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ORIGINAL ARTICLE

Professional traders' individual and social preferences under risk: Does group's wealth matter?

Rocco Caferra[1,2] | **Andrea Morone**[1] | **Piergiuseppe Morone**[3] | **Paolo Storelli**[3]

[1] Dipartimento di Economia, Management e Diritto dell'Impresa, Università degli Studi di Bari, Aldo Moro, Italy

[2] Department of Economics, Universitat Jaume I, Castellòn, Spain

[3] Unitelma Sapienza, Dipartimento di Scienze Giuridiche ed Economiche, Viale Regina Elena, 295 - 00161, Roma, Italy

Correspondence
Rocco Caferra, Università degli Studi di Bari, Aldo Moro, Italy.
Email: rocco.caferra@gmail.com

[Correction added on 11th May 2022, after first online publication: CRUI funding statement has been added.]

Abstract

We studied whether professional traders' risk attitudes varied according to social context. To this extent, we examined whether the level of wealth in the relevant group influenced traders' risky decisions. The results showed that risk aversion decreased with increased income/wealth conditions in the group context.

KEYWORDS
risk aversion, social preferences

JEL CLASSIFICATION
C9

1 | INTRODUCTION

Modern economies are characterized by complex causal structures, in which choices frequently impact not only the individual decision maker, but also groups of individuals, to whom the decision maker may be strongly or weakly connected. In this regard, many studies have demonstrated that, when making decisions, individuals consider not only their own payoff, but also the payoff of other individuals in their social environment (Rohde & Rohde, 2011). Previous research on social risk attitudes has generated contrasting results (see Baker et al., 2008; Morone et al., 2021; Shupp & Williams, 2008; Zhang & Casari, 2012). Since many decisions—particularly in economic and political spheres—target different segments of the population, we sought to analyze whether the

wealth of a target population might influence the risk attitude of an individual decision maker. Specifically, we aimed at examining whether professional traders' risk propensity varied based on the target population's level of wealth. The literature on risk taking on behalf of others (Andersson et al., 2020) includes both economic and financial perspectives. However, to the best of our knowledge, no prior study has presented a combined consideration of both: (i) the professional role of decision makers and (ii) the wealth of "others." To this end, the present study analyzed the decision making behavior of professional versus non-professional traders, with reference to target populations reflecting varying economic conditions.

2 | LITERATURE REVIEW

Before proceeding to the main working hypotheses, in this section, we discuss the state of the art with respect to the main aspects of the present work. Specifically:

-section 2.1 overviews the existing studies of professional traders' behavior under risk, motivating the need to further investigate their behavior;

-section 2.2. links the relationship between the decision makers/fund managers and the group of interest affected by their risky choice, motivating the analysis of both group financial wealth and risk sharing between shareholders and capital managers;

-section 2.3. briefly motivates the implications deriving from the features proposed in section 2.2. in term of contract structure and incentive schemes mitigating risk (i.e. risk sharing).

2.1 | Decision makers, professional decision makers and experiments

As is well depicted in the recent contribution of Cipriani et al. (2020), the literature is lacking analyses of the potential behavioral differences between professional investors and students (i.e., the typical sample recruited for laboratory experiments). The authors note that only a few studies have involved professional traders, in research on the emergence of financial bubbles: King et al. (1993), Smith et al. (1988) and Weitzel et al. (2020). They further found that professional traders aggregate information significantly better than students, and are linked to more attenuated financial bubbles (Cipriani et al., 2020).

Accordingly, we were motivated to investigate the behavior of professional traders, given their prominent role in making risky and potentially costly decisions. Although some studies (e.g., those referenced above) have examined the behavior of professional traders in market contexts, to our knowledge, no research has measured risk attitudes among this specific population. However, in one example of related research, Masclet et al. (2009) compared the risk preferences of self-employed people (who take daily decisions that directly affect their personal outcomes) with those of employees (who take decisions for others daily).

Beside the specific aim of the experiment conducted, the comparison between the two subjects pool, i.e. the professional traders and the non-professional decision makers (other participants), will contribute to the debate on external validity of experiments (Guala & Mittone, 2005). In case of statistical differences among the behavior of the two subjects' pool, it would be noteworthy that lab results based on traditional subjects' pool might lack of representativeness of real-life risk management. Indeed, risk management is a task usually performed by professional traders, hence all the experiments assessing the effectiveness of some incentive scheme to lessen gambling in investing must consider the category of subjects doing this activity in a real-life context. If the

behavior of such category is different from the typical subjects' pool recruited in experiments, the lab results would be difficult to be generalized if this aspect is not taken into account.

Otherwise, the similarity of behavior will favor the laboratory results based on traditional subjects' pool, highlighting the relevance of experiments in stylizing real context. Hence, as an interesting corollary, we might contribute on how such type of experiments should be conducted in the future in order to obtain results that can be valid proxy of real-life risk management.

