

MASTERARBEIT

Titel der Masterarbeit

„Gender Differences in Risk and Competition Aversion“

Verfasserin

Constanze Miriam Müller, Bakk.rer.soc.oec. Bakk.rer.soc.oec.

angestrebter akademischer Grad

Master of Science (MSc)

Wien, 2012

Studienkennzahl lt. Studienblatt:
Studienrichtung lt. Studienblatt:
Betreuer:

A 066 915
Masterstudium Betriebswirtschaft
Univ.-Prof. Dr. Oliver Fabel, M.A.

Table of Contents

INDEX OF TABLES.....	II
ABSTRACT ENGLISH.....	III
ABSTRACT GERMAN.....	IV
1. INTRODUCTION	1
2. GENDER DIFFERENCES IN PREFERENCES	2
2.1. <i>Differences in Social Preferences</i>	3
2.1.1. Inconsistent Results	4
2.1.2. Ultimatum Games.....	5
2.1.3. Dictator Games	11
2.1.4. Trust and Reciprocity	16
2.1.5. The Prisoners' Dilemma, Social Dilemmas, and Public Goods Provision	17
3. GENDER DIFFERENCES IN RISK PREFERENCES.....	18
3.1. <i>Abstract Gamble Experiments: Objective Probability Lotteries</i>	18
3.2. <i>Contextual Environment Experiments</i>	23
3.2.1. Financial Decision-making.....	23
3.2.2. Portfolio Selection: High Stakes Decisions	27
3.3. <i>Evidence from Field Studies</i>	31
3.4. <i>Explanations for the observed Gender Differences in Risk Behavior</i>	34
3.4.1. Explanations for Gender Differences in Investment Behavior	34
3.4.2. Risk Perception	35
3.4.3. Emotions	36
3.4.4. Overconfidence	40
3.4.5. Risk as Challenge or Threats	42
3.5. <i>Exceptions to the Rule: Managers and Professional Population</i>	43
3.6. <i>Conclusion</i>	46
4. GENDER DIFFERENCES IN COMPETITION PREFERENCES.....	48
4.1. <i>Gender Differences in the Response to Competition</i>	48
4.1.1. Lab Experiments.....	48
4.1.2. Field Studies	55
4.2. <i>Self-selection</i>	61
4.3. <i>Bargaining</i>	65
4.4. <i>Why are Men More Competitive than Women?</i>	67
5. CONCLUSION	74
6. REFERENCES.....	77
6.1. <i>Bibliography</i>	77

6.2. Online Resources..... 81

CURRICULUM VITAE 83

Index of Tables

TABLE 1: REJECTION RATES IN ULTIMATUM GAMES

(CROSON & GNEEZY, 2009)..... 7

TABLE 2: AGE, PROFESSION, GENDER, AND MEDIUM OF VALID SUBMISSIONS

(GÜTH, SCHMIDT, & SUTTER, 2007) 9

Abstract English

This work focuses on the persistent gender differences in economic life, such as the gender gap in top management positions as well as the glass ceiling effect. Evidence for the hypothesis that gender-specific outcomes in the labor and goods markets are caused by different preferences of the genders is presented.

Systematic gender differences in risk behavior are observed in most laboratory experiments and field studies, with important exceptions for the managerial population. Women's higher risk-aversion thus is mirrored in all aspects of female decision-making, such as the choice of profession (and thus earnings), investment decision, and what products to buy.

Gender differences in competition are examined and in the vast majority of studies, women are found to be less willing to compete than men, and as a consequence women may have to accept lower earnings as they often fail to initiate negotiations. Thus, the observed gender differences in behavior under tournament incentives may contribute to the explanation of gender disparities among top management in large corporations.

Evidence in favor of both, the nature and the nurture hypotheses are presented, however, the important question whether the observed gender differences in competitive behavior are ingrained (nature) or taught (nurture) could not be answered satisfactorily before the background of the state of research.

Abstract German

Diese Arbeit behandelt geschlechtsspezifische Unterschiede im ökonomischen Leben wie beispielsweise die unterproportionale Anzahl der Frauen in Führungspositionen sowie den sogenannten „Effekt der gläsernen Decke“. Argumente für die Hypothese, dass geschlechtsspezifische Ergebnisse in den Arbeits- und Gütermärkten durch unterschiedliche Präferenzen von Männern und Frauen verursacht werden, werden vorgestellt.

Systematische Unterschiede zwischen den Geschlechtern im Risikoverhalten können in den meisten Laborexperimenten und Feldstudien beobachtet werden; eine wichtige Ausnahme stellt jedoch der Teil der Bevölkerung dar, der schon Führungsposition bekleidet. Die höhere Risikoaversion von Frauen kommt in (fast) allen Aspekten der Entscheidungsfindung zu tragen, so wie beispielsweise bei der Wahl des Berufs (und damit des Einkommens), bei Investitionsentscheidungen und bei Entscheidungen am Gütermarkt.

Geschlechtsspezifische Unterschiede im Wettbewerb werden untersucht und im Großteil der Studien erweisen sich Frauen als weniger wettbewerbsfreudig als Männer und verzichten öfter auf mögliches Konkurrieren. Als Folge müssen Frauen öfters schlechtere Ergebnisse akzeptieren; nicht zuletzt deshalb weil sie oft auf Verhandlungen verzichten. Die beobachteten geschlechtsspezifischen Unterschiede im Verhalten unter Wettbewerbsbedingungen tragen zur Erklärung der unterschiedlichen Geschlechterverteilung in Management- und Führungspositionen in großen Unternehmen bei.

Argumente sowohl zu Gunsten der „Natur“(*nature*)- als auch der „Erziehungs“(*nurture*)-Hypothese werden präsentiert. Die wichtige Frage, ob die

beobachteten Unterschiede zwischen den Geschlechtern im Wettbewerbsverhalten angeboren und somit verwurzelt (*nature*) oder gelehrt und anerzogen (*nurture*) sind, kann jedoch mit dem bisherigen Forschungsstand nicht zufriedenstellend beantwortet werden.

1. Introduction

This work is concerned with the persistent gender differences in economic life. Gender differences have been observed in many different domains such as consumption and investment behavior, and in what is maybe the most interesting domain for policymakers and economists, the labor market (Blau & Kahn, 2000). There is the strong hypothesis that gender-specific outcomes in the labor and goods markets are caused by different preferences between the genders (Croson & Gneezy, 2009).

Most studies find systematic gender differences in risk behavior. The question whether men and women differ systematically in their responses to risk is of great economic interest. If women are truly more sensitive to risk than men, this will be mirrored in all aspects of female decision-making, such as the choice of profession (and thus earnings), investment decision, and what products to buy (Eckel & Grossman, 2008).

As much modern economic life involves competition in some form or another, differences in the willingness to compete may have a large impact on economic outcomes. If women are really less willing to compete than men, women may have to accept lower earnings. Thus gender differences in behavior under tournament incentives may explain gender disparities among top management in large corporations (Vandegrift, Yavas, & Brown, 2004).

Substantial vertical segregation between men and women can be observed across fields. A vastly overproportional number of senior positions in management and in the professions is held by men (Niederle & Vesterlund, 2008).

In most European Union countries, the gender wage gap increases across the wage

distribution and accelerates in the upper tail – a phenomenon labeled “glass ceiling” effect. Identically qualified men and women receive different returns (Booth, 2009). Only very few women are involved in the top-level management of U.S. corporations – amounting to a mere 2.4 percent of the executives. Moreover, female managers are especially under-represented in large corporations. Furthermore, the gender gap in compensation among top executives accounts for about 45 percent of mean managerial income (Bertrand & Hallock, 2001).

The aim of this study is to find an explanation why women hold grossly underproportional shares of top management positions. By reviewing the existing literature on gender differences in preferences, and in risk and competition behavior this work tries to answer the question whether one of these differences can be identified as the main cause for the observed gender gap in top management positions.

The first part gives an idea of gender differences in preferences in general with a special focus on social preferences. The second provides a detailed account of gender differences in risk behavior observed in laboratory settings and in field the studies. The third section considers gender differences in competition in detail and offers several possible explanations for the observed differences. The final section concludes.

2. Gender Differences in Preferences

Gender Differences may be observed in various situations and domains. Experimental evidence on preference differences between men and women focuses on three domains: social preferences, risk preferences, and reaction to competition.

Replicable economic experiments, allowing the researcher to isolate single factors (e.g., risk preferences) of decisions and study them in isolation from other factors (e.g., altruism), are used as the main source of data. In addition to this, researchers have tested the impact of various parameters, such as self-selection and learning, on men and women. Their main findings are that women's social preferences are more situationally specific than those of men, that women are neither more nor less socially oriented, but their social preferences are more malleable; that women are indeed more risk-averse than men, and finally that women are more averse to competition than men are (Croson & Gneezy, 2009).

The remainder of this section reviews evidence on gender-specific social preferences focusing on ultimatum and dictator game experiments, whereas gender differences in risk behavior will be covered in section three. Section four reviews gender differences in preferences with regard to competition.¹

2.1. Differences in Social Preferences

If the payoffs or the utilities of some other person enters into an individual's own utility function, then this individual exhibits a social preference. There are various models describing how an individual may be other-regarding: altruism, envy, inequality aversion or positive and negative reciprocity are used to model social preferences in the economic literature. Across genders the extent and the form of the social preference may differ (Croson & Gneezy, 2009).

Croson & Gneezy (2009) review several studies to gain evidence how strongly and in which direction social preferences manifest themselves in men and women. Whereas

¹ In the dictator game the proposer has to divide a pie or a sum of money between himself and the recipient. For detail see section 2.1.3..

ultimatum and dictator games studies are used to gain evidence on altruism and inequality aversion; trust and related games are used to test for reciprocity. Also the Prisoner's Dilemma game and studies making use of social dilemmas and/or public goods provision games are useful to study social preferences.

2.1.1. Inconsistent Results

A large number of attempts to test for differences in the behavior of men and women in economic situations in the laboratory have revealed mixed, even contradictory results. A possible explanation for these differing results may be caused by failure to control for important environmental factors that might confound gender differences. The resulting differences in outcomes may be explained by diversity in the stakes, information, social distance, decision options, and other aspects of the experimental design (Eckel & Grossman, 1998).

