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Gender Differences in Preferences

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This paper reviews the literature on gender differences in economic experiments. In the three main sections, we identify robust differences in risk preferences, social (other-regarding) preferences, and competitive preferences. We also speculate on the source of these differences, as well as on their implications. Our hope is that this article will serve as a resource for those seeking to understand gender differences and to use as a starting point to illuminate the debate on gender-specific outcomes in the labor and goods markets.

1. *Introduction*

Economists and policymakers have observed gender differences in a number of different domains, including consumption, investment and, perhaps of most concern, in the labor market (see Francine D. Blau and Lawrence M. Kahn 2000 for a review). It is often hypothesized that these differences are caused by preference differences between the genders.

In this article, we review experimental evidence on preference differences between men and women, focusing on three factors that have been extensively studied: risk preferences, social preferences, and reaction to competition.[1]

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[1] Another type of preference difference relates, for example, to family–career trade-offs. We do not explore this issue in the current survey. This does not mean that we believe that these issues are of less importance or relevance, only that experimental methods cannot illuminate them as clearly.

The main source of data used in the current article is economics experiments. In the experiments we review, the decisions that individuals make allow the researcher to isolate one factor of a decision (e.g., risk preferences) and study it in isolation from other factors (e.g., altruism). Experiments are also *replicable*, so the same experiment can be conducted multiple times with different individuals with diverse backgrounds and demographics. This allows us to test the impact of various parameters, such as self-selection and learning, on men and women. We also include some data from naturally occurring markets (e.g., portfolio selection) when relevant.

We find that women are indeed more risk-averse than men. We find that the social preferences of women are more situationally specific than those of men; women are neither more nor less socially oriented, but their social preferences are more malleable. Finally, we find that women are more averse to competition than are men.

A number of previous papers review experimental psychology studies on the impact of

gender.[2] We hope that this article serves a similar purpose in economics; as a resource for those seeking to understand gender differences and (perhaps) to use as a starting point to illuminate the debate on gender-specific outcomes in the labor and goods markets.

The remainder of this article is divided into three topics. Section 2 reviews evidence on gender differences in risk preferences. Section 3 reviews evidence on gender differences in social preferences. Section 4 reviews evidence on gender differences in competitive preferences. The final section provides a conclusion and discussion.

2. *Risk Preferences*

Many of the decisions people make involve risk.[3] In this section, we review the experimental economics literature examining gender differences in risk preferences.

2.1 *Objective Probability Lotteries*

To set the stage, we begin by discussing risk-taking in what we call objective probability lotteries, with known probabilities and dollar outcomes. Table 1 lists ten papers investigating gender differences in risk preferences using both real and hypothetical gambles**.** The robust finding is that men are more risk-prone than are women. Previous surveys of economics (Catherine C. Eckel and Philip J. Grossman 2008c) and psychology (James P. Byrnes, David C. Miller, and William D. Schafer 1999) report the same conclusions: women are more risk averse than men in the vast majority of environments and tasks. This table (and future tables as well) also note whether the authors included controls other than gender in their analyses (e.g., year in school, age, major, country of origin, race, etc). The inclusion of controls, and exactly which were included, varies by paper.

There are two notable and interesting papers in this table. First, Melissa L. Finucane et al. (2000) find a gender difference among whites, but not among any other ethnic group. They term this "the white male effect." This is important because it implies there may be cultural biases causing gender differences in risk taking. This topic of culture will reemerge in the section on competition below. The second paper is by Renate Schubert et al. (1999) who find one situation in which men are more risk averse than women: when lotteries are framed as losses rather than gains.[4]

[2] Meta-analyses have been published in examining the impact of gender on intelligence testing (e.g., Marise Born, Nico Bleichrodt and Henk van der Flier 1987); cognitive ability including mathematical, verbal, and spatial ability (e.g., Janet S. Hyde, Elizabeth Fennema and Susan J. Lamon 1990); personality development (e.g., Alan Feingold 1994); conformity and social influence (e.g., Blair T. Johnson and Alice H. Eagly 1989); self-disclosure (e.g., Kathryn Dindia and Michael Allen 1992); leadership style, evaluation, and effectiveness (e.g., Eagly, Steven J. Karau, and Mona G. Makhijani 1995); aggressive behavior (e.g., Eagly and Valerie J. Steffen 1986); and social behavior (e.g., Eagly and Wendy Wood 1991). In an excellent overall review, Eagly (1995) describes over twenty-five years of psychological gender research (see also the heated debate in the February 1996 issue of *American Psychologist* that followed).

[3] We use "risk" and "uncertainty" interchangeably throughout the paper. We do not use Knight's (1921) distinction by which risk refers to situations where one knows the probabilities and uncertainty refers to situations when this randomness cannot be expressed in terms of specific probabilities. This is in line with the approach that, even under uncertainty, one can assign subjective probabilities to outcomes. It is interesting to note that, while most real life situations involve Knight's uncertainty, laboratory experiments are more focused on decisions under risk in which probabilities are known.

[4] One paper not included in the table, Tomomi Tanaka, Colin F. Camerer, and Quang Nguyen (forthcoming), finds no significant risk differences in estimations of prospect-theory preferences (no gender differences in loss aversion or in the curvature of the value function). However, they do not report gender differences in risk aversion parameters from traditional expected utility models.

TABLE 1

	Experimental details	Pay	Gain/ loss	Summary	Risk taking	Controls included?
Holt and Laury (2002)	Students	Yes	Gain	Choice between lotteries according to mean–variance. Varied also the level of pay	Low payoffs: M > F High payoffs: M = F	Yes
Hartog, Ferrer-I-Carbonell, and Jonker (2002)	Mail survey and Dutch newspaper	No	Gain	Willingness to pay for high-stakes lotteries. Gender difference in risk aversion parameter is estimated at 10 to 30 percent	M > F	Yes
Dohmen et al. (2005)	Rep. sample of German population and students	real and hyp	Both	Survey instrument is validated in experiments. Survey questions predicted behavior well	M > F	Yes
Powell and Ansic (1997)	Students	Yes	Both	Choice of insurance cover in one treatment and an unfamiliar financial decision about gains in another	M > F	No
Eckel and Grossman (2002a)	Students	Yes	Both	Choice between lotteries according to mean–variance. Frame (gain/ loss) changed between treatment	M > F	Yes
Eckel and Grossman (2002b)	Students	Yes	Both	Choice between lotteries according to mean–variance. Lotteries and investment frames with the possibility of loss, and a lottery frame with no loss	M > F	Yes
Fehr-Duda, Gennaro, and Schubert (2006)	Students	Yes	Both	Gender differences depend on the size of the probabilities for the lotteries' larger outcomes	M > F	Yes
Levin, Snyder, and Chapman (1988)	Students	No	Both	Half of the subjects were given the "chance of winning" each gamble, and half were given the "chance of losing" each lottery	M > F	No
Finucane et al. (2000)	Phone survey	No	Both	Ethnically diverse group of participants. White males were more risk taking than all other groups	M > F	Yes
Schubert et al. (1999)	Students	Yes	Both	Choice between certain payoffs and lotteries in abstract and contextual frames	Gains: M > F Losses: M > F Contextual: M = F	No

2.2 *Portfolio Selection: High Stakes Decisions*

In economics, the highest-stakes decisions made by individuals, for themselves or as agents working for others, are often of special interest. It is an open question whether laboratory experiments with small stakes will yield conclusions that generalize to these high-stakes settings. One approach is to conduct experiments with high stakes when possible (e.g., in poor countries where modest payments by Western standards have high purchasing power). Most of the comparisons between high- and low-stakes data have shown that conclusions driven from modest stakes do generalize. However, in the domain of financial risk taking, we can often generate direct evidence. There are several studies directly comparing high-stakes decisions of men and women, and this literature demonstrates strong gender differences, consistent with the results found in the lab.

