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Eliciting risk preferences

Firefighting in the field

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Abstract: Heterogeneity in subject populations often necessitates choosing an elicitation task that is intuitive, easy to explain, and simple to implement. Given that subject behaviour often differs dramatically across tasks when eliciting risk preferences, caution needs to be exercised in choosing one risk elicitation task over another. Using a within-subject design, we compare behaviour in the simple most investment game (Gneezy and Potters 1997) and the ordered lottery choice game (Eckel and Grossman 2002) to evaluate whether the simpler task allows us to elicit attitudes consistent with those elicited from the ordered lottery task. Using a large sample of over 2000 subjects, we find risk attitudes to be fairly stable across the two tasks. Our results further indicate that the consistency of risk attitudes across the tasks depends on gender of the subject, quantitative skills, father's education level, and dispositional factors such as locus of control and Big Five personality traits.

Keywords: risk preferences, experiment design, elicitation methods, personality traits, India
JEL classification: C91, C81, D81

Figure and tables: at the end of the paper.

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1. Introduction

There is a rapidly growing interest in implementing economics experiments outside the laboratory to allow more robust and externally valid conclusions. However, they come with their own set of constraints. In particular, subjects in these extra-lab settings are often characterized by low levels of education and comprehension, and face higher opportunity costs of participation. The restrictions on cognition and opportunity costs of participation often necessitate simpler experimental tasks that are relatively easy to explain, simple enough to comprehend, and easy to implement. Consequently, researchers often are in need of a simpler task that can be adopted in lieu of the more elaborate elicitation task (Angerer, Lergetporer, Glätzle-Rützler and Sutter 2015).

This compromise however, might not be straightforward when eliciting risk attitudes. There are two potential problems. First, although it is well established that risk attitudes influence economic choices, the normative theory on decision-making under uncertainty as well as its experimental evaluations remain divided on how decision-makers evaluate risk (von Neumann and Morgenstern 1944; Kahneman and Tversky 1979; Harrison and Rutström 2009; Harrison, Humphrey and Verschoor 2010; Cox, Sadiraj, Vogt and Dasgupta 2013). A second, and critical problem is that settling for any particular risk elicitation method is worrisome in the light of the previous experimental findings that find that elicited risk preferences can vary dramatically across alternate elicitation tasks (Crosetto and Filippin 2015; Deck, Lee, Reyes and Rosen 2013; Isaac and James 2000), independent of the subject group (WEIRD or non-WEIRD).[1]

Our paper primarily focuses on this second issue, where we compare consistency in risk attitudes between the Eckel and Grossman (2002, 2008) ordered lottery choice task and the investment game of Gneezy and Potters (1997) to evaluate whether the simpler risk elicitation task – the investment game – allows the researcher to draw similar conclusions as the more intricate ordered lottery choice task. We compare risk attitudes across these tasks using a within-subject design for a large sample of undergraduate students from Delhi University, India.

While Binswanger (1980) devised one of the earlier choice tasks to elicit risk preferences among rural farmers in India, laboratory experiments over the years have adopted the multiple

[1] Western, Educated, Industrialized, Rich, and Democratic (WEIRD).

price list method of Holt and Laury (2002) as the gold standard for eliciting the complete range of risk attitudes (HL, henceforth). The HL method asks subjects to make ten different choices between two different gambles with probabilities varying from 0.1 to 0.9 across each choice. This multiple-choice task however is often found to be too complex for subjects. Experiments using the typical Western student subject pool find 10-15 percent inconsistency in choices (Holt and Laury 2002; Stockman 2006; Meier and Sprenger 2010). When implementing the HL method among subjects with poor cognition/education – typically those belonging to rural areas in developing countries – this inconsistency becomes starker, with studies documenting 40-60 percent rates of inconsistency in risk attitudes among subjects (Charness and Viceisza 2015; Cook, Chatterjee, Sur and Whittington 2013; Brick, Visser and Burns 2012; Jacobson and Petrie 2009; Galarza 2009). Eckel and Grossman (2002, 2008) proposed a simpler single-choice design where subjects are asked to choose one gamble from six different gambles where the probabilities of low and high outcomes are always 0.5 in each gamble (EG, hereafter). Dave, Eckel, Johnson and Rojas (2010) compare behavior in the HL and EG tasks to find that subjects consider the EG task to be simpler to comprehend, and the EG task provides more reliable estimates of risk aversion for subjects with limited mathematical ability.

However, even the EG task can be conceptually demanding, unfamiliar and non-intuitive by its very representation. To that end, Gneezy and Potters (1997) provided a more simply formulated task (GP, hereafter) that asks subjects to divide an allocation between a safe asset and a risky lottery where the expected returns from the gamble are always greater than the invested amount. Not only does this elicitation method have a natural description of a typical uncertain investment environment, it is also intuitive and easy to explain (Holt and Laury 2014). Recent surveys on perceived complexity of this investment task confirm that subjects find the task comparatively simpler to understand than the EG task (Crosetto and Filippin 2015). It is therefore no surprise that the investment task is being used increasingly, especially in developing countries with non-WEIRD subjects (Gneezy, Leonard and List 2009; Gong and Yang 2012; Cameron, Erkal, Gangadharan and Meng 2013; Gangadharan, Jain, Maitra and Vecci 2015; Dasgupta, Gangadharan, Maitra, Mani and Subramanian 2015).

