Journal of Economic Behavior & Organization 83 (2012) 50–58

Contents lists available at ScienceDirect

Journal of Economic Behavior & Organization

journal homepage: www.elsevier.com/locate/jebo

Strong Evidence for Gender Differences in Risk Taking

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ARTICLE INFO

Available online 12 July 2011

JEL classification:
B49
C91
D81
G11
G19
J16

Keywords:
Gender differences
Experiment
Risk attitudes

ABSTRACT

Are men more willing to take financial risks than women? The answer to this question has immediate relevance for many economic issues. We assemble the data from 15 sets of experiments with one simple underlying investment game. Most of these experiments were not designed to investigate gender differences and were conducted by different researchers in different countries, with different instructions, durations, payments, subject pools, etc. The fact that all data come from the same basic investment game allows us to test the robustness of the findings. We find a very consistent result that women invest less, and thus appear to be more financially risk averse than men.

1. Introduction

Many economic interactions involve some form of risk. Thus, it is not surprising that a substantial body of research in social science has tried to understand how decision makers incorporate risk in their choices. Expected utility, the dominant theory of decision under risk, makes some testable empirical predictions. However, under expected utility the actual level of risk-taking behavior by the agent is left as a free parameter, allowing for individual differences. This is also true for more behaviorally driven theories, such as prospect theory.

In this article we study one important systematic difference in risk taking between groups. In particular, we study the interaction of risk-taking with the gender of the decision maker. The common stereotype is that women are more risk averse than men; this stereotype is important since it can potentially explain important economic phenomena.[1] Empirical investigation of gender differences in risk taking do point in the direction of less risk taking by women than by men (see the surveys in Eckel and Grossman, 2008 and Croson and Gneezy, 2009).

A major problem with the empirical investigation of individual differences in risk taking is the variation in the methods used to study the phenomenon. Considering only the experimental work (done mostly by psychologists), each experiment

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[1] Some might argue that this difference across gender seems grounded in evolutionary psychology, given our role-differentiated hunter-gatherer roots (for a background to the evolutionary psychology literature, see for example, Tooby and Cosmides, 1990, 1992; Cosmides et al., 1992). However, it is not completely clear how the hunter-gatherer origins map into contemporary financial behavior. Connecting competitive behavior with risk taking, Dekel and Scotchmer (1999) developed an evolutionary model of preference-formation, to investigate to what extent evolution leads to risk-taking in winner-take-all environments (like reproduction). They show that winner-take-all games are related to the survival of risk-takers and the extinction of risk-averters. Since in many species a winner-take-all game determines the males' right to reproduce, the argument suggests that males will evolve to be risk-takers.

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doi:10.1016/j.jebo.2011.06.007

uses a different decision problem, which makes it hard to compare results. In addition, some of these articles found gender differences without looking for them and others were specifically designed to test for these differences. The problem with the former approach is that these articles report the results of one experiment, and we do not know how many experiments have looked for a difference and did not find one. We are left with a selection bias of articles with a positive finding. The problem with the latter approach is that when the goal is to find (or not to find) a gender difference, the design of the experiment may be based on a small set of incidents in which the researchers expect to find the results they are after; here again, finding no difference can lead to the researcher shelving the project. It is easier to publish an article that reports a gender difference in risk taking than a study that reports no difference. For example, when a study finds that women are more risk taking than men ("man bites dog"), this study has a much higher chance of being published than a study that finds no difference in risk taking. This bias in publication also creates incentives for researchers to design studies that will generate such a difference.

The novelty of our article is in using existing empirical results that were collected in a systematic way using thousands of observations by different researchers in a variety of setups, but based on one simple investment game. Most of the data were collected not in order to study gender differences but rather to study other hypotheses regarding investment behavior, and they vary with respect to the subject pools, country, age, different incentives and probabilities, repeated versus one-shot interaction, laboratory versus Internet, known probabilities versus uncertainty, and framing. Moreover, since the original data were not collected in order to facilitate comparisons, there was no effort made by the researchers to have a uniform design (e.g., use the same instructions). This variety allows us to test the robustness of the hypothesis.

The data are based on an investment decision that was introduced by Gneezy and Potters (1997). In this choice, the decision maker receives $\$X$ and is asked to choose how much of it, $\$x$, she wishes to invest in a risky option and how much to keep. The amount invested yields a dividend of $\$kx$ ($k > 1$) with probability p and is lost with probability $1 - p$. The money not invested $\$(X - x)$ is kept by the investor. The payoffs are then $\$(X - x + kx)$ with probability p, and $\$(X - x)$ with $1 - p$. In all cases, p and k are chosen so that $p \times k > 1$, making the expected value of investing higher that the expected value of not investing; thus, a risk-neutral (or risk-seeking) person should invest $\$X$, while a risk-averse person may invest less. The choice of x is the only decision the participants make in the experiment. We report data from all studies (of which we are aware) using this method for testing risk aversion.

