survey data relating to a representative sample of approximately 2500 Italian households, the household financial decision maker is aged within the 35–39 year age bracket on average, and

holds a bachelor's degree in only 15% of the cases. Moreover, average household wealth falls in the range of 11,000–25,000 euros.

4. We also run a principal component analysis on correct answers to the same set of questions. Results of estimations are consistent with those of the alternative use of the *missing-values* variable. Therefore, we omit to include a specification with the financial literacy variable.
5. Note that responses for A and B were not sufficient for running a multivariate estimation.
6. Please note that we choose to elicit the perception of complexity and usefulness of Information sheets F and G through a question asking a dichotomous answer in order to simplify the questionnaire administering.

References

Anderson, A., F. Baker, and D. Robinson. 2015. *Optimism, Financial Literacy and Participation*. Swedish house of finance. Research Paper no. 15-01.

Barber, B. M., and T. Odean. 2008. "All That Glitters: The Effect of Attention and News on the Buying Behavior of Individual and Institutional Investors." *Review of Financial Studies* 21 (2): 785–818.

Barber, B., T. Odean, and L. Zheng. 2005. "Out of Sight, Out of Mind: The Effects of Expenses on Mutual Fund Flows." *The Journal of Business* 78: 2095–2120.

Benartzi, S., and R. Thaler. 1999. "Risk Aversion or Myopia? Choices in Repeated Gambles and Retirement Investments." *Management Science* 45 (3): 364–381.

Beshears, J., J. J. Choi, D. Laibson, and B. C. Madrian. 2009. *How Does Simplified Disclosure Affect Individuals' Mutual Fund Choices?*. Working Paper 14859, National Bureau of Economic Research.

Beshears, J., J. Choi, D. Laibson, and M. Madrian. 2011. *Can Psychological Aggregation Manipulations Affect Portfolio Risk-taking? Evidence from a Framed Field Experiment*. NBER Working Paper 16868, National Bureau of Economic Research, Cambridge, MA.

Campbell, D. J. 1988. "Task Complexity: A Review and Analysis." *The Academy of Management Review* 13 (1): 40–52.

Célérier, C., and B. Vallée. 2013. "What Drives Financial Complexity? A Look into the Retail Market for Structured Products." http://www.hbs.edu/faculty/conferences/2013-household-behavior-risky-asset-mkts/Documents/What-Drives-Financial-Complexity_Celerier-Vallee.pdf.

Célérier, C., and B. Vallée. 2014. "The Motives for Financial Complexity: An Empirical Investigation." https://www.researchgate.net/publication/279808930_The_motives_for_financial_complexity_An_empirical_investigation.

Davies, R. J., and S. S. Kim. 2009. "Using Matched Samples to Test for Differences in Trade Execution Costs." *Journal of Financial Markets* 12: 173–202.

Dermer, J. D. 1973. "Cognitive Characteristics and the Perceived Importance of Information." *The Accounting Review* 48 (3): 511–519.

Desanctis, G., and S. L. Jarvenpaa. 1989. "Graphical Representation of Accounting Data for Financial Forecasting: An Experimental Investigation." *Accounting, Organizations and Society* 14 (5–6): 509–525.

Diacon, S., and J. Hasseldine. 2005. *Framing Effects and Risk Perception: The Effect of Prior Performance Presentation Format on Investment Fund Choice*. CRIS Discussion Paper Series.

Dolan, P., A. Elliott, R. Metcalfe, and I. Vlaev. 2012. "Influencing Financial Behavior: From Changing Minds to Changing Contexts." *Journal of Behavioral Finance* 13 (2): 126–142.

Driver, R., N. Chater, B. Cheung, M. Latham, R. Lewis, and H. Stott. 2010. "Helping Consumers Understand Investment Risk. Experimental Research into the Benefits of Standardising Risk Disclosure." Association of British Insurers-ABI, Research Paper n. 25. http://www.insurancehound.co.uk/abstract/helping-consumers-understand-investment-risk-experimental-research-benefits-standardising-risk-disclosure-8517.

Duxbury, D., and B. Summers. 2004. "Financial Risk Perception: Are Individuals Variance Averse or Loss Averse?" *Economics Letters* 84: 21–28.

Eckel, C. C., and P. J. Grossman. 2002. "Sex Differences and Statistical Stereotyping in Attitudes Toward Financial Risk." *Evolution and Human Behavior* 23: 281–295.

ESAs JC (Joint Committee of the European Supervisory Authorities – EBA, EIOPA and ESMA). 2015. "Technical Discussion Paper on Risk, Performance Scenarios and Cost Disclosures for Key Information Documents (KIDs) for Packaged Retail and Insurance-based Investment Products (PRIIPs)." https://www.esma.europa.eu/databases-library/esma-library.

Fischhoff, B., P. Slovic, S. Lichtenstein, S. Read, and B. Combs. 1978. "How Safe is Safe Enough? A Psychometric Study of Attitudes Towards Technological Risks and Benefits." *Policy Sciences* 9: 127–152.

Ganzach, Y. 2000. "Judging Risk and Return of Financial Assets." *Organizational Behavior and Human Decision Processes* 83: 353–370.

Gentile, M., N. Linciano, C. Lucarelli, and P. Soccorso. 2015. *Financial Disclosure, Risk Perception and Investment Choices. Evidence Form a Consumer Testing Exercise*. Consob Working Paper no. 82, May.

Gilliam, J., S. Chatterjee, and J. Grable. 2010. "Measuring the Perception of Financial Risk Tolerance: A Tale of Two Measures." *Journal of Financial Counseling and Planning* 21 (2): 30–43.

Grable, J. E., and R. H. Lytton. 2003. "The Development of a Risk Assessment Instrument: A Follow-up Study." *Financial Services Review* 12: 257–274.