However, whether this simple investment task provides consistent measures of risk preference compared to other tasks remains an open question, especially since previous work comparing behavior across alternate risk elicitation tasks provide mixed results. For example,

Reynaud and Couture (2012) compare behavior of French farmers in the HL and EG tasks and find that choices are not stable across tasks, and subjects appear more risk-averse in the EG task. Deck, Lee, Reyes and Rosen (2008) compared behavior in the HL task with behavior in a variation of the 'Deal or No Deal' game to show that risk attitudes are poorly correlated across elicitation methods. Deck et al. (2013) test for domain-specific risk attitudes using multiple risk tasks in a within-subjects design (including versions of the EG and the HL tasks) to find considerable variation in behavior across tasks, and do not find evidence supporting models of domain-specific risk attitudes. Crosetto and Filippin (2015) use a battery of incentivized tasks (HL, EG, GP, balloon analogue, bomb risk elicitation) along with the non-incentivized willingness to take risk scale and the domain-specific risk taking scale, to elicit risk attitudes. Importantly, in contrast to most of the previous literature, they use a between-subjects design, and hence rely exclusively on the assumption of preference homogeneity across subjects in interpreting their results. They suggest that the estimated risk aversion parameters from the tasks vary greatly due to biases introduced by the task themselves and not due to instability in preferences across tasks.

The above discussion underscores the importance of searching for a risk elicitation task that serves the dual purpose of being simple and at the same time providing results consistent with more elaborate procedures. To address this, we evaluate the consistency of choices in the EG and the investment task using a within-subject design that allows us to control for individual-specific unobserved heterogeneity in underlying risk attitudes. Drawing on insights from psychology, we examine the role of Big Five personality traits and locus of control in explaining both variation in risk preferences and consistency in risk preferences. We also examine the association between inconsistency in risk preferences and subjects' quantitative abilities and socioeconomic characteristics.

Our results indicate that elicited risk attitudes are fairly stable across the EG and the investment task. Risk attitudes elicited from the investment game predict well, although not perfectly, attitudes in the EG task. We also find that subjects who are males, have better math skills, highly educated fathers, score higher on the Big Five emotional stability scale and score lower on the agreeableness scale are more likely to be consistent in their risk preferences across tasks. Additionally, we find that individuals with greater internal locus of control demonstrate more consistent risk attitudes across tasks.

2. Experiment

2.1 Choice of Elicitation Tasks

Given our primary interest in using intuitive, easily comprehensible and incentivized risk elicitation tasks that are comparable, the EG task and the investment task were our preferred candidates. In the EG task, subjects are asked to choose one of the six gambles presented in separate rows, where each row represents a gamble with equal chances of receiving a high or a low payoff. Columns 1 and 2 in Table 1A list the high and low payoffs for all rows. Gamble 1 is the safe alternative where the high and low payoffs are identical. In moving down from gamble 1 to gamble 5, there is a linear increase in expected returns as well as an increase in the standard deviation of the payoffs; between gambles 5 and 6, there is only an increase in standard deviation but no increase in expected return. Under expected utility theory (EUT), risk-averse subjects should choose one of the lower-risk, lower-return gambles (i.e., gambles 1-4) whereas risk-neutral subjects should opt for gambles 5 or 6. Further, those opting for gamble 6 (in the presence of gamble 5) can plausibly be characterized as risk-loving. Strictly speaking, risk-neutrality does not rule out choosing gamble 6, and there is no obvious way to distinguish between risk-neutrality and risk-loving agents among those who choose gamble 6. In the investment task subjects are asked to divide an allocation of Rs. 150 between a safe asset and a risky investment. If the risky investment is successful (50 percent chance of success), three times the invested amount is paid to the subject along with the amount set aside in the safe option. If the risky investment is unsuccessful, subjects only received the amount set aside in the safe option. Under EUT, a risk-neutral or a risk-loving person should invest the full amount in the GP task.[2]

The two tasks can be categorized under the 'investment portfolio' approach (Holt and Laury 2014) and are similar in many ways. First, they are both framed as single decision tasks in contrast to elicitation tasks that require subjects to make multiple decisions. Second, in both games the lottery probabilities are held constant at 0.5, which allows for better comprehension of the risk since 50 percent may be easier to understand (compared to 30 percent or 75 percent). Finally, the two tasks suffer from similar shortcomings in eliciting risk attitudes when trying to

[2] Instructions for the two tasks are available from the authors upon request.

distinguish between risk-neutral and risk-loving behavior and are typically useful only in separating out degrees of risk aversion.