Social dilemma and ultimatum experiments represent strategic environments in which subjects have to considerate the likely actions of their partners when making their own decisions; thus they both involve strategic risk. Whereas in social dilemma experiments players may choose a cooperative strategy carrying the risk of a particularly low payoff, an unequal proposal carries the risk of rejection in ultimatum game experiments. Still, both experiments should deliver consistent results indicating that women behave more generously in both, if men and women only differ in their degree of selfishness. However, if there is a gender difference in the degree of risk-aversion, the results should differ: if women's decisions really exhibit a greater degree of risk-aversion, then their contributions in social dilemma experiments have to be less generous, whereas their offers in the ultimatum game have to be more generous. Therefore, observed differences between the behavior of men and women in these environments may illustrate either a basic gender

difference in the selfishness, or a difference in their responses to risk (Eckel & Grossman, 1998).

2.1.2. Ultimatum Games

Ultimatum game experiments are designed to test the effect of gender pairings, in order to find out whether systematic differences in the behavior of men and women can be observed (Eckel & Grossman, 2001).

In ultimatum games, two players are allocated a sum of money, which can be viewed as a pie, and the players have to divide this pie among them. The proposer offers to the responder how to divide the pie among them and the responder may accept or reject this offer. Only if the offer is accepted, each player receives the suggested amount; otherwise – if the offer is rejected – both players receive nothing. Assuming selfish players, this game has a continuum of Nash equilibria. However, there is a unique subgame perfect equilibrium in which the proposer offers the responder ϵ , and the responder accepts. The responder's rejection of a positive offer represents a deviation from this equilibrium and can be interpreted as inequality-aversion, negative reciprocity, or punishment. On the other hand, proposer's deviations from this equilibrium, namely making positive offers, can be interpreted as inequality aversion, altruism and risk-aversion (Croson & Gneezy, 2009).

Eckel & Grossman (2001) conduct a lab experiment examining gender effects in ultimatum games. They find that women's proposals are on average more generous than men's, regardless of the sex of the other player. In addition to this, female respondents are more likely to accept an offer of a given amount. The results indicate that women are significantly more cooperative than men. In addition to this, the sex of the other player seems to have a strong effect on the subject's decision: offers are more likely to be accepted if coming from a woman. When female proposers and

male respondents face each other, the authors term this result *chivalry*. Another important result is termed solidarity between women, meaning that women paired with women almost never fail to reach an agreement; cooperative players cooperate more with other cooperative players.

In S. Solnick's (2001) ultimatum game experiment two different treatments are used to explore gender differences in bargaining behavior that might impact wage negotiations. While in one treatment players remain mutually anonymous, the players' gender is common knowledge in the second treatment. The outcomes of the experiment suggest that average offers do not differ based on the gender of player 1, the proposer; however, offers are affected by the gender of player 2, the respondent: men attract higher offers, particularly from female proposers. Furthermore, respondents of both genders choose a higher minimum acceptable offer when facing a woman as proposer. The outcomes do not show that women are content with less. Quite on the contrary, female respondents demand higher minimum acceptable amounts than male respondents. Yet players seem to expect women being satisfied with a smaller share, inducing men as well as women to offer smaller amounts to female respondents. When men and women are paired with a woman, they both set their minimum acceptable amount higher than when being paired with a man, seeming to expect women to give them more and keep less. Solnick's results are consistent with the evidence that women are quoted higher prices for cars and that women obtain smaller increases in salary when they choose to bargain. These systematic differences in the expectations and decisions of men and women exist even in this stylized negotiating environment. Thus they may impact salary negotiations and other real-world transactions so that part of the pay gap between men and women may be due to bargaining differences.

Table 1: Rejection Rates in Ultimatum Games (Croson & Gneezy, 2009)

Rejection Rates in Ultimatum Games				
	Eckel & Grossman (2001)	Solnick (2001)	Difference	
Male Responders				
Male to Male	18.8%	4.5%	14.3%	
Female to Male	9.4%	6.3%	3.2%	
Difference	9.4%	1.7%	8.7%	Average
Female Responders				
Male to Female	17.2%	0.0%	17.2%	
Female to Female	3.1%	23.1%	20.0%	
Difference	14.1%	23.1%	18.6%	Average
Female - Male	4.7%	21.4%		
Controls included?	Yes	No		

Table 1 shows the rejection rates under comparable conditions to facilitate comparison between the two studies. The rejection rates of male responders differ by an average of 8.7 percent, whereas female responders' rejection rates differ by an average of 18.6 percent. This indicates that female responding behavior is more sensitive to the experimental context (face-to-face, strategy vs. game methods) than male responding behavior (Croson & Gneezy, 2009).

A comparison within the two studies fortifies women's greater context-sensitivity. Whereas men's rejection rates are not very sensitive to the gender of the proposer of the offers in both studies [a 9.4 percent difference in Eckel & Grossman (2001) and a 1.8 percent difference in Solnick (2001)], women's rejection rates are quite sensitive to their counterpart's gender [a 14.1 percent difference in Eckel & Grossman (2001) and a 23.1 percent difference in Solnick (2001)] (Croson & Gneezy, 2009).

W. Güth, C. Schmidt and M. Sutter (2007) conducted a newspaper experiment on bargaining, which was run in the German weekly, *Die Zeit*, in November 2001. 5,132 individuals, ranging from 8 to 96 years and participating via mail, fax or internet. Several research questions were controlled for. First, do socio-demographic variables as gender, age or education influence bargaining behavior? Second, has the chosen answer medium (mail, fax or Internet) an impact on bargaining behavior? And third, the most important question, does student behavior (in the lab and in the newspaper experiment) differ from the behavior of non-students in the newspaper experiment, and, if so, how?

As an experimental task, the authors have chosen a three-person ultimatum game, in which the proposer (X) has to suggest how to divide a pie of DM² 1,200 between himself, the responder (Y), and a dummy player (Z) who has no decision authority. Only if the responder accepts the offer, all three players receive their corresponding share; otherwise all players receive nothing. The instruction published in *Die Zeit* introduce:

- (i) the pie of DM 1,200,
- (ii) the three players (or brothers) X, Y, and Z, and
- (iii) the rules: player X proposes a vector (x, y, z) which has to be $x + y + z = 1,200$.

The number of possible vectors is limited by assuming that x can only be $\{0, 200, 400, 600, 800, \text{ and } 1000\}$ and y and z can only be $\{100, 200, 300, \text{ and } 400, 500, 600\}$. All participants have to decide for both roles X and Y. In the role of X the participants have to select one of the 18 possible proposals (x, y, z) and in the role of Y, for all 18 proposals (x, y, z) it has to be decided whether to accept or reject them. From a total of 5,132 submissions 4,869 were classified as valid. Responses were

² DM, the „Deutsche Mark“, was the official currency of Germany (1990–2002) and before of West Germany (1948–1990) until the adoption of the Euro in 2002.

only valid when subjects had given their full address, indicated the chosen proposal in the role of *X*, and had accepted or rejected all 18 proposals in the role of *Y*. In addition to this, participants were asked on a voluntary basis to state their age, profession and/or education. To avoid implicit demand effects it was not asked explicitly for gender; but still in 96.4 percent of valid submissions, gender could be determined from the first name of participants (Güth, Schmidt, & Sutter, 2007).

Table 2: Age, Profession, Gender, and Medium of Valid Submissions (Güth, Schmidt, & Sutter, 2007)

Age, Profession, Gender, and Medium (Valid Submissions Only)				
Medium	Internet (n = 2,954)	Mail (n = 1,625)	Fax (n = 290)	All (n = 4,869)
Age				
Share of subjects				
Under 26	21.7%	11.0%	6.3%	17.2%
26 to 45	52.5%	37.6%	42.2%	46.9%
46 to 65	23.7%	36.8%	39.5%	29.0%
over 65	2.1%	14.6%	12.1%	6.9%
Average age (Std. dev.)	36.6% (13.2%) (n = 2,329)	46.6% (16.6%) (n = 1,292)	48.2% (14.6%) (n = 223)	40.6% (15.3%) (n = 3,844)
Gender				
Share of male participants	71.1% (n = 2,912)	63.2% (n = 1,519)	68.8% (n = 263)	68.4% (n = 4,694)
Profession				
Share of Academic	46.0%	45.6%	50.0%	46.0%
Non-academic	20.8%	22.8%	28.0%	24.2%
Retired	3.2%	14.8%	14.0%	7.6%
Students	23.8%	11.2%	5.4%	18.5%
Pupils	6.2% (n = 2,064)	5.6% (n = 1,114)	2.7% (n = 186)	5.8% (n = 3,364)

The results show that 56.8% of participants choose the *equal split* of (400, 400, 400) thus representing the most frequent choice. The second most frequent choice made by 15.9% of participants is (600, 500, 100), which the authors title the *power coalition* since the players with strategic power (X and Y) share the pie by exploiting the dummy player (Z). The third most frequent choice (1000, 100, 100) is the *game theoretic benchmark*, which is chosen by 8.3% of participants. So in total, the three most frequent proposals account for 81 percent of all proposals (Güth, Schmidt, & Sutter, 2007).

This large-scale newspaper experiment on bargaining can be summarized by two major findings: first, age, gender, education, and the medium of participation have a significant influence on bargaining behavior. Second, a rather high degree of parallelism between student data and non-student data can be shown: aggregate behavior of students in the newspaper experiment is similar to the behavior of students in laboratory settings. When controlling for the age group of 19 to 30 years, students in the newspaper experiment do not act significantly differently from newspaper participants with another profession. Thus, the authors' finding support the claim that results from laboratory experiments with university students are representative enough.

The authors find female participants to be significantly more likely to propose a three-way *equal split* than men and this may be due to altruism or inequality aversion. Moreover, the medium is important, even when controlling for socio-demographic data. Internet users propose an equal split less often and accept more proposals, which leads to the assumption that they act in a more opportunistic way than mail or fax participants do (Güth, Schmidt, & Sutter, 2007).