The striking and consistent result is that despite the large environmental differences among the sets of experiments, a consistent gender difference is reported: Men choose a higher x than women do.

2. Data

2.1. Dreber et al. (2010)

This study was conducted in the field, with highly skilled people who consider probabilities and risk quite frequently: tournament bridge players; the financial stakes were also rather large. Participants at the Fall 2008 North American Bridge Championship in Boston were recruited for the study. "Almost all of the participants were serious tournament bridge players who play many dozens of session per year." The primary focus of the study was with how risk-taking behavior correlates with different versions of a dopamine receptor gene. A prior study was concerned with risk taking by these individuals in their bridge decisions; this study examines financial risk-taking. The results are interesting – even though there were no significant gender differences in risk-taking in tournament-bridge decisions (which are not financial in nature), there was a very large gender difference in financial risk-taking.

2.1.1. Design

Participants at the national bridge tournament first completed an incentivized bridge quiz, and then took part in the investment task. Each of 186 participants was endowed with \$250, from which they could choose to invest as much as they wished in the risky asset. If successful, this asset paid 2.5 times the amount invested (i.e., $k = 2.5$); the chance of success was $p = 1/2$. Each participant kept whatever amount he or she chose not to invest.

2.1.2. Results

The aggregate amounts invested by males and females are highly different. On average, 105 males invested 198.8 (standard deviation = 79.7), or 79.5% of the endowment. In contrast, 81 females invested only 120.1 (standard deviation = 88.8), or 48.0% of the endowment. The difference in investment rates is strongly significant; the Wilcoxon ranksum test gives $Z = 5.91$ ($p = 0.000$), while a t-test gives $t = 6.35$ ($p = 0.000$). This simple risk-elicitation mechanism provides strong evidence that, in the field, females are substantially more financially risk-averse than males.

2.2. Dreber and Hoffman (2007)

This study considered the relationship between financial risk-taking and the ratio between the length of the 2nd (index) finger and the 4th (ring) finger; this is a biological measure thought to positively correlate with prenatal estrogen and negatively correlate with prenatal testosterone (see Coates et al., 2009, for other evidence on the digit ratio and financial risk-taking). In fact, such a relationship was found, with a strong correlation between the digit ration and the level of investment in the risky asset. These results suggest that prenatal hormones influence risk preferences more than 20 years later. The measure of financial risk-taking was the investment decision we have been discussing.

2.2.1. Design

Each of 146 students (92 males and 54 females) at the Stockholm School of Economics was endowed with 1700 SEK (about $250), from which he or she could choose to invest as much as they wished in the risky asset. If successful, this asset paid 2.5 times the amount invested (i.e., $k = 2.5$); the chance of success was $p = 1/2$. Each participant kept whatever amount he or she chose not to invest.

2.2.2. Results

Overall, the average investment was 1049 SEK (61.7%), with a standard error of 42.2. Males invested 1170 SEK (68.8%), with a standard error of 54.1; females invested 843 (49.6%), with a standard error of 57.8. The 19 percentage-point difference is highly significant, with a test-statistic on investment levels of $Z = 3.77$ (ranksum test) or $t = 3.79$ (t-test); both of these tests give significance at $p = 0.000$. Thus, females are seen to be definitely more risk-averse than males in this study.

2.3. Charness and Gneezy (2010)

In Charness and Gneezy (2010) we consider whether psychological biases such as ambiguity aversion and the illusion of control affect the rate of investment in a risky asset.

2.3.1. Design

Data were collected from 2 large classes at UCSB, in which each student who was willing to participate (in fact all students) was randomly assigned to one of our treatments. A total of 200 people participated, 136 males and 64 females. Eight separate sets of instructions (4 ambiguity-aversion conditions and four illusion-of-control conditions) were passed out, with each person randomly assigned one of these. Each participant was endowed with 100 units, which could be kept or invested in a risky asset. If successful, this asset paid 2.5 times the amount invested (i.e., $k = 2.5$); the chance of success was $p = 1/2$.

