Betrayal Aversion.

Evidence from Brazil, China, Switzerland, Turkey, the United Arab Emirates, and the United States*

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Due to betrayal aversion, people take risks less willingly when the agent of uncertainty is another person rather than nature. Individuals in six countries (Brazil, China, Switzerland, Turkey, the United Arab Emirates and the United States) confronted a binary-choice trust game or a risky decision offering the same payoffs and probabilities. Risk acceptance was calibrated by asking individuals their "minimum acceptable probability" (MAP) for securing the high payoff that would make them willing to accept the risky rather than the sure payoff. People's MAPs are higher when another person rather than nature determines the outcome. This gap indicates betrayal aversion. (JEL C72, C91)

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Risk aversion plays a central role in economic theory. It helps us understand why individuals insure and save, why investors do not place all their eggs in the basket offering the highest expected payoff, and why entrepreneurs earn a generous premium. But risk aversion alone may not account for people's willingness to take risk when the chance event is the action of another person rather than nature, for then additional considerations may enter.

We use the term "social risk" to describe situations where decisions by other human beings are the prime source of uncertainty. In this paper, we focus on the social risks involved when trusting another person, for example a salesperson who may or may not describe a product accurately. In these trust situations, an individual (the principal) must decide whether to make herself vulnerable to another person (the agent). Traditional decision analysis, now well incorporated into economic theory, would tell us that for a rational, self-interested individual "a risk is a risk is a risk." Assuming that there was no effect on future behavior, a decision maker facing the same payoffs and probabilities would make the same decision whether nature or the choice of another person resolves a lottery. This paper examines whether individuals actually behave this way. Specifically, using a series of experiments, we compared individuals' willingness to take risks when the outcome is due to a chance device, as opposed to an identical odds-and-payoffs situation where the outcome depends on whether or not another player proves trustworthy. We found that people are less willing to take a risk, when the source of the risk is another person rather than nature. We argue that this is due to "betrayal aversion."

Betrayal aversion has significant economic impact. Trust is a central element with every sales transaction, every professional relationship, every business transaction, indeed with any decision where one's outcome is not fully contractible and is partly under the control of another party. Trust has been associated with economic performance (see, e.g., the empirical literature started by Stephen Knack and Philip Keefer 1997, and Raphael LaPorta et al. 1997). Modern economies have many instruments, such as insurance and liability systems, to encourage trust by diminishing the material costs of betrayal. But if people are averse to being betrayed beyond the mere payoff consequences, it will be important to decrease the likelihood of betrayal as well, for example through incentives acting on reputations.

The risks of betrayal bear two major differences from natural risks. First, the decision situation usually involves payoffs to the other player. People may care about the payoffs going to the other person, positively or negatively. Such *social preferences*—see Ernst Fehr and Klaus Schmidt (2002) for a survey—could influence principals' decisions, making them either less or more likely to accept the social risk involved in trusting than a natural risk.

Second, elements beyond mere outcome-based preferences may enter the utility function. When the principal trusts the agent, she in effect gambles on the agent being trustworthy. If trust is violated, she may incur betrayal costs, a psychological loss above and quite apart from any material costs. Conversely, the principal may reap honor benefits if the agent is trustworthy. If principals are affected by such psychological benefits and costs, this could lead trust decisions to differ from risky choices offering the same stakes and odds. Such behavior would suggest that people care about how outcomes came to be, a notion first introduced into economics in a seminal paper by Matthew Rabin (1993).

If individuals have an aversion to betrayal, they will be less willing to take risks in a trust situation than in an equivalent situation where chance determines the outcome. We employ a novel experimental design that enables us to measure concerns about betrayal, about risk, and about payoffs to another player as revealed by choices made in real-money decisions. In contrast to earlier work on trust and risk (e.g., Catherine Eckel and Rick Wilson 2004, Fehr et al. 2005, Michael Kosfeld et al. 2005), we do not directly compare behavior in a trust game and a risky choice task. Both social and betrayal preferences, jointly referred to as "exploitation aversion" by Fehr et al. (2005), could lead people to behave differently in these two contexts as the two games differ not just in the agent of uncertainty, but also in the number of players involved receiving payoffs.

To distinguish between social preferences and betrayal aversion, we employ the "risky dictator game" (RDG) (Iris Bohnet and Richard Zeckhauser 2004, and more generally, Daniel Kahneman et al. 1986), which only differs from a binary-choice trust game (TG) (Colin Camerer and Keith Weigelt 1988, David Kreps 1990) in that nature rather than the agent determines the principal's and the agent's payoffs. Comparing behavior in these two games gives us a measure of betrayal aversion. Comparing principals' choices in the risky dictator game and a "decision problem" (DP), a standard risky choice task where no second player is involved, gives us a measure for social preferences. Finally, the decision problem itself allows us to observe people's attitudes to risk.

We expect people to care about betrayal. To examine whether betrayal aversion is a widespread phenomenon, we ran experiments with men and women in six disparate countries across the world: Brazil, China, Switzerland, Turkey, the United Arab Emirates (UAE), and the United States (USA). This paper seeks to assess the generality of betrayal aversion. Thus, we observe but do not make any predictions about how betrayal aversion differs across genders or countries. We find that generally, people are betrayal averse and exhibit significant risk aversion. Although most groups show positive social preferences, the role of social preferences is somewhat more ambiguous, possibly because positive and negative social preferences work against each other.