For example, Annika E. Sunden and Brian J. Surette's (1998) investigation of the allocation of defined contribution plan assets finds that sex is significantly related to asset allocation. Single women were less risk prone than single men, consistent with the lab evidence above (see also Finucane et al. 2000; Nancy Ammon Jianakoplos and Alexandra Bernasek 1998). Similarly, Richard P. Hinz, David D. McCarthy, and John A. Turner (1997) used data on participants in the federal government's Thrift Savings Plan and found that women invest their pension assets more conservatively than men. A large percentage of women invested in the minimum-risk portfolio available to them. Married women also invest less in common stock than married men (see also Vickie L. Bajtelsmit and Jack L. VanDerhei 1997).

A potential problem with these studies is the inability to find out who makes investment decisions in married couple households. Bernasek and Stephanie Shwiff (2001) overcome this by obtaining detailed information about the gender of the household's decision maker and the household financial decision-making process. Using a survey on pension investments of universities' faculty employees, they again show that women tend to be more risk averse.

In summary, we find that women are more risk averse than men in lab settings as well as in investment decisions in the field. While gender differences in risk preferences are relatively consistent, very few explanations are offered for the observed differences. In the remainder of this section, we identify some potential explanations and discuss the evidence supporting each. We also identify exceptions to the general result in particular tasks and by special subject pools.

2.3 *Explanations for the Gender Difference in Risk Taking*

2.3.1 *Emotions*

The first explanation offered for gender differences in risk taking is based on differences in emotional reactions to risky situations. In an influential paper, George F. Loewenstein et al. (2001) develop what they call "risk as feelings" (see also the discussion of the "affect heuristic" in Paul Slovic et al. 2002); referring to our fast, instinctive and intuitive reactions to risk. These affective reactions are often better predictors of what we do when facing a risky choice than the more cognitive, reasoned approaches. We believe that this framework is crucial in understanding gender differences in risk preferences. We look at the gender-specific influence of emotions on outcomes and probabilities.

Previous research from psychology indicates that women experience emotions more strongly than men (see the review in R. A. Harshman and A. Paivio 1987). A stronger emotional experience can affect the utility of

a risky choice. In particular, women report more intense nervousness and fear than men in anticipation of negative outcomes (e.g., Leslie R. Brody 1993; Frank Fujita, Ed Diener, and Ed Sandvik 1991). If negative outcomes are experienced as worse by women than by men, they will naturally be more risk averse when facing a risky situation. Thus gender differences in emotional experiences of outcomes, especially lower utility resulting from bad outcomes, is one explanation of increased risk aversion.

Emotions also affect the perceptions of probability. Previous research demonstrates that, in identical situations, women tend to feel fear and men tend to feel anger (Michele Grossman and Wood 1993). There is also evidence that, when individuals are angry, they evaluate a given gamble as less risky than they do when they are afraid (Jennifer S. Lerner et al. 2003). Thus if women are more likely to be afraid of losing (e.g., to overweight the probability of a loss), relative to men, they will evaluate a given gamble as being more risky, and will act in a more risk-averse way.

A recent demonstration provides an elegant test of the different influence of fear and anger on estimation of probabilities and the resulting risk-taking behavior. Lerner et al. (2003) study the emotional reactions that followed September 11th by surveying a nationally representative sample of Americans on September 20, 2001. They find that experiencing more anger in response to September 11th (men experienced more anger) triggered more optimistic beliefs about future gambles, while experiencing more fear in response to September 11th (women experienced more fear) triggered greater pessimism. Across all risks, males expressed lower perceptions of risk than did females, and differences in reported emotions explained a large part of the variance.

An interesting aspect of gender differences in the assessment of risk for different probabilities is found by Helga Fehr-Duda, Manuele de Gennaro, and Schubert (2006). In their experiment, risk taking depends on the size of the probabilities for the lotteries' larger outcomes. Women are more risk averse in decisions with large probabilities in the gain domain and in decisions with small and medium probabilities in the loss domain. The relation between the size of the probability and the emotional reaction is yet an open question in the literature. Yuval Rottenstreich and Christopher K. Hsee (2001) demonstrate that individuals use different probability weights for high-affect and low-affect gambles, but no gender differences have been demonstrated in this probability weighting function.

2.3.2 *Overconfidence*

A second reason for gender differences in risk attitudes and in the evaluation of risk may relate to confidence. The literature finds that both men and women are often overconfident, with men being more overconfident in their success in uncertain situations than women (Sarah Lichtenstein, Baruch Fischhoff, and Lawrence D. Phillips 1982; Kay Deaux and Elizabeth Farris 1977; Mary A. Lundeberg, Paul W. Fox, and Judith Punccohar 1994). For example, Ralph Estes and Jinoos Hosseini (1988) investigate the effects of selected variables on investor confidence. Subjects were asked to examine the financial statements of a hypothetical company and then decide how much to invest in it. Next, the subjects were asked to assess their confidence in the correctness of this investment decision.[5] Women were substantially less confident than men in their investment decisions. In Jack B. Soll and Joshua Klayman (2004), participants were asked to provide high and low estimates such

[5] Note that this measure of overconfidence (how sure the individual is in their decision) is different than the question of misestimation of probabilities. The latter involves estimating the likelihood of an event occurring in the world, while the former involves estimating the likelihood that *one's own estimate* is likely to be correct.

that they were *X* percent sure that the correct answer for a given question lay between them. Participants exhibited substantial overconfidence: The correct answer fell inside their intervals much less than *X* percent of the time. Both men and women were overconfident, but men were more biased than women (for women, .58*X* percent of the answers fell within the stated range in experiment 1 and .60*X* percent in experiment 3, compared with a performance for men of .40*X* percent in experiment 1 and .51*X* percent in experiment 3).

Muriel Niederle and Lise Vesterlund (2007) find that men are substantially more overconfident about their relative performance in a task (solving mathematical problems) than women, and that the beliefs on relative performance help predict entry decisions into competition (see the competition section below). If men are more confident of their likelihood of coming out ahead in the gamble, they will be more likely to accept it than are women.

2.3.3 *Risk as Challenge or Threats*

A final explanation that we present for the observed risk preference difference is the interpretation of the risky situation. For example, Elizabeth Arch (1993) offers an explanation of the gender difference in risk taking on the basis of the believed appropriate response. Males are more likely to see a risky situation as a challenge that calls for participation, while females interpret risky situations as threats that encourage avoidance. This theme will reappear in the section on competitive behavior as well.

Arch argues that differences in risk behavior do not result from differences in ability, persistence, or eagerness to perform a task well. Rather, the differences result from a different motivation between genders. Men are more stimulated by challengeing, ego-involving situations; women are not stimulated by the same factors, and may even be impaired by them (Jeanne H. Block 1983).