Women exhibit a greater generosity, which is also consistent with risk-aversion: More generous offers are less likely to be rejected. However, generosity contradicts payoff-maximizing behavior. Women are sacrificing greater earnings by offering more equal splits than male participants relative to their optimal offers. Still women are both less likely to reject and to be rejected, with the result that their overall earnings are still on average higher than men's (Eckel & Grossman, 2001).

Due to the structure of ultimatum games, the observed behavioral differences could also be induced by risk-aversion. Dictator games enable us to tease apart these competing motivations (Croson & Gneezy, 2009).

2.1.3. Dictator Games

In the dictator game the proposer has to divide a pie or a sum of money between himself and the recipient. Neither strategic nor risk-related concerns are relevant as the recipient does not take any decision as the offer is always accepted. However, inequality aversion and altruism may still influence the proposer's behavior. Thus, the dictator game is rather an allocation exercise (Croson & Gneezy, 2009).

A dictator game experiment can be used to test whether men and women show the same inclination toward self-interested behavior. The dictator game provides a very sharp test as the dictator unilaterally decides how to allocate the pie between self-interest and beneficence. The amount of money allocated to the recipient can thus be interpreted as a measure of the dictator's beneficence (Bolton & Katok, 1995).

In order to examine the selfishness of men and women, Eckel & Grossman (1998) use a simple double-anonymous dictator setting, which removes risk, possible gender-related subject interactions, and the experimenter effect. Thus only individuals' selfishness is left as an explanation for donating money. In such conditions of anonymity the dictator has to split \$10 with an unknown recipient. Their results

indicate that women are less selfish than men: women donate almost twice as much as men to their paired recipient. More precisely, 60 percent of men donate nothing, whereas only 47 percent of women do so. On average, women donate \$1.60 to their anonymous partner, men only give \$0.82, which is statistically significant with a p-value of less than 0.01.

In Bolton & Katok (1995) another anonymous dictator game, where the dictator splits a pie of \$10 and each offer has to be under \$5, is applied. They found that women donate slightly more than men; average donation for men was \$1.13 and \$1.23 for women, however, this difference was not statistically significant.

Croson & Gneezy (2009) conduct a comparison between these two studies and show that as the social conditions³ of the experiment change, male donations change by \$0.31 while female donations change by \$0.37. So they conclude that the behavior of women is at least somewhat more sensitive to the conditions of the experiment than that of men.

Andreoni & Vesterlund (2001) use a modified dictator game with varying incomes and prices to study gender differences in altruism. The authors find that it depends on the price of giving which sex can be found to be more altruistic. When altruism is cheap, men appear more altruistic than women, however, when altruism is expensive, women are more generous. Moreover, women seem to be more concerned with equalizing payoffs between the parties, meanwhile men are more likely to be either perfectly selfish or perfectly selfless and concerned with maximizing efficiency. Thus this leads to crossing demand curves for altruism with those of men being more price-elastic.

³ Social conditions may be manifold, but here we refer to the experimental design and implementation such as information about the other party and the other party's action, etc.

Dickinson & Tiefenthaler (2002) execute similar laboratory dictator experiments where disinterested third-party decision makers allocate resources between two beneficiaries. Third party decision makers are used to remove the confounding effects of self-interest when fairness is examined in experiments with self-interested decision makers. The only motivation for the decision maker's behavior is the knowledge that the payoffs of each beneficiary depend upon his decision; hence, the decision maker's concept of fairness should therefore determine the payoffs of the beneficiaries. The researchers focus exclusively on individual preferences over payoffs to other individuals, unlike the typical bargaining experiments games in which two participants have to bargain over how to divide a sum of money among them.

Their results are largely consistent with results from survey and experimental research revealing significant gender differences in fairness perceptions. They found men to be significantly less likely than women to choose equal outcomes but more likely to choose the most efficient outcome. The authors also underline the fact that fairness concepts may not only differ across the sexes, but also across individuals. Culture, background, and other personal characteristics may influence morals and values, and thus one's notion of fairness. If men and women are found to have systematically different ideas about what is fair, this has important policy implications. Given different notions of fairness, men and women are likely to view the justice of court decisions, transfer policies, and even household distributions of resources differently. These results may impact business practices, court decision, intra-household resource allocation, and government transfer policy. Men in position of decision authority of how to allocate resources, such as judges, legislators, fathers, and managers, may be more inclined to divide scarce resources in order to maximize efficiency. However, when women hold these positions, they may be more likely to

allocate resources to equalize outcomes across the affected individuals (Dickinson & Tiefenthaler, 2002).

Selten & Ockenfels (1998) use a variant of the dictator game, called solidarity game. In contrast to the dictator game, all participants have to decide, how much they would be willing to give to a single loser, and to each of two losers in their group in the case of winning. Thus, all of the players have to decide on conditional gifts – conditioned on winning and on the presence of losers – and all of them are both potential winners (donors) and potential losers (recipients). Ex ante everybody is in the same situation, but the ex post distribution of payoffs may be very uneven unless the resulting inequality is attenuated by positive conditional gifts.

This experimental setup creates a situation in which participants can show solidarity in the sense that they are willing to help others, who by chance come to a much worse position than they themselves. Solidarity means willingness to help people in need who are similar to oneself but have become victims of outside influences such as unforeseen illness, natural catastrophes, etc.. Reciprocity, a motivation urging you to give something in exchange for something you have already received, even if you are not obliged to give anything back, is similar to solidarity up to a certain extent.

Subjects participate in a three-person-game in which each of them can either win DM 10.00 with a probability of 2/3 or zero with the converse probability of 1/3. The results of this solidarity game show that women are once again more inequality-averse than men. Egoistical behavior of giving nothing is much more common among males than among females; conditional gift behavior of men is less generous than that of women and, in this sense, women are found to show more solidarity than men (Selten & Ockenfels, 1998).

In Dufwenberg & Muren (2006a) gender effects in a team dictator game are examined. As experimental research so far has shown that men and women often take different decisions, and that group decisions often differ from those made by individuals. The authors have reason to believe that the gender composition matters for group decisions. In their experiment, groups of three are asked to sit together and to propose a split of a certain amount of money between themselves and a fourth recipient. The money allocated to the group then is divided equally between its members. The authors find evidence of a gender effect in group decisions: female-majority groups donate more to the fourth party and the equalitarian donation is particularly frequent with a female majority. However, groups with two women and one man are found to be the most generous. The researches explain this quite puzzling result by the presence of a man, which may trigger an exaggerate generosity among the women in the group (Dufwenberg & Muren, 2006a).

Many other studies do not only observe the main gender effects but also examine the interaction of the genders of the proposer and recipient in two-player dictator games. Dufwenberg & Muren (2006b) examine experimentally how an individual's generosity depends on the players' sexes and the degree of anonymity between the donor and the recipient. In their experiment, participants are told that their adversary is either a randomly selected male student or a randomly selected female student of the course. They use treatments with private payment of the dictators and with on stage payment, where dictators receive their payments in a lecture hall with a few hundred co-students present. Recipients are always paid privately. Contrasting earlier studies in which selfishness increased with the degree of anonymity, their results go in the opposite direction: less is donated when the dictator is paid on stage rather than in private. Moreover, men receive less than women, and fewer men than women give positive donations (Dufwenberg & Muren, 2006b).

Ben-Ner, Kong, & Putterman (2004) conduct dictator game experiments in which women and men have to split \$10 with either a completely unknown person or a person of known gender. They find no gender difference in giving when the gender of the other player is not known (females give \$3.29 while males give \$3.41) or male (females give \$3.81 and males give \$3.50). However, gender information significantly affects donations only in the case of women: women give significantly less to other women (\$2.185) than to men (\$3.81) or to a person of unknown gender (\$3.29) (Ben-Ner, Kong, & Putterman, 2004).

In a nutshell, these studies find that men are more likely to choose efficient allocation whereas women tend to be more inequality averse than men. In addition to this, women's decisions seem to be more context-specific than those of men.

2.1.4. Trust and Reciprocity

In laboratory experiments, trust can be viewed as sending resources to the second player and reciprocity or trustworthiness as the returning of resources to player one. Croson & Gneezy (2009) offer a broad literature review about studies examining trust and reciprocity. They come to the conclusion that women trust less than or the same as men; and that women's trust levels are more context-sensitive than those of men. Regarding reciprocal behavior, there are inconsistent results: some find no gender differences in reciprocity; others find women more reciprocal than men and in one study men are found to be more reciprocal than women (Croson & Gneezy, 2009).

2.1.5. The Prisoners' Dilemma, Social Dilemmas, and Public Goods Provision

Croson & Gneezy (2009) review a large number of prisoners' dilemma settings – and again mixed results are found: one early study⁴ shows that men cooperate more than women, some other studies reveal women as more cooperative than men, and others do not find any significant gender differences at all.

In social dilemma games in the field of public goods provision gender differences in the voluntary contribution mechanism are investigated. Individuals have resources, which they can either allocate towards their private consumption or to the group's public consumption. When privately consumed, resources are worth more to the individual, but they generate more social value when used to provide public goods. Equilibrium contributions towards the public good are zero in these settings, thus any positive deviations from this benchmark are viewed as altruistic. Again, Croson & Gneezy (2009) describe inconsistent results in this field of studies. Still, a comparison between studies shows that male contributions are more stable than those of females.

Croson & Gneezy (2009) finally conclude that women's increased context-sensitivity of the situation is the cause of inconsistent gender differences in social preferences. Players of both genders are likely to maximize their underlying utility function, however, these functions differ across the sexes: male utility functions seem to be less sensitive to the conditions of the experiment, information about the other party and the other party's action than those of women. Therefore, inconsistent results are observed; sometimes men appear more altruistic than women and other times, women's behavior is more other-regarding, but primarily, women's behavior is more context-dependent than that of men.

⁴ For detail see A. Rapoport & A. Chammah, 1965.

3. Gender Differences in Risk Preferences

In many situations, decisions involve risk or uncertainty. Risk is commonly understood as a complex mixture of facts, values, and fears. Risk assessment is often tainted by misinformation and unreliable heuristics (Cross, 1998).