Our results accord with recent findings in social psychology, organizational behavior and neuroscience. Work by Jonathan J. Koehler and Andrew Gershoff (2003) suggests that people are deeply concerned about betrayal. Their recent survey on criminal and product safety betrayals found that subjects felt worse and assigned larger (hypothetical) punishments to intentional betrayals than to accidental non-fulfillments that have the same payoff consequences. Intentional betrayals violate a duty or break a promise, which produces a second source of utility loss to the principal. In organizations, such utility losses may decrease a person's job satisfaction, lead to retributive actions and in the extreme to exit, research on psychological contracts suggests (Sandra L. Robinson and Elizabeth Wolfe Morrison 2000). Finally, recent findings in neuroscience provide evidence for the more general concept of exploitation aversion. Kosfeld et al. (2005) employed the neuropeptide oxytocin, which has been shown to promote prosocial behavior in animals. They found that humans given oxytocin took the social risk involved in trusting more readily, but not the natural risk involved in a risky choice task.

Our paper is organized as follows: the next section, I, introduces the experimental design, Section II shows how we measure our preference phenomena and makes predictions, Section III presents the results, and Section IV discusses some implications of our findings and concludes.

I. Experimental Design

We focus on binary-choice tasks. In each of our three decision situations, the trust game, the risky dictator game and the decision problem, the principal had to choose between a sure thing and a lottery. The sure strategy resulted in a sure outcome and the lottery could yield the principal either a higher ("good") or a lower ("bad") cash payoff than the sure outcome. Figure 1 presents our three games with the payoff structures employed in the experiment (in points).

Figure 1 about here

In the trust game, choosing the lottery meant that the principal trusted the agent to determine the final payoffs. A money-maximizing agent would prefer 22 points to 15, and thus should betray trust, given that chance. Anticipating such behavior, a money-maximizing principal should choose the sure thing, producing the Nash Equilibrium of (10,10), and thus receive 10 rather than 8. In the risky dictator game, the payoffs are the same, but nature (a random device) not the agent determines final payoffs if the principal chose the lottery. In the decision problem, as well, nature chooses, but there is no agent, hence no payoffs to a second person.

To calibrate risk acceptance in a given decision situation, we asked principals their "minimum acceptable probability" (MAP) for securing the high payoff that would make them just willing to accept the risky rather than the sure payoff. For example, in the trust game we posed principals the following question (in neutral language): "How large would the probability p of being paired with Person Y [an agent] who chose Option 1 [to be trustworthy] minimally have to be for you to pick Alternative B [the lottery] over Alternative A [the sure thing]?" In the trust game, we simultaneously asked agents whether they would be trustworthy if given the opportunity (strategy method). Sample instructions are included in Appendix A.1.

We used the agents' responses to determine the proportion of trustworthy agents, that is, the probability that a principal would find trust rewarded. We labeled this probability $p*$, with a separate $p*$ computed for each session of the trust game. Then we returned to each individual principal. She was informed of $p*$. If her *MAP* was less than or equal to the $p*$ in her session, she was assumed to trust. The outcome then depended on the prior decision of the agent with whom she was paired. She thus had a $p*$-chance of receiving the good outcome, or rather, a $p*$-chance of having been paired with an agent who chose to be trustworthy. If her *MAP* exceeded $p*$, her demands were too high and she and her agent each got the sure outcome of 10 points. Principals were informed of this procedure, in particular, that their MAP would be used to decide whether they trusted or whether they took the sure outcome. Agents only knew that principals had to make a decision between the sure thing and trust but were not informed on the specifics of the *MAP*-procedure or that their decision would help determine p^*.

Principals in the risky dictator games and the decision problems were told that p^* had been determined prior to the experiment, but not how. For each country, its p^* corresponded to the percent of all agents who had chosen to be trustworthy in the trust game in that country.[1] After the principals had made their decisions, we revealed the value of p^*. As in the trust game, if a principal's *MAP* was less than or equal to p^*, she was assumed to opt for the lottery, in which she had a p^*-chance of winning the high payoff. If her *MAP* was higher than p^*, she was assumed to opt for the sure outcome and earned the sure payoff. We resolved any lotteries by drawing a ball from an urn with (p^*)100 green balls and (1-p^*)100 blue balls.

The higher a principal's *MAP*, the higher p^* had to be for her to choose the risky strategy over the sure thing. Thus, the less one likes one or both outcomes flowing from the risky strategy, the higher will be one's *MAP*. This mechanism is incentive compatible: a rational principal should be indifferent between the sure thing and the gamble with the reported *MAP*, since individuals cannot affect the probability they receive in the lottery. Given our procedure, assuming that a principal adheres to the Substitution Axiom of von Neumann-Morgenstern utility, truth-telling is a dominant strategy.[2]

A. Experimental Procedures

874 subjects participated in our experiments: 192 in Brazil (98 in TG, 64 in RDG and 30 in DP), 108 in China (42 in TG, 42 in RDG, 24 in DP), 120 in Switzerland (50 in TG, 48 in

RDG, 22 in DP), 142 in Turkey (70 in TG, 42 in RDG and 30 in DP), 167 in the UAE (56 in TG, 60 in RDG, 51 in DP), and 145 in the USA (62 in TG, 58 in RDG, 25 in DP).[3] All were randomly recruited students at universities. Subjects were anonymous in all experiments, identified only by code numbers. The payoffs were presented to subjects in a matrix form with neutral terminology; payoffs were given in points. Each point was converted to 1 Brazilian real, 1.5 Chinese yuan renminbi, 1 Swiss frank, 0.75 new Turkish lira, 1 UAE dirham, or 1 US dollar at the end of the experiment. Monetary amounts were scaled for parity, using the hourly wage of a student research assistant as the metric. Subjects earned a 10-point show-up fee and received on average an additional 13 points for an experiment that took approximately 30-40 minutes.