2.4 *Exceptions to the Rule: Managers and Professional Populations*

Many of the studies discussed above selected members of the general population (or the convenient university population). However, some studies have focused on a subsample of the population; managers and professionals. Among this population, gender differences in financial risk preferences are smaller than in the general population and often nonexistent.

For example, Stanley M. Atkinson, Samantha Boyce Baird, and Melissa B. Frye (2003) compared the performance and investment behavior of male and female fixed-income mutual fund managers. They find that the way male and female managed funds do not differ significantly in terms of performance, risk, and other fund characteristics. Their results suggest that differences in investment behavior often attributed to gender may be related to investment knowledge and wealth constraints.

J. E. V. Johnson and P. L. Powell (1994) compare decision-making characteristics of males and females in a "nonmanagerial" population (in which the majority of individuals have not undergone formal management education), with those of a "managerial" population of potential and actual managers who have undertaken such education. The managerial subpopulation males and females display similar risk propensity and make decisions of equal quality, while in the nonmanagerial subpopulation women are more risk averse than men. Similar results are reported by Robert Master and Robert Meier (1988) with participants who owned a small business or managed one and by Sue Birley (1989), who studies entrepreneurs.

The conclusion is that gender differences in risk preferences among the general population do not extend to managers. This could be the result of selection; people that are more risk taking tend to choose managerial positions. While fewer women select these positions,

those that do choose them have similar risk preferences as men. This result could also be an adaptive behavior to the requirements of the job. In any case, the evidence suggests that managers and professional business persons present an important exception to the rule that women are more risk averse than men.

A nice piece of evidence that ties together this exception to the general rule is presented by Peggy D. Dwyer, James H. Gilkeson, and John A. List (2002) who use data from nearly 2,000 mutual fund investors and find that women take less risk than men in their mutual fund investments. However, the observed difference in risk taking is significantly attenuated when a financial investment knowledge control variable is included in the regression model (see Matthias Gysler, Kruse, and Schubert 2002 for similar results in the lab).

2.5 *Conclusion*

A large literature documents gender differences in risk taking; women are more risk averse than men. We highlight some of the factors that we believe cause this gender difference. One major factor is the affective reaction to risk. Men and women differ in their emotional reaction to uncertain situations and this differential emotional reaction results in differences in risk taking. Emotions affect the evaluation of outcomes as well as the evaluation of probabilities. However, emotions are not the only reason for gender differences in risk preferences. Men are also more confident than women and, as a result, may have a different perception of the probability distribution underlying a given risk. Men also tend to view risky situations as challenges, as opposed to threats, which leads to increased risk tolerance.

Those differences are found in most domains of risk taking. It is interesting to note that these differences are attenuated by experience and profession. For example, studies with managers and entrepreneurs find no gender differences in risk preferences. Future research should try to disentangle the two possible driving forces behind this exception to the rule: selection (more risk taking people choose and remain in professional careers) and learning (people learn from their professional environment).

3. *Differences in Social Preferences*

When individuals exhibit a social preference, others' payoffs (or utilities) enter into their utility function. Social preferences are modeled in the economic literature in the form of altruism (e.g., Gary S. Becker 1974; James Andreoni 1989), envy (e.g., Vai-Lam Mui 1995), inequality aversion (e.g., Gary E. Bolton and Axel Ockenfels 2000; Ernst Fehr and Klaus M. Schmidt 1999), or reciprocity (e.g., Matthew Rabin 1993; Gary Charness and Rabin 2002; Armin Falk and Urs Fischbacher 2006; Martin Dufwenberg and Georg Kirchsteiger 2004). While all these models describe how an individual may be other-regarding, the extent and form of the social preferences may also differ across the genders.

In this section, we discuss a number of studies that demonstrate how strongly (and in what direction) social preferences manifest themselves in men and in women. We include evidence on altruism and inequality-aversion from ultimatum and dictator game studies. We also include evidence on reciprocity from studies using trust and related games. Finally, we briefly mention a large number of older studies using the Prisoners' Dilemma game and discuss in more detail recent studies using social dilemmas and/or public goods provision games.[6]

[6] In addition, we identified four studies investigating the impact of gender on coordination (Charles Bram Cadsby and Elizabeth Maynes 1998, Cadsby et al. 2007, Hakan J. Holm 2000, and Rachel Croson, Melanie Marks, and Jessica Snyder 2008). Since these studies speak only weakly to the question of other-regarding preferences, they are not reviewed here.

Results on gender differences vary in these studies. For example, sometimes women are more trusting than men and sometimes less so. We believe that this variance is explained by a differential sensitivity of men and women to the social conditions in the experiment. Research from psychology suggests that women are more sensitive to social cues in determining appropriate behavior than are men (Carol Gilligan 1982). Small differences in experimental design and implementation can affect these social cues, leading women to appear more other-regarding in some experiments and less other-regarding in others.

Throughout this section, we provide two types of data to support our explanation. First, we look *within* experiments that have demonstrated gender differences for evidence that women are more responsive than men to the conditions of the experiment. Second, we look *between* studies and compare the differences in male and female behavior. If our explanation is correct, we will see more variability in female behavior across related studies than in male behavior. This evidence is summarized in section 3.4.

As with risk preferences, psychologists have also studied social preferences of the genders. Meta-analyses of gender differences in social loafing, which maps to public goods contributions and social dilemma games (Karau and Kipling D. Williams 1993), and helping behavior, which maps into altruism (Eagly and Maureen Crowley 1986), are both useful sources for the interested reader.

3.1 *Ultimatum Games*

In the ultimatum game, two players are allocated a sum of money (the pie) that can be divided between them. The proposer makes an offer to the responder of how the money will be divided, which the responder accepts or rejects. If the offer is accepted, each party receives the amount that the proposer suggested. If the offer is rejected, each party receives zero.[7] The earliest ultimatum experiment was Werner Guth, Rolf Schmittberger, and Bernd Schwarze (1982).

Although this game has a continuum of Nash equilibria, there is a unique subgame perfect equilibrium (assuming selfish players) in which the proposer offers the responder ε, and the responder accepts. Deviations from this equilibrium on the responder's side (that is, the rejection of positive offers) have been interpreted as inequality-aversion, negative reciprocity, or punishment. Deviations from this equilibrium on the proposer's side (that is, the making of positive offers) have been interpreted as inequality-aversion, altruism, and (occasionally) risk-aversion.

Two lab experiments examine gender effects in ultimatum settings: Eckel and Grossman (2001) and Sara J. Solnick (2001). Both find that men and women offer the same amounts, and that offers made to men are higher than offers made to women. However, these studies differ in their characterization of responder behavior (Eckel and Grossman 2008a).

Eckel and Grossman find that women are more likely to accept lower offers than men. In contrast, Solnick found that women were more demanding than men. These differences may be attributable to differences in the conditions of the experiment. In Eckel and Grossman (2001), participants are paired with a responder randomly chosen from a group of four counterparts sitting across an aisle, who were either all female, all male, or of mixed genders. Proposers made offers that were communicated to responders who accepted or rejected them. In Solnick (2001), participants sat on opposite sides of a curtain and had no face-to-face contact. Her study used the strategy

[7] Note that the ultimatum game is a simplified form of alternating-offer bargaining (also called Stahl-Rubinstein bargaining). While many experiments have been run in the latter paradigm, none have examined gender effects.

