

Gender Differences in Preferences

Rachel Croson and Uri Gneezy

September 16, 2004

1. Introduction

Economists and policy-makers have observed gender differences in a number of different domains, including consumption, investment and, perhaps of most concern, in the labor market. Two main empirical results identify gender differences; the “gender gap” refers to the unadjusted wage difference averaged over all men and women in the paid workforce, while “wage discrimination” involves lower pay for workers with similar characteristics like education and years of experience but whose gender differs. Scholars have documented that the gender gap in wages decreased in the 1980’s, but it is nonetheless still present. In 1998 for example, the median weekly earnings of full-time employed women was only 76% of those of men (Bowler 1999). Studying data on the top five highest paid executives of a large group of US firms over the period 1992-1997, Bertrand and Hallock (2001) found that only 2.5 % of the executives in the sample were women.¹

In the current survey we study preference differences between men and women, focusing on three factors that are relevant in the labor market: Risk taking, social preferences and reaction to competition.² If women prefer jobs that are less risky, more socially virtuous and less competitive, then this could explain part of the gender differences in the labor market.

¹ Goldin (1990) (and the subsequent review by Wright 1991) provides an excellent discussion of the gender gap and wage discrimination in the labor market throughout history, and suggests a series of potential causes. Blau et al. (1998) review the literature on the gender gap and wage discrimination, while Bowler (1999) provides recent data.

² Another type of preference differences relates, for example, to family-career trade offs. We are not going to explore this issue in the current survey. The same is true for reviewing the literature on gender discrimination. This of course does not mean that we believe that these issues are of less importance or relevance, but that these are not issues that experimental methods can illuminate as clearly as gender differences in risk, social or competitive preferences.

The main source of data used in the current article is economics experiments. In these experiments 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 done multiple times with different individuals with different backgrounds and demographics, allowing us to test the impact of self-selection and learning and their differential impacts on men and women. We also include data from real markets (e.g., risk taking by fund managers) whenever possible.

A number of previous papers review experimental psychology studies on the impact of gender. Meta-analyses have been published in examining the impact of gender on intelligence testing (Born, Bleichrodt and van der Flier 1987), cognitive ability including mathematical, verbal and spatial ability (Hyde 1981; Hyde, Fennema and Lamon 1990; Hyde and Linn 1988; Linn and Peterson 1985), personality development (Cohn 1991, Feingold 1994), conformity and social influence (Cooper 1979; Eagly and Carli 1981, Johnson and Eagly 1989), self-disclosure (Dindia and Allen 1992), leadership style, evaluation and effectiveness (Eagly and Johnson 1990; Eagly and Karau 1991; Eagly, Makhijani and Klonsky 1992; Eagly, Karau and Makhijani 1995), aggressive behavior (Eagly and Steffen 1986, Hyde 1984) and social behavior (Eagly and Wood 1991, Wood 1987). In an excellent overall review, Eagly (1995) describes over 25 years of psychological gender research (see also the heated debate in the February, 1996 of *American Psychologist* which followed). 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.

This article is divided into three sections. 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 taking

Almost every decision individuals make involves risk. This is especially true in the labor market, where individuals choose career paths, decide about changing jobs and make decisions about the form of their compensation.

The common stereotype is that women are more risk averse than men. Risk averse behavior in the labor market may lead to a choice of job with a lower mean and lower variance of salary. If indeed women choose less risky career paths, this can explain part of the gender gap unconditional on career choices. If women make different choices than men once they have entered the workforce (e.g., they don't change jobs as frequently, or negotiate for their compensation), this can explain part of the gender gap conditional on career choice.

Even if there were no actual differences in gender attitudes toward risk, the belief in the stereotype may by itself have implications for what jobs women are offered and how much they are paid. This is especially relevant for jobs requiring risky decision-making (e.g., investment management, entrepreneurs). If employers believe that women

are more risk averse than men, they may be unwilling to hire and/or compensate them as they would men.

In this section we review the literature examining gender differences and risk preferences. We find, on average, that women are indeed more risk averse than men. However, this finding carries a few caveats (men and women react differently to the framing of risks), and exceptions (risk attitudes of professional men and women are not generally different). We conclude with a discussion of stereotypes.

2.1 Gender Differences in Risk Preferences

A large literature in psychology and sociology indicates that women are more risk averse than men. Byrnes, Miller and Schafer (1999) analyzed 150 studies from 1967 to 1997 in which the risk-taking tendencies of male and female participants were compared in a variety of settings. These studies involved over 100,000 participants in total. They code the studies by the type of task (e.g., self-reported behaviors versus observed behaviors), task content (e.g., smoking versus sex), and age. Results showed that in 14 out of 16 tasks, males were more risk taking. Certain tasks (e.g., intellectual and physical risks) produced larger gender differences than others (e.g., health risks like smoking).

A similar review of social risk taking by Arch (1993) analyzes 50 studies and reports again that women are more risk averse than men. Arch (1993) explains this phenomenon by claiming that males are more likely to see a risky situation as a challenge that calls for participation while females tend to respond to these situations as threats that encourage avoidance. This theme will reappear in the section on competitive behavior as well.

In contrast to this literature, in economics the research has primarily focused on attitudes toward financial risk, and evidence on gender differences there is more mixed.³ Eckel and Grossman (2003) survey the economics literature, comparing the data across abstract gambles, contextual experiments and field studies. They conclude that while the results from field studies show that women are more risk averse, the findings of laboratory experiments are less clear. For example, in a lab experiment using gambles, Holt and Laury (2002) vary the size of the gamble. All participants were much more risk averse when the size of the real incentives increased. However, women were more risk averse than men in low-payoff decisions. No sex differences were found in high-payoff decisions.⁴

Field studies on risk preferences often focus on investment behavior by men and women (an inherently high-payoff decision), and this literature demonstrates strong gender differences. For example, using data from the Surveys of Consumer Finances, Sunden and Surette (1998) studied the allocation of defined contribution plan assets. They find that sex and marital status are significantly related to asset allocation. Married men and married women were less risk prone than their single counterparts. That is married men (women) chose less risky investments than single men (women). In addition, single women were less risk prone than single men.

³ See, e.g. Atkinson, Baird and Frye (2003); Gysler, Kruse and Schubert. (2002); Johnson and Powell (1994); Kruse and Thompson (2003); Master and Meier (1988); Schubert, Gysler, Brown and Brachinger (1999, 2000).

⁴ It is interesting to contrast Holt and Laury (2002) results with the findings of Hartog, Ferrer-I-Carbonell and Jonker (2002) who elicited hypothetical willingness to pay for a series of high-stakes lotteries. The latter study reports a strong gender difference, with men taking more risk. While the advantage of using real large stakes over hypothetical questions is clear and important, it also carries some cost. The number of participants in all of Holt and Laury (2002) experiments (including hypothetical choices) was 175, compared with over 20,000 participants in the Hartog, Ferrer-I-Carbonell and Jonker (2002) study. In the cost-benefit analysis of using actual large incentives, the quality of each observation is the benefit, and the number of participants is the cost. We believe that these two methods are complementary.

Also using data from the Survey of Consumer Finances, Jianakoplos and Bernasek (1998) examined investment behavior of single men, single women, and married couples. As their dependent variables they employed the ratio of risky assets held to wealth. Controlling for factors such as age, education, children, and home ownership, they report that single women were significantly more risk averse (i.e., hold a smaller percentage of their wealth in the form of risky assets) than single men.

A potential problem with these two studies is the inability to find out who makes investment decisions in married couple households. Bernasek and 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. Also, men who have spouses who are willing to take more risk allocate larger portions of their defined contribution pensions to risky assets than men whose spouses are unwilling to take any risks. Women in the same situation take less risk in the allocation of their defined contribution pensions.

Hinz, McCarthy and Turner (1997) collected data from a 1990 survey of participants in the federal government's Thrift Savings Plan. They find that women invest their pension assets more conservatively than men. A large percentage of women invested in the minimum-risk portfolio available to them. A portion of the pattern is explained by women's lower incomes, but the result persists after controlling for economic and demographic variables. Married women also invest less in common stock than married men, holding constant age and income. Similarly, Bajtelsmit and Van Derhei (1997) used a rich database of employee pension and demographic characteristics

to examine individual characteristics and pension allocation. The women in this sample are significantly more likely to invest in fixed-income securities and are less likely to invest in employer stock.

One hypothesized reason for the different exhibited risk attitudes had to do with the perceptions of risk rather than the reactions to a given level of risk. A few papers examine gender differences in *overconfidence*, which would lead to a reduced estimate of the riskiness of a given investment.⁵ Odean (1998) showed theoretically that overconfident investors hold riskier portfolios than do rational investors with the same degree of risk aversion, and they overtrade relative to the normative benchmark. Barber and Odean (2000) tested the overconfidence model and found that men trade 45 percent more than women and earn annual risk-adjusted net returns that are 1.4 percent less than those earned by women. These differences were more pronounced between single men and single women; single men trade 67 percent more than single women and earn annual risk-adjusted net returns that are 2.3 percent less than those earned by single women.

The experimental evidence on overconfidence suggest that men are more overconfident than women (Deaux and Farris, 1977; Lundeberg, Fox and Puncchohar, 1994). For example, Estes and 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. Women were substantially less confident than men in their investment decisions. This difference in confidence may be one cause of the observed differences in risky behavior.

⁵ Note that in many cases it is also not clear whether more conservative choices result from risk attitudes or risk perception. See Blais and Weber (2001) who study risk perceptions of males and females across domains.

2.2 Nature or Nurture: Culture and Age

Many authors argue whether gender differences in risk attitudes are caused by evolution or by socialization. Two streams of research shed some light on this question. The first looks across cultures. Societies and groups differ in gender roles; if gender differences in risk-taking behavior vary by culture, this provides evidence in favor of the nurture or socialization explanation.

For example, Zinkhan and Karande (1990) examined differences in risk-taking between American (from University of Houston) and Spanish (Madrid School of Business) MBA students, and between male and female subjects in both samples. The results indicated that Spanish subjects showed greater risk-taking behavior than American subjects, but found no gender-culture interaction with women being more risk averse than men in both samples.