To ensure the equivalence of experimental procedures across countries, we followed Alvin E. Roth et al. (1991) on designs for multinational experiments. Thus, we controlled for currency, language and experimenter effects to the best of our ability. We had the instructions translated (and back-translated) from English to Portuguese, Chinese, Turkish and Arabic. (The experiments in Switzerland were conducted in English.) The experiments in Switzerland and the United Arab Emirates were conducted by the first author; the experiments in Brazil by the second author, and the experiments in China and Turkey by the third author. All these authors ran experimental sessions in the USA. No experimenter effects were found in the USA.

We employed a between-subjects design where each subject participated in one game only. In the trust game and the risky dictator game, subjects were randomly assigned a role and then randomly matched with a counterpart. In the decision problem, all subjects were principals. We chose a between- rather than a within-subjects design because pilot studies had shown that people tended to anchor on the first game presented. Given these strong order effects and the complexity of our design, we chose the simpler format of a between-design where subjects were only confronted with one task at a time.

To ensure subjects understood the experimental procedures and their impact on their earnings, we asked them to complete a quiz testing their understanding. We confronted principals with various hypothetical values of p^* and individual *MAPs*, and in each scenario asked whether or not final outcomes would be determined by their agent (a draw from the lottery) and what payoff consequences would result from the agent's choice (lottery outcome). Agents were asked to indicate the payoff consequences of their possible choices. Only after all subjects understood the problem and could calculate their earnings for different values of hypothetical *MAPs* and p^* did we proceed with the experimental decision. After subjects had made their decisions, we informed everyone of the details of the experimental procedure and the results. Subjects presented their code number to collect a sealed envelope containing their earnings.

II. Preference Phenomena: Measurement and Predictions

To measure betrayal, social and risk preferences, we compared *MAP*s across the three decision situations. The three sets of *MAP*s and p', the value of p that makes the lottery actuarially fair, are the vital ingredients for our analysis. The difference between the *MAP*s in the trust game and the *MAP*s in the risky dictator game measures how much more willing principals are to take a risk against nature than to take the same risk relying on the trustworthiness of their agents. We take this magnitude to measure *betrayal aversion*, the net effect of the expected costs of betrayed trust less the expected benefits from honored trust.

Clearly, betrayal aversion only matters if principals do not only care about outcomes but also about how outcomes came to be. In line with psychological attribution theories (e.g., Fritz

Heider 1958, Arie W. Kruglansky 1979), recent theoretical models and empirical evidence in economics suggest that people respond to what actions, given certain choice sets, reveal about their counterpart's intentions (e.g., Rabin 1993, Sally Blount 1995, Kevin A. McCabe et al. 2003, Martin Dufwenberg and Georg Kirchsteiger 2004, and Armin Falk and Urs Fischbacher 2006). In the trust game and the risky dictator game, theoretically, the same set of strategies is available to the agent and to nature: they both can either produce a good or a bad outcome for the principal. However, nature does not *choose*; agents do. No malevolent motives are attributed to nature if a random device produces a bad outcome, but the same bad outcome will result in psychological cost when a person is responsible for it.

Building on these findings, the notion of betrayal aversion suggests that people are not only willing to sacrifice own income to reward (punish) those who were being kind (unkind) to them but also to avoid experiences of unkindness. This seems intuitive as, for example, in Rabin's (1993) model, the ability to punish only partly makes up for the loss in welfare experienced when treated badly (p. 1287).

To see this more easily, we use von Neumann-Morgenstern utilities and assign 1 to the good outcome of 15, 0 to the bad outcome of 8, and s to the sure outcome of 10 in the risky dictator game. Thus, s corresponds to the *MAP* in the risky dictator game, where $0<s<1$. The utility of the bad outcome when it is due to betrayal in the trust game is scaled as $-b$. We then have $MAP_{TG}(1) + (1-MAP_{TG})(-b) = s$. This implies that $MAP_{TG} = (s+b)/(1+b)$ in the trust game. This contrasts with the risky dictator game, where $MAP_{RDG} = s$.

We expect $b>0$. If so, principals will have a higher *MAP* in the trust game than in the risky dictator game, thereby indicating betrayal aversion. Our empirical hypothesis is that average betrayal aversion, as measured by the difference between the mean *MAP* in the trust game and that in the risky dictator game, will be positive: $\overline{MAP}_{TG} - \overline{MAP}_{RDG} > 0$.

