Southern Economic Journal 2012, 79(2), 277–299
DOI: 10.4284/0038-4038-2010.026

Risk-Taking Behavior: An Experimental Analysis of Individuals and Dyads

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The decision to undertake risk is often made by pairs (dyads), while much of the economics literature on risk taking focuses on the individual. We report the results of controlled laboratory experiments that compare behavior between individuals and pairs. Using the Holt and Laury (2002) procedure and a within-subjects design, we find that pair choices are largely consistent with subjects bargaining over the outcome rather than the pairs taking a more extreme stance than the individual members. Further, gender and age but not personality seem to influence relative bargaining weight. We also find that individuals are more willing to take risks after making decisions as part of a pair than beforehand. Both the personality of one's partner and nontask social interaction influence subsequent individual risk-taking behavior.

JEL Classification: C7, C9, D7, D8

1. Introduction

People routinely make decisions under uncertainty due to incomplete information. The perceived degree of uncertainty affects decisions regarding consumption, saving and investing, and the selection of warranties and insurance policies. It also impacts the decision to enter a given profession or engage in certain activities, such as crimes and extreme sports. Thus, it is no surprise that considerable attention has been given to measuring risk attitudes. To this end, researchers have used data from sources ranging from hypothetical responses in large-scale surveys (e.g., Barsky et al. 1997; Dohmen et al. 2005) to behavior in high-stakes game shows (e.g., Baltussen et al. 2008; Deck, Lee, and Reyes 2008). In the laboratory, researchers can manipulate the decision problem while obtaining complete information about the relevant payoffs and probabilities associated with a given choice. The generally observed pattern is that people tend to exhibit mild risk aversion in the laboratory.

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The authors wish to thank two anonymous referees, Philip Grossman, Charlie Holt, Robert Shupp, and participants at the Southern Economic Association Conference for helpful comments and suggestions. Deck, Reyes, and Rosen are grateful for Sutton Research Funding from the Walton College of Business Sutton Research. Lee is grateful for the financial support from the Sogang University Research Grant of 2010. This research was supported in part by NIH grant R21AG030184.

Received January 2010; accepted January 2012.

Risk-taking research has focused predominantly on choices by individuals, while many naturally occurring decisions are made in groups of various sizes. In some situations, decisions are made by large groups, such as boards or juries. In other situations, decisions are made by pairs or dyads, such as spouses or business partners. For dyads, the standard economic approach assumes that each person has a preferred outcome and that the two bargain over the single choice. For example, spouses may have different individual risk attitudes but have to make many joint decisions over a range of everyday economic activities (Mazzocco 2004).

The goal of this article is to explore differences in choices between individuals and pairs and determine what impacts relative bargaining power within a pair when making a joint decision. For this reason, we focus on *ad hoc* dyads so as to avoid repeated play concerns and unobservable (to the researcher) threat points that are invariably present with naturally occurring pairs. For example, a husband may concede on one decision so that he can get his way next time.[1]

This article contributes to the literature on risk taking by *ad hoc* dyads by considering the effect of demographic, psychological, and behavioral characteristics on the difference between individual and pair choices. The main conclusions from the experimental results are that we observe considerable evidence that people bargain over the action that the pair should take given their own personal preferences. We find that age and pair composition influence bargaining strength but that personality traits and observable behavior during (audio and video) recorded face-to-face pair discussions do not. We do, however, find that making a pair decision first increases individual risk taking. We also find that both a partner's personality traits and engagement in nontask socializing have an influence on subsequent individual choices.

2. Background Literature

Kocher, Strauss, and Sutter (2006) show that people have a preference for making decisions in groups, and there is a small but growing literature in experimental economics that studies group decision making. The results are not uniform. Cason and Mui (1997) explore group polarization in dictator game experiments and find that group behavior tends to resemble the behavior of the more generous members of the group, but Luhan, Kocher, and Sutter (2009) do not. Cox (2002) finds some evidence that groups are less trustworthy.[2] Some studies suggest that groups make *better* choices. For example, Cooper and Kagel (2005) find that pairs of subjects are dramatically better at a strategic signaling game than individuals. Kocher and Sutter (2005) show that groups are better at deducing optimal strategies in a beauty contest game. Borstein, Kugler, and Ziegelmeyer (2004) find that groups are more strategic in centipede games. However, other studies find that groups make poorer decisions. Cox and Hayne (2006) compare groups and individuals in common value auctions and report that groups are more susceptible to the winner's curse (see also Sutter, Kocher, and Strauss 2009).

[1] For a study that looks at the dynamics of bargaining power over time in couples, see de Palma, Picard, and Ziegelmeyer (2011).

[2] Group polarization refers to groups acting in a more extreme fashion than its members would individually. For background, see Stoner (1968) and Isenberg (1986).

Table 1. Decision Problem

	Option A	Option B
(Row) choice 1	\$10.00 [–]	\$19.25 [–]
	\$8.00 [1, 2, 3, 4, 5, 6, 7, 8, 9, 10]	\$0.50 [1, 2, 3, 4, 5, 6, 7, 8, 9, 10]
(Row) choice 2	\$10.00 [1]	\$19.25 [1]
	\$8.00 [2, 3, 4, 5, 6, 7, 8, 9, 10]	\$0.50 [2, 3, 4, 5, 6, 7, 8, 9, 10]
(Row) choice 3	\$10.00 [1, 2]	\$19.25 [1, 2]
	\$8.00 [3, 4, 5, 6, 7, 8, 9, 10]	\$0.50 [3, 4, 5, 6, 7, 8, 9, 10]
(Row) choice 4	\$10.00 [1, 2, 3]	\$19.25 [1, 2, 3]
	\$8.00 [4, 5, 6, 7, 8, 9, 10]	\$0.50 [4, 5, 6, 7, 8, 9, 10]
(Row) choice 5	\$10.00 [1, 2, 3, 4]	\$19.25 [1, 2, 3, 4]
	\$8.00 [5, 6, 7, 8, 9, 10]	\$0.50 [5, 6, 7, 8, 9, 10]
(Row) choice 6	\$10.00 [1, 2, 3, 4, 5]	\$19.25 [1, 2, 3, 4, 5]
	\$8.00 [6, 7, 8, 9, 10]	\$0.50 [6, 7, 8, 9, 10]
(Row) choice 7	\$10.00 [1, 2, 3, 4, 5, 6]	\$19.25 [1, 2, 3, 4, 5, 6]
	\$8.00 [7, 8, 9, 10]	\$0.50 [7, 8, 9, 10]
(Row) choice 8	\$10.00 [1, 2, 3, 4, 5, 6, 7]	\$10.25 [1, 2, 3, 4, 5, 6, 7]
	\$8.00 [8, 9, 10]	\$0.50 [8, 9, 10]
(Row) choice 9	\$10.00 [1, 2, 3, 4, 5, 6, 7, 8]	\$19.25 [1, 2, 3, 4, 5, 6, 7, 8]
	\$8.00 [9, 10]	\$0.50 [9, 10]
(Row) choice 10	\$10.00 [1, 2, 3, 4, 5, 6, 7, 8, 9]	\$19.25 [1, 2, 3, 4, 5, 6, 7, 8, 9]
	\$8.00 [10]	\$0.50 [10]
(Row) choice 11	\$10.00 [1, 2, 3, 4, 5, 6, 7, 8, 9, 10]	\$19.25 [1, 2, 3, 4, 5, 6, 7, 8, 9, 10]
	\$8.00 [–]	\$0.50 [–]

"(Row)" has been added to the table for expositional purposes and was on the form observed by subjects in the study. Numbers beside each payoff amount indicate the die rolls that would result in that payoff being realized. Subjects indicated their choice (A or B) for each of the 11 rows on a separate Scantron form.