Women are found to be more risk-averse in most studies, however, the question whether men and women systematically differ in their responses to risk contains economic importance. A large number of studies in sociology and psychology support the hypothesis that men and women respond to risk differently. The risk associated with the use of alcohol and drugs; the catastrophic potential of nuclear war, technology, radioactive waste, industrial hazards, and environmental degradation; and the risk associated with various recreational and social activities are perceived differently across the sexes. There is also evidence that women are less likely to adopt risky behavior such as engaging in criminal activities or the use of illicit drugs (Eckel & Grossman, 2008).

3.1. Abstract Gamble Experiments: Objective Probability Lotteries

In objective probability lotteries with known probabilities and dollar outcomes, risk-taking behavior can be observed. After a comparison between ten papers investigating gender differences in risk preferences in real and hypothetical gambles, Croson & Gneezy (2009) come to the robust finding that men are more risk-prone than women.

In a previous survey, Eckel & Grossman (2008) review the results from field and laboratory experiments for evidence of gender differences in risk-taking behavior and they also conclude that women are more risk-averse than men in field

experiment in the vast majority of settings. Though, in laboratory experiments, the findings are less conclusive (Eckel & Grossman, 2008).

In a notable paper Finucane et al. (2000) find that men and white people tend to judge risk lower than people of color. The authors examine how gender and race are related to a range of sociopolitical factors which are thought to influence risk perceptions using data collected as part of a national telephone survey which contained questions about worldviews, trust, and various demographic variables. Traditionally, *differences in rationality* and education served as a possible explanation for gender *differences in risk perceptions*. However, research indicates that discrepancies in risk perceptions of men and women may not only result from differences in rationality or education.

Their survey finds men to rate most hazards as lower in risk than women; and that whites are likely to rate risks lower than nonwhites; whereas nonwhite females often mention the highest risk ratings. Many females and nonwhite males are likely to be in positions of less power and less control, and thus benefit less from many technologies and institutions, so that they are more vulnerable to discrimination, and therefore see the world as more dangerous and perceive greater risks.

From their results, the authors come to the hypothesis that white males may perceive less risk than others as they are more engaged in creative, managerial and controlling processes and thus benefit more from technology. In contrast, women and nonwhite males may perceive greater risk as they are more likely to be more vulnerable, have less control over their social environment, and benefit less.

The results do not support the view that differences can solely be explained by biological factors as this would require men and women to show discrepancies in their risk perceptions regardless of race, which is not the case in this study. In addition to this, risk perception varies considerably across African, American,

Asian, and Hispanic males and females. This heterogeneity denotes that risk perceptions are strongly dependent on the characteristics of the individuals facing the risk (Finucane, Slovic, Mertz, Flynn, & Satterfield, 2000).

Schubert et al. (1999) run an experiment designed to examine gender-specific risk-propensity in decisions relevant for managers and investors. The authors implement contextual decisions to be able to study gender-specific risk propensities in contexts, which may be relevant to financial and labor markets. Their experiment includes two treatments: in the first treatment, participants have to make risky choices in the form of investment and insurance decisions; in the control treatment participants have to take the same risky choice, however, they are presented as abstract gambling decisions. The gambling treatment contains both a gain-gambling and a loss-gambling frame, in order to measure the risk-attitudes in the gain and loss domain respectively. The choice behavior in first treatment is used to gain insight in risk behavior in contextual financial decisions, whereas the second treatment is used to validate the risk behavior in the light of gambling-evidence.

Prior to the experiment, participants of both treatments were informed that their experimental earnings would be determined by one of their choices. In order to exclude possible wealth effects due to income differences outside the laboratory as an explanation of gender-specific choice behavior, all subjects have to complete a post-experimental questionnaire including information on each subject's disposable income.

Schubert et al. (1999) find that comparative risk-propensity of male and female participants in financial choices are strongly dependent on the decision frame. In contextual situations, female participants do not generally take less risky decision than male subjects, so that no gender difference is observed. In the abstract treatment, however, women display systematically lower certainty equivalents in the

gain-gambling frame, while females seem to be more risk-seeking in the loss-gambling frame than males. The estimated coefficient on income is insignificant in the context treatment, while wealth effects appear to bear a meaning in abstract gambling decisions, with higher income increasing risk tolerance.

As financial decisions in real world settings are always contextual, the results suggest that the gender stereotype of women being less risk-prone and more conservative than men, may not reflect true male and female attitudes towards financial risk. The authors suggest that gender-specific risk behavior found in previous studies may result from differences in male and female opportunity sets rather than stereotypic risk-attitudes. Thus, the authors suppose that abstract gambling experiments may not be suitable for the analysis of gender differences in risk-attitudes toward financial decisions (Schubert, Brown, Gysler, & Brachinger, 1999).

With the goal to fill a substantial gap in literature linking risk-attitudes to personal socio-economic and demographic characteristics such as income, type of work, and gender, J. Hartog, A. Ferrer-i-Carbonell and N. Jonker (2002) conduct a survey in which participants have to state their reservation price for a lottery ticket while knowing the probability of winning a prize of fixed magnitude. From the answers the researchers deduce each participant's individual measure of risk-aversion as defined by *Arrow and Pratt*⁵ by using expected utility theory and then they relate individual risk-aversion to personal characteristics. The researchers use three completely different and independent sources to derive their results: the Brabant Survey, the Accountants Survey, and the GPD Newspaper Survey.

The authors face a special problem concerning non-response and response with a

⁵ A standard, twice differentiable, concave utility function $U(W)$ in wealth W is assumed. The value of the Arrow-Pratt-measure of absolute risk-aversion is $\rho = -U''(W)/U'(W)$.

reservation price of zero. Some participants affiliate to a certain religion or ideology and thus consider gambling as morally objectionable, so that they will not participate in this lottery. However, these participants cannot avoid choices involving risk completely, so that each of them has his/her own personal risk-attitude. Hence, this makes the zero-answers a mixed bag: the answer either truly reflects strong risk-aversion or it signals that the question is not suitable to gain information on risk-attitude. Thus, non-response may reflect both, systematic moral objection or the usual variety of reasons for not answering.

The results reveal that risk-aversion is the most frequent situation, still accountants, who earn substantially higher incomes, exhibit risk neutral or even risk-loving behavior much more frequently. This suggests that increasing income and wealth reduce individuals' absolute risk-aversion. Still it is not clear whether the high scores for risk neutrality among accountants may derive from a professional habit of valuing a risky prospect at its expected value. The type of family in which the respondent grew up as a child was not found to have any significant effect on risk-attitudes. Moreover, neither marriage status, IQ, having impaired health condition, being unemployed, disabled, or not being active in the labor force are found to be related to the risk-aversion coefficient. Risk-aversion is only found to be significantly lower for the self-employed participants. Schooling level is identified to significantly reduce risk-aversion, especially for university education relative to lower levels of education. Referring to gender differences in risk-aversion, women exhibit a substantially higher degree of risk-aversion than men. The researches could not find an obvious explanation for the fact that females and self-employed participants are significantly less inclined to respond to the given lottery.

The results from the GPD survey – a two-page questionnaire published in a Dutch newspaper – indicate that women once again appear more risk-averse than men, that

risk-aversion diminishes with income and education, and that it is lower for the self-employed respondents. As the GPD survey also includes information on family status, age, and church attendance, new results could be drawn. Single parents as well as single individuals, and couples living together without a formal marriage status are less risk-averse than married couples. Frequent church visitors appear to be more risk-averse as compared to the other participants. A possible explanation once again may be possible moral objections to gambling, or that religiously active people are just more prudent, or one might interpret their religious activity as a form of insurance premium fostering their chances for a good afterlife.

Given the three different datasets consistency checks are derived and substantial empirical support is found: women and civil servants display higher risk-aversion, in contrast to the self-employed, and risk-aversion is falling with declining income, wealth and education (Hartog, Ferrer-i-Carbonell, & Jonker, 2002).

3.2. Contextual Environment Experiments

3.2.1. Financial Decision-making

Gysler, Kruse & Schubert (2002) examine the valuations of risky and ambiguous lotteries in a financial context. Their experiment brings together laboratory economic measures of individual valuation of uncertainty with psychological measures of competence and overconfidence. Competence is the perception of feeling knowledgeable or competent in an area, whereas overconfidence is the level to which individuals overestimate their own ability. The authors examine an individual's willingness to pay under different formats of uncertainty with a special focus on the influence of competence, overconfidence and gender effects.

The researches find two important variables for the explanation of the willingness to pay for ambiguous or risky lotteries: overconfidence and objective knowledge.

Moreover, gender seems to play an important role for the prediction of choice when individuals are confronted with uncertainty. Remarkably, men become more risk- or ambiguity-averse with increasing objectively measured knowledge, whilst women become more risk- or ambiguity-prone. Thus, among individuals of low knowledge, women are more risk- or ambiguity-averse than men; and among individuals of high knowledge, women are more risk- or ambiguity-prone.

Gysler, Kruse & Schubert (2002) suppose that an increase in knowledge in a financial decision-making context may have the potential to nearly reverse roles between men and women in attitudes towards uncertainty. They conclude that rating individual contextual knowledge may partly explain some of the puzzles concerning gender differences in labor market and financial market outcomes. Men with low knowledge will gain the knowledge – sometimes by “hard knocks” – if the acquisition of knowledge is a “learning-by-doing” process, however, women will not learn the same lessons due to their more conservative approach. Consequently, women may keep their risk- or ambiguity-averse behavior.

M. Powell and D. Ansic (1997) aim to assess the degree to which women display a common trait of more risk-averse behavior than men in financial decision processes. The researchers examine whether gender differences are largely determined by contextual instance factors rather than trait factors. In the existing literature the authors find only little support for the view that male and female decision-makers exhibit different personality profiles or abilities, while they find consistent evidence of gender differences in risk preferences in business and financial decision-making. However, when these gender differences are interpreted as results from general traits, the stereotypical attitudes about women as less able managers is supported.