The difference between the *MAP*s in the decision problem and the *MAP*s in the risky dictator game reveals how much more principals are willing to accept a lottery when another player will gain as well. We label this as their *social preference*, which could be positive or negative. Recent theoretical models and much empirical evidence suggest that principals may be motivated by outcome-based preferences such as altruism (James Andreoni and John Miller 2002), efficiency gains to the dyad (Gary Charness and Rabin 2002), and concerns about disparities in payoffs, i.e., inequality aversion (Fehr and Schmidt 1999, Gary Bolton and Axel Ockenfels 2000). For the numerical payoffs we employ, altruism and efficiency preferences would lead a principal to prefer the lottery in the risky dictator game to the lottery in the decision problem. Inequality aversion would reverse this preference, leading to a higher *MAP* in the risky dictator game than in the decision problem. The net influence of the two effects is unclear, and might well depend on the size of the payoffs. Accordingly, we make no prediction about the sign of social preferences ($\overline{MAP}_{DP} - \overline{MAP}_{RDG}$).

The difference between the *MAP*s in the decision problem and *p*' indicates principals' *risk aversion* (John W. Pratt 1964, Kenneth J. Arrow 1971). In accordance with most of the literature, we expect risk aversion to be positive: $\overline{MAP}_{DP} - p' > 0$.

III. Results

Table A.2 in the Appendix presents summary statistics. It shows the mean *MAP*s in each decision situation. It also reports the value of *p**, the likelihood of trustworthiness, for each country. Trustworthiness rates do not vary significantly across countries.[4]

The differences between the mean *MAP*s provide measures of our three variables of interest, betrayal aversion, social preferences and risk aversion. Those measures are presented in Table 1. For example, consider betrayal aversion for Americans. On average, Americans require a 22-percent better chance of getting the good outcome to trust an agent in the trust game than they do to choose the lottery in the risky dictator game. A Mann-Whitney U test shows that across all our countries, principals are significantly betrayal averse, have positive social preferences, and are risk averse. The aggregate z-scores are 5.74 for betrayal aversion, 1.73 for social preferences, and 7.75 for risk aversion.[5] The general pattern applies to most of our sub-groups, although some of the differences lose significance within some. Risk aversion is the most robust preference phenomenon across groups, and is significant in each sub-group. Betrayal aversion is significant in almost all sub-groups but only directionally and not significantly supported for Brazil and China. Social preferences are the least robust phenomenon: altruism and/or efficiency concerns slightly outweigh concerns about payoff disparities in all countries but China. However, on a single country basis, social preferences are only significant in the United Arab Emirates.

Table 1 about here

To probe our data in more detail, we ran OLS-regressions with individual *MAP*s as the dependent variable (Table 2). Standard errors are adjusted for clustering at the session level.[6] The independent variables are the three decision scenarios, gender and the six countries. The risky dictator game, the United States, and men are our omitted groups.

Table 2 about here

The regression results generally reproduce the findings of our nonparametric tests. They suggest that betrayal aversion is a robust phenomenon: *MAP*s in the trust game significantly exceed *MAP*s in the risky dictator game in each of our specifications. In Column 2, we add controls for gender and country. Women demand somewhat higher *MAP*s than do men, and Emiratis are substantially more averse to taking risk than are Americans.[7] In Column 3, we include a number of interaction variables. When we control for the Emiratis' particularly pronounced degree of betrayal aversion, the difference between the *MAP*s in the trust game and the risky dictator game decreases but remains both economically and statistically significant. In Column 4, we exclude the three countries with the largest degree of betrayal aversion, Turkey, the UAE and the USA, and run the regressions for Brazil, China and Switzerland only. Betrayal aversion remains significant in this subset of countries with $p<0.01$.[8]

Let us summarize our results: Our hypothesis regarding betrayal aversion is supported: subjects are betrayal averse across the six countries, but the degree of betrayal aversion varies between them. We made no prediction about the sign of social preferences and find that they are not a robust phenomenon across countries in our context. This may be because inequality aversion tends to counterbalance altruism or efficiency concerns. Alternatively, concerns about others' payoffs and efficiency may simply matter relatively little. Finally, as predicted, *MAP*s in the decision problem substantially exceed p', revealing risk aversion for all sub-groups.

IV. Discussion and Conclusions

People are less willing to take a risk when another person rather than nature determines the outcome. The goal of this study was to examine whether betrayal aversion is a broad-based phenomenon. We conducted our study in six countries—Brazil, China, Switzerland, Turkey, the United Arab Emirates and the United States. We chose these disparate countries to get a sense of the generality of our results. These countries differ in many aspects, e.g., their continents, political structures, economic systems, cultures, religions and histories. We consider our approach a first step towards increasing the external validity of laboratory experiments, as we estimate that more than 90 percent of experiments are run with American or Western-European subjects.