2.2 | Social context and risk preferences

Undoubtedly, daily decisions affect not only the decision makers, themselves, but also one or more groups of interest. This is evidently the case when, for example, policy makers craft policies targeting a specific group (e.g. poor classes, retired people) or investors/bankers propose strategies to manage family savings or company capital. For this reason, there has been much research on decision making in a collective context within the socio-economic sciences.[1]

From here, the concept of individual and social preferences has been introduced: while the first considers only individual pay-off determined by the decision made, the second one includes the reference group pay-off in the decision made by the individual. In this case, we consider individual preferences over social risk, that is the risk faced by a reference group (Harrison et al., 2013).

In these studies, as in real life, groups are typically defined on the basis of a discriminating factor, such as gender, national characteristics (See Lane (2016) for a review), political affiliation (Kranton et al., 2020) or, as in the case of this paper, income (Guiso & Paiella, 2010; Lei & Vesely, 2010).

Since the pioneering studies of Samuelson (1937) and Von Neumann and Morgenstern (1947), analyses of decision making under conditions of risk and uncertainty have been successfully extended from the individual to the collective context. The literature provides plenty of comparisons between group and individual decisions (see, e.g., Baker et al., 2008; Morone et al., 2019; Rockenbach et al., 2007; Shupp & Williams, 2008). Some scholars have reported that groups are more risk averse than individuals (Baker et al., 2008; Masclet et al., 2009; Shupp & Williams, 2008), while other studies have found the opposite (Zhang & Casari, 2012).

Since we stylize the scenario of fund management under risk, we consider how traders/investors decisions can be affected by the characteristics of the group of interests. In particular, how their attitude varies on the basis of the financial resources of savers, or, more generally, shareholders.

With regards to the personal traits of the decision makers dealing with risky resource management, Andersson et al. (2020) provided a review. The authors also reported that risk taking on behalf of others is common in many economic and financial decisions, such as when fund managers invest their clients' money (as proposed in the present study). Previously, the importance of understanding risk attitudes in relation to collective wealth was proposed by Chakravarty et al. (2011), who found a connection between individual and expected preferences of the reference group and risk levels that varied in accordance with the degree of detachment between the decision maker and the population of interest. With regard to job title, Masclet et al. (2009) found a link between the employment sector and risk attitude of the decision maker. This aspect deserves further investigation in sectors in which risky decisions are a daily occurrence (e.g. professional trading). Andersson et al. (2020) questioned the relevance of the risky decisions made by professional traders, though the authors focused on personal traits, rather than the employment sector.

[1] Comprehensive surveys comparing group and individual decision making can be found in Charness and Sutter (2012).

We aimed at investigating professional traders, specifically, in order to differentiate this particular employment sector. Additionally, we sought to disentangle the problem by considering different facets of a target group defined by income, assuming that wealth in the target group would contribute to the risk propensity of the decision maker (as in Guiso & Paiella, 2010). Both of these aspects, merged together, defined the novelty of the present research.

Considering the range of income proposed in our study (i.e. per capita net income of 800–5000 €), the stylized scenario closely resembled situations in which fund managers invest their clients' money; more extensively, we conceived the target population as all persons impacted by the investment (in a broad stakeholder perspective). Ultimately, we aimed at representing the risk management of traders acting on behalf of a group of interest, where gains and losses would have a differential impact according to the group's actual financial and economic resources.

Additionally, it is noteworthy to analyze the general relationship between decision makers and the affected group. In existing studies, the individual decision maker has sometimes—but not always—belonged to the affected group (see Andreoni & Miller, 2002; Eckel & Grossman, 1996; Harrison et al., 2013), while, as introduced, some studies consider the degree of detachment of the decision maker (Chakravarty et al., 2011). Taking together these aspects, we will consider the case where the traders share the risk with the group of interest (Risk-Sharing, hereafter RS), and the case where he/she is not included in the targeted group (Non-Risk-Sharing, hereafter NRS).

This will be important to draw different policy implication in regulating contract of capital management, mitigating risk.

2.3 | Risk, investment choice and contract structure

The prominent role of the decision maker, the characteristics of the target population and the degree of risk outlined for the decision maker's investment decisions determine several policy implications for contracts (Hart & Holmström, 1987). In particular, as discussed in several works (see, e.g., Fischer, 2013), it is crucial to mitigate risk with respect to investment choices (e.g., Karlan & Goldberg, 2011; Stiglitz, 1990). Additionally, the present study sought to uncover further implications, asking (for example): Can "risk sharing" (i.e. the inclusion of the investor in the target group) mitigate risky decisions? Does level of risk change based on group wealth and/or available capital? The answers to these questions are likely to have important implications for the regulation of contracts.

3 | EXPERIMENTAL DESIGN AND HYPOTHESES

The experiment involved 121 subjects recruited though social networking services, including both risk professional (RP) and non-professional (NP) agents.[2] In total, there were 48 RPs and 73 NPs. Most RPs were from the commodities trading sector, which is characterized by relatively high risk, due to market volatility. All subjects were asked to complete a questionnaire[3] divided into two main parts: part one collected demographic and professional data and part two elicited participants' risk preferences. More specifically, demographic and professional data pertained to gender,

[2] To preserve the anonymity of the data, we limit ourselves to specifying that participants were recruited through the internal network channels of a company operating in a sector in which such decisions are taken.