Finucane, Slovic, Mertz, Flynn and Satterfield. (2000) report data collected as part of a national telephone survey containing questions about worldviews, trust, and a range of demographic variables. Participants were American from different racial/cultural groups (African-American, Hispanic, Asian and White). The study found significant differences in risk perception (recall the discussion of overconfidence, above), in particular that men rate a wide range of hazards as lower risk than do women across all ethnic groups, but again found no interaction between culture and gender.

Participants in Thomas, Anisya and Mueller (2000) were 1,800 students from Belgium, Canada, China, Croatia, Germany, Ireland, Singapore, Slovenia and the U.S. They find that risk-taking propensity varied systematically with cultural distance from the

U.S., but that males exhibit greater levels of risk-taking than their female counterparts in all cultures. Again, there are no changes in gender differences in risk-taking between cultures. These studies lend support to the evolutionary (nature) story of risk preferences, which we mention again in our discussion.

A second way to study the relative importance of nature and socialization in gender differences is by studying children, who are presumably less socialized than adults. A large body of literature studies risk behavior in children. For example, Arenson (1978) observed children between the ages of 5 to 13 years who played a game in which they were asked to choose between gambles with equal expected value, but different probabilities of payoff (.5, .25 and .125). No age or sex differences were found in the last 30 trials of the game.

A series of other studies with children do find differences, however. For example, with non-monetary risks, Ginsburg and Miller (1982) examined 3 to 11 year-old children at 4 different risk-taking locations at the San Antonio zoo. Frequency counts of boys and girls were made at the elephant rides, burro exhibits, children's petting zoo, and along a steep embankment of the San Antonio River. Girls were just as likely as boys to enter the zoo. However, at all four of the risky encounters, significantly more boys than girls engaged in risk-taking behavior. Older boys and girls were more likely to take these risks than younger children. Thus, males, especially older ones, engaged in more risk-taking behavior than females within the context of this field study.⁶

⁶ It is interesting to note that nearly all of the children were accompanied by an adult. Each measure of risk taking involved children who performed the behavior without adult assistance. Thus, the extent to which parental roles shaped these behaviors was beyond the scope of this study. Differential parental encouragement of males or females to participate in risks (or to offer assistance) in these particular situations may of course play a major role in children's behavior.

Another example of the interaction between gender and age is Brinig (1995) who used 300 volunteers from an elementary school, a high school and graduate education. Participants chose from which of three urns to draw: An urn with .9 chance of winning a “very small” prize; an urn with .2 chance of a “slightly larger” prize; or an urn with .05 chance of winning a “very large” prize. Brinig (1995) finds a gender difference that peaks at age 30. This finding is also consistent with evolutionary theories that men are more risk-taking during the period in which they are trying to attract mates, and women are more risk-averse during the child-bearing years.

This literature again replicates the overall finding that men are less risk-averse than women. In addition, it sheds some light on the cause of this behavior, and lends support to the evolutionary argument over the socialization argument. Our overall conclusion from these first two sections is that there is a robust and significant gender difference in risk preferences.

However, not all studies find gender effects. For example, Harbaugh, Krause and Vesterlund (2002) measured the effect of age and the size of the probabilities on the risk-taking behavior among children and adults, using both losses and gains frames. In contrast to Byrnes, Miller and Schafer (1999) and Brinig (1995), this study does not find significant gender differences in risk aversion in any of the gambles studied. The authors conclude that differences in risk behavior or in probability weighting, either in children or in adults, are small and insignificant in their data. This leads us to the next section that describes the limits of the gender difference.

2.3 When Gender Differences Disappear

Framing

Framing refers to the description of a gamble as a gain or as a loss. Some experiments do not find gender differences in differently framed gambles. For example in Eckel and Grossman (2002a) experiment, 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 (2002a) found that women are more risk averse across all frames. Another example is presented in Eckel and Grossman (2002b) 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.

Similar results are reported by Powell and Ansic (1997) who studied whether differences in risk preference and decision strategies result from framing and the level of task familiarity. The first experiment involved a familiar financial decision framed in terms of losses. The second experiment presented an unfamiliar financial decision framed in terms of gains. The results show that females are less risk seeking than males irrespective of familiarity, framing, costs or ambiguity.

On the other hand, several studies find gender differences by frame. In an abstract lottery choice, Schubert, Gysler, Brown and Brachinger (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, Gysler, Brown and Brachinger (1999) subjects exhibited no evidence of systematic gender differences in risk attitudes.

Related to framing is ambiguity. In ambiguous situations, individuals make risky decisions without knowing the objective probabilities of the outcomes; they form subjective probabilities instead. Schubert, Gysler, Brown and Brachinger (2000), in a compare “weak” and “strong” ambiguity frames in their setup. They report no gender differences in abstract contexts or with weak ambiguity. With strong ambiguity women are more risk averse in the gain domain, but again males are more risk averse in the loss domain. Moore and Eckel (2003) also studied the effect of ambiguity and found events in which men were more risk averse than women. They also report mixed evidence; in the gain domain, women were more risk averse than men, as well as significantly more averse to weak ambiguity. However, when the gambles were framed as insurance this difference reversed and men were more risk averse. Moore and Eckel (2003) did not find gender difference in ambiguity aversion in the insurance frame.

With respect to probabilities, Fehr-Duda, Gennaro and Schubert (2004) find that the difference in 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.

To summarize the evidence on framing, gender differences in the predicted direction are found in gains gambles; women are significantly more risk-averse than men. However, less consistent evidence is found for loss gambles, where sometimes women are more risk-averse than men, sometimes there are no differences, and sometimes men are more risk-averse than women (see also Tables 1 and 2 in Eckel and Grossman, 2003).

Managers and professional business persons

A second and important domain in which gender effects in risk preferences are attenuated involves the selection of the participants. The studies discussed above selected members of the general population (or the convenient university population). In these studies, the authors compare a (perhaps more relevant) subsample of the population; managers and professionals.

For example, Atkinson, Baird and Frye (2003) compared the performance and investment behavior of male and female fixed-income mutual fund managers. They find that 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 (described above) may be related to investment knowledge and wealth constraints.

Similar results are reported in Johnson and Powell (1994). They compare decision-making characteristics of males and females in a “non-managerial” 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 sub-population males and females display similar risk propensity and make decisions of equal quality, while in the non-managerial sub-population women are more risk averse than men, as described above.

Master and Meier (1988) studied males and females who owned a small business or managed one. The participants were given questionnaires and were asked to give advice with respect to the level of risk one should take in pursuing a desired goal. Master and Meier (1988) concluded that female entrepreneurs and managers have the same risk-

taking propensity as their male colleagues. Also studying entrepreneurs, Birley (1989) asserts that although there seems to be a general supposition that male and female entrepreneurs differ in their personality traits (see the discussion on stereotypes below), there is little empirical evidence to support the claim, and the financial environments they face when starting their businesses is similar. In the laboratory, Gysler, Kruse and Schubert (2002) find that for women, but not for men, risk-aversion diminishes as expertise increases.

The conclusion from these studies is that gender-based risk differences among managers are quite different than those in the general population. 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 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 suggest that an important exception to the rule that women are more risk averse than men is among managers and professional business persons.

A nice piece of evidence that ties together the observation that women's investments are more conservative but that this is true only for non-professional women is presented by Dwyer, Gilkeson and List (2002) who use data from nearly 2000 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 Gysler, Kruse and Schubert, 2002 for similar results in the lab). With this selection issue in mind, evidence from this stream of research concludes that women are indeed more risk-averse than men.

This result is likely to be an important one for labor economics. If gender differences in risk preferences are obliterated by selection or training effects we can generate new empirical predictions for different subsamples of the workforce. However, predictions must be mediated by the attitudes not just of employees, but also of firms, as discussed in the next subsection.⁷

Stereotypes of Risk Preferences

This next section addresses the more complicated question of stereotypes; third-party beliefs about risk preferences of men and women. Many executive level jobs require risk-taking. If the stereotype (whether correct or not) is that women are less likely to take risks, this can lead to statistical discrimination against them in appointments and allocation of tasks. This could cause a gender gap in wages independent of actual differences in underlying risk preferences.

Some studies have found evidence supporting statistical discrimination, even when there are no gender differences in risk-taking. For example, after showing that the performance and investment behavior of male and female fixed-income mutual fund managers does not depend on gender, Atkinson, Baird and Frye (2003) find evidence that the gender of the manager still influences the decision-making of mutual fund *investors*. The net asset flows into funds managed by females are lower than for males, especially for the manager's initial year managing the fund. Similarly, Johnson and Powell (1994)

⁷ In other special populations in which risk-taking is an important component, researchers have also found gender differences. For example, Hudgens and Fatkin (1985) studied the behavior of male and female enlisted military personnel. In a simulated computer game, participants faced a video display of simulated mine fields. They first estimated the probability that a tank might successfully cross 100 mine fields when starting from an unknown point below each field. This was followed by the risk-taking task in which they decided whether to send a tank across each of the fields. The results indicate, as in the general population, a greater risk-taking in males.

argue that women are often excluded from managerial positions of authority and leadership because of stereotypes that have been constructed by observing non-managerial populations. They conclude that these stereotypes may not apply to managers as in the managerial sub-population in their study, males and females display similar risk propensities and make decisions of equal quality.

This overestimation of women's risk aversion is found also with students in the laboratory. For example, Eckel and Grossman (2002a) subjects' first chose among gambles (described below), and were then asked to guess the gamble choices of each of the other participants. Both men and women anticipated (correctly) that men would be more risk-taking, but overestimated the risk aversion of others—especially of women.

These studies are important because they illustrate another potential cause of the gender gap. Note that this behavior on the part of firms may be perfectly rational; if mutual fund investors are less likely to invest with a woman due to their stereotypes, then hiring a man may very well be the profit-maximizing move. As long as someone in the system shares these stereotypes one can get gender-gap outcomes.

Conclusion

The findings in this section show clear evidence that men are more risk-taking than women in most tasks and most populations. Some important caveats are, however, needed. Perhaps the most important one for labor markets is that women who chose (or who were trained) in jobs such as financial advisors, are not less risk-taking than their men colleagues. But why do we see so many more men in these positions than women? One answer might be the riskiness of the compensation in these positions. But there are

other possibilities as well. The next section considers gender differences in social preferences and how they might impact job choice.