Cooper and Kagel (2009) report that groups are no better than individuals at eliminating dominated strategies.

Experimental economists have also found mixed results as to how much risk groups are willing to accept as compared to the risk tolerance of individuals. Like strategic games, risk measurement tasks are in part judgmental because they deal with the idiosyncratic personal preferences of the decision maker in the sense that there is no objectively right amount of risk to take.[3] The judgmental nature of risk-taking tasks makes reaching a joint decision more complicated than in other settings where an optimal choice can be demonstrated. One common method for measuring risk attitudes is the Holt and Laury (2002; hereafter H&L) task. In the H&L task, a decision maker faces a series of choices between two binary lotteries (see Table 1). Masclet et al. (2009) use an H&L task to measure risk aversion in individuals and groups. They find that groups make fewer safe choices than individuals, and the researchers attribute this to the fact that the most risk-averse members of the group tend to concede to the other, more risk-loving group members. Baker, Laury, and Williams (2008) conduct a similar study with groups, but they report that the groups choose the safe lottery more frequently than the individual group members. Harrison et al. (2005) also conducted group experiments with the H&L procedure. Rather than the group reaching a decision, each member indicated one's own

[3] Laughlin (1980) defines intellective tasks as those with definite objective criteria and judgmental tasks as those for which there are no objective criteria, such as political or behavioral judgments. Intellective tasks can be further classified on the basis of their demonstrability, the ability to demonstrate why one choice is superior to another (see Laughlin and Ellis 1986).

preference for the decision of the group with the majority opinion being implemented. They report that group decisions closely follow that of the individuals in the group. Using willingness-to-pay data, Shupp and Williams (2008) found that the comparison of groups and individuals varies with the riskiness of the choice such that groups are more risk averse with riskier choices and vice versa.

The risky-choice papers discussed above focus on groups of three or more people, but there is an ongoing debate in the management and psychology literatures as to whether pairs are groups (for opposing perspectives, see Moreland 2010; Williams 2010). Therefore, it is not clear that these results shed much light on dyad behavior. To the degree that choices by pairs are important, one needs to study such behavior directly. Unfortunately, there is less research in economics on saliently motivated risky decision making by pairs than by larger groups. Sheremeta and Zhang (2010) find that pairs choose a safe lottery more often than individuals, a similar result to Baker, Laury, and Williams (2008). Bone, Hey, and Suckling (1999) find that pairs violate the expected utility axioms in a similar manner to that observed for individuals. Bateman and Munro (2005) move beyond *ad hoc* groups, looking at risk taking by established couples, and also find behavior similar to that of individuals.

An appealing aspect of pair decision making with judgmental tasks is that one can evaluate the choice as the outcome of a bargaining process. A natural starting point is to assume that pairs will simply meet in the middle, or "split the difference." Deviations from the middle ground suggest that one party has relatively greater bargaining power.[4] Our *ad hoc* pairs are an ideal place to explore bargaining power because the parties will not face future interactions (nor do they have a more complicated multidimensional problem) and there is no predetermined power structure.

What could explain bargaining power in *ad hoc* face-to-face pairs? One possibility is demographic variation. Another potential source of explanatory power is innate dispositions, or personality traits. One of the most enduring and popular taxonomies of human personality is Costa and McCrae's (1992) Five Factor Model (FFM), which identifies five traits that can be used to describe one's personality. These traits are extraversion, agreeableness, conscientiousness, neuroticism, and openness, often referred to as the "Big Five." The FFM is widely used in management and psychology because it is a parsimonious way of summarizing traits that have been identified in almost all other models of personality (Costa and McCrae 1992; Gill and Hodgkinson 2007). Moreover, research has consistently shown that the Big Five traits are stable across adulthood (McCrae and Costa 1990) and predict a variety of work (e.g., task performance, citizenship behaviors, job satisfaction, and training proficiency) and nonwork (e.g., creativity, life satisfaction, smoking, personality disorders, and decision making) attitudes, behaviors, and phenomena (see Barrick and Mount 1991; Saulsman and Page 2004; Malouff, Thorsteinsson, and Schutte 2006).

Formal hypotheses regarding the effects of each individual personality trait are not presented. However, we do suggest that personality plays a role in decision-making processes, as there is evidence that Big Five traits are related to judgment and decision making across a variety of contexts, including jury decisions (Clark et al. 2007), entrepreneurial business

[4] Of course, either party may prefer to exaggerate their own starting position so that meeting in the "middle" results in an outcome closer to their own true private preference. The ability to implement such a strategy is dependent on one's ability to identify the preference of the other party, as exaggerating preferences in the direction of one's rival would lead to a worse outcome. Our design cannot separate between this form of bargaining power and the more traditional notion of being able to obtain the lion's share given the starting point of the parties.

ventures (Wooten, Timmerman, and Folger 1998), and decisions to engage in risky health-related behaviors (Trobst et al. 2000). Moreover, traits such as extraversion, conscientiousness, and agreeableness are linked to persuasion attempts (i.e., people who are more outgoing are more likely to try to persuade others to see things their way), source credibility (i.e., individuals who are more organized and disciplined are likely to be viewed in a more favorable way), and acquiescence (i.e., by definition, someone who is more agreeable is more likely to acquiesce to others), all of which have the potential to influence decisions involving multiple decision makers. Big Five traits are also purported to affect decision making by influencing (over)confidence in decisions, sensitivity to information from the environment (McElroy and Dowd 2007), and heuristic biases (Trobst et al. 2000). In economics, personality tests have been used with varying degrees of success to explain behavioral variation in social dilemmas (Boone, De Brabander, and van Witteloostuijn 1999; Perugini, Tan, and Zizzo 2010), ultimatum and dictator games (Schmitt, et al. 2008), and bargaining (Gunnthorsdottir, McCabe, and Smith 2002).[5] Thus, we broadly consider what role, if any, the Big Five personality traits play in decision-making processes examined in the current study.

3. Experimental Design

The experiments in the current study relied on the H&L risk measurement tool.[6] The payoffs are shown in Table 1. In each row, decision makers choose between option A and option B. The payoffs associated with option A are always \$10.00 and \$8.00, and the payoffs associated with option B are always \$19.25 and \$0.50. These numbers represent the actual \$U.S. payments that the subjects could receive. What varies between rows is the likelihood of receiving the larger amount. In the first row, there is a 0% chance; in the second row, there is a 10% chance; and so on. Under standard assumptions, an individual who prefers more money to less should prefer option A in row 1 up to row X and then prefer option B for row X + 1 to row 11 with $1 \leq X < 11$. For a risk-neutral person, X = 6. A risk-averse person would select the safe option more than six times, and a greater number of safe choices implies a greater degree of risk aversion.[7]

Each subject completed the risk measurement task twice: once individually and once jointly with a randomly selected partner. Some pairs completed the task together before completing the task individually, and some pairs completed the task as individuals first. Subjects knew that they would complete the task twice but did not know how the second task differed from the first when they were completing the first task. To control for wealth effects, as in H&L, subjects were told that only one row from one task would be randomly selected for payment. Which task (individual or pair) would determine the subject's payoff was determined by a coin flip. The specific row used for payment was then selected by the roll of a die. Subjects were given the opportunity to inspect the randomization devices prior to making their decisions.

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[5] For a discussion of incorporating personality research into laboratory experiments, see Swope et al. (2008). Some of these studies used alternative personality tests, such as the Myers-Briggs Personality Inventory. McCrae and Costa (1989) discuss the overlap between the Big Five and the Myers-Briggs approaches to personality.

[6] The task is slightly modified by inclusion of the first row, in which the outcome is certain to be the lower amount.

[7] Because of the coarseness of the instrument, individuals with slight risk aversion, or risk-preferring preferences would also choose X = 6. For the model of constant relative risk aversion where $U(w) = w^{1-r}/(1 - r)$ *and the parameter values of* r *such that* $-0.15 < r < 0.15$ *are consistent with switching at* $X = 6$.