TABLE 2
REJECTION RATES IN ULTIMATUM GAMES

	Eckel and Grossman	Solnick	|Difference|	
Male Responders				
M to M	18.8%	4.5%	14.3%	
F to M	9.4%	6.3%	3.2%	
|Difference|	9.4%	1.7%	8.7%	Average
Female Responders				
M to F	17.2%	0.0%	17.2%	
F to F	3.1%	23.1%	20.0%	
|Difference|	14.1%	23.1%	18.6%	Average
F – M	4.7%	21.4%		
Controls included?	Yes	No		

method, where responders indicated their minimum willingness to accept. Gender was communicated by the first name of the counterpart (a practice which Holm 2000 suggests yields the same results as informing the participant "your counterpart is a (fe) male student"; see also Chaim Fershtman and Uri Gneezy 2001).

Table 2 shows rejection rates in comparable conditions to enable a comparison between the studies. When men are responders, their rejection rates differ by an average of 8.7 percent between the two studies. When women are responders, their rejection rates differ by an average of 18.6 percent between the two studies. This suggests that behavior of female responders is more sensitive to the experimental context (face-to-face, strategy vs. game methods) than is the behavior of male responders.

Comparing rejection rates *within* the studies provides further evidence of greater context-sensitivity by women. In both studies, men's rejection rates are not very sensitive to the gender of their proposer (a 1.8 percent difference in Solnick and a 9.4 percent difference in Eckel and Grossman). In contrast, women's rejection rates are quite sensitive to the gender of their counterpart (a 23.1 percent difference in Solnick and a 14.1 percent difference in Eckel and Grossman). These comparisons, and similar analyses below, support our organizing explanation of greater context sensitivity of women.

In an ultimatum field experiment, Guth, Carsten Schmidt, and Matthias Sutter (2007) asked readers of a weekly news magazine to propose (and respond to) offers in a three-party ultimatum game. In this game, the proposer makes an offer to split a pie between himself, the responder (who can accept or reject as usual), and a dummy player who has no decision authority. They find that female participants are significantly more likely to propose a three-way equal split than are men, and suggest it is due to altruism or inequality aversion.

However, given the ultimatum game structure, these behavioral differences could also be due to risk aversion (see previous section). Dictator games allow us to tease apart these competing motivations.

3.2 *Dictator Games*

In the dictator (Robert Forsythe et al. 1994) game, the proposer again has a pie of money to divide between himself and the recipient. But the recipient has no decision to make; she can only accept the offer. Thus the dictator game is really an allocation problem. Proposer decisions can be caused by inequality aversion or altruism, but strategic or risk-related concerns are not relevant here.

Two studies use a simple dictator setting to investigate gender effects. In Eckel and Grossman (1998), participants play a double-blind dictator game with a $10 pie. They find that in conditions of anonymity, women give almost twice as much as men to their paired recipient (on average women give $1.60 and men give $0.82). In Bolton and Elena Katok (1995), a less anonymous design is used in which participants again divide $10. The options facing the participants are less continuous, and no subject is permitted to offer more than $5. They again find that women give slightly more than men, but this difference is not close to statistically significant (on average women give $1.23 and men give $1.13).

However, note again the comparison between these two studies. As the social conditions of the experiment changed, male giving changed by $0.31 while female giving changed by $0.37. This again suggests that the behavior of women (at least somewhat) is more sensitive to the conditions of the experiment than the behavior of men.

Four papers find that women are more inequality averse in their dictator giving. Andreoni and Vesterlund (2001) manipulate the cost–benefit ratio of giving money to the recipient. They find that women are more concerned with equalizing earnings between the parties, while men are more concerned with maximizing efficiency. David L. Dickinson and Jill Tiefenthaler (2002) run similar experiments, except that the party making the allocations is a disinterested third party (rather than a self-interested dictator), and find the same results. Reinhard Selten and Ockenfels (1998) use a variant of the dictator game called the solidarity game, where participants can offer "conditional gifts" to insure each other against losses, and again find that women are more inequality-averse than men. Dufwenberg and Astri Muren (2006a) look at gender effects in a team dictator game (originally studied by Timothy N. Cason and Mui 1997), where groups of three divide money between themselves and a fourth recipient. The researchers find that female majority groups give the fourth party significantly more than male majority groups, and are more likely to implement equal splits, again supporting the notion that women are more inequality-averse than men.

A number of studies go beyond identifying the main effects of gender to look at the interaction of the genders of the proposer and recipient in two-party dictator games. In Dufwenberg and Muren (2006b), participants are told that their counterpart is a "randomly selected (fe)male student in the course." This experiment involves almost no anonymity and, consistent with Bolton and Katok, they find no significant differences between male and female giving.

In contrast, Avner Ben-Ner, Fanmin Kong, and Louis Putterman (2004) run dictator games with male, female, and partners of unknown gender. They find no gender differences in giving when the gender of the recipient is unknown (women give 3.29 out of 10, men give 3.41) or male (women give 3.81, men give 3.50). However, women give significantly less to other women (2.185) than they do to men (3.81) or to persons of unknown gender (3.29). A similar manipulation was run in which the recipient was described as being "from Minnesota" (the home state of most of the participants) or "not from Minnesota." This distinction was relevant for women, who sent less to out-of-staters than they did to

fellow Minnesota residents, but not for men. This study thus provides additional evidence that women are sensitive to the social context of the experiment (the gender or home state of the recipient) in ways that men are not.

Paralleling these results, Daniel Houser and Daniel Schunk (2007) run dictator games with schoolchildren between 8 and 10 years old. Children allocated 20 M&Ms between themselves and another child. They also find that girls' giving was sensitive to the gender of their counterpart, girls offer more to boys (9.8) than to other girls (7.9), and this difference is statistically significant; $p < .05$. In contrast, boys' offers are not statistically different depending on whether they're offering to boys (6.7) or to girls (4.6); $p > .1$ (Houser and Schunk 2007, p. 10).

In summary, these studies find that men choose efficient allocations while women are more inequality averse. However, comparisons between the first two studies (Eckel and Grossman and Bolton and Katok), and within the final two studies (Ben-Ner et al., Houser and Schunk), suggest that women's decisions are more context-specific than men's.

3.3 *Trust and Reciprocity*

Another series of experiments examine social preferences like trust and reciprocity. What differentiates these games from those above is that they are typically positive-sum, involving a multiplier for money passed to a second party. They also explicitly test for second-mover behaviors that are conditional. Reciprocity, also called conditional altruism, describes behavior in which one party's preferences over another party's consumption are conditional on the other party's actions. I act altruistically toward you if and only if you have been generous with me in the past.

Many of the studies below rely on the trust game paradigm. A discrete version of the trust game was introduced by David M. Kreps (1990) and first experimentally tested by Camerer and Keith Weigelt (1988). More continuous versions were introduced by Joyce Berg, John W. Dickhaut, and Kevin A. McCabe (1995) and John B. Van Huyck, Raymond C. Battalio, and Mary F. Walters (1995). In these games, player one can send all, some, or none of his endowment to player two (in the Kreps version, the decision is binary; send all or send none). The amount sent is multiplied, usually by 3 (occasionally by 2), and received by player two. Player two can then return as much or as little of the money in her possession (sometimes including her initial endowment) to player one (in the Kreps version the decision is again binary; return half or none). Note that this second stage exactly mirrors a dictator game as described above; player two is a dictator toward player one. However, the motivations for returning behavior may be different; here the pie which player two divides is created by the trusting actions and vulnerability of player one. In this section, we distinguish the two behaviors: trust (the sending of resources to player two) and reciprocity or trustworthiness (the returning of resources to player one).