Their study uses two computerized experiments with subjects drawn from the population of undergraduate and post-graduate business school students in order to

avoid that any gender differences found would be associated with non-specialist populations. The participants are familiar with financial decisions and have experience of viewing information on a computer screen so that the gender effects of familiarity with the general context and with the use of information technology and keyboard skills would be minimized. In the first experiment, participants have to choose the degree of insurance cover which represents a financial decision familiar to both men and women, and for which most participants have some prior real world experience. In the second experiment, participants have to decide about entering or leaving a currency market on the basis of information about exchange rates and the costs of re-entering the market, which represents an unfamiliar financial decision about which most participants do not have any experience. The degree of risk preference is measured by the frequency of actual choices in each experiment, whereas difference in decision strategies are measured by decision latencies or the time used to take a decision. Subjects know that the aim is to maximize wealth holdings in each decision separately and that for each decision either the wealth, the insurance premium, or the nature of risk would change. Afterwards, they have to complete a post-experiment questionnaire.

For the insurance study, the results from the post-experiment questionnaire revealed that male decisions are affected by prices and risk more frequently than female decisions, whereas women report wealth as the major influencing factor more frequently than men. Both, male and female strategies involve the observation of numerical information and patterns of change, yet men state to consider more sources of information more often. In addition to this, no significant gender differences in self-reported perception of performance (irrespective of earnings) is found, however, women feel significantly less confident at the beginning of the experiment and significantly luckier during the experiment. Regarding prior

experience, no significant difference between males and females is found; and participants consider the task and environment equally acceptable.

For the currency market study, the results show that women stay in the market less on average across all levels of cost than men, which suggests that women feature a lower risk preference independent of the level of sunk costs. Still, in this financial decision instance, no gender differences emerge in the ability to achieve results. As in the insurance experiment, the mean female payment is greater than the mean male payment, but the difference is not significant.

The results reveal, that women exhibit significantly lower preference for risk in both environments, irrespectably of the degree of familiarity, frame or cost. Hence, the view that gender differences are context related in these instances of financial decision-making, is not supported. Males and females adopt different strategies in financial decision-making, irrespective of ambiguity, framing or familiarity in both experiments. Due to women's lower risk preference, they tend to focus on strategies avoiding the worst situation to gain security. Thus, women chose a larger insurance cover and select loss avoiding strategies in the currency decisions, such as staying out of the market longer. Males, being more risk propensive, are more likely to focus on strategies which they consider to achieve the highest gains, such as selection of the lowest cost cover in the insurance framing, and staying in the market longer in the currency framing.

The authors conclude that gender differences in financial risk preference do exist in management populations, and that these differences are not explained by the context instance of familiarity, ambiguity or gains and loss framing. Moreover, gender differences in risk-propensity are associated with different decision strategies, which may be evoked by underlying differences in motivation. These differences may affect choices and opportunities in the labor market, domestic

decisions in financial planning, and the purchase and marketing of financial products (Powell & Ansic, 1997).

3.2.2. Portfolio Selection: High Stakes Decisions

The highest-stakes decisions taken by individuals, for themselves or as agents working for others, are often of special economic interest. The question whether laboratory experiments with small stakes can be used to draw conclusions for high-stakes settings remains unsolved. Croson & Gneezy (2009) argue that one possible solution would be to conduct experiments in poor countries where modest payments by Western standards have high purchasing power to gain insight in high-stakes decision processes. Most comparisons between low- and high-stakes data indicate that conclusions gained from modest stakes do generalize. In the domain of financial risk-taking, direct evidence can often be generated so that there is quite a large number of studies in which high stakes decisions from men and women are directly compared. This literature shows – consistent with the results from laboratory experiments – that there are strong gender differences (Croson & Gneezy, 2009).

Both, common wisdom and the predominant economic model of household behavior have typically identified household savings and investment decisions as the domain of men in the household. Specific individual and household financial decisions such as investment and retirement plan allocations are used to gain insight in gender differences in investing. As these decisions are important for economic well-being in the future, especially in retirement, and as women face a greater probability of being poor in their older age; it is important to understand the factors making women more likely to be involved in those decisions. It is assumed that greater involvement in financial decision-making implies greater influence on financial outcomes, and since women exhibit different attitudes and behavior toward risk than men, gender

differences in investment behavior are an area of increasing importance as we strive for income security in the evening of life (Bernasek & Bajtelsmit, 2002).

Bajtelsmit & Bernasek (1996) review the existing literature regarding gender differences in investment and conclude that several previous studies provide strong evidence that women allocate their portfolios differently than men, and that women may differ in their attitudes toward risk-taking.

A. Sundén and B. Surette (1998) examine the allocation of defined contribution (DC) plan assets. Usually, workers can choose how their assets are invested in such a DC plan. The authors use data from the 1992 and 1995 Surveys of Consumer Finances to examine whether there are systematically gender differences in the allocation of assets in DC plans. Information on households' assets, liabilities, and demographic characteristics as well as on pension coverage, pension plan characteristics, and the allocation of assets in DC plans are included in the data. A detailed analysis of investment choices in DC plans is conducted and then related to individual and household characteristics.

The results show that gender and marital status have significant effects on how individuals allocate assets in their DC plans. Consistently to lab experiments, single women are found to be less risk-prone than single men. Moreover, the authors conclude that demographic, financial, and attitudinal factors seem to be of importance, however, the results indicate that controls for these characteristics do not fully explain gender and marital effects (Sundén & Surette, 1998).

Hinz, McCarthy, & Turner (1997) use data from a 1990 survey of the federal government's Thrift Savings Plan (TSP) for federal employees, which represents the largest pension fund in the United States accounting two million participants. The

TSP contains three different funds of varying risk, and participants can choose in which of the three funds to invest. The survey includes economic and demographic variables such as salary, other family income, age, gender, and marital status (married/not married). The results show that women are more likely to invest their pension assets more conservatively than men, and a large percentage of females choose to invest in the minimum-risk portfolio. This pattern may be partly explained by women's lower salaries; however, the result still persists after controlling for economic and demographic characteristics. Married women also appear to invest less in common stock than married men, given constant income and age (Hinz, McCarthy, & Turner, 1997).

V. Bajtelsmit, A. Bernasek and N. Jianakoplos (1999) consider gender differences in allocation of household wealth to defined contribution pensions. The researches employ data from the 1989 Survey of Consumer Finances (SCF89) to examine whether gender difference can be observed in defined contributions to pension allocation decisions. Their study goes beyond previous research by analyzing pension decisions within the broader context of the household portfolio. Their results show that there are significant gender differences in the allocation of wealth into defined contribution pensions: women reveal greater relative risk-aversion in their allocation of wealth into defined contribution pension assets. Important implications for public policy can be drawn: despite increasing pension coverage rates for women in the last two decades as the number of women in the workforce has increased, women allocate a smaller proportion of their total wealth to retirement vehicles. As women seem to be very risk-averse with respect to the pension allocation decision, it is likely that women will retire with significantly lower pension wealth compared to men. In addition to this, women's smaller wealth will

have to be spread over a longer retirement due to their greater average longevity (Bajtelsmit, Bernasek, & Jianakoplos, 1999).

A. Bernasek and V. Bajtelsmit (2002) report empirical results from a survey of household finances, in which the participants have to specify their degree of involvement in financial decision-making for the household. Their aim is to examine female involvement in savings and investment decisions within married and cohabitating couple households. Previous research on gender differences in financial decision-making has been limited, as most datasets for household financial offer no information about the household decision-maker.

Bernasek and Bajtelsmit's (2002) empirical analysis is based on survey data taken from a sample of academics employed at universities in Colorado. All participants had to give information about the household's financial position, the financial decision-making process within the household, attitudes toward financial risk of household members, and demographic characteristics of the household. Since all of the respondents are employed, the majority has PhDs, and the majority is white and reasonably wealthy, some caution is required in attempts to generalize from these results. More research may be needed to confirm these findings among the population more generally.

Their results reveal that female involvement in household financial decisions increases with their share of household income and their formal financial education; while it decreases with their husbands' share of income and formal financial education, and with the total wealth of the household. Thus female involvement in household finances is significantly positively related to their share of total household income. Hence, the researches conclude that female contribution to the total household income may be a workable proxy for female decision-makers in married couples and that women are more likely to have an influence on financial decisions

when they contribute a larger share to the household earnings. Considered that on an aggregate level, women's salaries are smaller than men's on average, so that these results suggest that women are less likely on average to be heavily engaged in deciding about household level savings and investment. As women complete formal financial education less frequent than men, this result also suggests a smaller involvement of women in the household finances on average (Bernasek & Bajtelsmit, 2002).

3.3. Evidence from Field Studies

The evidence from abstract gambling as well as from contextual environment experiments of women's greater risk-aversion is consistent with non-laboratory studies of behavioral gender differences (Eckel & Grossman, 2008).

J.E.V. Johnson and P.L. Powell (1994) draw together the disparate literature on decision-making and gender. Moreover, they review two additional pieces of empirical evidence on betting and financial modeling: both studies conclude that men and women do not differ in the quality of their decision-making, which is in contrast to much of the earlier literature.

The betting shop study examines actual betting decisions in horse and dog races placed in 50 betting offices in the entire United Kingdom over the period of one week. Measured by the propensity to win, no significant gender differences in the decision quality are found; however, reinforcing the findings of earlier research, men who have not undergone formal management education are found to be more risk propensive than women in their betting habits.

The financial modeling study indicates that the observed differences may be rather caused by experience, information access, formal management education and managerial personality types than by gender. This study does not find any significant

differences in male and female decision quality or risk-attitudes.

The conclusions of both studies are drawn by a simply examination of the average performance of groups of male and female decision makers. Thus, there is no implication that an individual man or woman can be viewed as a qualitatively superior or more risk-averse decision-maker.