In addition to the two tasks, each subject completed a survey involving demographic information (i.e., age and gender) as well as personality characteristics.[8] Consistent with previous research, an established measure of the FFM from the International Personality Item Pool was used to assess the Big Five personality trait markers (Goldberg 1999). This measure uses 10 statements to which the respondents can strongly disagree, disagree, be neutral, agree, or strongly agree using a five-point Likert scale. For example, statements regarding neuroticism include "I get stressed out easily," "I seldom feel blue," and "I get irritated easily." Participants' responses were averaged to provide a mean score for each of the five personality traits.

In each laboratory session, eight subjects arrived at the lab at the prespecified time.[9] The subjects then drew ID numbers that would determine the task order and their pairings.[10] After drawing ID numbers, subjects proceeded to the lab's computer room, where they completed the online survey. Each station in the computer lab is separated by a system of privacy dividers. After all the subjects had completed the survey, those in the pair task were taken across the hall to one of the lab's group decision-making rooms (a small room with a table that can seat eight people). These subjects were given directions for the pair task and a Scantron form on which to indicate their responses and were then left in the room to make their decision. Video and audio recordings were made of the pair interaction. After the pairs completed the task, they returned to the computer lab, sat at separate work stations, received the individual task directions and Scantrons, and completed the task in private. The subjects who completed the individual task first remained in the computer initially and then moved to one of the lab's group rooms after completing the individual task. Copies of the directions for the pair and individual tasks are included in the Appendix. After all the subjects had completed both tasks, a coin was flipped to determine if the pair or individual task would be used to determine the payoff. If the pair task was selected, the pair rolled a single 12-sided die to determine which of the 11 rows would be selected (the subjects simply rerolled if the die landed on 12). Finally, a 10-sided die was used to determine the actual payoff that both subjects received. Once the subjects were paid, they were dismissed from the experiment. If the individual task was selected for payment, then each person privately rolled the two dice to determine their own payoff before being dismissed.

A total of 204 (102 dyads) undergraduate students at the University of Arkansas participated in the experiment. By random assignment, 96 (48 pairs) completed the individual task first, and 108 (54 pairs) completed the pair task first. Some subjects had participated in previous economics experiments, but none had participated in any studies measuring risk attitudes. The experiments lasted approximately 30 minutes. In addition to the salient earnings, subjects also received a $5 participation payment.

4. Data

The usable data consist of the H&L choices and complete survey information for 199 individuals and 97 pairs. We excluded one individual because this person never selected option

[8] A copy of the survey is available on request.

[9] Some sessions were run with four or six subjects because of other subjects' absenteeism.

[10] Subjects were not informed at this point that they would be engaging in a pair task, nor were they informed as to how their specific ID number would be used. Another advantage of drawing ID numbers is that no identifying information was collected from the subjects that could be connected to their responses, some of which are potentially sensitive.

Table 2. Descriptive Statistics of Sample Variables

	Mean	Standard Deviation	Minimum	Maximum
Male	0.648	0.479	0	1
Age	21.261	2.800	17	39
Big Five personality				
Agreeableness	3.980	0.527	1.9	5
Extraversion	3.447	0.722	1.8	5
Conscientiousness	3.210	0.441	1.4	4.2
Openness	3.670	0.452	2.5	4.6
Neuroticism	2.578	0.770	1	4.6
Video				
Justifications	1.035	0.907	0	3
Conversational leadership	0.910	0.780	0	2
Physical superiority	0.548	0.547	0	2
Social activity	0.151	0.359	0	1
No. of subjects	199			

B, perhaps indicating confusion. The other four subjects were excluded because of incomplete demographic information. Of the usable observations, 94 subjects performed the individual task first. There were more males (65%) in our sample, and the average age was 21, with a minimum age of 17 and a maximum age of 39. Table 2 contains summary statistics for each variable in our sample.

Following Baker, Laury, and Williams (2008), we use the number of safe choices as our measure of risk aversion. Theoretically, a subject should exhibit a single switching point from preferring the safe lottery to preferring the risky lottery, but it is common for some subjects to not behave consistently. Interestingly, no individual and no pair in our sample ever switched from the risky lottery back to the safe lottery.[11]

Our data also include the audio and video recordings of the pair decision-making process. While not common in economics, this type of information is commonly studied in other disciplines, such as psychology. Transforming the recordings into usable data requires a coding process that identifies the set of possible outcomes (for an overview, see Bakeman 2000). The same three observers watched each pair interaction and recorded occurrences of the following behaviors: justifications for choice (logical and emotional), conversational leadership (talking first and talking most), physical superiority (standing and completing the response form), and social activity (non–task-related interactions).[12] Conversational leadership is of particular interest, as psychologists have argued that there is a relationship between group leadership and

[11] As stated above, one subject selected the safe option every time and was eliminated from our sample. One of the subjects who was eliminated because of incomplete demographic information did not have a single switching point. We speculate that the high level of consistent behavior was due to our use of a Scantron response form.

[12] To assess interrater reliability among our three coders, we calculated Fleiss's kappa. This measure took on the following values for our coders (with higher numbers indicating greater consistency): 0.405 for the logical value, 0.244 for emotional, 0.716 for talking first, 0.460 for talking most, 0.736 for standing, 0.856 for completing the sheet, and 0.573 for engaging in non–task-related social activity. There is an ongoing debate as to how to objectively evaluate Fleiss's kappa, and therefore we also evaluated Cohen's kappa for each possible set of two coders for each of the behaviors. In the interest of brevity, rather than reporting the 3 combinations of two coders × 7 behaviors = 21 values for Cohen's kappa, we simply note that the probability of observing a Cohen's kappa as high as was observed by chance is less than 0.001 for each of the 21 values. Given the high degree of agreement between our coders, we rely on the average rater coding as the measure of subject behavior.

taking control of the conversation. Specifically, Van Knippenberg, Van Knippenberg, and Van Dijk (2000) report that risk-seeking individuals are more likely to take the lead of a group. A variable was created for each subject indicating the number of actions of a particular behavior the person did (i.e., someone who talked first and talked the most would receive a score of two for conversational leadership out of a maximum of two; someone who filled in the response sheet but did not stand would have a score of one out of a maximum of two for physical superiority).

5. A Model of Bargaining

In order to provide a framework for exploring differences in behavior across conditions, we present a simple conceptual model. Let $x^*_{i,p}$ denote the H&L choice revealing the true preference of person i randomly assigned to pair p. Let $x_{i,p}$ denote the actual individual choice made by the person. There are four different types of choices that we observe in our experiment: individual choices before or after the pair task and pair choices before or after the individual task. First, it seems reasonable to assume that individuals, when they take the individual task first, will reveal their true risk aversion. That is, $x_{i,p} = x^*_{i,p}$. This assumption hinges on the validity of the H&L method but is not testable. Second, it is also reasonable to assume that the pair choice is not influenced by whether the individual task is done first or second, as it is determined by a collective decision-making procedure based on two paired people's true risk preferences. In other words, the pair choice should not differ on the basis of task ordering.[13] This is testable and forms the basis of Hypothesis 1.

Hypothesis 1: There is no difference in the distribution of pair choices regardless of whether the pair task is done before or after the individual task.