House of Commons Committee of Public Accounts. 2016. "Financial Services Mis-selling: Regulation and Redress." https://publications.parliament.uk/pa/cm201516/cmselect/cmpubacc/847/847.pdf.

Ibrekk, H., and M. G. Morgan. 1987. "Graphical Communication of Uncertain Quantities to Nontechnical People." *Risk Analysis* 7: 519–529.

IFF Research, YouGov. 2009. "UCITS Disclosure Testing Research Report." http://ec.europa.eu/internal_market/investment/investor_information/index_en.htm.

Kahneman, D., and A. Tversky. 1974. "Judgment Under Uncertainty: Heuristics and Biases." *Science* 185: 1124–1131.

Kahneman, D., and A. Tversky. 1979. "Prospect Theory: An Analysis of Decision Under Risk." *Econometrica* 47: 263–291.

Kaufmann, C., M. Weber, and E. Haisley. 2013. "The Role of Experience Sampling and Graphical Displays on One's Investment Risk Appetite." *Management Science* 59 (2): 323–340.

Kurz-Milcke, E., G. Gigerenzer, and L. Martignon. 2008. "Transparency in Risk Communication Graphical and Analog Tools." *Annals of the New York Academy of Sciences* 1128: 18–28.

Linciano, N. 2010. *Cognitive Biases and Instability of Preferences in the Portfolio Choices of Retail Investors, Policy Implications of Behavioural Finance*. CONSOB Working papers no. 66.

Linciano, N., M. Gentile, and P. Soccorso. 2016. *Report on Financial Investments of Italian Households Behavioural Attitudes and Approaches*. CONSOB.

Lucarelli, C., G. Brighetti, P. Uberti, and M. Maggi. 2015. "Risky Choices and Emotion-based Learning." *Journal of Economic Psychology* 49: 59–73.

MacGregor, D. G., P. Slovic, D. Dreman, and M. Berry. 2000. "Imagery, Affect, and Financial Judgment." *Journal of Psychology and Financial Markets* 1: 104–110.

National Audit Office. 2016. "Financial Services Mis-selling: Regulation and Redress." https://www.nao.org.uk/wp-content/uploads/2016/02/Financial-services-mis-selling-regulation-and-redress.a.pdf.

O'Hara, M., and M. Yee. 2011. "Is Market Fragmentation Harming Market Quality?" *Journal of Financial Economics* 100: 459–474.

Olsen, R. A. 1997. "Investment Risk: The Experts' Perspective." *Financial Analysts Journal* 53(March/April): 62–66.

Patton, J. M., M. S. Stanford, and E. S. Barratt. 1995. "Factor Structure of the Barratt Impulsiveness Scale." *Journal of Clinical Psychology* 51: 768–774.

Payne, J. W. 1976. "Task Complexity and Contingent Processing in Decision Making: An Information Search and Protocol Analysis." *Organizational Behavior and Human Performance* 16: 366–387.

Penrose, J. M. 2008. "Annual Report Graphic Use. A Review of the Literature." *Journal of Business Communication* 45: 158–180.

Rocha, A. F., J. P. Vieito, E. Massad, F. T. Rocha, and R. I. Lima. 2015. "Electroencephalographic Activity Associated to Investment Decisions: Gender Differences." *Journal of Behavioral and Brain Science* 05: 203–211.

Shefrin, H. M., and M. Statman. 1985. "The Disposition to Sell Winners Too Early and Ride Losers Too Long: Theory and Evidence." *The Journal of Finance* 40: 777–790.

Slovic, P. 1972. "Psychological Study of Human Judgment: Implications for Investment Decision Making." *The Journal of Finance* 27: 779–799.

Slovic, P. 2000. *The Perception of Risk*. London: Earthscan.

Statman, M., K. L. Fisher, and D. Anginer. 2008. "Affect in a Behavioral Asset-pricing Model." *Financial Analysts Journal* 64: 20–29.

Tversky, A., and D. Kahneman. 1981. "The Framing of Decisions and the Psychology of Choice." *Science* 211: 453–458.

Unser, M. 1999. *Behavioral Finance am Aktienmarkt*. Bad Soden: Uhlenbruch.

Van Rooij, M., A. Lusardi, and R. Alessie. 2011. "Financial Literacy and Stock Market Participation." *Journal of Financial Economics* 101: 449–472.

Vlaev, I., N. Chater, and N. Stewart. 2009. "Dimensionality of Risk Perception: Factors Affecting Consumer Understanding and Evaluation of Financial Risk." *Journal of Behavioral Finance* 10: 158–181.

Wang, A., and T. Dowding. 2010. "Effects of Visual Priming on Improving Web Disclosure to Investors." *Journal of Behavioral Finance* 11: 11–20.

Wang, M., C. Keller, and M. Siegrist. 2011. "The Less You Know, the More You Are Afraid of – A Survey on Risk Perceptions of Investment Products." *Journal of Behavioral Finance* 12 (1): 9–19.

Weathers, D., S. D. Swain, and J. P. Carlson. 2012. "Why Consumers Respond Differently to Absolute Versus Percentage Descriptions of Quantities." *Marketing Letters* 23 (4): 943–957.

Weber, E. U., N. Siebenmorgen, and M. Weber. 2005. "Communicating Asset Risk: How Name Recognition and the Format of Historic Volatility Information Affect Risk Perception and Investment Decisions." *Risk Analysis* 25 (3): 597–609.

Wilcox, R. T. 2003. "Bargain Hunting or Star Gazing? Investors' Preferences for Stock Mutual Funds." *Journal of Business* 76 (4): 645–663.

Zaidi, Z. 2010. "Gender Differences in Human Brain: A Review." *The Open Anatomy Journal* 2: 37–55.