3. Differences in social preferences

Again we begin with the stereotype that women are more other-regarding than men. Formally, this means that others' payoffs (or utilities) enter into the utility function of women more strongly than they enter the utility function of men. Social preferences might influence the labor market in a number of ways. Social preferences determine what types of jobs individuals choose as they are trading off income and other attributes of jobs (e.g. "helping"). Social preferences can also determine how much employees help each other in the workplace, even when such help is unrecognized and uncompensated. Finally, social preferences can determine what employees believe is fair and how they negotiate for their salaries and promotions.

This social preference is modeled in the economic literature in the form of altruism (e.g. Becker 1974, Andreoni 1989) envy (e.g. Mui 1995), inequality-aversion (e.g. Bolton 1991, Bolton and Ockenfels 2000, Fehr and Schmidt 1999), or reciprocity (e.g. Rabin 1993, Charness and Rabin 2002; Falk and Fischbacher forthcoming, Dufwenberg and Kirchsteiger forthcoming). While all these models describe how an individual may be other-regarding, the extent and form of the social preferences may 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 four ultimatum game studies

and eight dictator game studies. We also include evidence on reciprocity from eleven studies using trust and related games. Finally, we discuss briefly a large number of older studies using the Prisoners' Dilemma game, and thirteen studies using social dilemmas and/or public goods provision games.⁸

As with the previous section, results on gender differences vary in these studies. We believe that this variance can be explained by a differential sensitivity of men and women to the social conditions in the experiment. Participants in these experiments think hard about what the appropriate and/or right thing to do might be. Research from psychology suggests that women are more sensitive to social cues in determining appropriate behavior than are men. 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.

We provide two types of analyses 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.

Of particular relevance to this inquiry are meta-analyses of gender differences in social loafing, which maps to public goods contributions and social dilemma games (Karau and Williams 1993) and helping behavior which maps into altruism (Eagly and Crowley 1986). In the former, men socially loaf (free-ride) significantly more than

⁸In addition, we identified six studies investigating the impact of gender on coordination (Cadsby and Maynes 1998, Cadsby et al. 2004, Holm 2000, Holm 2004 and Croson and Marks 2004). Since these studies speak only weakly to the question of other-regarding preferences, they are not reviewed here.

women. In the latter, the authors argue that men help strangers more than women do, but that women help friends and other close individuals more than men.

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 proposal suggested. If the offer is rejected, each party receives zero.⁹ The earliest ultimatum experiment was Guth, Schmittberger and 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, 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 and two field experiments examine gender effects in ultimatum settings. In Eckel and Grossman (2001), participants divide \$5 with a responder randomly chosen from a group of four counterparts sitting across an aisle. In the treatments, the counterparts were either all female, all male, or of mixed genders.

⁹Note that the ultimatum game is a simplified form of alternating-offer bargaining (also called Stahl-Rubinstein bargaining). While many experiments have been run in this paradigm, none have examined gender effects.

Participants play eight games against different opponents, four in the role of proposer and four in the role of responder. Eckel and Grossman find no differences in proposer behavior; men and women make the same-sized offers. However, there are significant differences in responder behavior. A given offer is significantly more likely to be accepted if it is made by a woman than by a man. And women are significantly more likely to accept lower offers than men. This leads to the result that offers made by women to women were the least likely to be rejected (only 3.1% of the time).

In contrast, Solnick (2001) reports ultimatum games in which participants sat on opposite sides of a curtain and had no face-to-face contact. Her study used the strategy method, where responders indicated their minimum willingness to accept. This method generates additional data (the minimum willingness can be analyzed directly) but is thought to lead to more analytical or “cold” decision-making states than the game method used by Eckel and Grossman. Gender is 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 Fershtman and Gneezy 2001). Like Eckel and Grossman, Solnick finds no effect of gender on proposer behavior: men and women make the same-sized offers. However, there are significant differences in responder behavior. Solnick finds that a given offer is significantly more likely to be rejected if it is made by a woman than by a man. This leads to the result that offers made by women to women were the most likely to be rejected (23% of the time).

In their excellent summary of gender differences, Eckel and Grossman (forthcoming) point out the similarities and differences in these two studies. Both find no gender differences in offering behavior, and that offers made to women are lower than

offers made to men. What differs is in the rejection behavior: In Solnick (where there is no face-to-face contact and the strategy (cold) method is used) offers made by women to women are the most likely to be rejected (23%). In Eckel and Grossman (where there is face-to-face contact and the game (hot) method is used) offers made by women to women are the least likely to be rejected (3%).

More generally, we can compare differences in responder behavior between the two studies by gender. When men are responders, their rejection rates differ by an average of 8.7% between the two studies. When women are responders, their rejection rates differ by an average of 18.6% 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 the behavior of male responders. This analysis, and others like it, will be further described below.

Two field experiments describe gender effects of ultimatum-like bargaining. In Ayres and Siegelman (1995), confederates expressed interest in purchasing a car at a dealership, and asked for the salesperson's price. In the field, this price is an opening salvo in an ongoing negotiation. However, in this study, the confederates always reject this (ultimatum) offer and leave without purchasing. The results show that white women in the role of buyers are offered somewhat (but not significantly) higher car prices than white men; this is reversed in the African-American group in which the women are offered lower prices than the men. In a related lab experiment, Fershtman and Gneezy (2001) found that while men were discriminated according to their ethnicity, women were not. That is, the offers to women did not depend on ethnicity while the offers to men did.

In a recent ultimatum field experiment, Guth, Schmidt and Sutter (2004) 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. As with Solnick, this paper uses the strategy method. They find that female participants are significantly more likely to propose a three-way equal split than are men.

These field experiments are helpful in that they demonstrate the impact of gender differences in a less artificial setting than in the lab. However, disadvantages come with the field as well; most notably an increased difficulty of replication. Thus we cannot compare offer or rejection rates between studies as easily as in the lab data.

3.2 Dictator Games

The results from ultimatum games are useful, however there are multiple motivations which could be causing behavior and are difficult to tease apart. In order to improve our ability to infer motivations Forsythe et al. (1994) used a dictator game. In this game the proposer again has a pie of money to divide between himself and the recipient. But the second player has no decision to make; they 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 concerns are not relevant here.

Eight papers have investigated gender differences in dictator giving. Here, we divide them into those that examine the main effects of gender (how much men give

versus how much women give) and those that examine the interaction effects of gender (how much do men give to men versus to women, etc.).

Main Effects of Gender

The first two studies use a simple dictator setting. 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 Katok (1995), a less anonymous design is used in which participants again divide \$10. The options facing the participants are less continuous however, 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 \$0.14 and men give \$0.13).

However, note again the comparison between these two studies. As the social conditions of the experiment changed, male giving changed by \$0.62 while female giving changed by \$1.46. This provides further evidence that the behavior of women is more sensitive to the social conditions of the experiment than the behavior of men.

The next four studies go beyond the simple dictator setting and look at how gender interacts with various details of the experiment. Andreoni and Vesterlund (2001) manipulate the cost/benefit ratio of giving money to the recipient. They find that the behavior of men is more responsive to price changes (which seems to counter our theme that women's behavior is more variable). However, the authors argue that men are concerned with maximizing efficiency; giving more when the cost/benefit ratio is low

and less when it is high. In contrast, women tend to equalize earnings between the two parties. Thus male and female reactions to price changes are consistent with different objective functions, rather than one being more variable than the other. The authors also find that women give more than men when the price of giving is one, significant in one condition (budget 4) and not significant in another (budget 5).

While a comparison between this study and the previous two is problematic, we can compare the proportion of the pie sent by men and women in the two treatments in which the price of giving equaled one (budgets 4 and 5). The difference between these treatments was the size of the pie; in budget 4 there was \$6 to divide and in budget 5 there was \$10 to divide. Men's giving was the same in these two conditions (23% of the pie in both). In contrast, women gave more under budget 4 than under budget 5 (32% of the smaller pie and 29% of the larger pie). Note that this experimental design involved a within-subject comparison, thus the same individuals faced both these budget sets. On average, female behavior changed while male behavior did not. Again, this provides evidence that female behavior is more sensitive to details of the experimental design than male behavior.

Dickinson and Tiefenthaler (2002) run experiments similar to Andreoni and Vesterlund, except that the party making the allocations is a disinterested third party (rather than a self-interested dictator). The two parties receiving resources have different marginal valuations for them. They again find that male allocators are more likely to maximize efficiency and female allocators are more likely to equalize what the two parties receive.

Selten and Ockenfels (1998) use a variant of the dictator game called the solidarity game. Here, three participants are arranged in a group and face a gamble. Before the gamble is resolved, they can offer side payments to each other in the case that they should win while the other(s) lose. These are interpreted as “conditional gifts,” but the decisions are nonetheless binding. The authors find that males give significantly lower conditional gifts than females, consistent with the previous results on dictator giving.

Dufwenberg and Muren (2004a) look at gender effects in a team dictator game (originally studied by Cason and Mui 1997). In this game groups of three divide money between themselves and a fourth recipient. Money kept for the group is divided equally amongst its members. The researchers vary the gender composition of the groups and find that female majority groups (all female, or two female and one male) give the fourth party significantly more than male majority groups (all male or two male and one female). This study again finds that women are somewhat more generous than men.

In summary, these studies find that women are more generous than men when there are no efficiency gains to be had. When efficiency gains are present, men choose more efficient allocations; women more equal allocations.

Interaction Effects of Gender

Two studies look at the interaction of the genders of the proposer and recipient in two-party dictator games. In Dufwenberg and Muren (2004b), 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. However, the authors do find that women receive significantly larger allocations than men receive.

Finally, Ben-Ner, Kong and 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 or male. However, women give significantly less to other women than they do to men or to persons of unknown gender. 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 provides additional evidence that women are sensitive to the social context of the experiment in ways that men are not.

3.3 Trust and Reciprocity

A series of experiments examine motivations 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.