The remaining question is how individual choices will be influenced by the pair choice when the pair task is done first. To address this question, let us assume that the individual choice made after the pair choice is the weighted average of the person's true choice and the predetermined pair choice. Formally, we conjecture that

$$x_{i,p} = (1 - \alpha_{i,p})x^*_{i,p} + \alpha_{i,p}x_p, \tag{1}$$

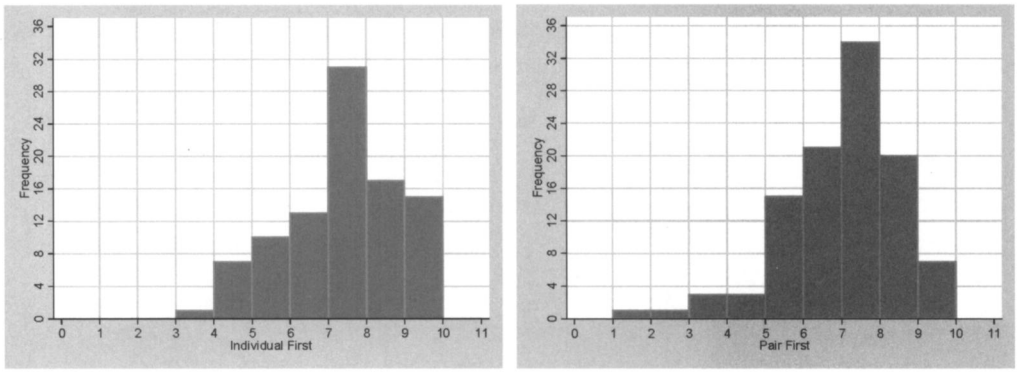
where x_p is the preceding pair choice and the parameter $\alpha_{i,p} \in [0,1]$ represents the extent to which the person is influenced by the pair choice. This parameter may depend on the person's characteristics and also the characteristics of his or her partner. For example, it may be that young people are more likely to be influenced by the pair choice than are older people.

Assume, without loss of generality, that person i is the more risk-averse member in the pairing. That is, $x^*_{i,p} \geq x^*_{-i,p}$, where the subscript $-i$ represents the partner of subject i. We assume that the pair choice is determined by a Nash bargaining procedure, consistent with the observed behavior shown in Figure 1. Specifically, we assume that the pair choice is determined by

[13] It is possible that there could be a "confirmation" effect where people who make their individual choices first hold on more strongly to their individual preferences when bargaining. However, our data suggest that this is not the case, as discussed later.

A. Individual Choices

Individual Task First *Pair Task First*



B. Pair Choices

Individual Task First *Pair Task First*

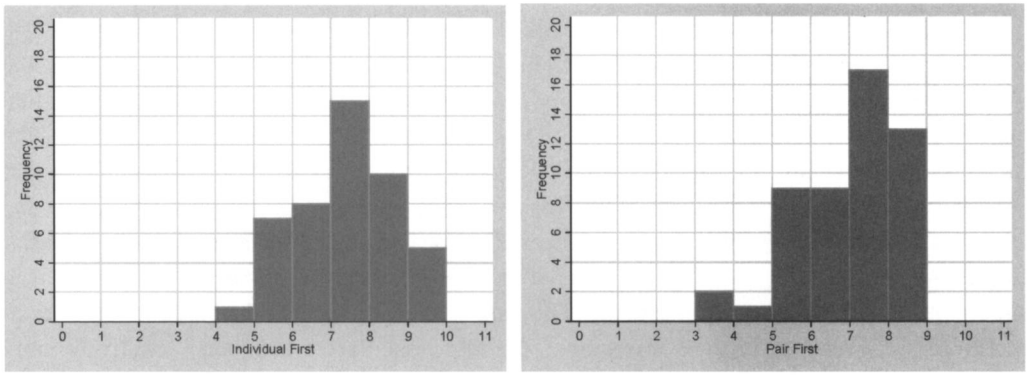


Figure 1. Histograms for Number of Safe Choices by Individuals and Pairs

$$x_p = w_p x^*_{i,p} + (1 - w_p) x^*_{-i,p}, \tag{2}$$

where $w_p \in [0,1]$ is the bargaining weight for the more risk-averse member of the pair.

The bargaining model in Equation 2 combined with Equation 1 implies that, when the individual task is completed second, the more risk-averse person's observed choice is weakly lower than his or her true choice and that the less risk-averse person's choice is weakly greater than his or her true choice. Thus, the variance of observed individual choices after the pair task should be (weakly) smaller than that of his or her true choices. This is testable and forms the basis of Hypothesis 2.

Hypothesis 2: The variance of individual choices after the pair task is weakly lower than the variance of individual choices before the pair task.

We can also compare the average of individual choices made before and after the pair task. Given that there are P dyads, the average of *all* individual choices made following the pair task is the simple average of the dyad average over the P dyads, which is $1/P \times \Sigma_p (0.5x_{i,p} + 0.5x_{-i,p})$.

However, the average over *all* individual choices made before the pair task is $1/P \times \Sigma_p (0.5x^*_{i,p} + 0.5x^*_{-i,p})$ since these individuals reveal their true preferences. To compare the two averages, first substitute Equation 2 into Equation 1. From this, the individual choice of person i is

$$\begin{aligned} x_{i,p} &= (1-\alpha_{i,p})x^*_{i,p} + \alpha_{i,p}x_p = (1-\alpha_{i,p})x^*_{i,p} + \alpha_{i,p}(w_p x^*_{i,p} + (1-w_p)x^*_{-i,p}) \\ &= (1-\alpha_{i,p}(1-w_p))x^*_{i,p} + \alpha_{i,p}(1-w_p)x^*_{-i,p}. \end{aligned}$$

Likewise, the partner's choice is

$$\begin{aligned} x_{-i,p} &= (1-\alpha_{-i,p})x^*_{-i,p} + \alpha_{-i,p}x_p = (1-\alpha_{-i,p})x^*_{-i,p} + \alpha_{-i,p}(w_p x^*_{i,p} + (1-w_p)x^*_{-i,p}) \\ &= (1-\alpha_{-i,p}w_p)x^*_{-i,p} + \alpha_{-i,p}w_p x^*_{i,p}. \end{aligned}$$

Therefore, the average of the two individual choices of a single pair made after the pair task is

$$\begin{aligned} 0.5x_{i,p} + 0.5x_{-i,p} &= 0.5[(1-\alpha_{i,p}(1-w_p))x^*_{i,p} + \alpha_{i,p}(1-w_p)x^*_{-i,p} + (1-\alpha_{-i,p}w_p)x^*_{-i,p} + \alpha_{-i,p}w_p x^*_{i,p}] \\ &= 0.5[(1-\alpha_{i,p}(1-w_p) + \alpha_{-i,p}w_p)x^*_{i,p} + (1+\alpha_{i,p}(1-w_p) - \alpha_{-i,p}w_p)x^*_{-i,p}] \\ &= (0.5 - 0.5\alpha_{i,p}(1-w_p) + 0.5\alpha_{-i,p}w_p)x^*_{i,p} + (0.5 + 0.5\alpha_{i,p}(1-w_p) - 0.5\alpha_{-i,p}w_p)x^*_{-i,p}. \end{aligned}$$

The previous line shows that the average of the individual choices after the pair task is a weighted average of their *true* choices, which in general differs from a simple average. Thus, the average of individual choices after the pair task may differ from the average of individual choices before the pair task. Specifically, the two differ if $\alpha_{-i,p}w_p - \alpha_{i,p}(1 - w_p) \neq 0$. The direction of the change depends on which person is stronger in terms of bargaining power as well as which person is relatively more sensitive to the preceding pair choice. If $\alpha_{-i,p}w_p - \alpha_{i,p}(1 - w_p) > 0$, the average of individual choices after the pair task should be higher than that of *true* choices. If $\alpha_{-i,p}w_p - \alpha_{i,p}(1 - w_p) < 0$, the average of individual choices after the pair task should be lower than that of *true* choices. This case is likely to occur if the bargaining power of the more risk-averse member is lower or if the more risk-averse member is relatively more influenced by the pair choice. In a particular case where members have the same bargaining power, the comparison depends only on which person is more influenced by the preceding pair choice.[14]

6. Empirical Results

Observed behavior is summarized in Table 3 and presented graphically in Figure 1. It appears that individuals who have already made a pair decision take more risk than those individuals making their first decision. When pair members have individual experience, the pair

[14] Our data on bargaining outcomes confirm this assumption. If we regress x_p on $x^*_{i,p}$ and $x^*_{-i,p}$ for the sample of those who performed the individual task first, then we cannot reject that the bargaining weight is equal to 0.5.