Table 3 describes a number of studies examining gender in trust and trust-related games.

3.3.1. *Trusting Behavior*

The amount sent (or likelihood of sending in discrete games) is usually used as a measure of trusting behavior. Unfortunately, like the first move in an ultimatum game, this decision confounds trust and risk preferences. Thus while a series of studies finds that women send the same or less than men in this setting, this can be attributed either to lower trust or to risk aversion.

A number of studies find no gender differences in sending behavior (Croson and Nancy R. Buchan 1999; Kenneth Clark and Martin Sefton 2001; James C. Cox and Cary A. Deck 2006; Iris Bohnet 2007; Christiane Schwieren and Sutter 2008;

TABLE 3
TRUST GAMES

Study	Experimental details	Trust	Reciprocity	Controls included?
Croson and Buchan (1999)	Continuous game U.S., China, Japan, Korea	M = F	M < F	Yes
Schwieren and Sutter (2004)	Continuous game trust in behavior versus ability	M = F in behavior	M < F in behavior	No
Clark and Sefton (2001)	Sequential PD trust = 1st, reciprocity = 2nd	M = F	M = F	Yes
Cox and Deck (2004)	Discrete game vary size of pie, single/double blind, response	M = F	M = F	No
Bohnet (2006)	Continuous game (study 1)	M = F	M = F	Yes
Ashraf et al. (2006)	Continuous game U.S., Russia, South Africa, strategy method	M = F	M = F	Yes
Eckel and Wilson (2004a)	Discrete game choice of partners (represented by icons)	M > F	M = F	Yes
Migheli (2006)	Continuous game	M > F	M = F	Yes
Innocenti and Pazienga (2006)	Continuous game double blind, gender communicated man/woman	M > F	M = F	No
Slonim (2004)	Mostly continuous game partner selection (gender, age known)	M > F no selection	M = F no selection	Yes
Kanagaretnam et al. (2006)	Continuous game multiple rounds, repaired, switch roles	M > F	M = F	Yes
Snijders and Keren (2004)	Discrete game subjects play both roles (strategy method)	M > F	M < F	Yes
Chaudhuri and Gangadharan (2004)	Continuous game subjects play both roles (strategy method)	M > F	M < F	No
Buchan et al. (2004)	Continuous game interaction of gender by first name, F, M or unknown	M > F	M < F	No
Slonim and Garbarino (2006)	Mostly continuous game online panel, strategy method, within subject	M > F	na	Yes
Bellemare and Kroger (2005)	Continuous game Dutch panel of Ss, strategy method	M < F	M > F	Yes
Eckel and Wilson (2004b)	Discrete game written info or photo of partner	M > F written M < F photo	M = F	Yes
Ben-Ner et al. (2004)	Sequential dictator, same or different pairings double-blind	na	M < F	Yes
Eckel and Grossman (1996)	Sequential dictator	na	M < F	Yes
Bohnet et al. (2008)	Betrayal aversion game	M = F Kuwait M > F	na	No

Bohnet, Benedikt Hermann, and Richard Zeckhauser forthcoming). Other studies find that men are more trusting than women (Eckel and Rick K. Wilson 2004b; Chris Snijders and Gideon Keren 2001; Ananish Chaudhuri and Lata Gangadharan 2007; Buchan, Croson, and Solnick 2008; Matteo Migheli 2007; Alessandro Innocenti and Maria Grazia Pazienza 2006; Robert Slonim 2006; Ellen Garbarino and Slonim 2009). Only a very few studies find women more trusting than men (Charles Bellemare and Sabine Kröger 2003; Bohnet, Hermann, and Zeckhauser forthcoming in Kuwait only). We believe that these inconsistent gender differences are caused by greater responsiveness of women to conditions of the experiment. Three within-study comparisons provide direct evidence for our explanation.

In Cox and Deck (2006), the authors vary the size of the pie available, the social distance of the experiment (single versus double-blind), and the ability of the second player to respond. The proportion of women who send varies from 64 percent to 32 percent with the conditions for a range of 32 percentage points. In contrast, the proportion of men who send varies from 55 percent to 35 percent for a range of only 20 percentage points. A probit model in table 4 of their paper reports that the decisions of men are not statistically sensitive to the treatments, but that the decisions of women are. The authors write " . . . depending on the decision context, women may appear to be more or less generous than men because men are relatively less responsive . . . " (p. 597).

In Buchan, Croson, and Solnick (2008), the authors look at the interaction of the two genders; participants in this study either know (or do not know) the gender-specific first name of their counterpart in a continuous trust game. The range of amounts (max minus min) that men send is $1.22, while the range of amounts that women send is $1.47. The standard deviation of average amounts sent by men is .46, but by women is .60. Women thus appear more responsive to the conditions of the experiment, especially to knowing the gender of their counterpart (and the realization of what that gender is) than men, similar to the results of Ben-Ner et al. and Houser and Schunk in dictator games described above.

Finally, in Eckel and Wilson (2004a), participants are either told information about their counterpart or see their picture. The results indicate that women trust less than men when they have only written information about their counterpart, but more than men when they have a photo. Again, women's behavior is more variable than men's behavior. There is a 19 percentage point difference between the male trusting rates in the two conditions (92 percent versus 73 percent), and a 24 percentage point difference between the female trusting rates in the two conditions (64 percent versus 88 percent).

Anna Dreber and Johannesson (2008) compared trusting behavior between men and women using a different experimental setting introduced by Gneezy (2005). The setting consists of a sender–receiver game in which the sender has a monetary incentive to send a deceptive message to the receiver, and the receiver can either act according to the message or not, indicating distrust. They found no difference in trusting behavior between men and women, as indicated by receivers acting in accordance with the message sent. They did, however, find that male senders were more likely to send a deceptive message.

In summary, a number of studies have demonstrated that women trust less than or the same as men in these settings. But women's trust levels are more context-sensitive than those of men.

3.3.2. *Reciprocal Behavior*

While some studies have found no gender differences in reciprocity (Clark and

Sefton 2001; Cox and Deck 2006; Eckel and Wilson 2004b; Eckel and Wilson 2004a; Bohnet 2007; Migheli 2007; Innocenti and Pazienza 2006; Slonim 2006), others have found that women are more reciprocal than men (Croson and Buchan 1999; Chaudhuri and Gangadharan 2007; Snijders and Keren 2001; Buchan, Croson, and Solnick 2008; Schwieren and Sutter 2008; Ben-Ner et al. 2004; Eckel and Grossman 1996). One study, Bellemare and Kroger (2007), finds that men are more reciprocal than women.

Two experiments demonstrate the increased responsiveness of women to context in this setting. Ben-Ner et al. (2004) use a two-stage dictator game with roles being switched and pairs being either kept together (specific reciprocity) or reshuffled (generalized reciprocity). The authors find that women are influenced by the amount they received in the first round more strongly than are men. Thus the link between the amount received and the amount returned is significantly stronger for women than for men; further supporting the conclusion that female behavior is more sensitive to context than is male behavior.