Many of the studies below rely on the trust game paradigm. A discrete version of the trust game was introduced by Kreps (1990). More continuous versions were introduced by Berg, Dickhaut and McCabe (1995) and Van Huyck, Battalio and 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).

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 Buchan (1999) for example, find no differences between men and women in how much they send in a continuous trust game. Similarly, Clark and Sefton (2001) find no effect of gender in a related game, the sequential prisoners' dilemma. Finally, Cox and Deck (2004) find that men and women are equally generous in a discrete trust game, where they can send either zero or 37.5% of the pie.

This last paper provides some additional evidence that women's choices are more sensitive to context than men's. 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 66% to 14% with the conditions for a range of 52 percentage-points. In contrast, the proportion of men who send varies from 25% to 50%, for a range of only 25 percentage-points. A probit model in Table 4 reports that the decisions of men are not statistically sensitive to these treatment differences, but that the decisions of women are. The authors write "...for men, the decision about whether to be generous does not depend on reciprocal considerations, the level of payoffs or the social distance... [but] unlike men, women do base the decision of whether or not to be generous on the costs associated with the decision." (pp. 10-11).

In a discrete setting, Eckel and Wilson (2004a) allow participants to choose with whom they will interact. Subjects see only icons which responders choose to represent themselves. The authors find that all participants prefer friendlier icons, and that the addition of choice increases amounts sent. However, they also find that women are less likely to send than men. Two other studies find that women are less likely to send than men; Snijders and Keren (2004) use a discrete game like Eckel and Wilson. Chaudhuri and Gangadharan (2004) use a continuous game, and find the same result.

In these studies, the trustors do not know the gender of their counterpart. A few studies have looked at the impact of gender when the gender of the counterpart is known. Fershtman and Gneezy (2001) used first and last names to signal gender and ethnicity.

They find that while men discriminate between counterparts according to both dimensions, women did not discriminate at all.

Buchan, Croson and Solnick (2004) look at the interaction of gender; participants in this study either know (or do not know) the gender-specific first name of their counterpart in a continuous trust game. This paper, like the others, finds that men send more than women in this setting (average \$7.80 versus average \$6.66). However, it also provides some additional evidence for the increased sensitivity of women to details of the game. The range of amounts that men send is \$1.22. In contrast, the range of amounts that women send is \$1.47. Women appear more responsive to knowing the gender of their counterpart (and the realization of what that gender is) than men.

Eckel and Wilson (2004b) look at the interaction of gender as well; participants in this study are told a set of information about their counterpart, or see their picture. This paper uses a discrete trusting decision (send all or send none) and a doubling of the amount sent rather than tripling. 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 of their counterpart. Again, however, women's behavior moves more than men's behavior. There is a 19 percentage-point difference between the male trusting rates in the two conditions (92% vs. 73%), and a 24 percentage-point difference between the female trusting rates in the two conditions (64% vs. 88%).

Two additional papers look at the interaction of genders but extend the traditional trust paradigm in creative ways. Schwierien and Sutter (2004) compare trust in another party's *actions* as the above papers do, with trust in another party's *ability*. In the control condition they use the continuous version of the trust game with a multiple of 3, but in

their ability condition the multiple is dependent on the responder's performance on a math test and the return rate fixed at $\frac{1}{2}$. Gender is communicated by first name. In the baseline condition, the authors find no gender effects, but in the ability game, men send more than women.

Slonim (2004) allows participants to choose their counterparts in the trust game. He finds that both men and women discriminate against their own gender in their choice of partner; men choose women 80% of the time and women choose men 65% of the time). However, for a given partner pairing, he finds no gender differences in the amount of trust observed.

Reciprocal Behavior

Findings on gender differences in reciprocal behavior are somewhat more consistent across studies. While three studies have found no gender differences in reciprocity (Clark and Sefton 2001 in a sequential PD, Eckel and Wilson 2004b in a discrete trust game with pictures and Eckel and Wilson 2004a in a discrete trust game with icons), seven other studies have found women are more reciprocal than men.

Five experiments demonstrate this in the trust-game setting. In settings where individuals do not know the gender of their counterpart, Croson and Buchan (1999) demonstrate that women return more as a percentage of the money they have (dictator style) than do men. This finding is replicated by Chaudhuri and Gangadharan (2004). Snijders and Keren (2004) use a discrete trust game, and find that women are more trustworthy than men as well. In a similar setting where participants know their counterpart's gender, Buchan, Croson and Solnick (2004) again replicate the finding that

women are more reciprocal than men. Similarly, in the control condition of Schwieren and Sutter (2004), women are more reciprocal than men (in their ability condition, the amount returned is not a choice variable).

Two experiments demonstrate the increased responsiveness of women to another party's 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 men are less likely to punish than women, and that women but not men reward the fair partner more when the cost is lower.

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. 153-154, 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.

Ben-Ner, Putterman, Kong and Magan (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 some main-effect differences in the generalized reciprocity condition, men send more than women but women reciprocate more than men. However, they also find that women are influenced by the amount they

received 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 male behavior.

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. Rapoport and Chammah (1965) show that men cooperate significantly more than women, as do a series of later studies (e.g. Kahn et al 1971, Mack et al 1971). However, other studies have shown that women are more cooperative than men (e.g. Sibley, Senn and Epanchin 1968, Tedeschi, Heister and Gahagan 1969), while others have shown no significant differences (e.g. Dawes et al 1977, Orbell et al 1994).

Another psychology study provides additional evidence for the increased sensitivity of women to the context of the game as an explanation for these inconsistent results. Stockard, van de Kragt and Dodge (1988) use the social dilemma setting (N=9 or N=7 but with a discrete cooperate/defect decision). Their experimental design varied whether groups could communicate before making their decision. They found that women were slightly more cooperative than men, but that women's cooperation was more sensitive to the existence of discussion (92% with discussion and 46% without; a 46% point difference) than was men's (80% with discussion and 52% without; a 28% point difference). Furthermore, this experiment asked participants to explain their actions. Women were significantly more likely than men to report that they were focused on harmonious group relations, and less likely to be nervous or upset at the end of the experiment. This focus on the group and a lack of self-focus (resulting in a lack of

nervousness), is consistent with the observation that women's decisions are sensitive to the social context in ways that men's are not.

In economics experiments (where participants are paid for their actions), Frank et al. (1993) finds that women are significantly more cooperative than men. Ortmann and Tichy (1999) finds the same result in the first round of a repeated experiment (strangers design, so no subject meets any other subject more than once), but that gender differences disappear over time. Again, this experiment provides some support for our conjecture that women are more sensitive to the context of the experiment than are men. Here, male subjects acted the same in mixed groups and all male groups (cooperating 27% of the time and 38% of the time respectively). Females, however, are significantly more cooperative in the mixed-sex groups than in the all-female groups (cooperating 65% of the time and 50% of the time respectively).

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 Marwell and Ames (1981), individuals have resources they can allocate toward their private consumption or the group's public consumption. Tokens 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 considered altruistic. A meta-analysis of gender differences in VCM games is currently underway in Gaechter and Poen (2004).

Early VCM experiments find competing results. Brown-Kruse and Hummels (1993) find that men contribute more toward the public good than women. This effect is

also found in Sell and Wilson (1991) and Sell (1997). In contrast, Nowell and Tinkler (1994), and Seguino, Stevens and Lutz (1996) find that women contribute more toward the public good than men. Finally, Sell, Griffith and Wilson (1993), Cadsby and Maynes (1998), and Solow and Kirkwood (2002) find no significant differences.

As above, these studies had significant methodological differences. We argue that male contributions are relatively stable across these studies, while contributions of females vary with these details. Data from all the studies is not available, but in three studies with no significant differences, the percentage of giving done by males was 66% (Solow and Kirkwood), 67.2% (Cadsby and Maynes) and 56.7% (Sell, Griffith and Wilson); averaging 63.3%. In three studies where men contribute more than women, men's contributions were quite close to this, 67.7% (Brown-Kruse and Hummels), 50.7% (Sell and Wilson) and 57.1% (Sell); averaging 58.7%, a difference of 4.6 percentage-points.

In contrast, in the three studies which found no significant differences giving on average by females was 60% (Solow and Kirkwood), 59.9% (Cadsby and Maynes), and 51.9% (Sell, Griffith and Wilson); averaging 57.3%. In the three studies where men contribute more than women, women's contributions are lower, 56.3% (Brown-Kruse and Hummels), 36.5% (Sell and Wilson) and 46.4% (Sell); averaging 46.4%, a difference of 9.9 percentage-points. Thus it is female contributions that reduce to create differences, rather than male contributions that increase (in fact, male contributions decreased on average in these three studies, but female contributions decreased more).

Finally, Chermak and 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, if any, are sensitive to protocol and context." (p. 61).

3.5 Organizing Explanation

A large body of work, both published and unpublished, identifies gender differences in other-regarding preferences. However, many of the results are contradictory. In some experiments, women are more altruistic and reciprocal 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 subtle cues in the experimental context than are men. Research from psychology suggests that women are more sensitive to social cues in determining appropriate behavior than are men (Kahn et al. 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 altruism 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 dictator games, we find that women's decisions vary with the size of the pie more than do men's (Andreoni and Vesterlund), and 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).

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), and with the existence of a picture of their counterpart (Eckel and Wilson). Similarly, female trust is sensitive to the size of the pie, the social distance in the experiment and the ability of the second player to respond, while male trust is not sensitive to any of these factors (Cox and Deck).

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

In social dilemma settings women's decisions are more sensitive to the ability to communicate than are men's (Stockard, van de Kragt and Dodge). In the prisoner's dilemma setting, female behavior varied more than males as the gender composition of their group changed (Ortmann and Tichy).

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 in three different settings.

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% while rejection rates by men differ by only 8.7%. In dictator giving we compare the Eckel-Grossman and Bolton-Katok papers and find that male giving differed by only \$0.62 while female giving differed by \$1.46 between the two studies. Finally, in VCM games, we find that gender differences are caused by female contributions changing by 9.9 percentage-points on average, while male contributions change by only 4.6 percentage-points on average.