Table 3. Tests Comparing Individual and Pair Choices

	Individual Choices	
	Individual Task First	Pair Task First
No. of observations	94	105
Mean	6.968	6.543
Variance	1.636	1.544
Normal distribution test	Jarque-Bera = 0.502 (>0.50)	Jarque-Bera = 18.715 (0.03)
Skewness	0.730	0.001
Kurtosis	0.645	0.025
Equal central tendency tests	t = 1.886 (0.061)	
	z approximation for U = 1.604 (0.1087)	
Equal variance test	F = 1.122 (0.566)	
Identical distribution test	Kolmogorov–Smirnov (0.735)	
	Pair Choices	
	Individual Task First	Pair Task First
No. of observations	46	51
Mean	6.913	6.529
Variance	1.330	1.347
Normal distribution test	JB = 0.385 (>0.05)	JB = 3.976 (0.070)
Skewness	0.972	0.038
Kurtosis	0.674	0.594
Equal central tendency tests	t = 1.409 (0.162)	
	z approximation for U = 1.113 (0.266)	
Equal variance test	F = 0.976 (0.937)	
Identical distribution test	Kolmogorov–Smirnov (0.984)	

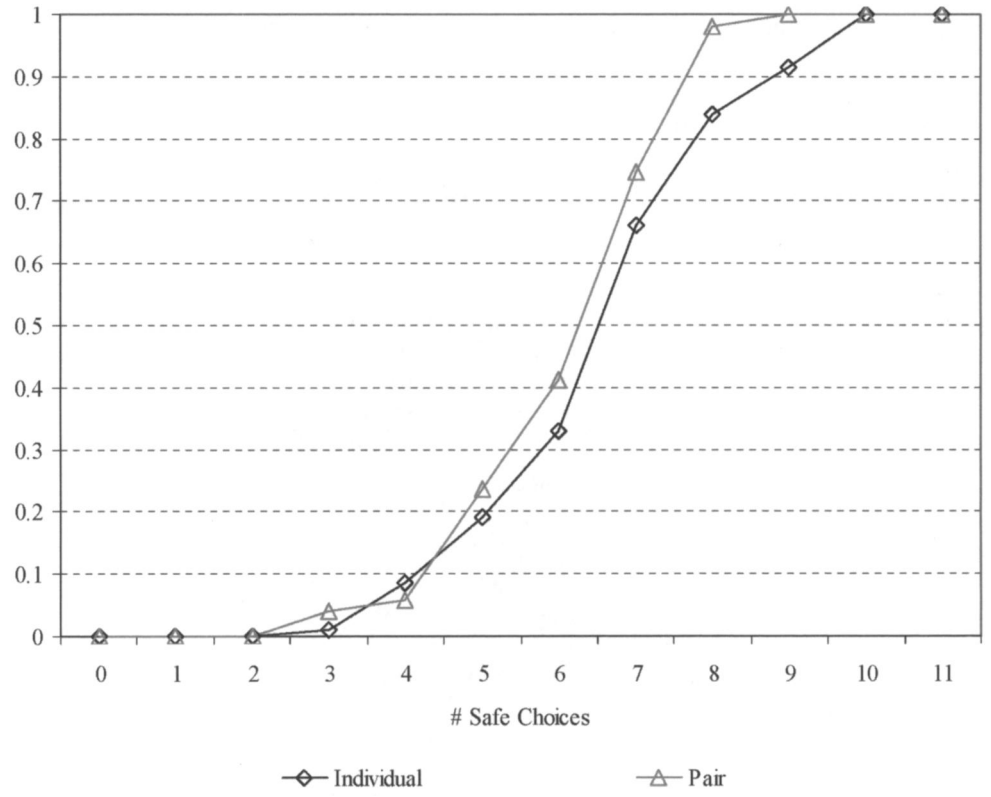
The p-value is presented in parentheses. Among those individual choices when the individual task is implemented first, one person's choice is excluded because the choice is unreasonably zero.

tends to take nominally less risk than pairs of inexperienced people. This suggests a potential ordering effect. Therefore, to compare individual and pair, we rely on the individual observations for those who did the individual task first and the pair observations for those completing the pair task first (a comparison of the top left and bottom right distributions shown in Figure 1). Figure 2 shows the cumulative density functions of the number of safe choices under these two inexperienced conditions. Figure 2 suggests that the distributions of choices are similar across the two treatments for riskier bets, but they appear to differ for safer bets, similar to the results of Shupp and Williams (2008). However, the distributions are not statistically different based on a Kolmogorov–Smirnov test, p-value of 0.505.

The following section ("Distribution Analysis and Test of Hypotheses") discusses the treatment effects in more detail and formally tests the hypotheses developed in the previous section. A separate section ("Bargaining Outcomes") treats pair decisions as the result of a bargaining process between the individuals and considers relative bargaining power. A final section ("Influence of Pair Choice on Individual Choice") examines the lasting impact that pair decisions and partner characteristics have on subsequent individual behavior.

Distribution Analysis and Test of Hypotheses

Supporting Hypothesis 1, the results indicate that the distributions of pair choices (see panel B of Figure 2) do not differ based on whether the task is completed first or second. That



Notes: N = 47 individuals who performed the individual treatment first and 27 pairs who performed the pair treatment first.

Figure 2. Cumulative Distribution Function for Selecting Risky Option by Individuals and Pairs

is, none of the four statistical tests reported in the bottom panel of Table 3 can reject the null hypotheses of there being no difference between the samples. Thus, as expected, there is no evidence of an ordering effect for the pair task.[15]

We do not find support for Hypothesis 2 that individual choices made after the pair task are less dispersed. The *F*-test of equal variances cannot be rejected, as reported in the top panel of Table 3. The result of the Kolmogorov–Smirnov test for identical individual choice distributions yields a similar conclusion (p-value = 0.984).

From panel A of Figure 1, it appears that subjects who completed the individual task first (left graph) make more safe choices as individuals than those who performed the pair task first (right graph). This result is weakly supported statistically in Table 3, where the *t*-test for equal

[15] One possible explanation for an ordering effect could be learning, and it is possible that learning differs from an individual and a pair task. While learning may occur between the first and the second task, the results of testing Hypotheses 1 and 3 provide some evidence that behavior is not being driven by a simple learning effect. For the results to hold, one would have to argue that no learning occurs from completing the individual task (Hypothesis 1 result) and that people systematically overstate their degree of risk aversion without learning. However, it is possible that some more complicated learning story explains the order effect that we observe.