[3] https://docs.google.com/forms/d/1qz7-Md2lLmxB-4SXAtG9nlISiGAnNEOcd4FtwUr82No/edit

nationality, age, number of family members, number of brothers/sisters, relationship status (i.e. single, engaged, married), population of the city of residence, educational level (i.e. secondary school, university, PhD), area of study (only for university graduates and PhDs), employment status (i.e. student, inactive, unemployed, employed, freelance) and monthly net income. The second part of the questionnaire employed Holt and Laury's (2002) mechanism to elicit risk attitudes. Here, subjects examined the same multiple choice problem in five different contexts, expressing their preference for 10 successive lottery choices with a probability[4] of winning a first prize ranging from p = 0.1 to p = 1 (see Table 1). For instance, in the first decision problem (Table 1), subjects were asked to choose between **lottery A**, which had a 90% chance of returning 40k euros and a 10% chance of returning 50k euros, and **lottery B**, which had a 10% chance of returning 100k euros and a 90% chance of returning nothing. Clearly, lottery B was riskier and had a lower expected value (EV(B)); accordingly, lottery A (with a higher EV(A)) was defined as the *safe option*. Therefore, the problem scheme was as follows: in each choice *i*, the expected value for both lotteries was shown together with the difference between the two. According to Holt and Laury (2002), risk neutral agents would choose lottery A for their first four choices and switch to lottery B starting with their fifth choice, since the expected value of lottery B was higher (as shown in the EV delta column of Table 1). Agents who switched to lottery B earlier would be relatively risk loving and those who switched later would be relatively risk averse. The final three columns in Table 1 present the constant relative risk aversion parameter (cRRA) *r* for subjects switching from lottery A to lottery B. As is evident, agents who switched in their fifth choice had $r \sim 0$ (i.e. risk neutrality), whereas risk loving and risk averse agents had negative and positive *r* values, respectively:

Subjects were asked to indicate their preferences for the above multiple-choice problem in five contexts, each involving a different target population for the risky decision. The target populations included both low-income and high-income cases, with scenarios that included (i.e. Risk Sharing-RS cases) or did not include (i.e. Non-Risk-Sharing NRS decision cases) the decision maker (see Appendix B, Figure B1).

All experimental payoffs were hypothetical, in the sense that subjects were asked to answer "as if" they were actually participating in the lotteries with real payment. Despite the significant discussion of the use of financial incentives in experimental economics (see Camerer & Hodgart, 1999), we did not feel our hypothetical treatment threatened the validity of the results, for two reasons: (i) the main purpose of the research was not to study the absolute values of risk aversion, but the differences between various types of agents and frameworks for risky decisions;[5] and (ii) given participants' high income levels[6], a monetary incentive was assumed ineffective to ensuring pay-off dominance (Harrison, 1994), since it would be difficult and extremely costly to achieve an adequate reward level to finance an incentivized scheme.[7]

Based on the proposed literature, we built the main working hypotheses in accordance with the novel aspects of the research, examining: (i) the role of professional traders in risk decision contexts, as discussed in Cipriani et al. (2020); (ii) the importance of the degree of detachment from the target group (following the suggestion of Chakravarty et al., 2011); and (iii) the relevance of the wealth of the target group (Guiso & Paiella, 2010).

[4] Probabilities were obtained by changing the composition of the white/black balls inside a hypothetical urn. Each agent made a random draw, knowing that he/she would win the first prize by extracting a white ball and the second prize by extracting a black ball.

[5] Any hypothetical bias was assumed constant, and therefore insignificant in the comparison across treatments.

[6] Different from the vast majority of experiments involving students, all subjects in the present sample had stable jobs.

[7] Incentives of only a few euros would have been considered very insignificant, relative to participants' monthly earnings.

TABLE 1 Holt and Laury (2002) mechanism, as adapted for the present questionnaire

i	Lottery A				Lottery B				EV(A) (k€)	EV(B) (k€)	EV delta (k€)	Implied r for a subject switching from the lottery A to the lottery B in the choice number i		
	p	Prize (k€)	P	Prize (k€)	p	Prize (k€)	p	Prize (k€)				Lower limit	Upper limit	estimation
i	0.1	50	0.9	40	0.1	100	0.9	0	41	10	31	−ro	−1.595	−2.00
2	0.2	50	0.8	40	0.2	100	0.8	0	42	20	22	−1.595	−0.864	−1.23
3	0.3	50	0.7	40	0.3	100	0.7	0	43	30	13	−0.864	−0.431	−0.65
4	0.4	50	0.6	40	0.4	100	0.6	0	44	40	4	−0.431	−0.117	−0.27
5	0.5	50	0.5	40	0.5	100	0.5	0	45	50	−5	−0.117	0.133	0.01
6	0.6	50	0.4	40	0.6	100	0.4	0	46	60	−14	0.133	0.344	0.24
7	0.7	50	0.3	40	0.7	100	0.3	0	47	70	−23	0.344	0.529	0.44
8	0.8	50	0.2	40	0.8	100	0.2	0	48	80	−32	0.529	0.697	0.61
9	0.9	50	0.1	40	0.9	100	0.1	0	49	90	−41	0.697	0.853	0.78
10	1	50	0	40	1	100	0	0	50	100	−50	0.853		0.95

H1. *RPs and NPs would exhibit the same level of risk aversion, independent of the social context*.