Our experiments show that in each of the six countries, people sacrifice more expected monetary value to avoid being betrayed than they sacrifice to avoid losing in a lottery offering the same odds and payoffs. We also find evidence for heterogeneity in behavior across countries. While we are reluctant to speculate on the sources of cross-country differences based on our small sample and the many variables that differ between the six countries studied, we offer some preliminary thoughts here. At first, it may seem surprising that we find hardly any evidence for betrayal aversion in Brazil, where surveys consistently report that trust rates are among the lowest in the world. Such low trust rates may be due to all three preference phenomena studied in this paper, and importantly, also to people's expectations about others' trustworthiness. Our design, which allows the principal to set a minimum threshold for trusting, renders such expectations irrelevant (for rational decision makers).[9]

In contrast to Brazil, betrayal aversion seems to be particularly pronounced in the United Arab Emirates. This may be related to the institutional instruments predominantly used to encourage trust. The instruments aimed at decreasing the material cost of betrayal, damages, insurance and liabilities, mentioned in the Introduction, play a comparatively small role in countries where Islamic law is the dominant form of law (Frank E. Vogel 1987). A recent study comparing how strongly trust responds to changes in the expected returns from trusting, including the risk of betrayal, in Gulf versus Western countries found that trust behavior is elastic in the two Western countries studied (Switzerland and the United States), but not in the three Persian Gulf countries analyzed (Kuwait, Oman, and the United Arab Emirates) (Bohnet et al. 2006). Rather, trust in the Gulf seems to be mainly fostered by basically eliminating the likelihood of betrayal through personal relationships and repeated game incentives.

This paper draws conclusions based on the observed differences in *MAP*s between the trust game and the risky dictator game. One might argue that in addition to (or in place of) betrayal cost and traditional arguments, other elements could enter a principal's utility function. For example, the controllability of risk has been identified as an important determinant of the perception and the acceptability of natural risks (e.g., Paul Slovic 2000). The literature on controllability in risk taking does not focus, however, on risks due to the choices of another human. Thus, it does not tell us whether a principal perceives the social risks involved in trusting to be less controllable than natural risks. Arguments could be made either way.

Be you Shamus or Shakespeare, betrayal is a central theme of human behavior. Whether in the modern era or the ancient world, agents at times betray their principals. The executives of Enron and Tyco betrayed their shareholders, and Cassius betrayed Caesar. The implications of our findings on betrayal aversion are that shareholders would prefer a 1-percent chance of losing half their value due to a natural catastrophe than a somewhat smaller chance of the same loss due to the malfeasance of corporate leaders; similarly, that political leaders would rather risk a 1-percent chance of dying due to an accident than a 0.8-percent chance of being killed by a subordinate. Betrayal costs are real, and thus require attention in our understanding of decision-making.

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[1] In practice, the value of *p** was written on a slip hidden in an envelope visibly posted to the blackboard. In each country, the sessions of the trust game were run first.

[2] It is strictly dominant if people assign positive probability to values of *p** in the immediate neighborhood of their *MAP*. Our procedure is related to the Becker-DeGroot-Marshak elicitation procedure, but unlike it, we do not generate *p** randomly from a uniform distribution. Note that the value of *p** in the trust game may have been thought to be more (or less) uncertain–ambiguous in the terminology related to the Ellsberg Paradox (Daniel Ellsberg 1961)–than that for the risky dictator game or the decision problem. But this should have no effect on the principal's reported *MAP*. A *MAP* is a cutoff value relating to preferences, and the estimated value of *p** should not affect it; i.e., the procedure is incentive compatible even when principals are ambiguity averse. Similarly, principals' beliefs about *p** may have differed between our games. For example, they may have expected a lower *p** in the games against nature than in the trust game because of "mean experimenters" (much like in the "mean Monty" games, see, e.g., Dolly Chugh and Max H. Bazerman 2005). The same reasoning as above applies here: our procedure remains incentive compatible; the *MAP* should not be affected.

[3] We ran a total of 36 sessions; 4 TG-, 3 RDG- and 1 DP-session in Brazil; 2 TG-, 2 RDG- and 1 DP-session in China; 2 TG-, 2 RDG- and 1 DP-session in Switzerland; 3 TG-, 2 RDG- and 2 DP-sessions in Turkey, 2 TG-, 2 RDG- and 2 DP-sessions in the UAE; and 2 TG-, 2 RDG- and 1 DP-session in the USA. Because of gender segregation, all sessions in the UAE were same-sex. Without introducing bias, we could not replicate this feature in any of our other countries, as running same-sex sessions elsewhere would have made sex salient, or would have led to questionable selection effects (e.g., in all-women's colleges in the USA).

[4] When comparing the trustworthiness rates in Switzerland and Turkey, the two most extreme cases, using a χ^2-test, p=0.16.

[5] All significance values are for two-tailed tests, though arguably they should be one-tailed for betrayal aversion and risk aversion, since we predict a specific direction. This rank-order procedure enables us to control for the effects of gender and countries separately, yet derive an overall measure of our three variables of interest. If the null hypothesis of no difference in subjects' *MAPs* across the three decision situations were satisfied, the test statistic for each country-gender group would have mean 0, with variance and standard deviation of 1. Our primary goal is to

determine whether each of our three preference phenomena is significant in the aggregate (across the six countries) once we control for country and gender. Our test statistics comprise 12 normal deviates. The null would posit their sum to be 0, their variance to be 12, and their standard deviation to be $\sqrt{12} = 3.46$. Adding the z-scores together and dividing by 3.46 gives an aggregate z score.

[6] Qualitatively similar results are obtained when we use a Tobit model instead. We prefer OLS because it allows us to cluster standard errors at the session level.

[7] Our gender results are compatible with other experimental studies on risk-taking and trust where women have been found to be more risk averse and less likely to trust strangers than men (for overviews, see Rachel Croson and Uri Gneezy 2004 and Eckel and Philip Grossman, forthcoming). For a discussion of cross-cultural differences in attitudes to risk, see, e.g., Elke U. Weber and Christopher K. Hsee (2000), and in willingness to trust, e.g., Croson and Nancy Buchan (1999).