In the first ambiguity condition, participants were told that there was one container with 50 red balls and 50 black balls and another container with an unknown composition of 100 red or black balls. People then chose how much to invest, the 'success' color that would pay if drawn, and the container from which to draw the ball. In the second (third) condition, only the container with the known (unknown) distribution was mentioned, and people chose how much to invest and the success color. In the final condition, the participant faced the same choice of the 2 containers as in the first condition, but was required to pay 5 units (out of the 100 endowment) if she or he wished to draw from the container with the known distribution.

In the first illusion condition, participants were told that a 6-sided die would be rolled to determine success. Each person then chose how much to invest, 3 'success' numbers that would pay if rolled, and who would roll the die (the experimenter or the investor). In the second (third) condition, only the investor (experimenter) could roll the die. In the final condition, the participant chose as in the first condition, but was required to pay 5 units (out of the 100 endowment) if she or he wished to personally roll the die.

One of every 10 participants was (randomly) chosen to actually receive payment, at the rate of $0.25 for every unit. Each person who was selected then met individually with the experimenter and was paid privately after the realization of the risky asset.

2.3.2. Results

Once again, we see a strong difference in investment behavior across gender. In all 8 independent comparisons in Table 1, males invested more than females. Again, we can apply the binomial test, comparing the average investment for males and females in each of the eight conditions. The likelihood that either gender would invest more than the other in all eight

Table 1
Investment with ambiguity aversion and illusion of control.

Treatment	Avg. male investment (N)	Avg. female investment (N)
Illusion – free choice	76.11 (18)	57.22 (9)
Illusion – investor rolls	79.69 (16)	49.29 (7)
Illusion – experimenter rolls	71.20 (20)	69.83 (6)
Illusion – costly choice	83.21 (14)	58.33 (9)
All illusion choices	76.97 (68)	58.19 (31)
Ambiguity –free choice	75.26 (19)	61.43 (7)
Ambiguity – known only	64.69 (16)	62.75 (8)
Ambiguity – unknown only	70.81 (16)	67.50 (10)
Ambiguity – costly choice	82.22 (18)	55.63 (8)
All ambiguity choices	74.68 (68)	62.18 (33)
All choices	75.82 (136)	60.25 (64)

treatments is $p = 0.008$, indicating a significant difference.[2] The overall average male investment in the ambiguity (illusion) treatments was 32% (26%) higher than the average female investment.

2.4. Charness and Gneezy (2004)

In Charness and Gneezy (2004) we consider whether framing differences affect the choice of investment in a risky asset. To the extent that we find a framing effect, we examine whether this effect is stronger for men or for women. Some experiments do not find gender differences in differently framed gambles. For example, in Eckel and Grossman (2002) participants chose among gambles that differed in expected return and variance, and were presented either as a loss or as no-loss. Eckel and Grossman found that women are more risk averse across all frames. Another example is presented in Eckel and Grossman (in press), who studied gamble and investment frames with the possibility of losses, and a gamble frame with no losses. Again, women were more risk averse than men in all three framings (see also Powell and Ansic, 1997).

On the other hand, several studies do find gender differences by frame. In an abstract lottery choice, Schubert et al. (1999) frame choices as either potential gains or as potential losses. They find that women were more risk averse than men in the gain-domain frame, consistent with the evidence presented earlier. For the loss-domain gambles, however, this result is reversed: men are more risk averse than women. In contextual environment gambles (e.g., investment and insurance), Schubert et al. (2000) subjects exhibited no evidence of systematic gender differences in risk attitudes.

2.4.1. Design

We conducted experiments at both The University of Chicago and UCSB. Participants at UCSB were recruited by sending out an e-mail message to a list of people who had signed up to be contacted about experiments. These people were drawn from the general student population. The Chicago participants were recruited using campus ads. People came to the lab individually; the instructions were presented and the experimenter answered any questions.

Each person then made an investment choice for the first period and observed the results of the roll of an 8-sided die; this continued for 10 periods. In each period, each participant was endowed with 100 units, which could be kept or invested in a risky asset. If successful, this asset paid six times the amount invested (i.e., $k = 6$); the chance of success was $p = 1/4$. We paid each person $1 for every 100 units they had aggregated over the course of the 10 periods. Each individual session lasted 10–15 min.

There were 2 separate treatments, differing only in some phrasing in the instructions, which are shown in Appendix. A total of 94 people participated, 48 in the Natural condition (22 males and 26 females) and 46 in the Frame condition (21 males and 25 females).[3] In the Natural condition, the second sentence of the instructions read that "In each period you will receive 100 points", while in the Frame condition this read "In each period you will receive 100 points to invest in a risky asset". Two sentences followed immediately in the Natural condition, mentioning that the participant could choose which portion of the 100 points to invest and that the points not invested would accumulate in the total balance; in the Frame condition, these 2 sentences came after 2 intervening paragraphs.