Should this hypothesis be rejected, it could be inferred that job title plays a significant role in shaping risk attitude, as suggested by Masclet et al. (2009). In particular, as proposed by Ciprani et al. (2020), we might expect professional traders to be less prone to risky decision making. This finding would be of extreme interest, considering that decisions could be optimized for risk neutrality to preserve the integrity of the capital invested, thereby limiting the potential for loss due to gambling.

H2. *The inclusion of the decision maker in the target group would not impact the decision maker's risk attitude*.

Putting it differently, we would observe no statistical differences between RS and NRS scenarios. Should this hypothesis be rejected, it could be inferred that the level of detachment between the decision maker and the target group significantly affects decision making, as in Chakravarty et al. (2011). In that paper, the authors suggested: "individuals tend to be significantly less risk averse when they make decisions over another person's money, compared to decisions that they make over their own money." This result may have implications for contracts (Hart & Holmström, 1987), contributing to the debate over the inclusion of terms (see, e.g., Prosser, 2005) to regulate risk sharing (Fischer, 2013). To wit, further policy implications may be inferred, with reference to the appropriateness of including (or not) a portion of the decision makers' gains/losses in their proposed investment outcomes, in order to attenuate risk. In other words, it would be important to understand if there is a significant benefit to including risk managers/traders in investments.

H3. *Decision makers' risk aversion is independent of the level of wealth in the social context*.

This hypothesis, adapted from Guiso and Paiella's (2010) main idea that greater income and uncertainty might reduce risk propensity, has never been tested in the literature. Should this hypothesis be rejected, it could be inferred that decision makers account for the wealth of the target population. For instance, the likelihood of taking a risky decision might be lower for low-income target populations, who would suffer more from a possible loss in earnings. Once again, any finding along these lines might generate several policy implications, including contract wording to prevent risk seeking decisions on the basis of the target group's wealth. As an example, contracts might include more (or less) stringent clauses and penalties linked to the financial constraints of stakeholders. All of these aspects will be discussed further below, in the context of the results presented in the following section.

4 | RESULTS

The majority of the participants were male (81 out of 121) and younger than 40 years old (82%). With respect to education, 72% had a university degree in Economics (50 out of 121) or Engineering (38 out of 121), and 48 participants were RPs.[8] Net monthly income was equally split between

[8] The suitability of the sample size is discussed in Appendix A, which presents the results of post-hoc power tests for two group comparisons, employed using the GPower software (https://www.psychologie.hhu.de/arbeitsgruppen/allgemeine-psychologie-und-arbeitspsychologie/gpower.html). Overall, we obtained an adequate sample size.

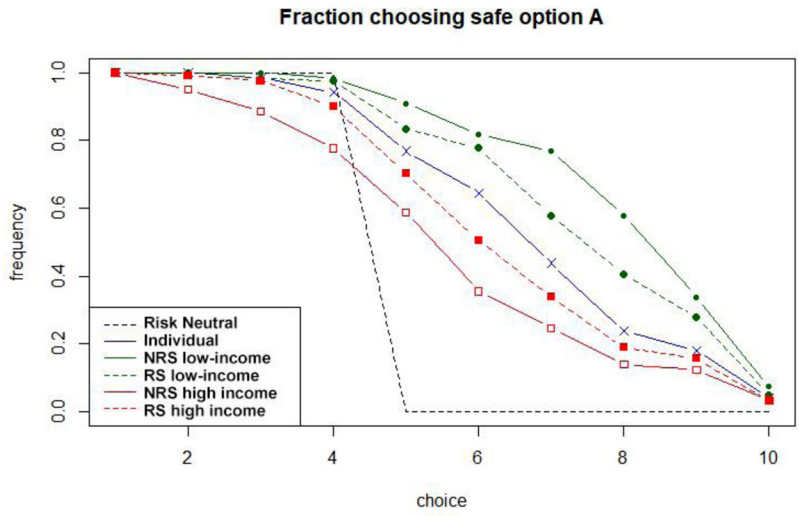

FIGURE 1 Total proportion of participants choosing the safe lottery A for each choice (y-axis) and decision (x-axis) [Colour figure can be viewed at wileyonlinelibrary.com]

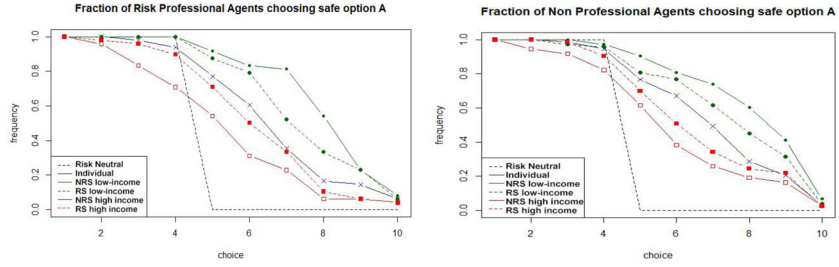

FIGURE 2 Total proportion (y-axis) of RPs (left) and NPs (right) choosing the safe lottery A for each choice (x-axis) [Colour figure can be viewed at wileyonlinelibrary.com]

the ranges of 1000–2000 and 2000–5000 euros, and most subjects lived with a nuclear family comprised of four members.