[8] Note that when we do not cluster standard errors at the session level, betrayal aversion remains significant with $p<0.05$ in both OLS and Tobit models.

[9] In addition, the trust questions typically used in surveys may simply measure something different than trust experiments, because of the different methodologies or subject pools used. Edward L. Glaeser et al. (2000) and Nava Ashraf et al. (forthcoming), for example, found that the trust question was more related to experimentally elicited trustworthiness behavior than to trust behavior. For Brazil, Sergio A. Lazzarini et al. (2005) found in investment games (John Berg et al.) that Brazilian student subjects were about equally as trusting and as trustworthy as comparable American or Western European subjects.

Table 1: Preference phenomena: Betrayal aversion, social preferences and risk aversion

	Betrayal aversion	**Social preferences**	**Risk aversion**
	$\overline{MAP}_{TG} - \overline{MAP}_{RDG}$	$\overline{MAP}_{DP} - \overline{MAP}_{RDG}$	$\overline{MAP}_{DP} - p'$
All	0.16**	0.10**	0.21**
Women	0.17**	0.11*	0.27**
Men	0.15**	0.09^	0.17**
Brazil	0.08	0.04	0.18**
China	0.09	-0.09	0.11*
Switzerland	0.11^	0.08	0.18**
Turkey	0.15*	0.07	0.11*
UAE	0.33**	0.16**	0.35**
USA	0.22**	0.05	0.08*

^sign. at 10-percent level; * sign. at 5-percent level; ** sign. at 1-percent level.

Table 2: Determinants of minimum acceptable probabilities (*MAP*s)

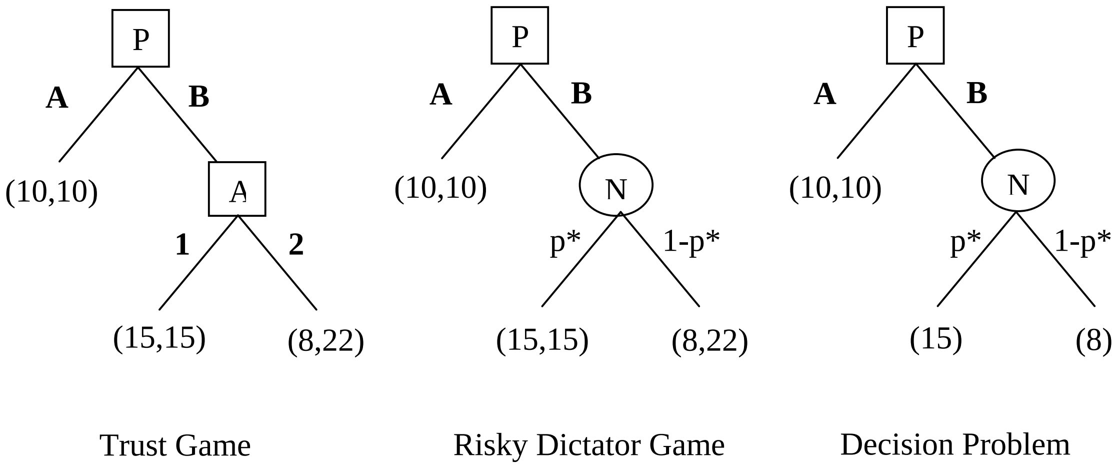
	*MAP*s	*MAP*s	*MAP*s	*MAP*s
	(1)	(2)	(3)	(4)[a]
Trust Game	0.153**	0.161**	0.123**	0.089**
	(0.036)	(0.026)	(0.029)	(0.026)
Decision Problem	0.074	0.051	0.034	0.010
	(0.043)	(0.029)	(0.026)	(0.041)
Women		0.073**	0.076	0.049
		(0.021)	(0.045)	(0.023)
Brazil		0.036	0.039	-0.001
		(0.028)	(0.033)	(0.021)
China		0.054*	0.054	0.013
		(0.020)	(0.027)	(0.024)
Switzerland		0.047	0.047	
		(0.026)	(0.032)	
Turkey		-0.006	-0.003	
		(0.031)	(0.037)	
UAE		0.223**	0.113*	
		(0.034)	(0.050)	
Trust Game x Women			0.005	
			(0.053)	
Decision Prob. x Women			-0.017	
			(0.050)	
Trust Game x UAE			0.203**	
			(0.050)	

Decision Problem x UAE			0.126*	
			(0.051)	
Constant	0.409**	0.313**	0.332**	0.407**
	(0.017)	(0.018)	(0.031)	(0.030)
Observations	528	517	517	248
R-squared	0.05	0.17	0.18	0.03

Robust standard errors in parentheses, clustered at the session level; * sign. at 5-percent; ** sign. at 1-percent.

[a] The regression presented in Column 4 includes Brazil, China and Switzerland only (with Switzerland being the omitted country).

Figure 1: Experimental games (Payoff to Principal, Payoff to Agent)



P=Principal; A=Agent; N=Nature

Appendix

A.1 Sample Instructions for the US: Risky Dictator (B.1) and Trust Game (C.1. and C.2)

Welcome to research project B.1! **Your code number is: …………**

You are participating in a study in which you will earn some money. The amount will depend on the outcome of a game you will play. At the end of the study, your earnings (1 point=$1) will be added to a show-up fee, and you will be paid in cash.