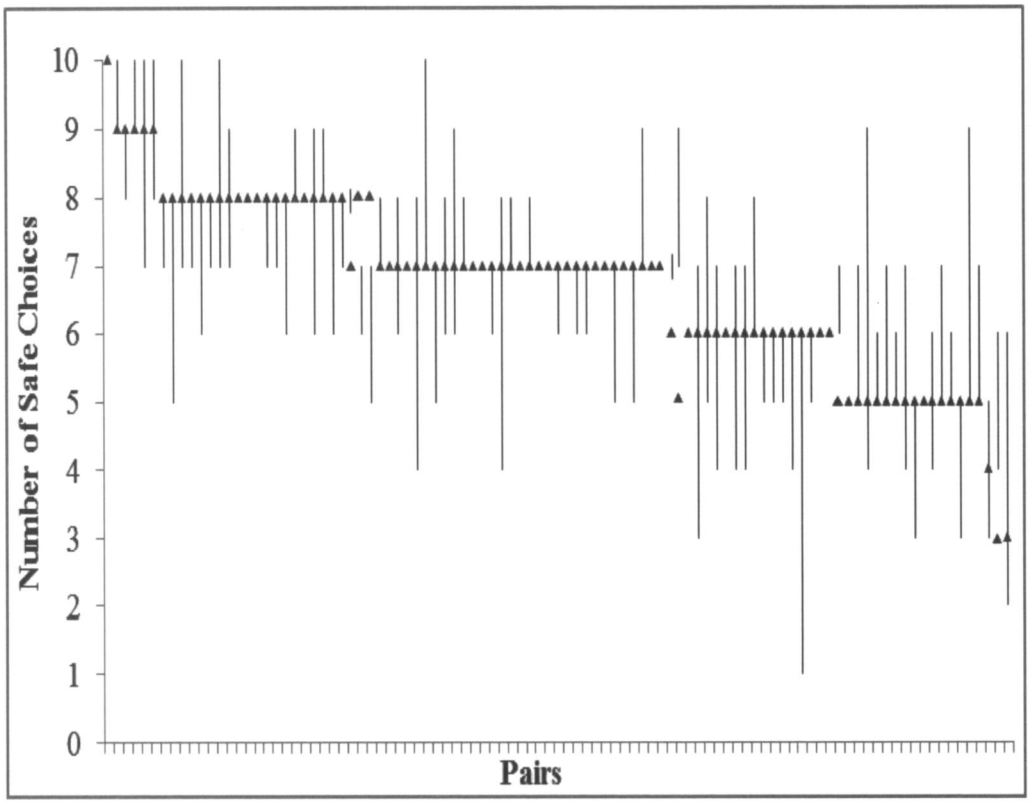


Figure 3. Pair Choices and the Range of Individual Choices

mean has a p-value of 0.061 and the Mann–Whitney test has a p-value of 0.109. These results suggest that the treatment order affects behavior.

Bargaining Outcomes

We first present graphical evidence in Figure 3 that pair outcomes are the result of bargaining. The solid markers in Figure 3 indicate the number of safe choices selected by the pair, while the top (bottom) of the solid vertical lines indicate the number of safe choices selected by the less (more) risk-averse individual in the pair. For 92.8% of the pairings, the pair choice falls weakly inside the range defined by the individual choices (i.e., only seven of the markers in Figure 3 lie off the vertical lines). Thus, we find little evidence that dyads make choices more extreme in either direction than both individuals in the pair, consistent with pair decision being the result of a bargaining process.

Given the potential ordering effect discussed in the previous section, we focus on those subjects who performed the individual task first since their individual choices should represent their true risk aversion ($x_{i,p} = x^*_{i,p}$). Let us continue to assume that individual i is the more risk-averse member of the pair. Under the hypothesis that people bargain in the pair task, $x_{-i,p} \leq x_p \leq x_{i,p}$. We define the pair-specific Nash bargaining weight as the following:

$$w_p = \frac{x_p - x_{-i,p}}{x_{i,p} - x_{-i,p}} = \frac{x_p - x^*_{-i,p}}{x^*_{i,p} - x^*_{-i,p}}, \tag{3}$$

where $w_p = 1$ indicates that the more risk-averse person gets his or her preferred outcome and $w_p = 0$ indicates that the more risk-loving person gets his or her preferred outcome. We use this relative weight variable as the dependent variable in a regression that controls for various individual characteristics with the objective of identifying which characteristics determine the bargaining weight of the more risk-averse person. In the spirit of the literature on collective bargaining models (Browning et al., 1994), we assume that intersubject *differences* in individual characteristics, such as extraversion and agreeableness, determine the bargaining weight. Formally, we use the following regression:

$$w_p = \beta_0 + \beta_1 \Delta Age + \beta_2 \Delta Personality + \beta_3 \Delta Conversation + \beta_4 GenderComposition + u_p, \quad (4)$$

where u_p is the random component of the bargaining weight, ΔAge is the age difference between the more and less risk-averse individuals ($Age_i - Age_{-i}$), $\Delta Personality$ represents a vector of the differences in Big Five personality measures, $\Delta Conversation$ is the difference in the measure of conversational leadership constructed from the video recordings, and *GenderComposition* is a vector of dummy variables that controls for the gender composition of the pair. Specifically, we include the following dummies: male, male partner, and both male. The reference group is a female with a female partner.

The sample we used for this analysis includes 34 pairs who performed the pair task second and made different individual choices.[16] The regression results are presented in Table 4. Columns 1 and 2 of Table 4 use different specifications, with column 2 including personality characteristics. First, we note that the constant terms are similar to 0.5, suggesting that two people in the reference group (both women) and who are similar in age and other characteristics will have equal bargaining power and essentially agree on an outcome that is halfway between their individual preferences. We find that two variables, age difference and both male, are significant for the case where the personality measures are omitted from the regression analysis, suggesting that these two factors influence bargaining power. However, only the age difference remains significant when controls for personality are included. The negative coefficient for age difference indicates that the greater the age gap, the lower the bargaining weight of the older person. That is, the pair's decision will be more similar to the preference of the younger person than to that of the older person. The negative sign and the statistical significance of the gender composition variable for both people being male indicates a peer pressure effect between males such that the more risk-averse person is given less bargaining power. That is, when two males are making a decision, their choice will be more similar to the more risk-loving individual than to the more risk-averse individual.

None of the Big Five personality traits demonstrated statistically significant effects, when these are all included in the regression (see column 2 of Table 4). We also tried alternative specifications in which only one of the personality traits is included in the regression, but none resulted in statistically significant results. Thus, there was no evidence that personality impacts bargaining power. Similarly, none of the variables from the audio-video recordings were significant when included separately. That is, the number of justifications, conversational leadership, physical superiority, and social activity do not significantly impact bargaining power. Because none of these variables are significant and including them does not

[16] Nine pairs were dropped because both people in the pair made the same individual choice. When the two individuals have the same preferences, there is no bargaining, and the dependent variable is infinite. Three additional pairs were dropped because the pair choice lay outside the range defined by the individual choices.

Table 4. Determinants for High Risk-Aversion Person's Bargaining Weight

			Placebo	Placebo
	(1)	(2)	(3)	(4)
ΔAge	−0.083**	−0.083**	0.013	0.018
	(0.023)	(0.029)	(0.013)	(0.015)
Male	0.240	0.236	−0.047	−0.107
	(0.167)	(0.221)	(0.270)	(0.312)
Male partner	0.096	0.033	−0.142	−0.174
	(0.205)	(0.208)	(0.240)	(0.244)
Both male	−0.486*	−0.442	0.245	0.142
	(0.226)	(0.271)	(0.340)	(0.415)
ΔAgreeableness		0.115		−0.203*
		(0.098)		(0.075)
ΔExtraversion		0.023		0.029
		(0.051)		(0.117)
ΔConscientiousness		0.039		0.012
		(0.112)		(0.145)
ΔOpenness		−0.111		−0.225
		(0.088)		(0.148)
ΔNeuroticism		−0.018		−0.031
		(0.074)		(0.143)
Constant	0.500**	0.512**	0.639**	0.701**
	(0.143)	(0.161)	(0.173)	(0.144)
Observations	34	34	32	32
Adjusted R^2	0.317	0.279	−0.100	−0.010
Joint significance of	$F = 15.68$	$F = 7.14$	$F = 0.67$	$F = 1.61$
all variables	(< 0.001)	(< 0.001)	(0.618)	(0.173)

The dependent variable is w_p except in columns 3, and 4 where it is $\tilde{w}_p$, which is defined in Equation 4. The linear equation is estimated by ordinary least squares. Tobit results are qualitatively the same. The sample for columns 1–2 includes 34 pairs who performed the individual task first. Columns 3 and 4 present placebo test results where the sample includes 32 pairs who performed the pair task first. Robust standard errors are reported in parentheses. Asterisks (** and *) denote statistical significance at the 1% and 5% levels, respectively.

substantially change other estimated coefficients, these results are omitted from Table 4 for brevity.