In the first step of the analysis, we examined the proportion of subjects who chose the safe lottery A for all scenarios. As discussed in the "Experimental Design" section, risk neutral agents ($r = 0$) shifted their selection to lottery B after the fourth choice. Figure 1 compares all 121 responses for each of the five scenarios (for a total of 605 observations). Individual choices can be considered reference points for comparison with the other scenarios. Table 2 summarizes the results, showing the average switching points for RPs and NPs. Figure 1 presents the ordered lotteries (following the first column of Table 1) on the x-axis and the cumulative fraction of respondents choosing lottery A on the y-axis.[9,10] The dashed black line indicates the risk neutrality theoretical prediction. Figure 2 repeats the same graph, differentiating between RPs and NPs.

As is evident, individual choices in both groups were far from risk neutral. Indeed, the average switching point for both NPs and RPs (6.38 and 6.02, respectively) were statistically different from

[9] This reflects the standard graphical representation employed in Holt and Laury (2002) and later studies.

[10] As can be inferred from the theoretical prediction, all subjects chose A up to the fourth decision problem; hence, the fraction was always 1 to that point, and 0 afterwards, when no subjects opted for lottery A.

TABLE 2 Average switching point per group and scenario. Risk neutral agents were theorized to shift from lottery A to lottery B after the fourth choice

Risk neutral = 4	NP	RP	Total	KS test-p value
Individual	6.38 (1.96)	6.02 (1.907)	6.24 (1.945)	0.631
Low-income NRS decision	7.51 (1.864)	7.42 (1.622)	7.47 (1.765)	0.291
High-income NRS decision	5.29 (2.365)	4.71 (2.230)	5.06 (2.321)	0.718
Low-income RS decision	6.93 (2.057)	6.81 (1.758)	6.88 (1.937)	0.81
High-income RS decision	5.93 (2.097)	5.56 (1.934)	5.79 (2.033)	0.47
Number of observations per response	73	48	121	

the risk neutral switching point of 4.[11] Additionally, considering Table 2 and Figure 2, it is possible to observe a lack of statistical difference between RPs and NPs. This result was also confirmed by our regression models.

Hence, with respect to the first hypothesis, no statistical behavioral differences emerged between RPs and NPs.

With respect to the second hypothesis, it was observed that the effect of including the decision maker in the target group mitigated the effect on risk attitude.[12] This was inferred from the finding that both low- and high-income RS decisions were closer to individual preferences than were low- and high-income NRS decisions.

Finally, with respect to the third hypothesis, we found that social context mattered. Indeed, we observed that subjects tended to be more risk averse when the decision targeted a poorer group (green lines) and more risk seeking in the opposite scenario (red lines).

All in all, no differences were found with respect to employment sector, while risk attitude was found to be strongly impacted by the level of wealth in the target population. To test this experimental framework more formally, we employed an interval random effect regression model (Andersen et al., 2006; Coller & Williams, 1999; Harrison et al., 2013) (Table 3). This model can be considered an extension of the Tobit regression model, which considers interval-censored variables. In the present case, the response variable was represented by the cRRA interval associated with the switch from lottery A to lottery B. That is, we constructed a dependent variable base on the lower and upper limit of the interval, corresponding to the switching point from lottery A to lottery B, as reported in Table 1.[13] We proposed four versions of the model, to better investigate our hypotheses. First, two reduced forms of the model were proposed (1–2, Table 3). In model 1, we confirmed the statistical differences between individual choices (i.e. the model constant) and choices made in other scenarios. In model 2, we accounted for potential differences between RPs and NPs, interacting the RP variable (i.e. a dummy variable indicating whether the unit was operating (1) or not (0) in the risk sector) with the categorical variable indicating each scenario.[14] Subsequently, model 3 (4), representing an extension of model 1 (2), introduced a set of control variables: gender (male, female), income (none[15], up to 1000, 1000–2000, 2001–5000, more than 5000 euro), educational level (secondary school, university, PhD), marital status (single, engaged, married), number of family members (1, 2, 3, 4, 5, more than 5) and age (up to 30, 30–39,40–49, 50–59, more than 60 years).[16] The selection of control variables was motivated by the literature on risk taking and age (Mata et al., 2011), income (Guiso & Paiella, 2010), gender (Maxfield et al., 2010) and other variables, including household size, marital status and education (e.g. Spicka, 2020). Of note, the literature is mixed with regards to the effects of each variable on the outcome (see, e.g., Fehr-Duda et al.'s (2006) significant discussion on the gender effect).

[11] Here, we employed both t-tests and Kolmogorov Smirnov (KS) tests, based on the differences between the empirical observations and the theoretical expectation of risk neutrality. The resulting distribution of differences was statistically different from 0 at all levels.