How the study is conducted. The study is conducted anonymously. Participants will be identified only by code numbers. There is no communication among them. We will call individuals who are in the same role as you “Persons S”. You are randomly paired with another person present in this room, call him/her “Person X”, whose identity you will never know. Your choice will not be known to other participants or to the researchers.

What the study is about. The study seeks to understand how people decide. You are confronted with two alternatives, A and B. A gives you and Person X a payoff of 10 points for sure. B gives you and Person X an outcome that depends on a lottery. The lottery can produce option 1 or option 2.

Payoff Table

Result of your decision	Nature of choice	Your earnings	Earnings to Person X
A	Certainty	10	10
B	Lottery produces 1	15	15
	2	8	22

The payoff table reads as follows:

If you end up choosing A, you and Person X will each get 10 points.

If you end up choosing B and the lottery produces 1, you and Person X will get 15 points.

If you end up choosing B and the lottery produces 2, you will get 8 points and Person Y will get 22 points.

KEY QUESTION: How large would the probability p of the lottery producing Option 1 minimally have to be for you to pick Alternative B over Alternative A? (like any probability, it must lie between 0 and 1)

YOUR ANSWER: I choose B, if p is at least __________

Note: You do not know what the actual value of p is. Your choice does not influence the value of p. It is indicated on a sheet of paper in a sealed envelope posted to the blackboard. With YOUR ANSWER you indicate how large p has to be before you pick B over A.

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Conduct of the study B.1.

1. While you answer the KEY QUESTION, we will post the envelope containing the value of p on the blackboard. After you have decided, we will collect the answer forms. Please fold them so that nobody can see YOUR ANSWER.
2. We will then open the envelope and inform everyone of the value of p for this experiment. This gives you p*, the probability of receiving option 1.
3. **If p* is greater than or equal to your required value of p (from YOUR ANSWER above), we will follow your instructions: Your earnings will be determined by the outcome of the lottery.**

   We will create and then conduct the lottery. We will put green and blue marbles into a bowl. Out of all marbles in the bowl, the percentage of green marbles will be the same as p*. The remaining marbles will be blue. We will then randomly pull a ball from the bowl.

   a. If the marble is green, you and your Person X will get 15 points each.
   b. If the marble is blue, you will get 8 points and your Person X will get 22 points.

4. **If p* is less than your required value of p (from YOUR ANSWER above), we will follow your instructions: You and your Person X will get Certainty A, namely 10 points each.**

Completion of Study and Earnings.

- Before we conduct the study, we ask you to complete a pre-study questionnaire. We will start the study once everyone has correctly filled out this questionnaire.
- 1 point=$1. You can collect your earnings by presenting your CODE NUMBER FORM at the end of the study. Your earnings will be in an envelope marked with your code number.

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Welcome to research project C.1! **Your code number is: …….**

You are participating in a study in which you will earn some money. The amount will depend on the outcome of a game you will play. At the end of the study, your earnings (1 point=$1) will be added to a show-up fee, and you will be paid in cash.

How the study is conducted. The study is conducted anonymously. Participants will be identified only by code numbers. There is no communication among them. We will call individuals who are in the same role as you “Persons S”. You are randomly paired with another person present in this room, call him/her “Person Y”, whose identity you will never know. Neither your choice nor Y’s choice will be known to other participants or to the researchers.

What the study is about. The study seeks to understand how people decide. You are confronted with two alternatives, A and B. A gives you a payoff for sure and Person Y takes no action. B gives you an outcome that depends on Person Y's behavior. Person Y chooses between options 1 and 2.

Payoff Table

Result of your decision	Nature of choice	Your earnings	Earnings to Person Y
A	Certainty	10	10
B	Person Y chooses 1	15	15
	2	8	22

The payoff table reads as follows:

If you end up choosing A, you and Person Y will each get 10 points.

If you end up choosing B and Person Y chooses 1, you and Person Y will each get 15 points.

If you end up choosing B and Person Y chooses 2, you will get 8 points and Person Y will get 22 points.

KEY QUESTION: How large would the probability p of being paired with a Person Y who chose Option 1 minimally have to be for you to pick Alternative B over Alternative A? (like any probability, it must lie between 0 and 1)

YOUR ANSWER: I choose B if p is at least ________

Note: You do not know what the actual value of p is. Your choice does not influence the value of p. It is determined by the fraction of Persons Y choosing Option 1. With YOUR ANSWER you indicate how large the fraction of Persons Y who choose 1 has to be before you pick B over A.

Conduct of the study C.1.

1. While you answer the KEY QUESTION, each of the individuals playing Persons Y have to answer the following question:

   ”Which option, 1 or 2, do you choose in case B?“

   After you and all Persons Y have decided, we will collect the answer forms. Please fold them so that nobody can see YOUR ANSWER.

2. We will then calculate the percentage of Persons Y who chose option 1 and inform everyone of it. This gives you p*, the probability of being paired with a Person Y who chose option 1.

3. **If p* is greater than or equal to your required value of p (from YOUR ANSWER above), we will follow your instructions. Your earnings will be determined by your Person Y’s choice.**

   a. If your Person Y chose 1, you and your Person Y will get 15 points each.

   b. If your Person Y chose 2, you will get 8 points and your Person Y will get 22 points.