One distinction between the two games seems pertinent to point out in light of the recent advances in normative theories of risk. Although the underlying level of uncertainty is identical across tasks (given the fixed probabilities in the gambles), a decision-maker might still perceive the final outcomes in the two tasks differently. In particular, subjects might view the EG task as one that compares two risky but non-zero positive payoffs, while the investment game introduces the risk of getting zero as one of the outcomes. The normative theory on mental accounting suggests that this difference can make decision-makers evaluate the two games differently (Thaler 1985). Of course, for subjects behaving according to EUT the differences in representation should not matter (the EG task can be interpreted in a way analogous to the GP task; see Table 1B for an exposition). However, recent work suggests that decision-making might not be restricted to a single normative theory of decision-making (Harrison and Rutström 2009); often reference dependence is observed, along with gender differences towards different levels of perceived losses (Nelson 2015; Filippin and Crosetto 2014).

2.2 Design and Protocol

As part of a larger project, the subjects participated in four experimental tasks that included making choices in the two risk tasks. Subjects did not receive feedback between the tasks. To avoid wealth effects, only one of the tasks was randomly chosen for payment at the end of a session. Subjects were always presented with the EG task first and the investment game next.

The experiment was conducted with undergraduate students at the University of Delhi, India. At the end of the experimental tasks, subjects completed a detailed socioeconomic questionnaire on family background characteristics, school and college information, academic performance, and personality traits (see Table 2 for descriptive statistics). We conducted 60 sessions with 2065 subjects, resulting in approximately 34 subjects per session. Each subject

participated in only one session lasting for 75 minutes. All subjects received a show-up fee of Rs. 150. The average additional payment from the chosen task was Rs. 230.[3]

3. Results

3.1 Aggregate Behavior in Tasks

In the EG task, 81.01 percent of subjects are risk averse (those who choose gambles 1-4), 9.64 percent are risk-neutral (those who choose gamble 5), and the remaining 9.35 percent are risk-loving (those who choose gamble 6 in the presence of gamble 5). Table 1A reports the distribution of choices in the EG task. In the investment game, 96.7 percent of the subjects invest less than the full endowment of Rs. 150, and hence appear risk-averse. Overall, they invest 47 percent of their endowment in the risky asset.[4]

Further, when we look at behavior separated by gender, females appear significantly more risk-averse than males. In the EG task, 86 percent of females and 76 percent of males (p-value = 0.00) exhibit risk aversion. In the investment game, males invest 49.6 percent of their endowment compared to 43.7 percent by females (p-value = 0.00). The significant gender difference found in our experiment is consistent with previous results (Eckel and Grossman 2008; Croson and Gneezy 2009; Charness and Gneezy 2012; Niederle 2014). Aggregate behavior under the two tasks suggests that a higher proportion of subjects appear to be risk averse in the investment game (see Figure 1). This observed greater risk aversion can plausibly stem from mental accounting and an aversion towards investing in an environment where there is an apparent chance of losing the invested amount, a conclusion also shared by Crosetto and Filippin (2015).

[3] The exchange rate at the time of running these experiments was USD 1 = Rs. 60. The current minimum wage *per day* for employees having completed a Matriculate degree but not a graduate degree is Rs. 429, suggesting our risk experiments were sufficiently incentivized.

[4] Charness and Viceisza (2015) in their review of papers using the investment game find it to vary between 44.67 percent and 70.86 percent among student population.

3.2 Stability of Risk Attitudes

In this section, we evaluate whether individuals exhibit consistent risk attitudes across the two elicitation methods. If they do, elicited risk attitudes from one task should be able to predict attitudes in the other task. We assume constant relative risk aversion (CRRA) utility functions to derive the risk coefficients and regress the risk aversion coefficients from the EG task on those derived from the investment game. Since the lottery-based EG task elicits ranges of risk aversion rather than point estimates (as seen in Column 3 of Table 1A), we rely on interval regression methods, allowing for the dependent variable to have both upper and lower bounds or be left or right-censored (Anderson and Mellor 2009; Deck et al. 2013). A coefficient estimate of 1 on the risk coefficient from the GP task would indicate perfect predictability across two tasks. A coefficient between 0 and 1 would indicate that there is partial predictability between the two tasks, and a coefficient of 0 would suggest no association between the two tasks.