The last two columns of Table 4 test for the validity of our bargaining model using a placebo test. Here we use only dyads that performed the pair task first. For these pairs, the bargaining weights created on the basis of observed individual choices should be tainted with the ordering effect, as shown in Equation 1 and tested in the following section. For those dyads who performed the pair task first, the bargaining weight is

$$\tilde{w}_p = \frac{x_p - x_{-i,p}}{x_{i,p} - x_{-i,p}} = \frac{(1-\alpha_{i,p})x_p - (1-\alpha_{-i,p})x^*_{-i,p}}{(1-\alpha_{i,p})x^*_{i,p} - (1-\alpha_{-i,p})x^*_{-i,p} + (\alpha_{i,p} - \alpha_{-i,p})} \neq \frac{x_p - x^*_{-i,p}}{x^*_{i,p} - x^*_{-i,p}}. \quad (5)$$

This fictitious bargaining weight is constructed on the basis of individual choices that are influenced by the preceding pair choice (and not the true individual preference). The last inequality means that the pseudo–bargaining weight should deviate from the true bargaining weight unless $\alpha_{i,p} = \alpha_{-i,p}$.[17] The results (see columns 3 and 4 of Table 4) show that all the variables

[17] In fact, $\alpha_{i,p}$ and $\alpha_{-i,p}$ are likely to be negatively correlated because the group choice is made by bargaining where it is likely that one person wins and the other person loses.

included in the analysis lack explanatory power, except agreeableness. The most important result here is the fact that the joint significance of all variables is always rejected for the placebo (columns 3 and 4), but it is not for the correctly specified bargaining model (columns 1 and 2).

Influence of Pair Choice on Individual Choice

In this section, we explore how the preceding pair choice influences the subsequent individual choice. First, we examine what affects the likelihood that a person will deviate from the dyad choice when making a subsequent individual choice. For this purpose, we construct a dummy variable (i.e., *Follow*) that takes the value of one if the individual choice coincides with the group choice and zero otherwise. We used this to estimate the following Probit regression:

$$Follow_{i,p} = F(\gamma_1 + \gamma_2 x_p + \gamma_3 Age_{i,p} + \gamma_4 Age_{i,p}^2 + \gamma_5 Personality_{i,p} + \gamma_6 GenderComposition_p), \quad (6)$$

where F is the standard normal cumulative distribution function and, as before, x_p denotes the decision of individual i's pair. The pair choice is included in order to control for initial conditions for each individual.[18]

Table 5 presents the results for the regression analysis based on Equation 6 using the data for the individual choices of those subjects who went through the pair task first.[19] We find strong statistical evidence that agreeable individuals are more likely to deviate from the pair choice. This result is intuitive because agreeable individuals would presumably be more willing to sacrifice their individual preferences (i.e., acquiesce) when participating in the pair task. No other control variables are significant in the regression.

To further investigate whether the pair choice influences the individual choices when the pair task precedes the individual task, we ideally want to estimate Equation 1. However, this is not possible because we do not observe the true choice. Thus, instead, we estimate the following reduced-form equation:

$$x_{i,p} = \delta_0 + \delta_1 x_p + \delta_2 X_{i,p} + \delta_3 X_{-i,p} + v_{i,p}. \quad (7)$$

In Equation 1, the individual choice depends on the predetermined pair choice (x_p), one's true choice, and $\alpha_{i,p}$ This last parameter is likely to depend on an individual's own characteristics as well of those of his or her partner.[20] Therefore, $X_{i,p}$ is the vector of individual i's characteristics, including demographic characteristics, conversational leadership, and Big Five personality traits. $X_{-i,p}$ is a similar vector of partner characteristics.[21] Finally, $v_{i,p}$ is an error term.

Equation 7 is useful for testing if the pair choice influences the subsequent individual choice. In terms of Equation 1, we want to test if $\alpha_{i,p} = 0$. Suppose that the individual choice is

[18] Because of the structure of the task, there is an upper bound on the number of safe choices. The bargaining framework creates a lower bound on the number of safe choices for the more risk-averse person. Therefore, the more risk-averse individual has less room to deviate from the pair choice the more safe choices the pair made. The same effect would restrict the more risk-loving person's ability to deviate from the pair if the pair made few safe choices, suggesting that x_p should enter Equation 6 nonlinearly; however, none of our pair observations is close to the lower boundary.

[19] One of the 105 observations was lost because the partner's gender was missing.

[20] One might include interaction terms between the pair choice and individual characteristics because the pair choice and the pair choice influence factor are included in Equation 1 in the multiplicative form. Even if we include all possible interaction terms, the results remain qualitatively the same.

[21] Unlike the estimation in Table 2, which relies on difference in personality characteristics to determine group outcome, the estimation in Table 4 requires each individual personality scores to determine the influence of one's partner controlling for one's own personality.

Table 5. Probit Regression for Likelihood Individual Follows Pair Choice

	(1)
	Probit
Pair Choice	0.139*
	(0.041)
Age	−0.001
	(0.123)
Age squared	0.000
	(0.002)
Agreeableness	−0.251*
	(0.097)
Extraversion	0.042
	(0.086)
Conscientiousness	0.152
	(0.103)
Openness	−0.156
	(0.134)
Neuroticism	0.018
	(0.070)
Male	0.198
	(0.210)
Male partner	0.189
	(0.220)
Both male	−0.121
	(0.238)
Observations	104
Pseudo-R^2	0.164

Robust standard errors reported in parentheses. Marginal effects evaluated at sample means are presented. Asterisk (*) denotes statistical significance at the 5% level.

not affected by the pair choice. In this case, the individual choice should be the true choice regardless of the treatment ordering. Since the true choice is based on one's own risk preference, the partner's characteristics should not affect the individual choice.[22] If individual choices are not impacted by partner characteristics, the estimates of the $\delta_3 s$ should be jointly insignificant.

We estimate Equation 7 by ordinary least squares. Robust standard errors are adjusted for clustering by pairs. We also estimate the equation after including pair fixed effects. In this case, we assume that $v_{i,p} = a_p + \varepsilon_{i,p}$, where a_p represents the pair-specific effects and $\varepsilon_{i,p}$ is the error term. The regression sample includes 102 subjects because three observations are lost because of missing data for the partner's birth year. Table 6 presents the regression results. There are four columns that employ different specifications and different samples. In column 1, we include only the subject's own demographic and personality characteristics. In column 2, we add the dyad choice. Column 3 includes partner characteristics as well as the measure of conversational leadership observed from video recording. In the last column, we implement a specification test that is based on a similar idea to the placebo test in Table 4, namely, applying the same estimation to those who did the tasks in the opposite order.

[22] It is still likely that the pair choice might be significant when we estimate Equation 7. This is because the pair choice also reflects the true choice.