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 in our experimental studies; sometimes men appear more altruistic than women and other times, women appear more altruistic than men. But primarily what we see is women's behavior is more *context-dependent* than that of men.

These results (and our organizing explanation of them) have important implications for the labor market. If, as the evidence suggests, women are more other-regarding than men they may be more likely to choose jobs that create benefits for others (e.g. in "helping"

professions) which are traditionally lower-paid. This may contribute to the wage gap. Similarly our organizing explanation suggests that women's social preferences are more sensitive to subtle cues than are men's. This can lead women to choose professions which they think are socially appropriate for women, based on the cues they observe about the workforce (for example, what proportion of women are in this given profession). In contrast, men's choice of profession would be less sensitive to these cues.

4. Competitive behavior

In this section we look at a final explanation for the gender gap: differences in attitudes toward competition. Anecdotal evidence suggests that women are more reluctant than men to engage in competitive interactions like tournaments and bargaining. Thus as the competitiveness of an environment increases, the performance and participation of men increases relative to that of women.

4.1 Reacting to Competition

Two studies address the question of whether men and women react differently to competitive situations. These studies suggest that, under some conditions, competition improves the performance of males, while it leaves the performance of females unchanged. This regularity can contribute to a gender gap in competitive environments that would not exist in noncompetitive environments.

In a lab experiment, Gneezy, Niederle and Rustichini (2003) asked men and women to solve mazes on a computer, and were paid either according to a piece rate (a dollar amount per maze solved), or according to a winner-take-all tournament. Under

piece rate, men performed slightly better than women. However, when subjects were paid on a competitive basis, males' performance increased significantly, while that of the female subjects remained constant. The main finding is that in competitive situations where only the best person in the group is rewarded, males react very differently than females.

Choosing a natural environment over a laboratory, Gneezy and Rustichini (2004a) tested this conjecture in a physical education class. Children ran alone over a short track and then in pairs with different gender compositions, with the teacher measuring their speed. When the children ran alone, there was no gender difference in performance. In competition, boys' time improved but girls' time stayed unchanged. The boys put more effort into their performance once they were competing. This race study provides a validation and generalization of the lab study. First, participants performed a familiar task in a familiar environment, without knowing that they were being observed, suggesting that the effect is not an artifact of the lab, nor is it caused by boys' desire to "show off" to the experimentalist. Second, the age of the participants is, on average, less than 10 years (as compared with 23 in the maze study). This difference suggests that gender differences in reactions to competitive situations are formed at an early age. Finally, the competition in the lab used extrinsic motivation (participants were paid in cash) while that in the field used intrinsic motivation. That the results remain suggest that these gender differences are robust and are likely to appear in a variety of different settings.

4.2 Choosing to Compete

The studies discussed above concentrated on gender differences in reactions to competition. But what would happen if participants could choose the incentive scheme according to which they would be paid? If men and women rationally anticipate the gender differences we observe, they may very well choose different environments, and this choice might contribute to the gender gap as well.

Two studies have investigated gender differences in the choice of environment. In both, participants in lab experiments had the option of choosing their own compensation scheme: piece rate or a winner-take-all tournament.

Niederle and Vesterlund (2004) examine the compensation choice for a task (addition problems) where there are no gender differences in performance under either the piece rate or the tournament compensation. Despite this equality in performance they find that most males request that their performance be compensated under the tournament, while most females request the secure 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.

Gneezy and Rustichini (2004b) found that more men than women chose the competitive environment in tasks that favored men *and* in task that favored women. The gap in choice, however, was smaller with tasks that favored women. They further found that women who chose to compete reacted in a similar way to the competitive incentives as men did.

The earlier results suggested that women react to competition differently than men. The current studies suggest a more complex view. First, a higher fraction of men

choose competitive environments than women. Second, men and women were more likely to choose competitive environments when they have an advantage in performing the task than when they do not. Women who choose competitive environments perform just as well as men in those settings. Under this more sophisticated view, the source of the observed gender differences in reaction to competition is driven by the fraction of competitive types, which is higher among men than among women.

4.3 Bargaining

One area in which avoiding competition can have a strong impact on the gender gap is bargaining. Psychologists have identified different styles of conflict management; avoiding, accommodating, collaborating, compromising and competing (Thomas and Kilmann, 1974). How these styles manifest themselves in bargaining is likely to depend on the rules of the game, topics, culture and the relationship between the disputing parties.

Competitiveness in this literature is measured indirectly by inference from strategies. It 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, it is assumed that 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. This definition is problematic because it ignores the possibility that these motivations are not mutually exclusive; many interactions involve elements of both motivations (see section 3 on social preferences in this survey).

Walters, Stuhlmacher and Meyer (1998) make this point when reviewing 62 studies on the relationship between gender and competitive behavior in bargaining. They classify behavior as competitive or cooperative, and conclude that women behave less competitively than men, but that this effect is small. A similar conclusion is reached by Stuhlmacher and Walters (1999), who review the literature on gender differences in negotiation and found that men negotiated better outcomes than women. See also Neu, Graham and Gilly (1988) and Womak (1987).

However, these studies miss an important part of the process: The decision whether to initiate/take part in negotiation. Considering outcomes of negotiations that actually took place ignores the selection issue: Is there a difference in the tendency of men and women to enter negotiation? In a recent book on gender and negotiation, Babcock and Laschever (2003) claimed that “Women don’t ask.” That is, women avoid competitive negotiation situations and thus get fewer concessions and lower wages than 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?” Nine times as many men requested more money as women (Small, Babcock, Gelfand and Gettman, 2003).

In a field setting, Babcock (2002) reports that average starting salaries of male MBAs graduating from Carnegie Mellon were 7.6% higher than those of females. This difference is attributed to the observation that only 7% of the women attempted to negotiate their salary offer, while 57% of their male counterparts negotiated. Similar results are reported in Baron (2003) who asked both men and women whether they

thought they were entitled to salaries that were higher or just equal to those of other applicants for the same jobs. Whereas about 70% of the men said they believed they were entitled to more money, 70% of the women indicated that they were entitled to a salary equal to that of other candidates. Moreover, 85% of the men, as opposed to only 17% of the women, felt that it was up to them to make sure the company paid them what they were worth.

In a direct measure of attitudes rather than behavior, Babcock, Gelfand, Small, and Stayn (2003) asked several hundred people about their negotiating experience. They found that men place themselves in negotiation situation more often than women, and regard more of their interactions as potential negotiations. This difference is robust to age.

Why do we see this difference in attitudes and behavior? We believe that it reflects differences in men and women's attitudes toward competitive situations. As in the research above, when people can choose men are more likely to choose competitive interactions (like negotiation) than women are. This type of sorting can have strong implications for labor market outcomes (e.g., Lazear, 2000). Differences between career choices and promotion speeds can be caused by the desire to avoid competitive situations. High status positions are usually highly competitive. If men are more eager to participate in competitive environments than are women, this could explain a large part of the gender gap.

But more interestingly, our explanation has unanticipated predictions. Sorting implies that gender differences in competitive preferences are smaller within a job categorization and within a given negotiation situation because both men and women

who chose to participate in this environment are more likely to have similar levels of competitiveness. To find differences in preferences towards competition one should compare the reaction to, and choice of, incentives between different job categorization such as CEOs versus teachers.

5. Discussion

This article has reviewed a stream of experimental literature on gender differences in risk preferences, social preferences and competitive preferences. In general, this literature has documented fundamental preference differences between the two genders (with exceptions noted in the text). These differences are consistent with preference-based explanations for the gender gap in wages.

For example, most lab and field studies indicate that women are more risk-averse than men (section 2). This risk-aversion can lead to the attraction of women to jobs with lower mean, lower-variance salaries. This preference-based explanation is consistent with some gender-gap evidence without resorting to discrimination arguments.

A number of studies also indicate that women's social preferences are more sensitive to subtle cues than are men's (section 3). This can lead women to choose professions which they think are socially appropriate for women, based on the cues they observe about the workforce (for example, what proportion of women are in this given profession).

Finally, a third stream of literature suggests that women's preferences for competitive situations are lower than men's. This can lead women to choose professions with less competition (and again to end up receiving lower wages on average). It can also

lead to women earning less or advancing more slowly within a given profession. Of course, the fact that the gender gap can be explained by preference differences does not mean that discrimination does not occur, nor can we conclude that social policy affecting this domain would not be welcome or value-creating.

One important and interesting question about these differences is whether they are ingrained or taught. By taking a step back and asking what causes the gender difference we can also connect some of the different elements discussed in this paper. For example, a large body of literature in evolutionary biology and socio-biology documents differences in competitiveness between males and females, in many species.¹⁰ This literature argues that the differences in competitiveness arise because, due to differences in the cost of reproduction, competitive males will attempt to mate at every opportunity. Females, on the other hand, are inherently choosy, reserving their favors for the strongest suitor.

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-aversers. 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.¹¹

¹⁰ See Knight (2002) or Tregenza and Wedell, (2002) for recent overviews. The debate is a classic in the field: see Darwin, (1871), Bateman, (1948) and Trivers, (1972).

¹¹A basic question in studying risk behavior in nonhumans is how to measure their risk attitude. Researchers focus on behaviors that are observationally equivalent both to risk taking and to sensation seeking (e.g. Fairbanks 1993; Possingham, Houston and McNamara 1990; Clutton-Brock 1988, see Dekel and Scotchmer 1999 for a survey). A nice example is reported in Battalio, Kagel and MacDonald (1985)

Similar evolutionary explanations are consistent with women being more sensitive to social cues than men. In exercising choosiness about mate selection, women who were sensitive to these cues could, on average, produce more fit offspring than those who were not. In contrast this increased sensitivity did not affect a male's chance of reproduction, and was thus not selected for.

Indirect evidence on the nature/nurture question comes from the studies with children (before nurture has full impact) and cross-culturally (when nature remains constant but nurture changes). The evidence we have here suggests that gender differences in preferences remain among children and in different cultures, providing support for the nature over nurture explanation. Of course, some cultural differences have been identified, suggesting that nurture has an effect as well.