The researchers underline the fact that current finding indicate that there are no differences in risk-propensity and decision quality between men and women in the “managerial” sub-population. This, however, clearly contradicts the commonly held stereotypes identified in previous research suggesting that there are gender differences in decision-making ability. This study suggests that these stereotypes may have been established by observation of the “non-managerial” population in which formal management education is likely to be minimal. Previous research indicates that women are often excluded from managerial positions of authority and leadership within organizations because of such stereotypes. The current study signifies that formally educated managers – women and men – are equally capable to contribute to organizational decision processes. Thus, the authors deduce that gender stereotypes may not apply to managers because men and women exhibit similar risk-propensity and make decisions of equal quality in the “managerial” sub-population (Johnson & Powell, 1994).

V. Bajtelsmit and J. VanDerhei (1997) examine defined contribution pension allocation decisions of 20,000 management employees of a large United States employer and their results offer further evidence supporting the hypothesis of women’s greater risk-aversion.

By using data from the 1989 Survey of Consumer Finances, N. Jianakoplos and A. Bernasek (1998) seek to empirically verify the popularly perceived prospect of

existing gender differences in risk-taking behavior. Their study compares single women with single men and married couples including an estimate of the impact of household wealth and other socioeconomic variables on the proportion of risky assets held.

Based on the survey responses, the authors find women to be significantly more risk-averse in financial decision-making than men. Their results confirm previous studies finding relative risk-aversion to decrease as household wealth increases, given wealth is measured excluding human capital and residential housing. Though, for single women, relative risk-aversion does not decrease as much as for single men, supposing that single women are relatively more risk-averse.

Holding other factors constant, single women over most age ranges possess a smaller proportion of risky assets than either single men or married couples. Moreover, holding other factors constant, single women even reduce the proportion of risky assets as the number of children in their household increases, contrasting the behavior of single men and married couples. Furthermore, the results reveal single black women to be more likely to hold a larger proportion of risky assets on average than single white women, single men and married couples. The authors conclude that age, race, and the number of children influence the observed gender differences in financial risk-taking behavior.

The researchers find evidence of gender differences in financial risk-taking in the allocation of total household wealth, which has several important implications. Individuals with greater risk-aversion may chose asset-allocation resulting in relatively lower levels of wealth. Women's greater financial risk-aversion may provide an explanation for women's lower levels of wealth. Moreover, greater risk-aversion featured by women may significantly impact the resources available to

them in retirement as there is an increasing tendency towards self-directed pensions and as women typically live longer (Jianakoplos & Bernasek, 1998).

Eckel & Grossman (2008) conclude that the findings from field studies reveal women as more risk-averse than men. Concerning laboratory experiments, the researchers report the findings as somewhat less conclusive. In large parts, results from laboratory experiments are consistent with those of field experiments, however, there is also enough counter-evidence so that one has to be careful in interpreting the results. Field studies as well as laboratory experiments typically fail to control for knowledge, wealth, marital status, and other demographic factors, which might bias measures of gender differences in risk behavior.

In a nutshell, women are found to be more risk-averse than men in both laboratory settings and investment decisions in the field. The observed gender differences are relatively constant, still few explanations are supplied. The remainder of this section will identify some possible explanations and the evidence supporting each will be discussed. Moreover, exceptions to the general result in particular tasks and by special subject pools will be identified.

3.4. Explanations for the observed Gender Differences in Risk Behavior

3.4.1. Explanations for Gender Differences in Investment Behavior

Bajtelsmit & Bernasek (1996) attempt to offer explanations for the observed gender differences in investment behavior. This is, however, a difficult question as only the outcomes of decisions rather than the decision-making processes themselves can be observed. Gender differences in investment and risk-taking behavior may root in discrimination and/or differences in individual preferences. Thus risk-aversion is

either influenced directly or through the outcomes such as gender differences in wealth, income and employment.

3.4.2. Risk Perception

P. Gustafson (1998) discusses how and why men and women differ in their perceptions of risk by reviewing a number of existing empirical studies of risk perception. The way men and women may differ is somehow problematic, as different methodological approaches give different, or even contradictory pictures, of such gender differences.

Quantitative approaches, such as the psychometric approach, generally use questionnaires and statistical methods to examine a number of risks selected by the researcher. Thereby, the focus is more often on differences between risks than on the differences among those who perceive these risks. After reviewing a number of quantitative studies, Gustafson (1998) concludes that men and women seem to worry about the same risks, but women constantly seem to worry a bit more.

Qualitative approaches use open-ended questions about risk, which allows the respondents to tell what risks they perceive themselves. Qualitative and quantitative approaches, however, draw a different picture of men's and women's risk perception. Gustafson (1998) reviews the existing literature: one survey finds women to be concerned about accident risks, health risks, the risk of death, whilst men stated greater concern about their working life. In another survey concerning health, safety and environmental risks, women mentioned environmental risks more frequently, whereas men mentioned health and safety risks more often. Regarding the risks of violence in the urban environment, males primarily express concern about physical violence, while females are much concerned about sexual assault.

In addition to this, the meanings attributed to risk differ across the sexes. One and the same risk may not always mean the same thing to men and women. Regarding

people's fear of crime, women's perception of risk is different than men's: women are primarily worried about rape or other forms of sexual assault, whereas men fear physical violence.

Gustafson (1998) concludes that gender differences in risk perception may be considered from three different perspectives: firstly, quantitative approaches reveal that men and women often convey different levels of concern of the same risks. Secondly, qualitative studies indicate that men and women perceive different risks. Thirdly, the use of qualitative methods also finds gender differences in the meanings attributed to one and the same risk.

Cutter, Tiefenbacher & Solecki (1992) also examine risk perceptions based on gender and find some minor differences between the views of men and women, especially concerning distrust, perceived catastrophic potential, and perceived potential for death of various technologies and activities. Women are likely to be more pessimistic about technology than men and seem to fear hazards that are societal in nature, such as nuclear weapons or commercial nuclear power. According to these authors shortcomings in the design of their research instrument produce some of the few observed slight gender differences.

3.4.3. Emotions

Another commonly used explanation for gender differences in risk behavior is based on differences in emotional reactions to risky situations (Croson & Gneezy, 2009).

G. Loewenstein et al. (2001) develop the risk-as-feelings hypothesis, highlighting the role of affect experienced at the moment of decision-making. Reviewing the research from clinical, psychological, and other subfields of psychology the authors conclude that emotional reactions to risky situations often diverge from the cognitive assessment of these risks. People react to risk at both the cognitive and the

emotional level. Both reactions are interrelated, but still these two reactions have different determinants. While *cognitive evaluations* of risk are influenced by the variables of decision theory, namely probabilities and outcome valences; *emotional reactions* are sensitive to the vividness of associated imagery, proximity in time, and a number of other variables also play a minimal role in cognitive evaluation. Emotions respond to cognitive evaluations, however, they can also arise without a profound cognitive evaluation process, so that people may experience fear without knowing what they are afraid of (Loewenstein, Weber, Hsee, & Welche, 2001).

Research from psychology suggests that women experience emotions more intensively than men. A stronger emotional experience may influence an individual's utility function and thus one's risk behavior. F. Fujita, E. Diener, and E. Sandvik (1991) find women to report more negative affect than men, but equal happiness as men. Their study reveals that individuals who experience strong positive emotions also experience strong negative emotions. In their results, women score significantly higher on almost all of the intensity measures. Thus, if researchers only collect data on the perception of negative emotions, women will be found to experience more negative affect than men. However, if data, which balances the positive affect against the negative affect is collected, these gender differences will disappear. The authors point out that the paradox of the past is replicated: women score higher on negative affect and still they are not lower on global happiness (Fujita, Diener, & Sandvik, 1991).

Based on these findings, Croson & Gneezy (2009) conclude that women will be more risk-averse in risky situations, if they really experience negative outcomes worse than men do. These underlying gender differences in emotional perception of outcomes lead to lower utility resulting from bad outcomes and thus offers one possible explanation for increased risk-aversion of women.

In M. Grossman and W. Wood's (1993) experiment, women report to experience more intense and more frequent emotions of love, joy, sadness and fear than men; with the exception of anger. Anger seems to be slightly different from the other four emotions the researches assess: anger is the only emotion which men report to experience more intensively than women.

In addition to this, the authors show that sex differences in emotional intensity derive from sex-differentiated normative pressures specifying women to be more emotionally responsive than men. Their results provide support for the social role interpretation of sex differences in emotions: the self-reports of emotional response correspond to an individual's stereotypic beliefs. Women endorsing the stereotypic belief that typical women are more intensely sad, fearful, joyous, and in-love than men, report experiencing heightened emotions themselves. Also men confirming the stereotypic sex differences in these domains report having experienced subdued and attenuated emotional responses.

In the case of anger, men reported stronger emotions than women, however, subjects held the stereotypic view that typical men experience and express anger more intensely than typical women (Grossman & Wood, 1993).

Lerner et al. (2003) conduct a national field experiment in the United States in order to examine the effect of fear and anger on perceived risks of terrorism. Their results also reveal that men hold less pessimistic risk estimates than women do, whereby emotion differences explain sixty to eighty percent of that gender difference. In addition to this, the researchers find that fear and anger alter the beliefs and attitudes concerning matters of national interest. The experience of more anger triggers more optimistic beliefs, whereas the experience of more fear triggers greater pessimism. Across all risks that were assessed males express less pessimism than females.

Based on these results Croson & Gneezy (2009) conclude the following: if females are more likely to be afraid of losing (e.g. to overrate the probability of losing), relative to males, females will consider a given gamble as more risky and thus will behave in a more risk-averse way than men.

H. Fehr-Duda, M. de Gennaro, and R. Schubert (2006) conduct a laboratory experiment with monetary incentives to examine whether the stereotype of women being more risk-averse than men in financial decision-making reflects gender differences in actual risk-taking behavior. The authors find that gender differences in risk-taking behavior crucially depend on probabilities: they can safely conclude that there are no strong gender differences in the valuations of monetary outcomes, however, they find convincing evidence that men and women weight the probabilities differently. Their experiment yields three important conclusions: Firstly, women seem to be less sensitive to changes in probabilities than men are, so that women's probability weighting curves are more curved than those of men, irrespective of the context and the domain. Secondly, female reaction to gains is strongly different to their reaction to losses. In the gain domain women are more likely to underweight large probabilities, whereas in the loss domain probability weights lie much closer to the identity line. Thirdly, females are more likely to be especially pessimistic when winning gambles are framed in investment terms.