[12] All results were confirmed through pairwise comparisons on the basis of Kolmogorov Smirnov tests on cumulative distributions and the regression results presented in Table 3.

[13] Here, we used the Stata intreg command (https://www.stata.com/manuals/rintreg.pdf).

[14] Again, the constant indicated the individual decision case.

[15] Here, we included those who had not yet received a job contract but were trainees or trial period trainees.

[16] The constant term included, as a reference category: females, trainees (baseline income category), those with a secondary school education, those who were engaged, those who were not living with family and those who were younger than 30 years. Additionally, in model 3, the status of "non-operating in risky sectors" was included in the reference category.

TABLE 3 Regression Results

Dependent variable: cRRA intervals	Coefficients (standard errors)							
Variables	Reduced model				Full model			
	(1)		(2)		(3)		(4)	
Constant	0.3494**	(0.06)	0.387***	(0.077)	0.356	(0.48)	0.359***	(0.485)
Low-income NRS decision	0.377***	(0.06)	0.348 ***	(0.064)	0.377***	(0.05)	0.347***	(0.064)
High-income NRS decision	−0.395***	(0.06)	−0.357 ***	(0.064)	−1.41***	(0.05)	−0.357 ***	(0.064)
Low-income RS decision	0.196***	(0.05)	0.164 **	(0.064)	0.196***	(0.05)	0.164 ***	(0.064)
High income RS decision	−0.141***	(0.05)	−0.133 **	(0.064)	−0.394***	(0.05)	−0.133 ***	(0.064)
Risk professional (RP)								
RP*constant			−0.094	(0.122)			−0.122	(0.131)
RP*Low-income NRS decision			0.075	(0.102)			0.075	(0.102)
RP*High-income NRS decision			−0.093	(0.102)			−0.093	(0.102)
RP*Low-income RS decision			0.082	(0.102)			0.081	(0.102)
RP*High income RS decision			−0.019	(0.103)			−0.020	(0.102)
Income								
1000–2000					−0.167	(0.4)	−0.167	(0.404)
2001–5000					−0.017	(0.42)	−0.016	(0.416)
Up to 1000					−0.113	(0.42)	−0.113	(0.422)
More than 5000					0.167	(0.48)	0.166	(0.479)
risk					−0.114	(0.11)		
University degree					−0.284	(0.26)	−0.284	(0.262)
PhD					−0.348	(0.28)	−0.348	(0.278)
Single					−0.079	(0.13)	−0.080	(0.128)
Married					−0.113	(0.14)	−0.114	(0.138)

(Continues)

TABLE 3 (Continued)

Dependent variable: cRRA intervals	Coefficients (standard errors)					
Variables	**Reduced model**		**Full model**			
	(1)	**(2)**	**(3)**		**(4)**	
Family members						
2			0.428**	(0.19)	0.429 **	(0.186)
3			0.283	(0.19)	0.284	(0.186)
4			0.368**	(0.17)	0.368 **	(0.170)
5			0.336	(0.22)	0.335	(0.219)
More than 5			0.605*	(0.35)	0.604 *	(0.348)
Age						
30–39			−0.008	(0.14)	−0.009	(0.137)
40–49			0.141	(0.27)	0.141	(0.267)
50–59			0.185	(0.35)	0.185	(0.350)
More than 60			0.414	(0.56)	0.412	(0.561)
male			0.172	(0.12)	0.172	(0.124)
Log likelihood	−1080.7412	−1078.4038	−1072.0581		−1070.0698	
obs/groups	605(121)	605 (121)	605(121)		605 (121)	

***,**,* refer to 99%, 95% and 90% statistically significant coefficients, respectively. Response variable: cRRA interval corresponding to the first switch from lottery A to lottery B.

As is evident: (i) there were no statistical differences between RPs and NPs (models 2 and 4), (ii) group decision coefficients were most similar to individual choices (i.e. constant terms) and (iii) subjects were most risk seeking when decision making for high-income target populations, and increasingly risk averse as the average wealth of the target population decreased. Of note, the response variable was not affected by decision makers' socio-demographic characteristics.

In summary:

1. *RPs and NPs exhibited the same level of risk aversion, independent of the social context*.

Although there was weak evidence of reduced risk aversion for RPs, this result was not supported by the statistical tests or regression models.

R2. *The inclusion of the decision maker in the target group mitigated the decision maker's risk attitude*.

R3. *Subject risk aversion was strongly dependent on the wealth of the target group*.

From the first result, we can draw two conclusions. First, the finding lends support to the claim that laboratory experiments represent valid conditions to hypothesize real world scenarios, independent of the subject pool involved, since non-professional decision makers act similar to professional ones when facing a decision-making problem. Hence, the success of the proposed risk elicitation procedure does not depend on the decision maker's professional status. Second, the result suggests that professional status does not guarantee against risky behavior with investments (i.e. gambling). Therefore, it might be useful to insert a penalty/incentive into contracts, or to consider the propensity to seek risk with higher capital when evaluating the potential payoff of an investment.