In these regressions we also include controls that have been previously identified as influencing risk attitudes. We include a gender dummy (takes a value 1 if male, 0 if female). We measure 'crystallized intelligence' i.e., the ability to use existing knowledge as well as quantitative aptitude with subjects' performance on a simple two-digit number addition task. As dispositional factors might affect one's risk perceptions and willingness to take risk, we include measures of the broadly accepted taxonomy of Big Five personality traits: *Openness to experience* is the tendency to be open to new aesthetic, cultural, or intellectual experiences; *Conscientiousness* refers to a tendency to be organized, responsible and hard working; *Extraversion* relates to an outward orientation rather than being reserved; *Agreeableness* is related to the tendency to act in a cooperative and unselfish manner; *Neuroticism* (opposite of *emotional stability* as used in the specifications) is the tendency to experience unpleasant emotions easily, such as anger, anxiety, depression, or vulnerability. We use a 10-item Big Five inventory. Further, we use a 13-item Locus of Control questionnaire to measure individuals' beliefs about how much control they have over events in their life. An individual with an internal locus of control (i.e., higher score on the scale) tends to believe that they can control, and are responsible for their own outcomes whereas those with an external locus of control attribute their outcomes to luck and to other external factors. We use standardized values of all traits in the regressions. The pairwise correlations between all the personality traits (Big Five traits and locus

of control) are less than 0.26 ruling out concerns of multicollinearity in the regressions to follow.[5]

We also control for the following socioeconomic characteristics: religion (takes value 1 if Hindu, 0 otherwise), caste (binary variables for belonging to the disadvantaged groups of Scheduled Castes and Scheduled Tribes (SC and STs) or Other Backward Classes (OBCs) respectively), father being highly educated (takes a value 1 if father has graduate or postgraduate degree, 0 otherwise) and high income family (takes a value 1 if family income is Rs. 1,00,000 or more per month, 0 otherwise). Summary statistics reported in Table 2 indicate that approximately 51 percent of the sample is male, 32 percent belong to households that have high income, and 66 percent of subjects have fathers who have a graduate or post-graduate degree. Subjects are mostly Hindu and approximately 30 percent belong to disadvantaged groups.[6] Each of the Big Five personality trait questions are answered on a scale of 1 to 7 (1 = disagree strongly; 7 = agree strongly). Typical response on the traits is 4 (neither agree nor disagree) or 5 (agree a little). Out of a maximum possible value of 13 on the locus of the control scale, the average score is 7 in our sample.

Table 3 presents the regression results. Column 1 reports results without including the control variables introduced above. We find that the risk preferences in both tasks are highly positively correlated such that a 1-unit increase in the coefficient of relative risk aversion in the GP task increases the coefficient in the EG task by 0.84. Further, we find this marginal effect to be significantly different from zero but not different from 1, indicating a strong association between elicited risk attitudes from the two tasks. In Column 2, upon adding controls, the coefficient on the investment game drops to 0.70. While still significantly different from zero, it is now significantly different from 1 as well, indicating strong but less than perfect predictability of preferences across the two tasks. We find males to be significantly less risk-averse than females in our sample, as has been documented in previous studies (see Niederle 2014 for a recent review). Similar to Dohmen, Falk, Huffman, Sunde, Schupp and Wagner (2011), who find father's education to be a positive determinant of willingness to take risks, subjects with highly educated fathers in our sample are significantly less likely to be risk-averse. We do not find other

[5] Results available from authors upon request.
[6] While age is considered to an important determinant of risk preferences, by design, there is not much variation in the data due to our exclusive subject sample of 2nd and 3rd year college students.

factors such as caste, religion, and family income of our subject population to be associated with risk attitudes. We also do not find subjects' cognitive abilities to be significantly associated with their risk preferences.[7]

The association between Big Five personality traits and risk preferences is comparatively less explored. We find that subjects scoring high on the emotional stability scale are less risk-averse, potentially indicating that they are able to calmly and reasonably make a risk assessment and ignore threats of perceived losses better. This is in line with the finding reported in Borghans, Golsteyn, Heckman and Meijers (2009) who find a positive association between risk aversion and neuroticism (converse of emotional stability). We also find that subjects with a more internal locus of control have less risk-averse preferences, supporting recent findings by Caliendo, Fossen and Kritikos (2014) that individuals with an internal locus of control are more likely to undertake entrepreneurship, an inherently risky activity. Note that the Big Five traits and locus of control are jointly significant in our sample.

It is evident however, that in spite of being positively and significantly associated, the within-subject risk measures are not perfectly identical. We next examine plausible determinants of this observed inconsistency across tasks that will further help with our choice of risk task in different experiment environments.

3.3 Sources of Inconsistency

The within-subject design allows us to focus entirely on the sources of cross-sectional variation in inconsistency controlling for all individual-specific unobservables common to the two risk elicitation tasks. In the regressions that follow, we use the earlier described vector of controls. We examine inconsistency in risk preferences using two measures (Table 4 reports the results).

Since the investment game does not allow us to identify risk-loving preferences from risk-neutral ones, we pool gambles 5 and 6 together in the EG task to facilitate comparison. In our first measure of inconsistency, we use the subjects' risk coefficient elicited from the investment game to predict the associated row or gamble (1-5) they should have picked in the

[7] There is no evidence of a non-linear relationship between cognitive ability as measured by performance in the number addition task and risk preference.

EG task.[8] We code a subject as being inconsistent if the actual gamble they chose in the EG task is different from the one that is implied based on their risk coefficient elicited from the GP task. In Column 1 of Table 4, we report marginal effects from probit regressions where the dependent variable takes a value 1 if inconsistent by the above definition, 0 otherwise.