It is, of course, a big leap to apply evolutionary arguments to labor force or experimental decisions. And the nurture explanation of gender differences is one that admits the possibility for improvement; cultures can be changed and popular opinion can be molded so as to reduce active discrimination and even to change the tastes of its (male and female) members.

In summary, we have identified three types of preferences which differ between men and women. Each of these have implications for the labor and product decisions that men and women make and are consistent with evidence of a gender gap in wages even without active discrimination. Note that this does not imply that gender discrimination is absent in the workforce, but instead that the existence of a gender gap, even among

who examine rats' preferences over lotteries that differ by mean preserving spreads and find evidence of risk aversion.

similarly-educated individuals in similar occupations, is not enough to imply discrimination as a cause.

We wish to end with a methodological note: A possible bias in the literature on gender differences is that journals are more likely to publish papers that do find a gender difference than papers that do not. Moreover, this publication bias may cause researchers to invest more effort to finding differences than to finding no difference. In the current article we devote much effort to discussing also the literature that does not find differences. May be more important to the future, we urge researcher to routinely record (as is the case in the psychology literature) the gender of the participants when possible. This will greatly expand our understanding of gender differences and avoid the publication bias that is currently in place.

References

- Andreoni, James. 1989. "Giving with Impure Altruism: Applications to Charity and Ricardian Equivalence," *Journal of Political Economy* 97:6, pp. 1447-1458.
- Andreoni, James and Lise Vesterlund. 2001. "Which Is The Fair Sex? Gender Differences In Altruism," *The Quarterly Journal of Economics* 116, pp. 293-312.
- Arch, Elizabeth. 1993. "Risk-Taking: A Motivational Basis for Sex Differences," *Psychological Reports* 73: 3, pp. 6-11.
- Arenson, Sidney J. 1978. "Age and Sex Differences in the Probability Preferences of Children," *Psychological Reports* 43, pp. 697-698.
- Atkinson, Stanley M; Samantha Boyce Baird, and Melissa B. Frye. 2003. "Do Female Fund Managers Manage Differently?" *Journal of Financial Research* 26, pp. 1-18.
- Ayres, Ian and Peter Siegelman. 1995. "Race and Gender Discrimination in Negotiation for the Purchase of a New Car," *American Economic Review* 84, pp. 304-321.
- Babcock, Linda and Sara Laschever. 2003. "Women Don't Ask", Princeton University Press: New Jersey.
- Babcock, Linda; Michele Joy Gelfand, Deborah A. Small, and Heidi Stayn. 2003. "The propensity to initiate negotiations: Toward a broader understanding of negotiation behavior," Mimeo, Carnegie Mellon University.
- Babcock, Linda. 2002. "Do graduate students negotiate their job offers?" Mimeo, Carnegie Mellon University.
- Bajtelsmit, Vickie L. and Jack L. Van Derhei. 1997. "Risk Aversion an Pension Investment Choices." in *Positioning Pensions for the Twenty-First Century*, Michael S. Gordon (ed.), Philadelphia: University of Pennsylvania Press, pp. 45-66.
- Barber, Brad and Terrance Odean. 2000. "Boys will be Boys: Gender, Overconfidence, and Common Stock Investment," *Quarterly Journal of Economics* 116:1, pp. 261-292.
- Baron, Lisa A. 2003. "Ask and you shall receive: Gender differences in negotiators' beliefs about requests for a higher salary," forthcoming, *Human Relations*.
- Bateman, A. J. 1948. "Intra-sexual selection in Drosophila," *Heredity* 2, pp. 349-368.
- Battalio, Raymond C; John H. Kagel, and Don N. MacDonald. 1985. "Animals' choices over uncertain outcomes: Some initial experimental results," *American Economic Review* 75, pp. 597-613.
- Becker, Gary. 1974. "A Theory of Social Interactions," *Journal of Political Economy* 82, pp. 1063-1093.
- Ben-Ner, Avner; Fanmin Kong, and Louis Putterman. 2004. "Share and Share Alike? Intelligence, Socialization, Personality and Gender-Pairing as Determinants of Giving." Working Paper, University of Minnesota.
- Ben-Ner, Avner; Louis Putterman, Fanmin Kong, and Dan Magan. 2004. "Reciprocity in a Two Part Dictator Game." Working paper, Brown University.
- Berg, Joyce; John Dickhaut and Kevin McCabe. 1995. "Trust, Reciprocity and Social History," *Games and Economic Behavior* 10, pp. 122-42.
- Bernasek, Alexandra and Stephanie Shwiff. 2001. "Gender, Risk, and Retirement." *Journal of Economic Issues* 2, pp. 345-356.
- Bertrand, Marianne and Hallock, Kevin, 2001, "The gender gap in Top Corporate Jobs," NBER Working Paper 7931.

- Birley, Sue. 1989. "Female Entrepreneurs: Are They Really Any Different?" *Journal of Small Business Management*, pp. 32-37
- Blais, Ann-Renee and Elke U. Weber. 2001. "Domain-specificity and gender differences in decision making," *Risk Decision and Policy* 6, pp. 47-69
- Blau, Francine; Marianne Ferber and Anne Winkler. 1998. *The Economics of Women, Men and Work*, 3rd edition. Prentice-Hall: NJ.
- Bolton, Gary E. 1991. "A comparative model of bargaining: Theory and evidence," *American Economic Review* 81, pp. 1096-1136.
- Bolton, Gary and Elena Katok. 1995. "An Experimental Test for Gender Differences in Beneficent Behavior," *Economics Letters* 48, pp. 287-292.
- Bolton, Gary and Axel Ockenfels. 2000. "ERC: A theory of equity, reciprocity and competition," *American Economic Review* 90, pp. 166-193.
- Born, Marise; Nico Bleichrodt, and Henk van der Flier. 1987. "Cross-Cultural Comparison of Sex-Related Differences on Intelligence Tests: A Meta-Analysis," *Journal of Cross-Cultural Psychology* 18, pp.283-314.
- Bowler, Mary. 1999. "Women's Earnings: An Overview." *Monthly Labor Review* 122 pp. 13-21.
- Brinig, Margaret F. 1995. "Does mediation systematically disadvantage women?" *Journal of Women and the Law* 2, pp. 1-34.
- Brown-Kruse, Jamie and David Hummels. 1993. "Gender Effects in Laboratory Public Goods Contribution: Do Individuals Put Their Money Where Their Mouth Is?" *Journal of Economic Behavior and Organization* 22, pp. 255-267.
- Buchan, Nancy R; Rachel Croson, and Sara S. Solnick. 2004. "Trust and Gender: An Examination of Behavior, Biases, and Beliefs in the Investment Game," Working Paper, University of Pennsylvania.
- Buchan, Nancy R; Rachel Croson, and Sara S. Solnick, "Trust and Gender: An Examination of Behavior, Biases, and Beliefs in the Investment Game," Under review at *Organizational Behavior and Human Decision Processes*
- Byrnes, James; David C. Miller, William D. Schafer. 1999. "Gender differences in risk taking: a meta-analysis," *Psychological Bulletin* 125, pp. 367-383
- Cadsby, Bram and Elizabeth Maynes. 1998. "Gender and Free Riding in a Threshold Public Goods Game: Experimental Evidence," *Journal of Economic Behavior and Organization* 34, pp. 603-620.
- Cadsby, Bram; Yasuyo Hamaguchi, Toshiji Kawagoe, Elizabeth Maynes, and Fei Song. 2004. "Cross-Cultural Gender Differences in Behavior in a Threshold Public Goods Game: Japan versus Canada" Under resubmission for *Organizational Behavior and Human Decision Processes*.
- Cason, Timothy N. and Vay-Lam Mui. 1997. "A Laboratory Study of Group Polarization in the Team Dictator Game," *The Economic Journal*, 107, pp. 1465-1483.
- Charness, Gary and Matthew Rabin. 2002. "Understanding Social Preferences with Simple Tests," *The Quarterly Journal of Economics* 117:3, pp. 817-869.
- Chaudhuri, Ananish and Lata Gangadharan. 2004. "Gender Differences in Trust and Reciprocity." Working Paper, Economics, Wellesley College.
- Chermak, Janie M. and Kate Krause. 2002. "Individual Response, Information and Intergenerational Common Pool Problems," *Journal of Environmental Economics and Management* 43, pp. 47-70.

- Clark, Kenneth and Martin Sefton. 2001. "The Sequential Prisoner's Dilemma: Evidence on Reciprocation," *Economic Journal* 111, pp. 51-68.
- Clutton-Brock, T.H. Ed. 1988. "Reproductive Success: Studies of Individual Variation in Contrasting Breeding Systems," University of Chicago Press, Chicago.
- Cohn, Lawrence D. 1991. "Sex Differences in the Course of Personality Development: A Meta-Analysis," *Psychological Bulletin* 109, pp. 252-266.
- Cooper, H. M. 1979. "Statistically Combining Independent Studies: A Meta-Analysis of Sex Differences in Conformity Research" *Journal of Personality and Social Psychology* 37:1, pp. 131-146.
- Cox, James C. and Cary A. Deck. 2004. "When are Women More Generous than Men?" Working Paper, University of Arizona.
- Croson, Rachel and Melanie Marks. 2004. "Groups Work for Women: Social Identity and Gender in Threshold Public Goods Games." Working Paper, University of Pennsylvania.
- Croson, Rachel and Nancy Buchan. 1999. "Gender and Culture: International Experimental Evidence from Trust Games." *Gender and Economic Transactions* 89:2, pp. 386-391.
- Darwin, Charles, 1871, *The Descent of Man, and Selection in Relation to Sex*. John Murray, London.
- Dawes, Robyn M; Jeanne McTavish, and Harriet Shaklee. 1977. "Behavior, communication, and assumptions about other people's behavior in a commons dilemma situation," *Journal of Personality and Social Psychology* 35, pp. 1-11.
- Deaux, Kay and Elizabeth Farris. 1977. "Attributing Causes for One's Own Performance: The Effects of Sex, Norms, and Outcome," *Journal of Research in Personality* 11, pp. 59-72.
- Dekel, Eddie and Suzanne Scotchmer. 1999. "On the Evolution of Attitudes towards Risk in Winner-Take-All Games," *Journal of Economic Theory* 87, pp. 125-143.
- Dickinson, David L. and Jill Tiefenthaler. 2002. "What is Fair? Experimental Evidence," *Southern Economic Journal* 69, pp. 414-428.
- Dindia, Kathryn and Michael Allen. 1992. "Sex Differences in Self-Disclosure: A Meta-Analysis," *Psychological Bulletin* 112, pp. 106-124.
- Dufwenberg, Martin and Georg Kirchsteiger. "A Theory of Sequential Reciprocity," forthcoming, *Games and Economic Behavior*
- Dufwenberg, Martin and Astri Muren. 2004a. "Gender in Committees." Working Paper, University of Arizona.
- Dufwenberg, Martin and Astri Muren. 2004b. "Discrimination by Gender and Social Distance." Working Paper, University of Arizona.
- Dwyer, Peggy D; James H. Gilkeson, and John A. List. 2002. "Gender Differences in Revealed Risk Taking: Evidence from Mutual Fund Investors," *Economics Letters* 76, pp. 151-158
- Eagly, Alice. 1995. "The Science and Politics of Comparing Women and Men," *American Psychologist* 50, pp. 145-158.
- Eagly, Alice and Linda Carli. 1981. "Sex of Researchers and Sex-Typed Communications as Determinants of Sex Differences in Influenceability: A Meta-Analysis of Social Influence Studies," *Psychological Bulletin* 90, pp. 1-20.