2.4.2. Results

The results are shown in Figs. 1 and 2, and are summarized in Table 2.

First, we see that investment rates differ considerably across treatments – the average investment is 73.77 in the Frame condition, compared to 42.54 in the Natural condition. A Wilcoxon–Mann–Whitney ranksum test (see Siegel and Castellan, 1988) using each individual's average investment rate indicates that this difference is highly significant ($Z = 4.92$, $p < 0.00001$). The small difference in the language used in the instructions makes a big difference in investment behavior, suggesting that financial decisions may be easily influenced by the manner of presentation.

Second, we see that males consistently invest at a higher rate in each period in both the Natural and Frame treatments, so the average investment for males is always higher than that for females. Tobit regressions (reflecting the censoring at 100; no one invested 0) with investment as the dependent variable find that the $t = 2.60$ ($p = 0.006$, one-tailed test) for the gender dummy in the Natural condition and $t = 1.85$ ($p = 0.036$, one-tailed test) for the gender dummy in the Frame condition. The gender difference is more significant if we pool the data across treatments.

Finally, regarding the question of whether the frame has differential effects on males and females, we see that the investment rate increases by 28.90 points for males and by 33.28 points for females. The difference between these differences is not large, only 4.41 points. On the other hand, if we instead look at the percentage change in the investment rates, we see that the average investment nearly doubles (up 97%) for females, but increases by only just over half (55%) for males. Nevertheless, although while it may seem that the framing has a somewhat larger effect on females, we do not identify a

[2] If we presume a directional hypothesis, the likelihood that males invest more than females in all 8 treatments is $p = 0.004$.

[3] We also have data from a Natural treatment in which a decision was only made for one period, with 100 points worth $10. The average investment for 15 males was 48.30 and the average investment for 13 females was 33.46. As shall be seen, this differs little from the 10-period Natural results.

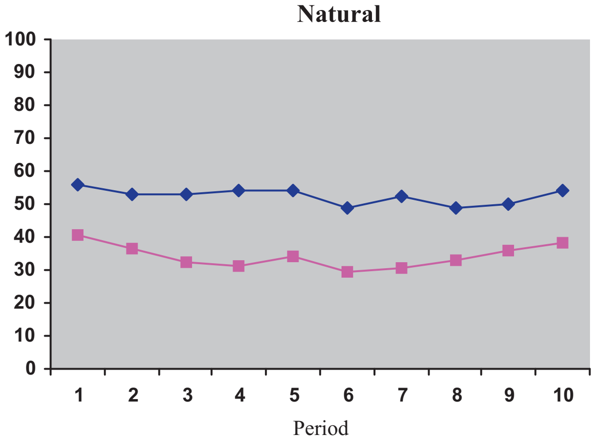

Fig. 1.

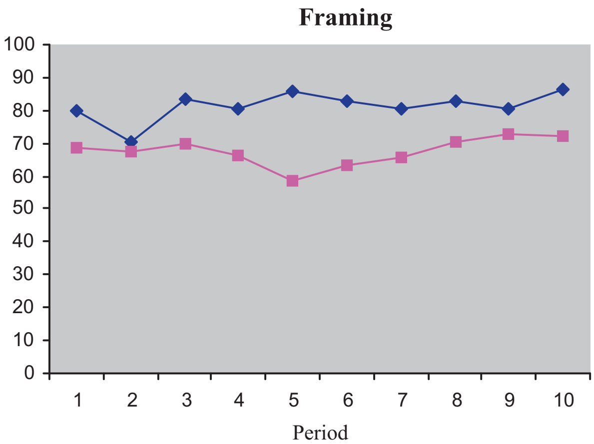

Fig. 2.

Table 2
Investment with different framing conditions.

Treatment	Avg. male investment (*N*)	Avg. female investment (*N*)	Difference
Natural	52.43 (22)	34.25 (26)	18.18 (53%)
Frame	81.33 (21)	67.56 (25)	13.77 (20%)
All choices	66.54 (43)	50.58 (51)	15.96 (32%)

significant effect.[4] Thus, while our simple framing device has a major effect on the investment rate, our evidence that women are more susceptible to this framing is inconclusive.

2.5. Yu (2006)

Yu (2006) collected data both online and in the laboratory to study the separate effects of alternative feedback-information rules and the freedom to change the investment in a repeated environment; this approach attempts to decompose into components the effects observed in Gneezy and Potters (1997).