For the second measure of inconsistency, we take the absolute value of the difference between the risk coefficients from the EG task and the GP task. For the EG task, we use the midpoints of the intervals. The difference in risk coefficients in the two tasks captures the degree of inconsistency assuming CRRA, with higher values denoting greater inconsistency. In Column 2 of Table 4, we use this measure as the outcome variable and report parameter estimates from OLS regressions.

Males appear to be relatively less inconsistent across risk elicitation tasks according to both measures of inconsistency. Being better at quantitative tasks reduces inconsistency, using the first measure of inconsistency in Column 1 (although not the degree of inconsistency as measured by the absolute deviations in the risk coefficients reported in Column 2). Parental education – an indicator of acquired cognitive ability – is correlated with the degree of inconsistency such that subjects with more educated fathers are less likely to be inconsistent. Other characteristics such as family income, caste, and religion have no power in explaining either aggregate inconsistency or degrees of inconsistency between the two tasks in our sample.

Evidence from psychology suggests that variation in risk attitudes can be attributed to differences in perceptions of riskiness in different domains and outcomes (Weber, Blais and Betz 2002; Deck et al. 2013), which in turn can be influenced by differences in personality traits (Weber and Johnson 2008). Consequently, differences in personality can possibly help explain some of the inconsistency observed across the two tasks. We find that subjects scoring higher on the Big Five emotional stability scale and those with a stronger internal locus of control are less likely to exhibit inconsistency in risk preferences across tasks.

[8] For subjects with r = 0.5 in the EG task, there is a discontinuity across intervals since at r = 0.5, one is indifferent between gambles 4 and 5. In order to not lose the sample where r = 0.5, we assume that they would have chosen gamble 4 in the EG task.

4. Conclusion

Experimental evaluations of welfare policies have taken off in a big way in developing countries (Miguel and Kremer 2004; Cohen and Dupas 2010) and new evidence suggests that being aware of recipients' risk attitudes is critical for successful policy implementation (Harrison 2011; Dasgupta et al. 2015). While attempting to elicit risk attitudes under field constraints, researchers are often forced to avoid elicitation methods that constitute the gold standards, to allow less educated subjects with poor comprehension to participate in the study.[9]

Choosing an alternative and simpler task is particularly challenging in light of the evidence from previous studies that show elicited risk preferences to be highly sensitive to the method used. In particular, varying probabilities as well as domains across tasks plausibly makes decision-makers approach uncertainty in each situation differently and possibly leads to the observed differences in risk attitudes across tasks. This observed inconsistency in choices across elicitation methods is prevalent among WEIRD as well as non-WEIRD field subjects from developing countries.

We use a within-subject design to evaluate consistency in risk attitudes between the ordered lottery format of the EG task and the simple investment representation of the GP task, using a large sample of over 2000 student subjects from the University of Delhi, India. Although from a developing country, our experiment subjects should have higher levels of comprehension on average than the typical non-WEIRD subject in the field. We propose, in light of previous research, that if we find substantial inconsistency in choices made in the two tasks *even* among these subjects with relatively higher cognition, it will then pose a more acute problem in choosing one of the two risk tasks in the field faced with subjects who exhibit lower cognitive skills. Our results indicate that with fixed and commonly understood probabilities and similar elicitation methods, subjects indicate more consistent risk preferences across the two elicitation tasks. Risk attitudes seem to be fairly stable across the two tasks such that preferences elicited from the investment game predict quite well, albeit imperfectly, attitudes in the EG task. Results from our large subject pool indicate that the consistency across tasks depends weakly on cognitive abilities, and inherited characteristics such as gender and some personality traits seem

[9] For example, Charness and Viceisza (2015) provide a cautionary note on using relatively sophisticated risk elicitation mechanisms in the rural developing world, a conclusion shared in Cook et al. (2013) who use subjects from a low-income urban setting in India.

to matter more. We conclude that faced with constraints related to time, subjects' cognition or comprehension, the investment game can provide stable and comparable measures of risk attitudes elicited using the EG task.

References

Anderson, L.R., and Mellor, J.M. (2009). Are risk preferences stable? Comparing an experimental measure with a validated survey-based measure. *Journal of Risk and Uncertainty,* 39, 137-160.

Angerer, S., Lergetporer, P., Glätzle-Rützler, D., and Sutter, M. (2015). How to measure time preferences in children: a comparison of two methods. *Journal of the Economic Science Association,* 1, 158-169.

Binswanger, H.P. (1980). Attitudes toward risk: Experimental measurement in rural India. *American Journal of Agricultural Economics,* 62(3), 395-407.

Borghans, L., Golsteyn, B.H.H., Heckman, J.J., Meijers, H. (2009).Gender Differences in Risk Aversion and Ambiguity Aversion. *Journal of the European Economic Association,* 7(2–3), 649-658.

Brick, K., Visser, M., and Burns, J. (2012). Risk aversion: experimental evidence from South African fishing communities. *American Journal of Agricultural Economics*, 94(1), 133-152.