In Eckel and Grossman (1996), participants chose to be dictators with a large pie and a counterpart who had previously acted unfairly toward a third party, or with a small pie and a counterpart who had previously acted fairly. They find that women are more likely to both reward and to punish than are men. The authors also find that female punishment behavior is sensitive to the cost of punishment, while male behavior is not. Women punish 64 percent of the time when it is cheap, and 32.7 percent of the time when it is expensive, while men punish 39.3 percent of the time when it is cheap and 40.8 percent of the time when it is expensive.

The authors argue that "[t]he results are consistent with Gilligan's (1982) claims about male and female differences. As she argues, for men, fairness is more of an absolute, a matter of principle: one is, or is not, fair . . . . For women, fairness does not appear to be a moral imperative. *Choices are made with greater consideration of the circumstances surrounding the decision* . . . . Women are less likely to be driven by a rigid ethical code" (pp. 153–54, italics ours). We find this explanation compelling, and have provided further evidence throughout this section (summarized below) that the increased sensitivity of women to the context of the situation is the cause of inconsistent gender differences in social preferences.

3.4 *The PD, Social Dilemmas, and Public Goods Provision*

A great many studies from psychology have examined gender differences in the prisoners' dilemma setting. In an early study, Anatol Rapoport and Albert M. Chammah (1965) show that men cooperate significantly more than women, as do a series of later studies (e.g., Arnold Kahn, Joe Hottes, and William L. Davis 1971; David Mack, Paula N. Auburn, and George P. Knight 1971). However, other studies have shown that women are more cooperative than men (e.g., S. Sibley, S. Senn, and A. Epanchin 1968; J. T. Tedeschi, D. Hiester, and J. Gahagan 1969), while others have shown no significant differences (e.g., Robyn M. Dawes, Jeanne McTavish, and Harriet Shaklee 1977; John Orbell, Dawes, and Peregrine Schwartz-Shea 1994).

In economics experiments, Robert H. Frank, Thomas Gilovich, and Dennis T. Regan (1993) finds that women are significantly more cooperative than men in prisoner's dilemma games. Andreas Ortmann and Lisa K. Tichy (1999) reports the same result in the first round of a repeated experiment, but that gender differences disappear over time. Additionally, male subjects acted the same in mixed groups and all male groups (cooperating 27 percent of the time and 38 percent of the time respectively). Females, however, are significantly more cooperative in the

TABLE 4
PUBLIC GOODS/SOCIAL DILEMMAS

	Study details	Contribution rates: Males	Contribution rates: Females	Significantly different?	Controls included?
Solow and Kirkwood (2002)	$n = 5$, continuous, identity manipulated (strangers, MGP, band)	66%	60%		No
Cadsby and Maynes (1998)	$n = 4$, discrete, all M/F groups, manipulate MPCR, anonymity	67%	60%		No
Sell et al. (1993)	$n = 4$, continuous, all M/F/mixed/unknown groups	57%	52%		No
Andreoni and Petrie (2007)	$n = 5$, continuous, photos of counterparts	47%	41%		No
Brown-Kruse and Hummels (1993)	$n = 4$, discrete, all M/F groups, manipulate MPCR, comm.	68%	56%	M > F	No
Sell and Wilson (1991)	$n = 4$, continuous, full, total or no feedback	51%	37%	M > F	No
Seguino et al. (1996)	$n = 5$ to 52, continuous game	49%	66%	F > M	Yes
Range of contributions		21%	30%		

mixed-sex groups than in all-female groups (cooperating 65 percent of the time and 50 percent of the time respectively). Again, this experiment provides some support for our conjecture that women are more sensitive to the context of the experiment than are men.

Economists have spent more energy investigating continuous versions of dilemma games in the field of public goods provision. A series of experiments investigates gender differences in the *voluntary contribution mechanism* (VCM). In this game, introduced by Gerald Marwell and Ruth E. Ames (1981), individuals have resources they can allocate toward their private consumption or the group's public consumption. Resources are worth more to the individual when privately consumed, but generate more social value when used to provide public goods. Equilibrium contributions toward the public good in these settings are zero, and deviations from that benchmark are considered altruistic. An analysis of a large-scale VCM dataset exploring gender differences is currently underway in Simon Gachter and Eva Poen (2004).

Early VCM experiments find competing results. Jamie Brown-Kruse and David Hummels (1993), Jane Sell and Wilson (1991), and John L. Solow and Nicole Kirkwood (2002) find that men contribute more toward the public good than women. In contrast, Stephanie Seguino, Thomas Stevens, and Mark A. Lutz (1996) find that women contribute more toward the public good than men. Finally, Sell, W. I. Griffith, and Wilson (1993), Cadsby and Maynes (1998), and Andreoni and Ragan Petrie (2008) find no significant differences.

As above, these studies have significant methodological differences, as described in table 4. However, when comparing between studies, we find that male contributions are more stable (with a range of 21 percent),

than female contributions (with a range of 30 percent).

Finally, Janie M. Chermak and Kate Krause (2002) examine the effect of gender in a different public goods game, one modeling common pool resources. They find that gender matters when individuals know the roles they are to play. In those treatments women are more generous (take less) than men. However, when individuals do not know their roles, there are no gender differences. The authors conclude (as do we) that " . . . gender effects . . . are sensitive to protocol and context" (p. 61).

3.5 *Organizing Explanation*

A large body of work identifies gender differences in other-regarding preferences. However, many of the results are contradictory. In some experiments, women are more altruistic, inequality averse, reciprocal, and cooperative than men, and in others they are less so.

We believe that the cause of these conflicting results is that women are more sensitive to cues in the experimental context than are men. Research from psychology suggests that women are more sensitive to social cues in determining appropriate behavior (Kahn, Hottes, and Davis 1971). Small differences in experimental design and implementation will thus have larger impacts on female participants than on male participants. Some examples of these design and implementation differences include economic variables like the size of the payoffs, the price of altruismm, or the repetition of the game, and psychological variables like the amount of anonymity between counterparts, the amount of anonymity between the participant and the experimenter, and the way that the situation is described.

We provide two types of analyses to support our explanation. First, we identify experiments that have demonstrated gender differences and look for evidence that women are more responsive than men to the conditions of the experiment. We find such evidence in a wide variety of settings.

In ultimatum games, women's accept–reject decisions vary more with the gender of their partner than do men's (Eckel and Grossman; Solnick). In dictator games, we find that women's decisions are sensitive to the gender (and home state) of their counterpart while men's are not (Ben-Ner, Kong, and Putterman; Houser and Schunk).

In trust decisions, we find that the amounts women send varies more than the amounts men send with the identification (and gender) of their counterpart (Buchan, Croson, and Solnick 2008), and with the existence of a picture of their counterpart (Eckel and Wilson). Similarly, female trust is sensitive to the social distance in the experiment and the ability of the second player to respond, while male trust is not sensitive to these factors (Cox and Deck).

In reciprocal decisions, we again find that women are more sensitive to what happens in the experiment. Men are less likely to punish (reward) a partner who had previously been unfair (fair) than are women (Eckel and Grossman). Women are influenced more strongly than men by the first-mover's decision in sequential dictator games as well (Ben-Ner et al.). And women are more reciprocal in trust games than men (Croson and Buchan; Buchan, Croson, and Solnick; Chaudhuri and Gangadharan; Snijders and Keren; Schwieren and Sutter).