[4] A Wilcoxon ranksum test on framing differences, using each individual's overall investment rate, gives $Z = 0.82$, while the corresponding test using percentage changes gives $Z = 1.36$. At best, the latter test statistic indicates significance at $p = 0.087$ (one-tailed test). To conduct these tests, we ordered the investment rates in each condition and made comparisons directly across the conditions (so that the highest investment rates were compared, etc.). We have $N_M = 21$ and $N_F = 25$ for these comparisons.

Table 3
Yu (2006).

Treatment	Avg. male investment (*N*)	Avg. female investment (*N*)
Laboratory		
Daily	52.65 (19)	37.26 (9)
Intermediate	49.03 (13)	35.53 (15)
Weekly	67.06 (17)	47.81 (14)
All laboratory choices	56.69	40.46
Internet		
Daily	61.52 (22)	38.07 (18)
Intermediate	58.39 (22)	34.67 (11)
Weekly	72.23 (19)	45.81 (18)
All Internet choices	63.66	40.08
All choices	60.61	40.26

2.5.1. Design

The participants in the online experiment were recruited using an email list of students who register in order to be invited to participate in experiments, plus MBA students who took a decision making class; 177 students replied to this message. The participants were divided randomly into three equal-sized groups, and they then received the instructions for the experiment. About 60% (114) of the respondents actually participated in the experiment after receiving the instructions. The participants in the laboratory experiment were recruited using ads posted on campus. Participants were given instructions that were very similar to those of the online study. Each "investment day" took 2 min.

In all treatments, participants were told that the experiment consists of 15 successive investment days. Each investment day lasted from 7:00 a.m. until midnight. In each investment day they received 100 points, and were asked to choose the portion of this amount (between 0 points and 100 points, inclusive) they wish to invest in a risky option. The rest of the points (those not invested) were accumulated in the participant's total balance. Participants were told that at the end of the three weeks one participant would be chosen at random for actual payment, calculated as the sum of the earnings in each of the 15 investment days; this person was paid $100 for each 200 points accumulated.

Investing in the risky option meant that in any particular investment day there is a $p = 1/3$ probability that the investment will succeed, and a $1 - p = 2/3$ probability that the investment will fail. If the investment failed, the participant lost the entire amount she or he invested. If the investment was successful, she or he received 3.5 times the amount invested (i.e., $k = 3.5$). The computer randomly chose whether the participant won or lost in any given day.

To make their investment decisions, participant had to log on to our webpage using the username and password assigned to each of them personally in an email. There were three treatments in the online experiment. In the daily condition, people could change their investment on every investment day. In the intermediate condition, people only made investment choices on the first day of each investment week (days 1, 6, and 11). The weekly condition was the same as the intermediate condition, except that participants only received information about the realization of each day once per investment week.

2.5.2. Results

As can be seen from the results presented in Fig. 3 and Table 3, there is a substantial and consistent gender difference in investment choices.

The average investment for males in each condition is between 28% and 68% higher than the average investment for females, half again as much (51%) overall. This difference is substantially larger in the on-line treatments (62%) than in the lab condition (36%). Using an OLS regression Yu (2006) finds that the gender dummy is highly significant (and the binomial test gives $p = 0.031$, two-tailed test). Regression results treating these data as panel data also provide strong support for the hypothesis that men invest more in the risky option than women in each of the treatments.

2.6. Other studies

In this section we consider all the other studies of which we are aware that gather gender data on risk and investment using this methodology.[5] These studies are Langer and Weber (2004), Haigh and List (2005), Fellner and Sutter (2004), Charness and Genicot (2009), Bellemare et al. (2005), Dreber and Hoffman (2007), and Gneezy et al. (2009), Ertac and Gurdal (2011), and Gong and Yang (2011).

These articles examine various aspects of risk taking in multi-period designs, using the same type of investment choice as described above. It is interesting that the subject pools vary widely across these experimental studies.

[5] Some of the studies that used this game did not record the gender of participants (e.g., Gneezy and Potters, 1997, and the student data in Haigh and List, 2005) and are hence excluded from our analysis.