Caliendo, M., Fossen, F., and Kritikos, A.S. (2014). Personality characteristics and the decisions to become and stay self-employed. *Small Business Economics*, 42, 787-814.

Cameron, L., Erkal, N., Gangadharan, L., and Meng, X. (2013). Little Emperors: Behavioural Impacts of China's One-Child Policy. *Science,* 339(6122), 953-957.

Charness, G., and Gneezy, U. (2012). Strong Evidence for Gender Differences in Risk-taking. *Journal of Economic Behavior and Organization*, 83, 50-58.

Charness, G., and Viceisza, A. (2015). Three risk-elicitation methods in the field: evidence from rural Senegal. Working Paper.

Cohen, J., and Dupas, P. (2010). Free Distribution or Cost-sharing? Evidence from a Randomized Malaria Prevention Experiment, *Quarterly Journal of Economics*, 125(1), 1-45.

Cook, J., Chatterjee, S., Sur, D., and Whittington, D. (2013). Measuring risk aversion among the urban poor in Kolkata, India. *Applied Economics Letters,* 20(1), 1-9.

Cox, J.C., Sadiraj, V., Vogt, B., and Dasgupta, U. (2013). Is There a Plausible Theory for Decision under Risk? A Dual Calibration Critique. *Economic Theory,* 54(2), 305-333.

Croson, R., and Gneezy, U. (2009). Gender differences in preferences. *Journal of Economic Literature, 47*(2), 448-474.

Crosetto, P., and Filippin, A. (2015). A Theoretical and Experimental Appraisal of Four Risk Elicitation Methods. *Experimental Economics*, forthcoming.

Dasgupta, U., Gangadharan, L., Maitra, P., Mani, S., and Subramanian, S. (2015). Choosing to be trained: Do Behavioral Traits Matter? *Journal of Economic Behavior and Organization,* 110, 145-159.

Dave, C., Eckel, C.C., Johnson, C.A., and Rojas, C. (2010). Eliciting risk preferences: When is simple better? *Journal of Risk and Uncertainty,* 41(3), 219-243.

Deck, C., Lee, J., Reyes, J., and Rosen, C. (2008). Measuring risk attitudes controlling for personality traits. Working paper, University of Arkansas.

Deck, C., Lee, J., Reyes, J., and Rosen, C. (2013). A failed attempt to explain within subject variation in risk taking behavior using domain specific risk attitudes. *Journal of Economic Behavior and Organization*, 87, 1-24.

Dohmen, T., Falk, A., Huffman, D., Sunde, U., Schupp, J., and Wagner, G. G. (2011). Individual risk attitudes: Measurement, determinants and behavioral consequences. *Journal of the European Economic Association,* 9(3), 522-550.

Eckel, C., and Grossman, P. (2002). Sex differences and statistical stereotyping in attitudes toward financial risk. *Evolution and Human Behavior,* 23(4), 281-295.

Eckel, C.C., and Grossman, P.J. (2008). Forecasting risk attitudes: An experimental study using actual and forecast gamble choices. *Journal of Economic Behavior and Organization,* 68(1), 1-7.

Filippin, A., and Crosetto, P. (2014). A Reconsideration of Gender Differences in Risk Attitudes. IZA DP No. 8184.

Galarza, F. (2009). Choices under risk in rural Peru. MPRA Working Paper 17708.

Gangadharan, L., Jain, T., Maitra, P., and Vecci, J. (2015). Social Norms and Governance: The Behavioral Response to Female Leadership. *European Economic Review*, forthcoming.

Gneezy, U., Leonard, K., and List, J., (2009). Gender differences in competition: evidence from a matrilineal and a patriarchal society. *Econometrica*, 77, 1637-1664.

Gneezy, U., and Potters, J. (1997). An experiment on risk taking and evaluation periods. *Quarterly Journal of Economics*, 112(2), 631-645.

Gong, B., and Yang, C-L. (2012). Gender differences in risk attitudes: Field experiments on the matrilineal Mosuo and the patriarchal Yi. *Journal of Economic Behavior and Organization*, 83, 59-65.

Harrison, G. (2011). Experimental Methods and the Welfare Evaluation of Policy Lotteries. *European Review of Agricultural Economics*, 38(3), 335-360.

Harrison, G.W., Humphrey, S.J., and Verschoor, A. (2010). Choice under uncertainty: evidence from Ethiopia, India and Uganda. *Economic Journal*, 120(543), 80-104.

Harrison, G. W., and Rutström, E. E. (2009). Expected utility theory and prospect theory: one wedding and a decent funeral. *Experimental Economics*, 12(2), 133-158.

Holt, C. A., and Laury, S. K. (2002). Risk aversion and incentive effects. *The American Economic Review,* 92(5), 1644-1655.

Holt, C. A., and Laury, S. K. (2014). Assessment and Estimation of Risk Preferences, in M. Machina and K. Viscusi (eds.), *The Handbook of the Economics of Risk and Uncertainty*. Elsevier.