- Eagly, Alice and M. Crowley. 1986. "Gender and Helping Behavior: A Meta-Analytic Review of the Social Psychological Literature," *Psychological Bulletin* 100, pp. 283-308.
- Eagly, Alice and Blair T. Johnson. 1990. "Gender and Leadership Styles: A Meta-Analysis," *Psychological Bulletin* 108, pp. 233-256.
- Eagly, Alice and S. J. Karau. 1991. "Gender and the Emergence of Leaders: A Meta-Analysis," *Journal of Personality and Social Psychology* 60, pp. 685-710.
- Eagly, Alice and V. J. Steffen V. J. 1986. "Gender and Aggressive Behavior: A Meta-Analytic Review of the Social Psychology Literature," *Psychological Bulletin* 100, pp. 309-330.
- Eagly, Alice and Wendy Wood. 1991. "Explaining Sex Differences in Social Behavior: A Meta-Analytic Perspective," *Personality and Social Psychology Bulletin* 17, pp. 306-315.
- Eagly, Alice; S. J. Karau and M. G. Makhijani. 1995. "Gender and the Effectiveness of Leaders: A Meta-Analysis," *Psychological Bulletin* 117, pp. 125-145.
- Eagly, Alice; M. G. Makhijani and B. G. Klonsky. 1992. "Gender and the Evaluation of Leaders: A Meta-Analysis," *Psychological Bulletin* 111, pp. 3-22.
- Eckel, Catherine C. and Philip J. Grossman. 1996. "The Relative Price of Fairness: Gender Differences in a Punishment Game," *Journal of Economic Behavior and Organization* 30, pp. 143-158.
- Eckel, Catherine C and Philip J. Grossman. 1998. "Are Women Less Selfish than Men? Evidence from Dictator Experiments," *Economic Journal* 108, pp. 726-735.
- Eckel, Catherine C and Philip J. Grossman. 2001. "Chivalry and Solidarity in Ultimatum Games," *Economic Inquiry* 39, pp. 171-188.
- Eckel, Catherine C and Philip J. Grossman. "Differences in the Economic Decisions of Men and Women: Experimental Evidence." *Handbook of Experimental Results*, edited by Plott and Smith, forthcoming, New York, Elsevier.
- Eckel, Catherine C. and Rick K. Wilson. 2004a. "Whom to Trust? Choice of Partner in a Trust Game." Working Paper, Virginia Polytechnic.
- Eckel, Catherine C and Rick K. Wilson. 2004b. "Conditional Trust: Sex, Race and Facial Expressions in a Trust Game," Working Paper, Virginia Polytechnic.
- Eckel, Catherine C., and Philip J. Grossman. 2002a. "Sex Differences and Statistical Stereotyping in Attitudes Toward Financial Risk." *Evolution and Human Behavior* 23:4, pp. 281-295.
- Eckel, Catherine C. and Philip J. Grossman. 2002b. "Forecasting Risk Attitudes: An Experimental Study of Actual and Forecast Risk Attitudes of Women and Men," *Unpublished Manuscript*, Department of Economics, Virginia Tech.
- Eckel, Catherine C. and Philip J. Grossman. 2003. "Men, women and risk aversion: experimental evidence," forthcoming *The Handbook of Experimental Economics Results*
- Estes, Ralph and Jinoos Hosseini. 1988. "The Gender Gap on Wall Street: an Empirical Analysis of Confidence in Investment Decision making," *The Journal of Psychology* 122: 6, pp. 577-590
- Fairbanks, Lynn A. 1993. "Risk taking by juvenile vervet monkeys," *Behaviour* 124, pp. 57-72.

- Falk, Armin and Urs Fischbacher. "A Theory of Reciprocity," forthcoming, *Games and Economic Behavior*
- Fehr, Ernst and Klaus M. Schmidt. 1999. "A Theory Of Fairness, Competition, And Cooperation," *The Quarterly Journal of Economics* 114:3, pp. 817-868
- Fehr-Duda, Helga, Manuele de Gennaro, Renate Schubert. 2004. "Genders, Financial Risk, and Probability Weights," Working paper,
- Feingold, Alan. 1994. "Gender Differences in Personality: A Meta-Analysis," *Psychological Bulletin* 116, pp. 429-456.
- Fershtman, Chaim and Uri Gneezy. 2001. "Discrimination in a Segmented Society: An Experimental Approach," *Quarterly Journal of Economics*, February, pp. 351-377.
- Finucane, Melissa L; Paul Slovic, C. K. Mertz, James Flynn, and Theresa A. Satterfield. 2000. "Gender, race, and perceived risk: the 'white male' effect," *Health, Risk & Society* 2, pp. 159-172
- Forsythe, Robert; Joel L. Horowitz, N.E. Savin and Martin Sefton. 1994. "Fairness in Simple Bargaining Experiments," *Games and Economic Behavior* 6, pp. 347-369.
- Gächter, Simon and Eva Poen. 2004. "Are females more cooperative than males?" Working Paper, University of St. Gallen, Switzerland.
- Gilligan, Carol. 1982. "In a Different Voice: Psychological Theory and Women's Development," Harvard University Press: Cambridge, MA.
- Ginsburg, Harvey and Shirley Miller. 1982. "Sex Differences in Children's Risk Taking Behavior", *Child Development* 53, pp. 426-428
- Gneezy, Uri and Aldo Rustichini. 2004a. "Gender and competition at a young age," forthcoming, *American Economic Review Papers and Proceedings*
- Gneezy, Uri and Aldo Rustichini. 2004b. "CEO's versus teachers," Mimeo.
- Gneezy, Uri; Muriel Niederle, and Aldo Rustichini. 2003. "Performance in competitive environments: Gender differences," *Quarterly Journal of Economics*, August 2003, pp. 1049-1074.
- Goldin, Claudia. 1990. *Understanding the Gender Gap: An Economic History of American Women*. Oxford University Press: New York.
- Guth, Werner; Carsten Schmidt, and Matthias Sutter. 2004. "Bargaining Outside the Lab: A Newspaper Experiment of a Three Person Ultimatum Game," Working Paper, Max Planck Institute.
- Guth, Werner; Rolf Schmittberger, and Bernd Schwarze. 1982. "An Experimental Analysis of Ultimatum Bargaining," *Journal of Economic Behavior and Organization* 3, pp. 367-388.
- Gysler, Matthias; Jamie Brown Kruse, and Renate Schubert. 2002. "Ambiguity and Gender Differences in Financial decision Making: An Experimental Examination of Competence and Confidence Effects," working paper, Center for Economic Research, Swiss Federal Institute of Technology
- Harbaugh, William T; Kate Krause and Lise Vesterlund. 2002. "Risk Attitudes of Children and Adults: Choices Over Small and Large Probability Gains and Losses," *Experimental Economics* 5:1, pp.53-84.
- Hartog, Joop; Ada Ferrer-I-Carbonell, and Nicole Jonker. 2002. "Linking Measured Risk aversion to Individual Characteristics." *Kyklos* 55:1, pp. 3-26

- Hinz, Richard P; David O. McCarthy, and John A. Turner. 1997. "Are Women Conservative Investors? Gender Differences in Participant-directed Pension Investments," Philadelphia: University of Pennsylvania Press, pp. 91-103
- Holm, Hakan J. 2000. "Gender-Based Focal Points," *Games and Economic Behavior* 32, pp. 292-314.
- Holm, Hakan J. 2004. "Sex Discrimination or Paranoia? Gender Differences in Experimental Discrimination Behavior" Working Paper, Lund University.
- Holt, Charles. A., and Susan. K. Laury. 2002. "Risk Aversion and Incentive Effects," *American Economic Review* 92: 5, pp. 1644-1655
- Hudgens, Gerald A. and Linda-Torsani Fatkin. 1985. "Sex Differences in Risk Taking: Repeated Sessions on a Computer simulated Task," *The Journal of Psychology* 119:3, pp.197-206.
- Hyde J. S. 1981. "How Large are Cognitive Gender Differences? A Meta-Analysis using ω^2 and d." *American Psychologist* 36, pp. 892-901.
- Hyde J. S. 1984. "How Large are Gender Differences in Aggression? A Developmental Meta-Analysis," *Developmental Psychology* 20, pp. 722-736.
- Hyde J. S. and Marcia C. Linn. 1988. "Gender Differences in Verbal Ability: A Meta-Analysis," *Psychological Bulletin* 104, pp. 53-69.
- Hyde J.S., E. Fennema and S. J. Lamon. 1990. "Gender Differences in Mathematics Performance: A Meta-Analysis," *Psychological Bulletin* 107, pp. 139-155.
- Jianakoplos, Nancy Ammon and Alexandra Bernasek. 1998. "Are Women More Risk Averse?" *Economic Inquiry* 36, pp. 620-630.
- Johnson, Blair T. and Eagly, Alice. 1989. "Effects of Involvement on Persuasion: A Meta-Analysis," *Psychological Bulletin* 106, pp. 290-314.
- Johnson, J. E. V. and P. L. Powell. 1994. "Decision Making, Risk and Gender: Are Managers Different?" *British Journal of Management* 5, pp. 123-138.
- Kahn, Arnie; Hottes J. and Davis W. L. 1971. "Cooperation and Optimal Responding in the Prisoner's Dilemma Game: Effects of Sex and Physical Attractiveness," *Journal of Personality and Social Psychology* 17, pp. 267-279.
- Karau S. J. and Kipling D. Williams. 1993. "Social Loafing: A Meta-Analytic Review and Theoretical Integration," *Journal of Personality and Social Psychology* 65, pp. 681-706.
- Knight, Jonathan. 2002. "Sexual stereotypes," *Nature* 415, pp. 254-256.
- Kreps, David. 1990. "Corporate Structure and Economic Theory. In Perspectives on Positive Political Economy," ed. Alt and Shepsle. Cambridge: Cambridge University Press.
- Kruse, Jamie Brown and Renate Schubert. 2002. "Ambiguity and Gender Differences in Financial decision Making: An Experimental Examination of Competence and Confidence Effects," Center for Economic Research, Swiss Federal Institute of Technology, Working Paper
- Kruse, Jamie Brown and Mark A. Thompson. 2003. "Valuing low probability risk: survey and experimental evidence," *Journal of Economic Behavior and Organization* 50, pp. 495-505
- Lazear, Edward P. 2000. "Performance, pay and productivity," *American Economic Review* 90, pp. 1346-1361.