Second, we look *between* studies and compare the differences in male and female behavior. Between-study comparisons of levels is always tricky, thus we are more careful in our interpretations here. If our explanation is correct, we will see more variability in female behavior across related studies than in male behavior. We find between-study evidence for our explanation as well.

In responder behavior in ultimatum games, we compare the Eckel–Grossman and Solnick papers and find that rejection rates by women differ by 18.6 percent while rejection rates by men differ by only 8.7 percent. In dictator giving, we compare the Eckel and Grossman and Bolton and Katok papers and find that male giving differed by $0.31 while female giving differed by $0.37 between the two studies. Finally, comparing seven VCM experiments, we find that female's contributions changed by 30 percentage points, while male's contributions changed by only 21 percentage points.

We believe, as suggested by Gilligan (1982), that men's decisions are less context-specific than women's. Participants of both genders are likely maximizing an underlying utility function, but the function that men use is less sensitive to the conditions of the experiment, information about the other party, and (even) the other party's actions, than the function that women use. This causes what appear to be inconsistent results; sometimes men appear more altruistic than women and other times, women appear more other-regarding than men. But primarily what we see is women's behavior is more *context-dependent* than that of men.

We conclude this section with a recent field experiment that demonstrates this difference in sensitivity directly. Carl Mellström and Johannesson (2007) test whether paying people to donate blood will crowd-out their intrinsic motivation to do so. They find a strong gender difference. While men's donation behavior was not affected by the availability of payment, donations by women were negatively affected.

4. *Competitive Behavior*

In this section, we look at a third gender difference identified in experiments: differences in attitudes toward competition. Recent findings suggest that women are more reluctant than men to engage in competitive interactions like tournaments, bargaining and auctions. Additionally, men's performance, relative to women's, is improved under competition. Thus as the competitiveness of an environment increases, the performance and participation of men increase relative to that of women.

4.1 *Reacting to Competition*

What happens when people find themselves in competition? Do men and women react differently to the competitive incentives? Recent findings suggest that men's performance is more affected by the competitiveness of the environment than women's performance. We demonstrate this with two studies.

In the first demonstration in the lab, Gneezy, Niederle, and Aldo Rustichini (2003) asked men and women to solve mazes on a computer for fifteen minutes. In a between-subjects design, participants were paid either according to a piece rate (a dollar amount per maze solved) or according to a winner-take-all tournament. Under the piece rate, men performed slightly (but not statistically significantly) better than women, solving 11.2 mazes on average, compared with 9.7 for women. However, when participants were paid on a competitive basis, males' mean performance increased significantly to 15, while that of the female subjects remained statistically the same at 10.8. The main finding is that in competitive situations where only the best person in the group is rewarded, males react with extra effort, while females do not.

In a field study, Gneezy and Rustichini (2004b) tested this conjecture in a physical education class. In a within-subject design, children ran twice over a short track with the teacher measuring their speed. First they ran alone, and then in pairs with different gender compositions. When the children ran alone, there was no gender difference in performance. In competition, boys' time improved

by .163 seconds, but girls' ran .015 seconds slower than when they ran alone.

It is tempting to generalize from those two studies and conclude that "men are more responsive to competition." However, there are still many open questions. For example, it is hard to know how sensitive the results are to the task used. Another unanswered question regards the gender composition of the group. In the maze study, women did react to the competitive incentives in single sex groups, but not in mixed groups. In the race study, however, the gender composition of the group did not affect the results, and in Nabanita Datta Gupta, Anders Poulsen, and Marie-Claire Villeval (2005) men competed more against men than against women. Future research is needed to answer these questions.

4.2 *Self-Selection*

The maze and the race studies concentrated on gender differences in reactions to competition. But what if participants could choose the incentive scheme? If men and women rationally anticipate the gender differences observed, they may very well choose different environments. Several papers have investigated gender differences in the choice of incentives. In these studies, participants in lab experiments had the option of choosing their own compensation scheme: piece rate or a winner-take-all tournament.

Niederle and Vesterlund (2007) examine the compensation choice for addition problems, where there are no gender differences in performance under either the piece rate or the tournament compensation. They have groups of two women and two men who first experience both compensation schemes with feedback about their own performance, and then choose the incentive scheme for the next task. Despite the equality in performance they find that most males (73 percent) request that their performance be compensated under the tournament incentives, while the majority of females (65 percent) request the piece-rate compensation. When controlling for individual ability, it is evident that while many well-performing females hurt themselves financially by shying away from competition, poorly performing males also hurt themselves by embracing it. Note that those results are related to the findings regarding overconfidence discussed in the risk section above.

Gneezy and Rustichini (2004a) used two tasks: one that favored men (shooting baskets) and one that favored women (solving anagrams). When solving anagrams, 40 percent of the men and 25 percent of the women chose to compete; in shooting baskets the numbers were 53 percent and 15 percent, respectively. That is, more men than women chose the competitive environment in both tasks, but the gap in choice was smaller with the task that favored women.

These and other findings (e.g., Donald Vandegrift and Paul Brown 2005; Datta Gupta, Poulsen, and Villeval 2005) suggest that women are less likely to choose to compete than men. Yet, women who choose competitive environments perform just as well as men in those settings.

4.3 *Bargaining*

One area in which avoiding competition can have a strong impact is bargaining. Competitiveness in this literature is measured indirectly by inference from strategies. Competitiveness is associated with negotiators who make large demands of their opponents or use distributive, win–lose tactics like making threats, insults, and firm positional commitments. In other words, competitiveness involves concerns about one's own outcomes in a conflict, while cooperativeness is characterized by a concern for the outcomes of the other party (cooperativeness thus implies social preferences of some sort, as discussed above). This definition is somewhat problematic

because it ignores the possibility that these motivations are not mutually exclusive; many interactions involve elements of both motivations.

Many studies in psychology documented an economically small but significant gender effect in negotiation performance (see the meta-analyses in Amy E. Walters, Alice F. Stuhlmacher, and Lia L. Meyer 1998; Stuhlmacher and Walters 1999; Joyce Neu, John L. Graham, and Mary C. Gilly 1988; and D. F. Womak 1987). However, recent research suggests that studies miss an important part of the process: The decision whether to initiate/take part in negotiation (that is, the selection issue). Note that this question is related to the above discussion of selecting into more or less competitive settings.

In a recent book on gender and negotiation, Linda Babcock and Sara Laschever (2003) claimed that women avoid competitive negotiation situations relative to men. For example, in a laboratory study participants were told that they would be paid between $3 and $10 for their participation. After each participant finished, an experimenter thanked them and said "Here's $3. Is $3 OK?" Only 2.5 percent of the female participants but 23 percent of the male participants requested more money (Deborah A. Small et al. 2007). Babcock (2002) reports that average starting salaries of male MBAs graduating from Carnegie Mellon were 7.6 percent higher than those of females. This difference is attributed to the observation that only 7 percent of the women attempted to negotiate their salary offer, while 57 percent of their male counterparts negotiated (see also Hannah Riley Bowles, Babcock, and Kathleen L. McGinn 2005; Barry Gerhart and Sara Rynes 1991; Laura J. Kray, Leigh Thompson, and Adam D. Galinsky 2001; Kray, Galinsky, and Thompson 2002; Stuhlmacher and Walters 1999).