4. **If p* is less than your required value of p (from YOUR ANSWER above), we will follow your instructions: You and your Person Y will get Certainty A, namely 10 points each.**

Completion of Study and Earnings.

- Before we conduct the study, we ask you to complete a pre-study questionnaire.

  We will start the study once everyone has correctly filled out this questionnaire.

- 1 point=$1. You can collect your earnings by presenting your CODE NUMBER FORM at the end of the study. Your earnings will be in an envelope marked with your code number.

Welcome to research project C.2! **Your code number is: …….**

You are participating in a study in which you will earn some money. The amount will depend on the outcome of a game you will play. At the end of the study, your earnings (1 point=$1) will be added to a show-up fee, and you will be paid in cash.

How the study is conducted. The study is conducted anonymously. Participants will be identified only by code numbers. There is no communication among the participants. We will call individuals who are in the same role as you "Persons Y". You are randomly paired with another person present in this room, call him/her "Person S", whose identity you will never know. Neither your choice nor S's choice will be known to other participants or to the researchers.

What the study is about. The study seeks to understand how people decide. Person S is confronted with two alternatives, A and B. A gives you and Person S a payoff for sure. You do not take any action. If Person S' decision results in B, you have to choose one of two options, 1 or 2.

Payoff Table

Result of Person S' decision	Nature of choice		Your earnings	Earnings to Person S
A	Certainty		10	10
B	You choose	1	15	15
		2	22	8

The payoff table reads as follows:

If Person S' decision results in A, you and Person S will each get 10 points.

If Person S' decision results in B and you choose 1, you and Person S will each get 15 points.

If Person S' decision results in B and you choose 2, you will get 22 points and Person S will get 8 points.

KEY QUESTION: Which option, 1 or 2, do you choose in case B?

YOUR ANSWER: I choose ________

After you have answered this question, we will collect your answer form.

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[Distributed after Persons Y have made their decisions and handed in their forms.]

Conduct of the study C.2.

1. Persons S have to answer the following question:

   "How large would the probability of being paired with a Person Y who chose option 1 minimally have to be for you to pick B over A? (like any probability, it must lie between 0 and 1)"

   After all Persons S have decided, we will collect their answer forms.

2. Based on your and all other Persons Y's choices, we will then calculate the percentage of Persons Y who chose option 1 and inform everyone of it. This gives us p*, the probability that a Person S will be paired with a Person Y who chose option 1.

3. **If p* is greater than or equal to the value of p required by your Person S, then YOUR ANSWER from above will determine the final earnings.**

   a. If you chose 1, you and your Person S will each get 15 points.

   b. If you chose 2, you will get 22 points and Person S will get 8 points.

4. **If p* is less than the value of p required by your Person S, then you and your Person S will each get Certainty A, namely 10 points each.**

Completion of Study and Earnings.

- Before we conduct the study, we ask you to complete a pre-study questionnaire. We will start the study once everyone has correctly filled out this questionnaire.
- 1 point=$1. You can collect your earnings by presenting your CODE NUMBER FORM at the end of the study. Your earnings will be in an envelope marked with your code number.

Table A.2: *MAP*s in three decision situations

	Trust Game	**Risky Dictator Game**	**Decision Problem**
All			
Mean	**0.56**	**0.41**	**0.48**
Median	0.60	0.35	0.50
Stand. Dev.	0.27	0.26	0.26
N	[189]	[157]	[158]
Women			
Mean	**0.61**	**0.46**	**0.53**
Median	0.70	0.50	0.51
Stand. Dev.	0.27	0.28	0.27
N	[89]	[72]	[92]
Men			
Mean	**0.52**	**0.37**	**0.44**
Median	0.50	0.30	0.40
Stand. Dev.	0.25	0.23	0.25
N	[100]	[74]	[80]

Brazil (*p=0.35)**			
Mean	**0.51**	**0.43**	**0.47**
Median	0.50	0.38	0.49
Stand. Dev.	0.29	0.31	0.30
N	[49]	[32]	[30]
China (*p=0.29)**			
Mean	**0.58**	**0.49**	**0.39**
Median	0.65	0.55	0.4
Stand. Dev.	0.22	0.27	0.17
N	[21]	[21]	[24]
SWI (*p=0.28)**			
Mean	**0.51**	**0.40**	**0.47**
Median	0.51	0.42	0.50
Stand. Dev.	0.21	0.22	0.22
N	[25]	[24]	[22]
TUR (*p=0.46)**			
Mean	**0.49**	**0.33**	**0.40**
Median	0.50	0.29	0.43
Stand. Dev.	0.25	0.28	0.21
N	[35]	[21]	[30]

UAE (*p=0.32)**			
Mean	**0.81**	**0.48**	**0.64**
Median	0.80	0.48	0.70
Stand. Dev.	0.20	0.23	0.30
N	[28]	[30]	[51]
USA (*p=0.29)**			
Mean	**0.54**	**0.32**	**0.37**
Median	0.6	0.29	0.3
Stand. Dev.	0.24	0.21	0.15
N	[31]	[29]	[25]

N=number of independent observations: 1 subject in the risky dictator game and 13 subjects in the decision problem did not indicate their gender.