- Linn, Marcia C. and Anne C. Peterson. 1985. "Emergence and Characterization of Sex Differences in Spatial Ability: A Meta-Analysis," *Child Development* 56, pp. 1479-1489.
- Lundeberg, Mary A; Paul W. Fox, and Judith Puncchohar. 1994. "Highly Confident but Wrong: Gender Differences and Similarities in Confidence Judgments," *Journal of Educational Psychology* 86, pp. 114-121.
- Mack, D., Auburn P. N. and Knight G.P. 1971. "Sex Role Identification and Behavior in a Reiterated Prisoner's Dilemma Game," *Psychonomic Science* 24, pp. 280-282.
- Marwell, Gerald and Ruth Ames. 1981. "Economists Free Ride, Does Anyone Else? Experiments on the Provision of Public Goods, IV," *Journal of Public Economics* 15, pp. 295-310.
- Master, Robert. and Robert Meier. 1988. "Sex Differences and Risk Taking Propensity of Entrepreneurs," *Journal of Small Business Management*, January, pp. 31-35
- Moore, Evan and Catherine C. Eckel. 2003. "Measuring Ambiguity Aversion." Working paper, Virginia Polytechnic.
- Mui, Vai-Lam. 1995. "The Economics of Envy." *Journal of Economic Behavior and Organization* 26, pp. 311-336.
- Neu, Joyce; John L. Graham, and Mary C. Gilly. 1988. "The influence of gender on behaviors and outcomes in a retail buyer-seller negotiation simulation," *Journal of Retailing* 64 pp. 427-451.
- Niederle and Vesterlund (2004)
- Nowell, Clifford and Sarah Tinkler. 1994. "The Influence of Gender on the Provision of a Public Good," *Journal of Economic Behavior and Organization* 25, pp. 25-36.
- Odean, Terrance. 1998. "Volume, Volatility, Price, and Profit When All Traders Are Above Average," *Journal of Finance*, Vol. LIII, 6, December pp. 1887-1934.
- Orbell, John M; Robyn Dawes, and Peregrine Schwartz-Shea. 1994. "Trust, Social Categories and Individuals: The Case of Gender," *Motivation and Emotion* 18, pp. 109-128.
- Ortmann, Andreas and Lisa K. Tichy. 1999. "Understanding Gender Effects in the Laboratory: Evidence from Prisoner's Dilemma Games," *Journal of Economic Behavior and Organization* 39, pp. 327-339.
- Possingham, Hugh P.; Alasdair I. Houston, and John M. McNamara. 1990. "Risk-averse foraging in bees: A comment on the model of Harder and Real," *Ecology* 71, pp. 1622-1624.
- Powell, Melanie and David. Ansic. 1997. "Gender Differences in Risk Behaviour in Financial Decision-Making: An Experimental Analysis," *Journal of Economic Psychology* 18, pp. 605-628
- Rabin, Matthew. 1993. "Incorporating Fairness into Game Theory and Economics," *American Economic Review* 83, pp. 1281-1302.
- Rapoport, Anatol and Albert M. Chammah. 1965. "Sex Differences in Factors Contributing to the Level of Cooperation in a Prisoner's Dilemma Game," *Journal of Personality and Social Psychology* 2, pp. 831-838.
- Schubert, Renate; Matthias Gysler, Martin Brown, and Hans-Wolfgang Brachinger. 1999. "Financial Decision-Making: Are Women Really More Risk Averse?" *American Economic Review Papers and Proceedings* 89, pp. 381-385.

- Schubert, Renate; Matthias Gysler, Martin. Brown and Hans-Wolfgang Brachinger. 2000. "Gender Specific Attitudes Towards Risk and Ambiguity: An Experimental Investigation." Working Paper Center for Economic Research, Swiss Federal Institute of Technology.
- Schwieren, Christiane and Matthias Sutter. 2004. "Trust in Cooperation or Ability? An Experimental Study on Gender Differences," Working Paper, Max Planck Institute.
- Seguino, Stephanie; Thomas Stevens, and Mark Lutz. 1996. "Gender and cooperative behaviour: Economic man rides alone," *Feminist Economics* 2, pp. 1-21.
- Sell, Jane. 1997. "Gender, strategies, and contributions to public goods," *Social Psychology Quarterly* 60, pp. 252-265.
- Sell, Jane and Rick Wilson. 1991. "Levels of information and contributions to public goods," *Social Forces* 70, pp. 107-124.
- Sell, Jane; W. I. Griffith and Rick Wilson. 1993. "Are women more cooperative than men in social dilemmas?" *Social Psychology Quarterly* 56, pp. 211-222.
- Selten, Reinhard and Axel Ockenfels. 1998. "An Experimental Solidarity Game," *Journal of Economic Behavior Organization* 34, pp.517-539.
- Sibley, S.; Senn S. and A. Epanchin. 1968. "Race and Sex of Adolescents and Cooperation in a Mixed-Motive Game," *Psychonomic Science* 13, pp. 123-124.
- Slonim, R. 2004. "Gender Selection Discrimination: Evidence from a Trust Game." Mimeo, Case Western Reserve University.
- Small, Deborah A; Linda Babcock, Michele Gelfand, and Hilary Gettman. 2003. "Gender and the initiation of negotiations in ambiguous situations," Mimeo, Carnegie Mellon University.
- Snijders, Chris and Gideon Keren. 2004. "Do You Trust? Whom Do You Trust? When Do You Trust?" Working Paper, Utrecht University.
- Solnick, Sara J. 2001. "Gender Differences in the Ultimatum Game," *Economic Inquiry* 39, pp. 189-200.
- Solow, John L. and Nicole Kirkwood. 2002. "Group Identity and Gender in Public Goods Experiments," *Journal of Economic Behavior and Organization* 48, pp. 403-412.
- Stockard, Jean; Alphons van de Kragt, and Patricia Dodge. 1988. "Gender Roles and Behavior in Social Dilemmas: Are There Sex Differences in Cooperation and in its Justification?" *Social Psychology Quarterly* 51, pp. 154-163.
- Stuhlmacher, Alice F. and Amy E. Walters. 1999. "Gender differences in negotiation outcome: A meta-analysis," *Personal Psychology*, 52:3, pp. 653-677.
- Sunden, Annika E. and Brian J. Surette. 1998. "Gender Differences in the Allocation of Assets in Retirement Savings Plans," *American Economic Review, Papers and Proceedings* 88, pp. 207-211.
- Tedeschi, J. T., D. Hiester and J. Gahagan (1969). Trust and the Prisoner's Dilemma Game. *Journal of Social Psychology* 79, pp. 43-50.
- Thomas, Kenneth W., and Ralph H. Kilmann. 1974. "Thomas-Kilman conflict mode instrument," Tuxedo, NY: XICOM.
- Thomas, S. Anisya and Stephen L. Mueller. 2000. "A Case for Comparative Entrepreneurship: Assessing the Relevance of Culture," *Journal of International Business Studies*, 31:2, pp. 287-301.

- Tregenza, Tom and Nina Wedell. 2002. "Polyandrous females avoid costs of inbreeding," *Nature*, 415, pp. 71-73.
- Trivers, Robert L. 1972. in *Sexual Selection and the Descent of Man* (ed. Campbell, B.) pp. 136-177, Aldine, Chicago.
- Van Huyck, John B; Rayomond C. Battalio, and Mary F. Walters. 1995. "Commitment versus Discretion in the Peasant Dictator Game," *Games and Economic Behavior* 10, pp. 143-170.
- Walters, Amy E., Alice F. Stuhlmacher, and Lia L. Meyer. 1998. "Gender and Negotiator Competitiveness: A Meta-analysis," *Organizational Behavior and Human Decision Processes*, 76: 1, pp. 1-29.
- Womak, D. F. 1987. "Cooperative behavior by female negotiators: Experts or masochists?" In L. B. Nadler, M. K. Nadler, & W. R. Mancillas (Eds.), *Advances in gender communication research*. New York: University Press of America.
- Wood, Wendy. 1987. "Meta-Analytic Review of Sex Differences in Group Performance," *Psychological Bulletin* 102, pp. 53-71.
- Wright, Gavin. 1991. "Understanding the Gender Gap: A Review Article." *Journal of Economic Literature* XXIX, pp. 1153-1163.
- Zinkhan, George M. and Kiran W. Karande. 1990. "Cultural and Gender Differences in Risk-Taking Behavior Among American and Spanish Decision Makers," *The Journal of Social Psychology* 131:5, pp. 741-742.