Isaac, R., and James, D. (2000). Just who are you calling risk averse? *Journal of Risk and Uncertainty*, 20(2), 177-187.

Jacobson, S., and Petrie, R. (2009). Learning from mistakes: What do inconsistent choices over risk tell us? *Journal of Risk and Uncertainty*, 38(2), 143-158.

Kahneman, D., and Tversky, A. (1979). Prospect Theory: An Analysis of Decision under Risk. *Econometrica*, 47(2), 263-291.

Meier, S., and Sprenger, C. (2010). Present-biased Preferences and Credit Card Borrowing. *American Economic Journal: Applied Economics*, 2(1), 193-210.

Miguel, E., and Kremer, M. (2004). Worms: Identifying Impacts on Education and Health in the Presence of Treatment Externalities. *Econometrica*, 72 (1), 159-217.

Nelson, J.A. (2015). Are Women Really More Risk-Averse than Men? A Re-Analysis of the Literature Using Expanded Methods. *Journal of Economic Surveys*, 29(3), 566-585.

Niederle, M. (2014). Gender. NBER Working Paper No. 20788.

Reynaud, A., and Couture, S. (2012). Stability of risk preference measures: results from a field experiment on French farmers. *Theory and Decision*, 73, 203-221.

Stockman, C. (2006). Differences and Similarities in Health Risk Preferences across Two Subject Cohorts. California University of Pennsylvania Working paper, California, PA.

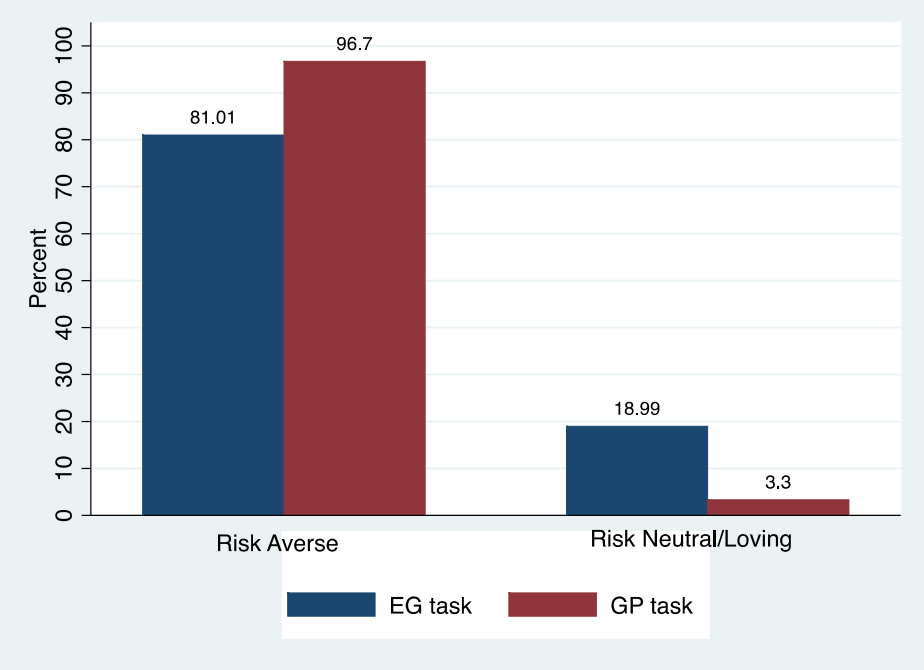
Thaler, R. (1985). Mental Accounting and Consumer Choice. *Marketing Science*, 4(3), 199-214.

von Neumann, J., and Morgenstern, O. (1944). *Theory of Games and Economic Behavior*. Princeton, New Jersey: Princeton University Press.

Weber, E. U., Blais, A., and Betz, N. E. (2002). A Domain-specific Risk-attitude Scale: Measuring Risk Perceptions and Risk Behaviors. *Journal of Behavioral Decision Making*, 15, 263-290.

Weber, E. U., and Johnson, E. J. (2008). Decisions under uncertainty: Psychological, economic and neuroeconomic explanations of risk preference. In P. Glimcher, C. Camerer, E. Fehr, and R. Poldrack (Eds.), *Neuroeconomics: Decision making and the Brain*. New York: Elsevier.