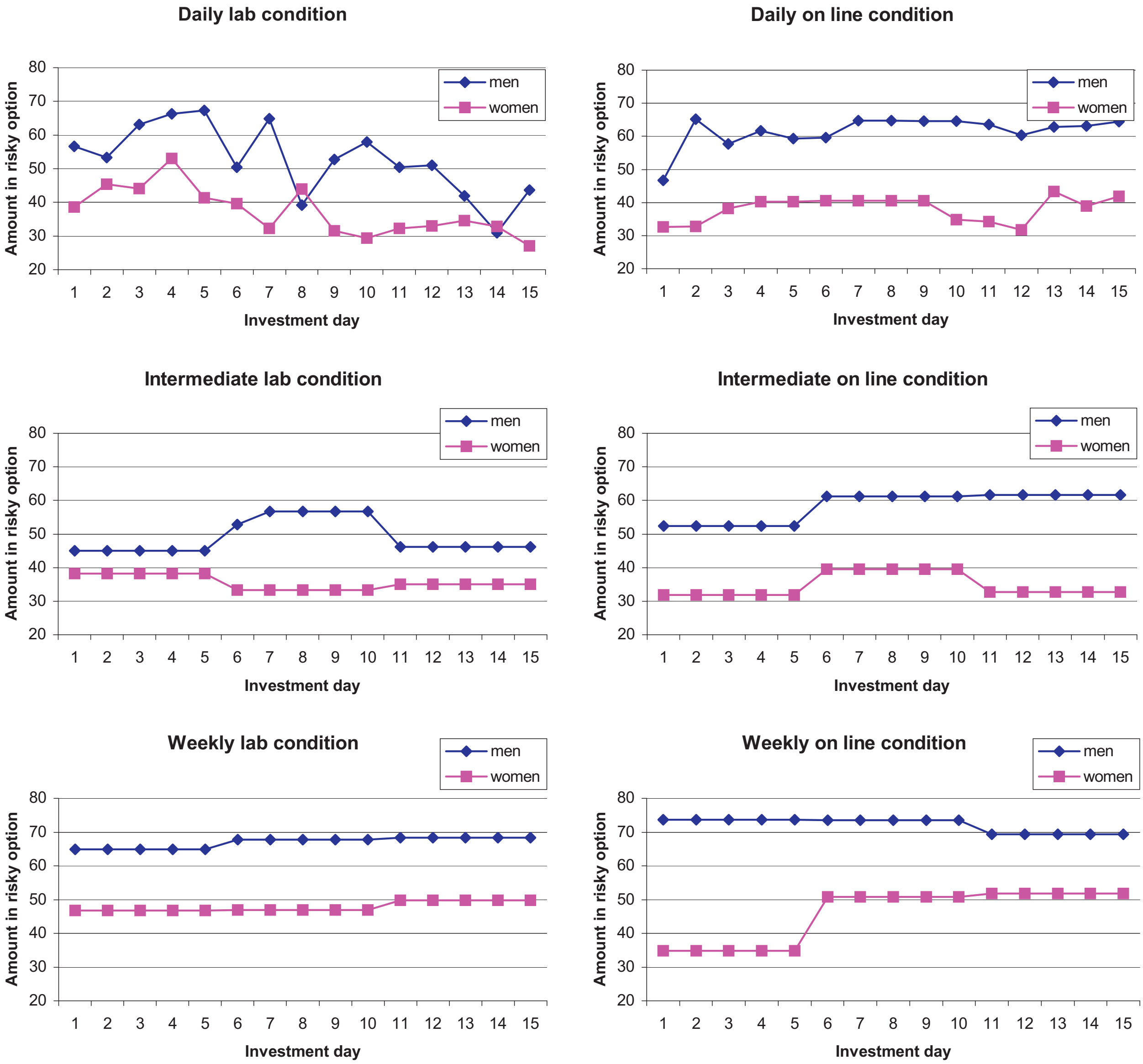

Fig. 3.

The language of the instructions, the parameters used, and the length of the experiment all vary between the experiments.

We present these data in Table 4; we aggregate across multiple treatments in a study, as the number of female observations would otherwise sometimes be very small in some case.

In 9 of the 10 experiments in Table 4 men invested more than females. Only in one experiment in reported in the table there is no gender difference in risk taking. Note that Gong and Yang (2011) find that males are less risk averse than females in both matrilineal and patrilineal societies.

We can apply the simple binomial test, where the null hypothesis is that there is no difference between the number of studies finding that males are more financially risk averse than females and the number of studies that show the opposite. The likelihood that either gender would invest more than the other in all nine studies where there is a difference is $p = 0.004$, while the likelihood that males invest more than females in every case is $p = 0.002$. These data support the consistent pattern of greater risk-taking by males in investment choices.[6] In combination with the data from Sections 2.1–2.3, the pattern seems compelling.

[6] Even if we count the data from Gneezy et al. (2009) as indicating greater risk-taking by females, we have $p = 0.022$ on a two-tailed test or $p = 0.011$ on a one-tailed test.

Table 4
Investment choices in other studies.