The second result suggests that the level of involvement in each project leads investors to reveal their own preferences. In particular, we identified an asymmetric effect: investors were extremely risk adverse when dealing with low-income groups, while showing the opposite behavior when dealing with high-income groups. Accordingly, "risk sharing" is likely to: (i) prevent an excess of risk aversion in the former cases and (ii) mitigate extreme risk seeking in the latter.

Finally, participants were more careful when their choices affected low-income groups, and they assumed greater risk when their choices impacted wealthier ones. This suggests that the income of the target population contributes to shaping decision makers' risk attitudes. In a similar vein to Guiso and Paiella (2010), we might extend these results to cases in which subjects must manage not only their own money, but also the money of others (i.e. group contexts) (Andersson, 2020). Given the finding that low wealth in the target group mitigated the risk attitude of decision makers (and vice versa), investors should be encouraged to be more cautious when dealing with target groups possessing large sums of capital.

5 | CONCLUSIONS

The present study aimed at investigating attitudes towards risk, with particular reference to professional background and social context. A survey was administered to a sample of 121 subjects, and Holt and Laury's (2002) lottery choice problem was exploited to elicit subjects' constant relative risk aversion (cRRA) in different scenarios. The influence of professional background on risk preference was analyzed by recruiting sample workers from the risk management sector—in particular, financial traders and analysts operating in commodities markets. The introduction of groups with different income levels reflected a range of social contexts, alternatively including

and excluding the decision maker from the group. Although risk professionals showed generally lower levels of risk aversion, the effect was not statistically significant. Furthermore, subjects' risk attitudes were strongly correlated with the target group's financial constraints. In particular, the higher the income of the target group, the greater risk was allocated to them by decision makers; in contrast, the lower the income of the target group, the less risk was allocated. All in all, we observed an inverse relation between risk and group wealth. Interestingly, we also found a "risk sharing" asymmetric effect: when decision makers were affected by their own decisions, they were less risk seeking in high-income cases and less risk adverse in low-income cases. This result has important implications for contracts, as the inclusion of investors in the target group is likely to mitigate risky decisions.

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APPENDIX A: TESTS

Tables A1–A3 report: (i) the p-value (α) of the Kolmogorov tests and (ii) the power of the results (1-β), accounting for the possibility of Type II errors (result in brackets). Hence, we jointly consider: (i) the statistical significance of the differences found and (ii) the probability of correctly accepting the alternative hypothesis.

TABLE A1 Pairwise comparisons of the results for professional traders (RP)

Category = RP	Individual	Low-income NRS decision	High-income NRS decision	Low-income RS decision	High-income RS decision
Individual	-				
Low-income NRS decision	0.000 (0.988)	-			
High-incomeNRS decision	0.03 (0.715)	0.000 (0.99)	-		
Low-income RS decision	0.185 (0.701)	0.03 (0.451)	0.000 (0.99)	-	
High-income RS decision	0.59 (0.13)	0.000 (0.99)	0.180 (0.51)	0.03 (0.85)	-

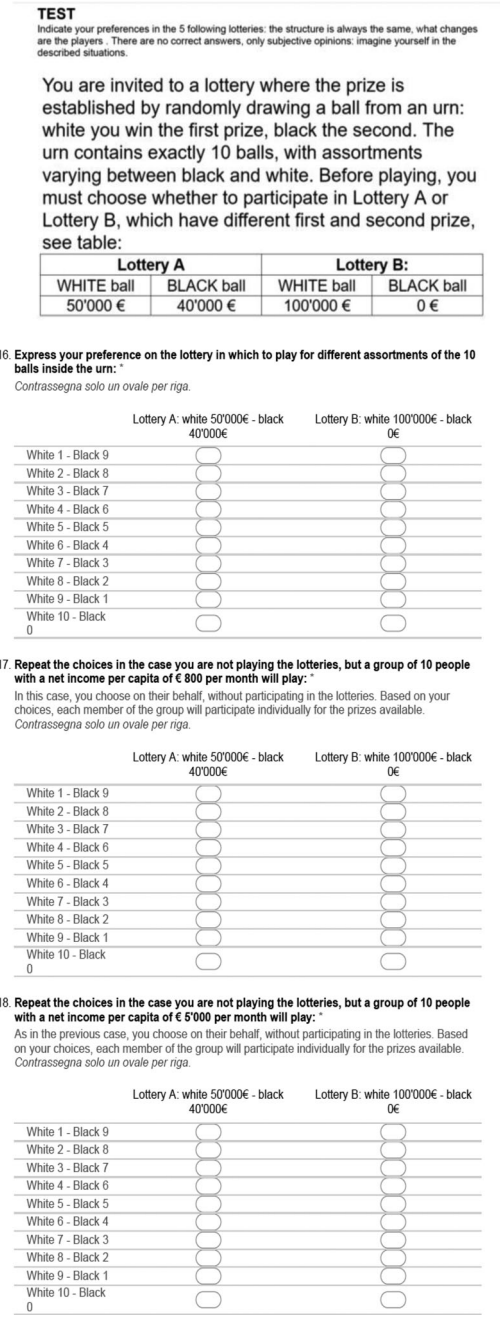
TABLE A2 Pairwise comparisons of the results for those employed in non-risky sectors (NP)