Thus in bargaining situations, women are less likely to exhibit competitive preferences than men, slightly in their reactions once in a negotiation, but significant in their propensity to engage in a negotiation at all.

4.4 *Why are Men More Competitive than Women?*

Why do we see this genger difference in attitudes and behavior? One suggested explanation is *backlash*: It might be rational for women to avoid negotiating in some situations. Bowles, Babcock, and Lei Lai (2007) show experimentally that participants penalize female job candidates more than male candidates for assertive negotiation behavior (see also Eckel and Grossman 1996). This explanation is related to the findings in the discrimination literature regarding incentives to underinvest in education, for example, because the expected rewards are lower for women than for men in equilibrium (Becker 1965).

An additional set of data comes from experiments with children. William T. Harbaugh, Krause and Steven G. Liday (2002), for example, show that younger boys and girls (second, fourth, and fifth grades) make the same dictator offers as each other, but that older boys (ninth and twelfth grades) make lower dictator offers than do girls (boys average 0.97 token out of 10, while girls average 2.12 tokens out of 10). The fact that gender differences exhibit only later in life suggests an environmental cause.

Gneezy, Kenneth L. Leonard, and List (2006) use an experimental task to explore whether there are gender differences in selecting into competitive environments across cultures, examining a patriarchal society (the Maasai in Tanzania) and a matrilineal society (the Khasi in India). Similar to the evidence from the West discussed above, Maasai men opt to compete at twice the rate as Maasai women (50 percent versus 25 percent, respectively). However, this result is reversed amongst the Khasi, where women choose the competitive environment

considerably more often than Khasi men (men chose to compete 39 percent of the time whereas women chose to compete 54 percent of the time). These results provide further support for the argument that societal structure is crucially linked to the observed gender differences in competitiveness, and thus, that "nurture matters."

An opposing view, that differences between men and women are based on genetic differences, argues that "nature" is important as well. From Charles Darwin through today, many evolutionary biologists and psychologists hold that the basic structure of the brain is genetically determined.[8] In this view, the regularities of human behavior as well as consistent differences between male and female psychology could be inherited characteristics. Under this nature explanation, at some point in human history men and women evolved different strategies to maximize the fitness of their genes. For example, genetic or hormonal differences could cause women to be less competitive than men (e.g., Stephen Colarelli, Jennifer L. Spranger, and M. Regina Hechanova 2006).

Support for this explanation can be found in studies of the effect of biological measurements on behavior. For example, testosterone (and other hormones, such as cortisol) are known to be correlated with aggression and are different between genders. There is a large literature documenting the role of testosterone in competitiveness (for a review, see Helen S. Bateup et al. 2002). Prenatal hormone exposure is thought to correlate with sexually dimorphic behaviors as well (John T. Manning and Rogan P. Taylor 2001). Dreber and Moshe Hoffman (2007) recently found that financial risk aversion correlates with a proxy for prenatal hormone exposure, namely the ratio between the second and fourth fingers. This measure negatively correlates with prenatal testosterone, positively correlates with prenatal estradial, and is fixed early in life (Matthew H. McIntyre 2006).

An interesting example of the role of biological measurements in the auction literature is Yan Chen, Peter Katuscak, and Emre Ozdenoren (2009) who find that women's competitiveness depends on menstruation and contraceptive pill usage. In first-price auctions, while women bid significantly higher than men do in all phases of the cycle, they find a sine-like pattern of bidding throughout the menstrual cycle, with higher bidding in the follicular phase and lower in the luteal phase. The studies demonstrate, just as convincingly, that "nature matters" as well.

We conclude from those findings that both nature and nurture are responsible for the gender differences in competition. The interesting question is thus the weight of each factor and, more interestingly, the interaction of the two forces. Further research is clearly needed.

5. *Summary and Discussion*

This article has reviewed the experimental literature on gender differences in risk preferences, social preferences, and competitive preferences. In general, this literature has documented fundamental differences between men and women (with exceptions noted in the text).

Most lab and field studies indicate that women are more risk averse than men (section 2), with important exceptions for managerial populations. We suggest a list of possible mechanisms behind these findings, including emotions, overconfidence, and framing.

A number of studies also indicate that women's social preferences are different than men's (section 3), although the results of these studies are varied. We suggest an organizing explanation that relies on the observation that women are more sensitive to social cues

[8] See Darwin (1871), A. J. Bateman (1948), and Robert L. Trivers (1972).

than are men. This leads to higher variability in women's behavior than in men's, which we observe both within experimental studies and between studies.

Finally, a third stream of literature suggests that women's preferences for competitive situations are lower than men's, both in purely competitive situations and in bargaining settings (section 4). One important and interesting question about these differences is whether they are ingrained (nature) or taught (nurture). We present evidence in favor of both explanations, and suggest that the research question going forward should be the relative weights of these two factors and their interaction.

In summary, we have identified three types of preferences which differ between men and women. Each of these has implications for the economic decisions that men and women make in labor and product markets.

We wish to end with three methodological notes. First, one way to organize our discussion is using the following simple model of the world (see List 2006):

$$Y = X\beta + \tau T + \eta,$$

where Y is the outcome of interest (risk posture, social preference behavior, competitive spirit), X is a vector of person-specific variables (including gender), T is a binary treatment variable (experimental treatments controlled by the researcher), η is the error component, and β and τ are estimated parameters.

In the typical case, to estimate τ the analyst simply needs proper randomization when using controlled experimental methods. Here we are using T primarily as an explanatory variable for our most interesting estimate, that of β on the gender term. This "treatment effect" is of course not randomly determined by the researchers of the different studies, but instead selected to illuminate their research question of interest. T can therefore be correlated with other X variables either missing or observed. In the case of social preferences, we argue for an interaction between T (the experimental context) and X (the gender of the participant).

In this sense, we do not really summarize experimentation in the classic physical sciences sense—i.e., studies that use randomization to achieve identification. In particular, gender is not randomly assigned. We believe that more assumptions may be needed to infer what we would like to infer from these experimental studies, and more research is needed in this direction.

Second, an important bias in the literature on gender differences is that journals are more likely to publish papers that find a gender difference than papers that do not. Moreover, this publication bias may cause researchers to invest more effort into finding differences than to finding no difference. In the current article, we devote much attention to including studies that do not find gender differences, even when they are unpublished, in our attempt to counteract this bias. Going forward, we urge researchers to routinely record the gender of the participants when possible (as is the case in the psychology literature). This will greatly expand our understanding of gender differences and avoid the publication bias that is currently in place.

In all inference from a sample of individuals, one is concerned about whether the participants in the sample are self-selected. In the field, the degree of self-selection must often be inferred or measured indirectly. In the lab, it can often be controlled (e.g., using students in a class who are required to participate, or paid at such a high rate that virtually all volunteer), or measured (comparing traits of volunteers and nonvolunteers). For example, we discussed above some findings showing that women experience increases in auction bids near the time of ovulation. Interestingly, Richard L. Doty and Colin Silverthorne (1975) find that menstrual

cycles affect volunteering behavior; most of the female volunteers for their experiment were in the ovulatory phase, whereas most of the female nonparticipants were in the postovulatory, premenstrual, and menstrual phases. When data is collected in classes in which all participants take part in the experiment, this bias should not affect the results. But further research is needed to investigate the effect of such selection biases in laboratory experiments.

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