Study	Participants	Periods	Avg. male investment (*N*)	Avg. female investment (*N*)
Langer and Weber	Finance students, Mannheim	30	64.62 (93)	58.70 (14)
Haigh and List	Professional traders, CBOT	9	58.30 (50)	55.59 (8)
Fellner and Sutter	Undergrads, Jena	18	57.44 (39)	49.04 (79)
Bellemare et al.	Undergrads, Tilburg	9	45.48 (95)	42.73 (40)
Charness and Genicot	Undergrads, UCLA	1	59.22 (41)	52.23 (53)
Dreber and Hoffman	Students, Stockholm	1	69.60 (92)	50.00 (55)
Gneezy et al.	Villagers in Tanzania and India	1	50.00 (157)	50.06 (157)
Ertac and Gurdal[a]	Undergrads, Turkey	1	72.32 (79)	54.29 (49)
Gong and Yang	Matrilineal villagers in China	1	53.9 (31)	32.5 (36)
Gong and Yang	Patrilineal villagers in China	1	37.3 (37)	4.3 (28)

[a] We include only the individual risk decisions where there is a positive expected return from investing in the risky asset. A similar gender difference applies in the other cases.

3. Conclusion

The results reported in this article are obtained by using data from previous studies based on one similar design in which the data of interest was recorded independently of the goal of the study. The field of experimental economics is growing quite rapidly, with experiments being relatively easy to run (compared with, e.g., analyzing real world data). There is a natural tendency to continue to collect new evidence without fully considering what we might learn from the data that are already available. We suspect that as the field of experimental economics matures, the approach taken in the current article will become more common and will help to provide answers to important economic questions.

The answer to the question we posed at the beginning of this article is clear: women make smaller investments in the risky asset than do men, and so appear to be financially more risk averse. We believe that this very clear and consistent result answers an open question in the literature. We do not argue that women are always more risk averse than men, and clearly research into the boundaries of these findings should be encouraged. However, one should be careful not to base counter-arguments regarding no difference or difference in the other direction on one or two studies. Rather, a more comprehensive investigation of the boundary conditions based a substantial number of experiments and robustness checks should be encouraged. As a first step in this direction, researchers running experiments should be encouraged to record as much background information about the participants as possible.

The economic implications of our results are important, as investment behavior by men and women (an inherently high-payoff decision) appears to differ. A few articles (e.g., Sundén and Surette, 1998; Finucane et al., 2000; Jianakoplos and Bernasek, 1998; Hinz et al., 1997; Bajtelsmit and Van Derhei, 1997) investigate allocation of portfolio assets and find that gender is significantly related to asset allocation. Women's portfolios are less risky than men's. However, studying investments in field data has certain limitations. For example, it is hard to know how investment decisions are reached in households with married couples (Bernasek and Shwiff, 2001). We believe that the convergence of the laboratory findings such as we report in this article with empirical findings from investment decisions is an important step in understanding the important features of gender differences in risk taking.

Appendix A. Supplementary data

Supplementary data associated with this article can be found, in the online version, at doi:10.1016/j.jebo.2011.06.007.

References

Bajtelsmit, V., VanDerhei, J., 1997. Risk aversion and retirement income adequacy. In: Gordon, M.S., Mitchell, O.S., Twinney, M.M. (Eds.), Positioning Pensions for the Twenty-first Century. University of Pennsylvania Press, Philadelphia, pp. 45–66.

Bellemare, C., Krause, M., Kröger, S., Zhang, C., 2005. Myopic loss aversion: information feedback vs. investment flexibility. Economics Letters 87, 291–439.

Bernasek, A., Shwiff, S., 2001. Gender, risk and retirement. Journal of Economic Issues 35, 345–356.

Charness, G., Genicot, G., 2009. An experimental test of inequality and risk-sharing arrangements. Economic Journal 119, 796–825.

Charness, G., Gneezy, U., 2004. Gender, Framing, and Investment. Mimeo.

Charness, G., Gneezy, U., 2010. Portfolio choice and risk attitudes: an experiment. Economic Inquiry 48 (1), 133–146.

Coates, J., Gurnell, G., Rustichini, A., 2009. Second-to-fourth digit ratio predicts success among high-frequency traders. In: Proceedings of the National Academy of Sciences, vol. 106, pp. 623–628.

Cosmides, L., J. Tooby, J., Barkow, J., 1992. Evolutionary psychology and conceptual integration. In: Barkow, J., Cosmides, L., Tooby, J. (Eds.), The Adapted Mind: Evolutionary Psychology and the Generation of Culture. Oxford University Press, NY.