Figure 1: Risk Attitudes in the EG and GP Tasks



Source: authors' illustrations

Table 1A: Distribution of Choices in the Eckel and Grossman Task

Choice (50/50 Gamble)	(1) Low payoff	(2) High payoff	(3) Implied CRRA range	(4) All Subjects (%)	(5) Male Subjects (%)	(6) Female Subjects (%)
Gamble 1	84	84	3.46<r	20.36	18.24	22.59
Gamble 2	72	108	1.16<r<3.46	22.27	18.72	26.00
Gamble 3	60	132	0.71<r<1.16	20.51	20.15	20.88
Gamble 4	48	156	0.5<r<0.71	17.87	18.82	16.87
Gamble 5	36	180	0<r<0.5	9.64	11.27	7.93
Gamble 6	6	210	r<0	9.35	12.80	5.72
Sample size				2043	1047	996

Note: CRRA: coefficient of relative risk aversion
Source: Authors' calculations

Table 1B: Eckel and Grossman Task with an Investment Game Interpretation

Choice (50/50 Gamble)	(1) Equally likely Payoffs	(2) Amount in Safe Asset	(3) Investment Allocation and Gamble Structure	(4) Implied CRRA range
Gamble 1	84	84	84	3.46<r
Gamble 2	72 or 108	72	72+ 0.5 chance of 3 x 12	1.16<r<3.46
Gamble 3	60 or 132	60	60+ 0.5 chance of 3 x 24	0.71<r<1.16
Gamble 4	48 or 156	48	48+ 0.5 chance of 3 x 36	0.5<r<0.71
Gamble 5	36 or 180	36	36+ 0.5 chance of 3 x 48	0<r<0.5
Gamble 6	6 or 210	6	6+ 0.5 chance of 3 x 68	r<0

Note: CRRA: coefficient of relative risk aversion
Source: Authors' calculations

Table 2: Summary Statistics

	Mean (SD)
Risk coefficient in the EG task	1.62
	(1.41)
Risk coefficient in the GP task	0.59
	(0.35)
Male	0.51
	(0.50)
Performance in the addition task	4.90
	(2.54)
High income	0.32
	(0.46)
Highly educated father	0.66
	(0.47)
Hindu	0.90
	(0.29)
SCST	0.14
	(0.35)
OBC	0.16
	(0.36)
Big Five: Extraversion	4.61
	(1.38)
Big Five: Agreeableness	5.11
	(1.15)
Big Five: Conscientiousness	5.27
	(1.25)
Big Five: Emotional stability	4.56
	(1.33)
Big Five: Openness to experience	5.33
	(1.13)
Locus of control	7.27
	(1.94)

Note: The average of the risk coefficient in the EG task is computed over its 6 rows/intervals.
Source: Authors' calculations

Table 3: Stability of Risk Attitudes

	(1) Relative risk aversion range in the EG task	(2) Relative risk aversion range in the EG task
Risk coefficient in the GP task	0.84***	0.70***
	(0.130)	(0.124)
Male		-0.440***
		(0.098)
Performance in the addition task		0.027
		(0.018)
High income		0.136
		(0.113)
Highly educated father		-0.215**
		(0.089)
Big Five: Extraversion		-0.005
		(0.044)
Big Five: Agreeableness		0.069
		(0.043)
Big Five: Conscientiousness		0.064
		(0.044)
Big Five: Emotional stability		-0.090**
		(0.040)
Big Five: Openness to experience		0.017
		(0.040)
Locus of control		-0.122***
		(0.039)
Constant	1.060***	1.215***
	(0.093)	(0.244)
Null: Risk coefficient in GP task = 1	1.54	5.80**
(p-value)	(0.21)	(0.016)
Null: Big five traits and Locus of control are jointly = 0		19.80***
(p-value)		(0.00)
Log pseudolikelihood	-3695.62	-3619.38
Observations	1,983	1,950

Note: Standard errors clustered at the session level in parentheses. *** p<0.01, ** p<0.05, * p<0.1. In both columns, coefficient estimates from interval regression models are reported. Religion and caste dummies also included in these regressions.
Source: Authors' calculations

Table 4: Determinants of Inconsistent Behavior

	(1) Inconsistent	(2) Difference in CRRA parameters
Male	-0.060***	-0.192***
	(0.022)	(0.065)
Performance in the addition task	-0.016*	-0.022
	(0.010)	(0.031)
Performance in the addition task squared	0.001	0.002
	(0.001)	(0.003)
High income	0.004	0.075
	(0.019)	(0.071)
Highly educated father	-0.018	-0.140**
	(0.021)	(0.060)
Big Five: Extraversion	-0.006	-0.018
	(0.010)	(0.027)
Big Five: Agreeableness	0.008	0.058**
	(0.012)	(0.027)
Big Five: Conscientiousness	0.002	0.044
	(0.008)	(0.028)
Big Five: Emotional stability	-0.017**	-0.046*
	(0.009)	(0.026)
Big Five: Openness to experience	0.001	0.025
	(0.011)	(0.025)
Locus of control	-0.013*	-0.064***
	(0.008)	(0.024)
Constant		1.362***
		(0.147)
Null: Big five traits and Locus of control are jointly equal = 0 (p-value)	8.56 (0.20)	3.34 (0.00)
Observations	1,998	1,950
R-squared		0.02
Pseudo R-squared	0.011	

Note: Standard errors clustered at session level in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Column 1 reports marginal effects from a probit regression. Column 2 reports marginal effects from an OLS regression. Religion and caste dummies also included in these regressions.
Source: Authors' calculations