These results suggest that women are more risk-averse in the domain of investment decisions when probabilities of winning are of medium or large size. As a consequence, females seem to be more risk-averse than males are in specific circumstances (Fehr-Duda, De Gennaro, & Schubert, 2006).

3.4.4. Overconfidence

Besides gender differences in risk-attitudes and in the evaluation of risk, confidence represents another possible source for gender differences in risk-attitudes (Croson & Gneezy, 2009). Overconfidence can be observed when someone says to be X percent sure about a fact, however, this person is right less than X percent of the time (Soll & Klayman, 2004).

M. Lundeberg, P. Fox, and J. Punčochař (1994) examine gender differences in item-specific confidence judgments. The researchers find only little evidence to support the notion that women have low confidence. Both, men and women, but especially undergraduate men, state higher levels of confidence than the accuracy of their answers justified. Furthermore, their results reveal that men and women report very different confidence scores regarding estimates of general feelings of confidence than they do in estimating their confidence in the accuracy to their answer to specific items. A very important finding is that gender differences depend on the content of the question. In certain domains, such as mathematics, men report higher levels of confidence than women, while in other domains, such as learning and memory, no such gender differences are observed. The data indicates that performance alone does not account for difference in confidence, especially confidence in incorrect answers. Regarding their results, the authors conclude that women may not necessarily lack confidence, but in some cases men simply have too much confidence, especially when they are wrong. The typical perception that women lack confidence, rather than men are overconfident, may arise from comparing prospective general confidence rather than retrospective and task or item-specific confidence. This study uses an objective standard, namely the accuracy of the answers, to assess confidence, so that the problem of using men's level of confidence as the norm is eliminated. In many situations, being overconfident when wrong, may not be a desirable trait – just

as the American humorist Josh Billings put it more than a century ago: *"It ain't what a man don't know that makes him a fool, but what he does know that ain't so."*⁶

R. Estes and J. Hosseini (1988) experimentally examine the personal characteristics influencing confidence in investment decisions. Their experiment included 1,359 participants nationwide. By the use of multiple regressions they control statistically for variation among participants and then the researchers develop a model of investment decision confidence. The most notable result reveals women to be substantially less confident in their investment decisions than men, even after having controlled for other relevant variables such as the amount of the investment decision itself (Estes & Hosseini, 1988).

J. Soll and J. Klayman (2004) conduct a study in which participants are asked to provide estimates of a quantity in terms of ranges or boundaries corresponding to a given degree of confidence so that they were X percent sure that the correct answer for a given question lay between their chosen boundaries. The authors find participants to be substantially overconfident: 80 percent intervals contained the correct answer 48 percent of the time. Both, men and women exhibit overconfidence, however, men are almost twice as overconfident as women. Women do not estimate more precisely, but their intervals are more than 50 percent wider than those of men. Concerning the domain in which the participants have to specify their intervals, no interaction between gender and domain can be found, although two of the domains – automobiles and basketball – might be viewed as stereotypically masculine (Soll & Klayman, 2004).

⁶ <http://www.writersdreamtools.com/view/guest/authors.asp?AuthorID=764> (accessed on 02.11.2012)

M. Niederle and L. Vesterlund (2007) use a mathematical problem-solving task to examine whether men and women of the same ability differ in their selection into a competitive environment. The researchers can not observe any gender differences in performance, however, males select the tournament twice as much as their female counterparts: 73 percent of the men choose the tournament, and only 35 percent of the women do. The resulting gender gap in tournament entry does not root in performance or other factors such as risk and feedback aversion. Their results reveal that the gender gap in tournament entry is primarily caused by two factors: firstly, men are substantially more overconfident about their relative performance than women, and secondly, men and women differ in their preferences for performing in a competition. Thus, gender differences in overconfidence seem to play a considerable role in the explanation of the gender gap in tournament entry, however, these differences only account for a share of the gap. Other general factors, such as overconfidence, risk, and feedback aversion by themselves also generate a gap in choices of compensation scheme. The combination of such factors cause equal performing men and women to choose different compensation schemes. Gender differences in overconfidence largely explain this difference, whereas risk and feedback aversion seem to play a negligible role. The researchers interpret their results that women shy away from competition whilst men seem to embrace it (Niederle & Vesterlund, 2007).

3.4.5. Risk as Challenge or Threats

Another remaining explanation for the observed risk preference differences between men and women is the interpretation of a risky situation. E. Arch (1993) tries to explain the persistence of difference between the public achievement of women and men by gender differences in the responses of men and women to situations that are perceived as risky. Whilst men are more likely to view a risky situation as a challenge

calling for participation, women consider risky situations as threats so that they are encouraged to avoid these situations. The author argues that gender differences in risk-taking behavior do not root in differences in ability, persistence, or eagerness to perform a task well, but they do result from different underlying motivations between men and women. The section on competitive behavior will focus on this topic in detail.

J. Block (1983) underlines the fact that men and women are motivated differently. Male achievement is stimulated under challenging, ego-involving situations, while these same situational factors do not facilitate, and eventually even impair, female performance. Moreover, women express less confidence in problem-solving tasks and tend to underestimate their level of ability or performance compared to men.

The author also points out that there is appreciable sex-differentiated socialization of girls and boys at home as well as at school. Boys are usually granted more freedom to explore and encourage curiosity, independence, and testing of oneself in achievement and other competitive settings. This socialization pattern may extend the experience of males relative to females. For girls, the socialization process often discourages exploration, constrains spheres of activity, stresses proprieties, and emphasizes close supervision, so that female experiences are restricted. Such sex-differentiated socialization practices influence the cognitive and personality development of males and females and thus may lead to sex differences in risk and competition behavior (Block, 1983).

3.5. Exceptions to the Rule: Mangers and Professional Population

The better part of the studies discussed above used members of the general population, or the convenient university population, as participants. Notwithstanding, there are also studies focusing on a subsample of the population,

namely managers and professionals. Among this subpopulation, gender differences in financial risk preferences are not that distinctive compared to the general population, or even nonexistent (Croson & Gneezy, 2009).

S. Atkinson, S. Baird, and M. Frye (2003) compare the performance and investment behavior of female fixed-income mutual fund managers compared with male fixed-income mutual fund managers. Professional fund managers as study object allow the authors to overcome the shortcomings of prior research suggesting that gender influences investment behavior and risk-aversion. The examination of female mutual fund managers enables the researchers the control for wealth and knowledge differences between men and women. Their results suggest that these controls are important as male and female managers seem similar in terms of performance, risk, and other fund characteristics, so that male- and female-managed funds do not differ significantly. The researchers interpret their results in the way that differences in investment behavior, which are often attributed to gender, may be related to wealth constraints and investment knowledge.

However, gender is found to influence the decision-making of mutual fund investors: the net asset flows into female-managed funds are lower than for male-managed funds. This is especially the case in the manager's first year of managing the fund, irrespective of whether she is replacing another manager or starts managing a new fund. This finding may explain why there are relatively few women managing mutual funds, given they perform as well as men. Thus, mutual fund families may hesitate to hire female fund managers if they fear that investors prefer male-managed funds (Atkinson, Baird, & Frye, 2003).

The paper of J.E.V. Johnson and P.L. Powell (1994) comparing the differences in the nature of decisions taken by men and women has already been discussed in the

previous section. This section only offers a very brief overview of their results concerning managers. The authors find that the decision-making characteristics of men and women in a non-managerial population, in which subjects have not undergone a formal management education, contrast those of the managerial population of potential and actual managers who have a formal management education. Johnson and Powell (1994) argue, that women are often excluded from managerial positions of authority and leadership due to the stereotypes, which have come to existence by the observation of non-managerial population. However, this stereotypical view may not apply to the managerial sub-population, which consists of men and women displaying similar risk-propensity and taking decisions of equal quality (Johnson & Powell, 1994).

R. Masters and R. Meier (1988) examine whether men and women owning or owning and managing a small business, the entrepreneurs, differ from men and women not owning but managing a small business, the managers. Their findings reveal that contrary to the popular opinion, entrepreneurs and managers do not differ in their risk-taking propensity. Moreover, the researchers find no differences in the risk-taking propensity of male vs. female entrepreneurs (Masters & Meier, 1988).

S. Birley (1989) also studies the entrepreneurial sector and finds a growth of women-owned businesses reflecting a changing society in which women are beginning to feel more confident about their own skills and to build their own commercial networks. Thus, the author concludes that differences between the sexes in skills and motivation have diminished since the World War II (Birley, 1989).

The above leads to the conclusion that gender differences in risk preferences observed among the general population do not extend to the managerial population.

This may also be a result of self-selection, and with regard to the nature and nurture debate, we now focus on *nature*: People with a more risk-averse behavior may not choose managerial occupations frequently. While fewer women select managerial positions, those who do, exhibit similar risk preferences as men.

Another possible explanation may be adaptive behavior to the job: once a woman has become a manager, she starts behaving in a less risk-averse way. Nevertheless, the existing evidence indicates that managers and professionals embody import exceptions to the rule that men are less risk-averse than women (Croson & Gneezy, 2009).

P. Dwyer, J. Gilson, and J. List (2002) tie together these exceptions to a general rule. They use data from nearly 2000 mutual fund investors to examine whether investor gender is related to risk-taking behavior, which is revealed in mutual fund investment decisions. According to the existing literature the researchers find women to display less risk-taking than men in their most recent, largest, and riskiest mutual fund investment decisions. However, the impact of gender on risk-taking behavior is significantly attenuated when investor knowledge of financial markets and investments is controlled for in the regression. Thus, their results suggest that women's greater level of risk-aversion, which is frequently documented in the literature, is partly explained by knowledge disparities between men and women (Dwyer, Gilkeson, & List, 2002).