Table 6. Impacts of Pair Choice on Subsequent Individual Choice

				Placebo
	(1)	(2)	(3)	(4)
Own characteristics				
Gender (male = 1)	−0.033	0.165	0.017	0.233
	(0.387)	(0.248)	(0.258)	(0.376)
Age	−0.091	−0.085	−0.085	0.611
	(0.331)	(0.272)	(0.234)	(0.399)
Age squared	0.001	0.002	0.002	−0.012
	(0.006)	(0.006)	(0.005)	(0.007)
Agreeableness	0.337	0.234	0.138	0.757
	(0.328)	(0.223)	(0.238)	(0.465)
Extraversion	0.087	−0.042	−0.041	−0.339
	(0.228)	(0.197)	(0.244)	(0.339)
Conscientiousness	0.681*	0.619**	0.596**	−0.381
	(0.359)	(0.246)	(0.224)	(0.416)
Openness	−0.438	−0.455*	−0.540	−0.069
	(0.312)	(0.255)	(0.327)	(0.327)
Neuroticism	0.213	0.263*	0.135	−0.140
	(0.207)	(0.134)	(0.155)	(0.245)
Pair choice		0.805***	0.735***	0.612***
		(0.067)	(0.088)	(0.144)
Justifications (video)			0.208	0.436
			(0.205)	(0.261)
Conversational leadership (video)			−0.165	0.200
			(0.217)	(0.208)
Physical superiority (video)			−0.134	−0.394
			(0.454)	(0.316)
Social activity (video)			−0.650***	−0.481
			(0.242)	(1.508)
Partner's characteristics				
Gender (male = 1)			−0.053	0.231
			(0.268)	(0.382)
Age			0.050	0.059
			(0.233)	(0.420)
Age squared			−0.002	−0.002
			(0.004)	(0.008)
Agreeableness			−0.064	−0.157
			(0.263)	(0.545)
Extraversion			0.359*	−0.260
			(0.188)	(0.362)
Conscientiousness			0.311	−0.596
			(0.245)	(0.470)
Openness			−0.167	0.422
			(0.253)	(0.419)
Neuroticism			0.153	−0.412
			(0.153)	(0.251)
Justifications (video)			−0.123	−0.373
			(0.200)	(0.272)
Conversational leadership (video)			−0.027	0.138
			(0.243)	(0.218)

Table 6. Continued

				Placebo
	(1)	(2)	(3)	(4)
Physical superiority (video)			−0.363	−0.372
			(0.494)	(0.235)
Social activity (video)			0.106	−0.086
			(0.382)	(1.573)
Constant	5.371	0.155	0.211	−2.158
	(4.496)	(3.826)	(4.809)	(4.940)
Observations	102	102	102	93
Adjusted R^2	0.016	0.502	0.482	0.201
Joint significance of partner's characteristics			$F = 1.89$ (0.059)	$F = 0.97$ (0.489)

In columns 1–3, the sample includes 102 individuals who performed the pair task first. In column 4, the sample includes 93 individuals who performed the individual task first. Robust standard errors, adjusted for clustering by pairs, are reported in parentheses. Asterisks (***, **, and *) denote statistical significance at the 1%, 5%, and 10% levels, respectively.

For the purpose of this section, the main result is the joint significance of the partner's characteristics in column 3. It turns out that the variables are jointly weakly significant (p-value = 0.059). In particular, the findings suggest that the partner's personality matters. The partner's extraversion is significant for one's individual choice after the dyad choice. These results provide evidence that the preceding pair choice influences subsequent individual choice.

The findings regarding partner characteristics do not hold in the last column, where we use data from those individuals who performed the individual task before the pair task.[23] For these people, the dyad choice should not influence the individual choice in the way implied by Equation 1. On the contrary, the pair choice is the consequence of a bargaining process that is governed by the bargaining weight. That is, $x_p = w_p x^*_{i,p} + (1 - w_p)x^*_{-i,p}$. Since the dependent variable in column 4 is one's true choice ($x^*_{i,p}$), the results that are statistically significant should originate from the reverse of the bargaining model; that is,

$$x^*_{i,p} = \frac{1}{w_p} x_p - \frac{w_p}{1-w_p} x^*_{-i,p}. \tag{8}$$

Indeed, the results in column 4 show that the pair choice is significant. On the other hand, most of the other explanatory variables are insignificant. This is, however, not surprising because the equation is (intentionally) misspecified. In particular, the partner's characteristics are jointly insignificant (p-value = 0.489). By construction, the specification has little explanatory power; the adjusted R^2 of 0.201 is low compared to 0.482 for the comparable specification in column 3.

Some other findings in Table 6 are worth noting. First, we find that it is difficult to explain one's individual choice after the pair choice by one's own characteristics alone. In column 1, all characteristics except conscientiousness are insignificant. Second, in column 3, it is difficult to interpret why a certain personality trait has a positive or a negative effect. This is because our estimation equation is not a structural equation that identifies determinants for one's choice. For instance, we find that one's conscientiousness has a significant effect on the individual

[23] The regression analysis in column 4 of Table 5 is based on 93 individuals since one observation is lost because of missing data for the partner's age.

choice. However, we do not know if that personality matters because it affects one's psychological tendency to follow the preceding pair choice or because it affects one's bargaining power. It is also possible that personality directly affects the degree of one's risk aversion, as psychologists have described personality traits as reflecting fundamental dispositions that influence broad and specific attitudes, perceptions, and behavior (Barrick and Mount 1991; Johnson, Rosen, and Djurdjevic 2011).

Finally, we find that, although it is again difficult to interpret the direction of the effect, non–task-related social activity while bargaining does affect subsequent individual choice. Somewhat surprisingly, the arguments made by one's partners do not have any lasting effect on the individual choice, nor do any of the other variables from the audio-video recordings.

7. Conclusions

Many risky decisions are undertaken by pairs, but relatively few studies have systematically looked at jointly made choices. Studies that have considered pairs or small groups have been focused primarily on determining if group choices differ from individual choices. The results have been mixed in terms of risk tolerance and seem to suggest that the decision structure (negotiation, voting, and so on) may matter. Our research focuses on negotiation and goes a step further by considering how an individual's demographic and personality characteristics affect bargaining weight and the willingness of an individual to deviate from the group.

We use the common risk attitude elicitation tool of Holt and Laury (2002) with prizes ranging from \$0.50 to \$19.25 to directly compare the risk-taking behavior of individuals and dyads. Our subjects completed the task twice, once individually and once in a pair (video and audio recorded) with the ordering determined randomly. We find no difference in the number of safe choices made by individuals and pairs when considering only subjects' initial task, which constitutes a between-subjects comparison. However, we find some evidence suggesting an ordering effect. The behavior of pairs does not depend on the task order, but subjects who had previously made decisions in a pair took on more risk individually than those making an individual choice first.

In only a few cases did the pair make a choice more extreme than the individual choices of the members. Instead, pair behavior appears to be consistent with a more traditional economic approach where the pair decision is the result of a bargaining process between the members. We find evidence that an individual's bargaining weight is dependent on relative age and dyad gender composition. The relatively older the more risk-averse person is, the less bargaining power the person will have, suggesting that the younger person drives risk-taking behavior. The more risk-averse person has less power in all male pairs, indicating evidence of a peer pressure effect between males and leading to more risk-taking behavior. We find no evidence to suggest that relative personality differences, as captured by the Big Five, have an effect on the bargaining process. Of course, this lack of significance may be due to our sample size, which is relatively large for a lab study on risk taking, but is small in comparison to the large-scale individual experiments, field studies, and meta-analyses that are often used to assess personality. We also find no evidence that conversational leadership or physical superiority,

as measured from the audio and video recordings of the pair task, has any significant impact on bargaining power.

We do find that individual behavior is influenced by a preceding dyad decision and the personality characteristics of one's partner. One's partner's extraversion significantly impacts one's own subsequent individual choice. We also find that more agreeable people are less likely to simply follow the pair choice when making a subsequent individual choice. These results are interesting in that they suggest that risk-taking behavior can be influenced by factors not typically considered germane to the task. Thus, this article adds to a growing literature on how personality affects economic decision making. More broadly, our results demonstrate the need to consider not only "individual" versus "group" behavioral outcomes but also within-group dynamics and how group member personalities affect economic choices.

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