Croson, R., Gneezy, U., 2009. Gender difference in preferences. Journal of Economic Literature 47 (2), 448–474.

Dekel, E., Scotchmer, S., 1999. On the evolution of attitudes towards risk in winner-take-all games. Journal of Economic Theory 87, 125–143.

Dreber, A., Hoffman, M., 2007. 2D:4D and Risk Aversion: Evidence that the Gender Gap in Preferences is Partly Biological. Mimeo.

Dreber, A., Rand, D., Garcia, J., Wernerfelt, N., Lum, J., Zeckhauser, R., 2010. Dopamine and Risk Preferences in Different Domains. Harvard University, John F. Kennedy School of Government (Working Paper Series, rwp10-012).

Eckel, C., Grossman, P., 2002. Sex differences and statistical stereotyping in attitudes toward financial risk. Evolution and Human Behavior 23, 281–295.

Eckel, C., Grossman, P. Forecasting risk attitudes: an experimental study of actual and forecast risk attitudes of women and men. Journal of Economic Behavior and Organization, in press.

Eckel, Catherine C., Grossman, Philip J., 2008. Men, women and risk aversion: experimental evidence. In: Plott, C., Smith, V. (Eds.), Handbook of Experimental Economics Results., vol. 1. Elsevier, New York, pp. 1061–1073, Chapter 113.
Ertac, S. and Gurdal, M., 2011. Deciding to decide: gender, leadership and risk-taking in groups. Journal of Economic Behavior 83, 50–58.
Fellner, G., Sutter, M., 2004. How to Overcome the Negative Effects of Myopic Loss Aversion – An Experimental Study. Mimeo, MPI Jena.
Finucane, M., Slovic, P., Mertz, C., Flynn, J., Satterfield, T., 2000. Gender, race, and perceived risk: the 'white male' effect. Health, Risk and Society 2, 159–172.
Gneezy, U., Leonard, K.L., List, J.A., 2009. Gender differences in competition: evidence from a matrilineal and a patriarchal society. Econometrica 77, 1637–1664.
Gneezy, U., Potters, J., 1997. An experiment on risk taking and evaluation periods. Quarterly Journal of Economics 112, 631–645.
Gong, B. and Yang, C.-L., 2011. Gender differences in risk attitudes: field experiments on the Matrilineal Mosuo and the Patriarchal Yi. Journal of Economic Behavior, in press.
Haigh, M., List, J.A., 2005. Do professional traders exhibit myopic loss aversion? an experimental analysis. Journal of Finance 60, 523–534.
Hinz, R., McCarthy, D., Turner, J., 1997. Are women conservative investors? Gender differences in participant directed pension investments. In: Gordon, M.S., Mitchell, O.S., Twinney, M.M. (Eds.), Positioning Pensions for the Twenty-first Century. University of Pennsylvania Press, Philadelphia, pp. 91–103.
Jianakoplos, N., Bernasek, A., 1998. Are women more risk-averse? Economic Inquiry 36, 620–630.
Langer, T., Weber, M., 2004. Does Binding or Feedback Influence Myopic Loss Aversion? An Experimental Analysis. Mimeo, Mannheim.
Powell, M., Ansic, D., 1997. Gender differences in risk behaviour in financial decision-making: an experimental analysis. Journal of Economic Psychology 18, 605–628.
Schubert, R., Gysler, M., Brown, M., Brachinger, H., 1999. Financial decision-making: are women really more risk averse? American Economic Review Papers and Proceedings 89, 381–385.
Schubert, R., Gysler, M., Brown, M., Brachinger, H., 2000. Gender Specific Attitudes Towards Risk and Ambiguity: An Experimental Investigation. Mimeo, Center for Economic Research, Swiss Federal Institute of Technology.
Siegel, S., Castellan Jr., N., 1988. Nonparametric Statistics for the Behavioral Sciences. McGraw-Hill, Boston.
Sundén, A., Surette, B., 1998. Gender differences in the allocation of assets in retirement savings plans. American Economic Review Papers and Proceedings 88, 207–211.
Tooby, J., Cosmides, L., 1990. On the universality of human nature and the uniqueness of the individual: the role of genetics and adaptation. Journal of Personality 58, 17–67.
Tooby, J., Cosmides, L., 1992. The psychological foundations of culture. In: Barkow, J., Cosmides, L., Tooby, J. (Eds.), The Adapted Mind: Evolutionary Psychology and the Generation of Culture. Oxford University Press, NY.
Yu, F., 2006. Information Availability and Investment Behavior. Mimeo, University of Chicago.