Category = NP	Individual	Low-income NRS decision	High-income NRS decision	Low-income RS decision	High-income RS decision
Individual	-				
Low-income NRS decision	0.001 (0.810)	-			
High-income NRS decision	0.004 (0.803)	0.000 (0.99)	-		
Low-income RS decision	0.130 (0.381)	0.195 (0.445)	0.000 (0.979)	-	
High-income RS decision	0.130 (0.297)	0.000 (0.99)	0.316 (0.561)	0.004 (0.891)	-

TABLE A3 Pairwise comparisons of the results for the full sample

Category = ALL	Individual	Low-income NRS decision	High-income NRS decision	Low-income RS decision	High-income RS decision
Individual	-				
Low-income NRS decision	0.000 (0.99)	-			
High-income NRS decision	0.000 (0.996)	0.000 (0.999)	-		
Low-income RS decision	0.075 (0.812)	0.025 (0.73)	0.000 (0.999)	-	
High-income RS decision	0.091 (0.561)	0.000 (0.999)	0.065 (0.854)	0.001 (0.92)	-

APPENDIX B: THE LOTTERY



TEST

Indicate your preferences in the 5 following lotteries: the structure is always the same, what changes are the players . There are no correct answers, only subjective opinions: imagine yourself in the described situations.

You are invited to a lottery where the prize is established by randomly drawing a ball from an urn: white you win the first prize, black the second. The urn contains exactly 10 balls, with assortments varying between black and white. Before playing, you must choose whether to participate in Lottery A or Lottery B, which have different first and second prize, see table:

Lottery A		Lottery B:	
WHITE ball	BLACK ball	WHITE ball	BLACK ball
50'000 €	40'000 €	100'000 €	0 €

16. **Express your preference on the lottery in which to play for different assortments of the 10 balls inside the urn:** *

Contrassegna solo un ovale per riga.

	Lottery A: white 50'000€ - black 40'000€	Lottery B: white 100'000€ - black 0€
White 1 - Black 9		
White 2 - Black 8		
White 3 - Black 7		
White 4 - Black 6		
White 5 - Black 5		
White 6 - Black 4		
White 7 - Black 3		
White 8 - Black 2		
White 9 - Black 1		
White 10 - Black 0		

17. **Repeat the choices in the case you are not playing the lotteries, but a group of 10 people with a net income per capita of € 800 per month will play:** *

In this case, you choose on their behalf, without participating in the lotteries. Based on your choices, each member of the group will participate individually for the prizes available.
Contrassegna solo un ovale per riga.

	Lottery A: white 50'000€ - black 40'000€	Lottery B: white 100'000€ - black 0€
White 1 - Black 9		
White 2 - Black 8		
White 3 - Black 7		
White 4 - Black 6		
White 5 - Black 5		
White 6 - Black 4		
White 7 - Black 3		
White 8 - Black 2		
White 9 - Black 1		
White 10 - Black 0		

18. **Repeat the choices in the case you are not playing the lotteries, but a group of 10 people with a net income per capita of € 5'000 per month will play:** *

As in the previous case, you choose on their behalf, without participating in the lotteries. Based on your choices, each member of the group will participate individually for the prizes available.
Contrassegna solo un ovale per riga.

	Lottery A: white 50'000€ - black 40'000€	Lottery B: white 100'000€ - black 0€
White 1 - Black 9		
White 2 - Black 8		
White 3 - Black 7		
White 4 - Black 6		
White 5 - Black 5		
White 6 - Black 4		
White 7 - Black 3		
White 8 - Black 2		
White 9 - Black 1		
White 10 - Black 0		

FIGURE B1 Screenshots of the choice scenarios administered to each participant

19. **Repeat the choices in the case a group of 10 people, made up by YOU and 9 other people with a net income per capita of € 800 per month, will play:** *

In this case you choose for the whole group. Based on your choices, each member of the group (including yourself) will participate individually for the prizes available.
Contrassegna solo un ovale per riga.

	Lottery A: white 50'000€ - black 40'000€	Lottery B: white 100'000€ - black 0€
White 1 - Black 9		
White 2 - Black 8		
White 3 - Black 7		
White 4 - Black 6		
White 5 - Black 5		
White 6 - Black 4		
White 7 - Black 3		
White 8 - Black 2		
White 9 - Black 1		
White 10 - Black 0		

20. **Repeat the choices in the case a group of 10 people, made up by YOU and 9 other people with a net income per capita of € 5000 per month, will play:** *

In this case you choose for the whole group. Based on your choices, each member of the group (including yourself) will participate individually for the prizes available.
Contrassegna solo un ovale per riga.

	Lottery A: white 50'000€ - black 40'000€	Lottery B: white 100'000€ - black 0€
White 1 - Black 9		
White 2 - Black 8		
White 3 - Black 7		
White 4 - Black 6		
White 5 - Black 5		
White 6 - Black 4		
White 7 - Black 3		
White 8 - Black 2		
White 9 - Black 1		
White 10 - Black 0		

FIGURE B1 Continued