3.6. Conclusion

A large part of the existing literature documents gender differences in risk-taking behavior: women are more risk-averse than men. Croson & Gneezy (2009) highlight some factors, which they believe to cause this gender differences. Affective reaction to risk is one major factor: men and women differ in their emotional reactions to

risky or uncertain situations and these different emotional reactions lead to differences in risk preferences. Moreover, emotions influence both, evaluations of outcomes and evaluations of probabilities; and yet emotions are not the only reason for gender differences in risk-taking behavior. In addition to this, men are more confident than women, which results in men having a different perception of the probability distribution underlying a specific risk than women. Furthermore, men are more likely to consider risky situations as a challenge rather than as threat, which results in men's increased risk tolerance.

These differences can be observed in most domains of risk-taking. It is important to point out that these differences are weakened by experience and profession: studies with managers and entrepreneurs find no significant or even not any gender differences in risk preferences of the subjects.

Future research should address these two driving forces behind these exceptions to the rule and try to disentangle them: self-selection meaning that more risk-loving people select and remain in professional careers, and learning, which means that people learn from their professional environment and thus adopt less risk-averse behavior (Croson & Gneezy, 2009).

4. Gender Differences in Competition Preferences

This section is concerned with an important gender difference, which has been identified in experiments as well as in field studies: differences in attitudes toward competition. Recent findings indicate that women are more disinclined than men to participate in competitive interactions such as tournaments, bargaining, and auctions. Moreover, male performance seems to improve under competition relative to female performance. As a result, the performance and participation of men increase relative to that of women as the competitiveness of a certain environment increases (Croson & Gneezy, 2009).

4.1. Gender Differences in the Response to Competition

This section tries to answer what happens, when people find themselves in competition. Moreover, this section provides evidence whether men and women react differently to competitive incentives. Croson & Gneezy (2009) point out that recent findings suppose that men's performance is more affected by the competitiveness of the environment than women's performance. The remainder of this section presents findings from several laboratory experiments and field studies.

4.1.1. *Lab Experiments*

U. Gneezy, M. Niederle, and A. Rustichini (2003) conduct a laboratory experiment to test for the hypothesis that men and women react differently to competitive incentive schemes when competing against one another. They use groups of three men and three women and the participants have to perform the task of solving computerized mazes. In the benchmark treatment, participants' payoff depends solely on their own performance: each participant receives a fixed piece-rate for every maze solved in a given time period of fifteen minutes. Male participants

perform slightly better solving 11.2 mazes on average, compared with 9.7 for women. In this treatment, the researchers do not find any statistically significant gender differences in performance.

In the second treatment, a tournament is used to study the effect of competition: the group has the same size and composition as in the benchmark treatment, but only the participant solving the largest number of mazes is paid proportionally to the output. As a result to the new competitive environment, men's performance increases, while women's performance is not affected. When being paid on a competitive basis, men's mean performance increases significantly to 15 mazes on average, whilst women's performance remains statistically the same at 10.8 mazes on average. Hence, when only the best participant is rewarded in such a competitive situation, men do react with an extra effort, whereas women do not. Thus, men outperform women on average – in the noncompetitive environment not significantly, however, in the competitive environment, the gender gap in average performance is significant.

The tournament treatment differs from the piece-rate treatment in two ways: firstly, payment is uncertain, and the payment depends on the other participants' performance. Hence, a possible explanation of the resulting gender difference is women's higher risk-aversion, so that if effort is costly, the introduction of uncertainty into payments will affect men and women differently. In order to control for this assumption, the authors also include a third treatment, introducing uncertainty without competition. Again, as in the tournament only one participant is paid, however, this participant is chosen at random. In this treatment, no significant gender differences are found, and thus the gender gap in performance is lower than in the tournament treatment.

All these three experiments are conducted in groups of mixed gender with three

men and three women each. As the question whether women might perform differently in single-sex groups than in mixed groups has not been answered yet, the researchers include single-sex tournaments to discern the effect of competition per se on women's performance. The tournament treatment is conducted a second time, but now the groups consist of either six men or six women. The results reveal that women's performance significantly increases in the single-sex tournament as compared to the non-competitive treatment. So whilst single-sex tournaments lead to an increase in women's mean performance, the gender gap in mean performance is decreased. Thus, competitive environments in which women's performance increase do exist. Overall, the performance of the winners of single-sex tournaments is not worse than that of the winners of mixed-sex tournaments.

The researchers show that the significant gender gap in tournaments is not caused by the uncertainty of the payments in tournaments through sex differences in risk-aversion. Furthermore, the authors find a significant increase in mean performance when noncompetitive schemes, such as the piece-rate or the random payment, are replaced by competitive schemes, such as single-sex and mixed-sex tournaments. Single-sex tournaments and mixed-sex tournaments are equally effective in eliciting performance of all participants and in terms of eliciting high performance of the tournament's winners. (Gneezy, Niederle, & Rustichini, 2003).

N. Datta Gupta, A. Poulsen, and M. Villeval (2005) set up a laboratory experiment based on Gneezy, Niederle, and Rustichini's (2003) task of solving mazes for fifteen minutes. The authors adopt this task as no gender differences in performance under a piece-rate scheme were found in Gneezy, Niederle, and Rustichini's (2003). Participants are matched with a co-participant before performing the task and then have to choose between being paid by a piece-rate payment scheme or by a tournament payment scheme. Under the piece-rate payment scheme, participants'

payoff depends solely on their on performance as they are paid per unit output. Under the tournament payment scheme, participants receive a higher payment per unit of output, however, unless they perform better than their co-participant, they only receive a low payment. Once subjects have chosen their payment scheme, they learn his co-participant's payment scheme choice. The researchers' design captures the main properties of many competitive situations, such as choosing between a low-pay-low-risk or a high-pay-high-risk job or occupation, the decision whether or not to work hard in order to be promoted or to apply for a better job, and the decision whether or not to participate in a contest or election in order to obtain a prize or a mandate.

The authors provide the participants with information about his co-participant's gender in order to observe whether men and women hold different beliefs about the relative ability and about other people's payment scheme decision, and whether these beliefs depend on the co-participant's gender.

In the experiment, 60 percent of men and 40 percent of women opt for the tournament payment scheme. When the expected monetary payoff from the tournament relative to the piece-rate is increased, both men and women choose the tournament more frequently, yet men still choose the tournament significantly more often than women. Hence, men and women react to economic incentives. Women also like to compete, however, a substantial gender gap in competitiveness persists.

Furthermore, the results show that risk does not matter for men when choosing their payment scheme, however, women opting for the tournament payment scheme are less risk-averse than those who opt for the piece-rate. In addition to this, beliefs about the co-participant's payment scheme choice do not influence women's payment scheme choice, whilst they do affect men's decision, and the effect depends on the opponent's gender: men are more likely to choose the tournament when their

co-participant is a man than when it is a women. When males are matched with females, those who believe that the woman chooses the tournament option are more likely to choose it themselves. Men as well as women are found to believe that males perform the task better than females, and the typical man and women view themselves as superior performing the task than the average participant, however, neither men nor women condition their own payment scheme choice on these beliefs about their relative ability.

Interesting gender differences are revealed in the analysis how well men and women perform the task itself. In general, men are slightly better at the task than women, but this difference is only significant when a subject is the only one to have chosen the tournament (meaning that the co-participant has decided for the piece-rate). Moreover, women's performance does not vary significantly with the payment scheme chosen, whereas men's effort increases as soon as they have opted for the tournament option. Furthermore, when a man and his co-participant decide for the tournament, if the co-participant is female the man works significantly less than if he faces a man as competitor. The researchers interpret this as an expression of *chivalry*.⁷ Thus, men do not only condition their decision of payment scheme on other people's gender, but also when actually performing the task.

The results show that men and women base their choices on different considerations: women are primarily "internally" oriented when they chose their payment scheme; their choice depends on their own attitude to risk. Quite on the contrary, men are "externally" oriented and they appear to be influence by a norm or convention according to which they "have to" or "should" compete against other men and against other women, when the latter are thought to compete. Despite the fact that men and women in the sample do not differ in their risk-attitudes, women seem

⁷ See also Eckel & Grossman, Chivalry and Solidarity in Ultimatum Games, 2001.

to condition their payment scheme choice on this variable. Another possible explanation for the observed differences in behavior is biological: in our ancestors' life, males competed for females, and those males performing best had the most offspring. In contrast, the optimal behavior for childbearing women was based on cautiousness, selectivity, and avoidance of dangerous situations or risks. However, if males believe that a woman will compete and choose the tournament payment scheme, then according to this gender norm, the woman behaves like a man in the male's eyes and thus the male is more likely to compete as well and to opt for the tournament payment scheme (Datta Gupta, Poulsen, & Villeval, 2005).

D. Vandegrift, A. Yavas, and P. Brown (2004) examine the outcomes when agents have the choice between a payment scheme, where rewards are based on absolute performance, such as piece-rate, and a scheme, where relative performance is rewarded, such as in a tournament. Their participants are students from the Pennsylvania State University who have to complete a forecasting task with reward depending on the accuracy of their forecasts. Primarily, the subjects have to choose between entering the piece-rate option and the tournament option, and then they have to make their forecasts. Three different payment schemes are used. Firstly, the piece-rate scheme, where the piece-rate is based on the participant's absolute forecasting error so that participants with more accurate forecasts receive higher payments. The second payment scheme, the tournament, pays the participants based on their forecasting error relative to other participants who opt for the tournament option. Participants placing more accurate forecasts earn higher payments once again. In the tournament payment scheme, two conditions are used: the winner-take-all condition, whereby the most accurate forecaster receives a payment of \$4.50 and all other participants who chose this option do not earn any payment. In the second condition, the graduated tournament, the same \$4.50 payment is divided among the

first, second, and third finisher in the tournament and again, all other finishers receive nothing.

The researchers test for the presence of gender differences in the participants' forecasting accuracy, the rate of entry into the tournament option, and whether these differences are related to the structure of the tournament rewards. Their results reveal that women do not avoid the tournament, however, women do not respond to changes in the structure of the incentives for the tournament option, whereas men produce more accurate forecasts in both the winner-take-all and graduated tournament conditions. The gender gap is greater in the winner-take-all condition. Women do not show a statistically significant response to changes in the structure of the payoffs in the tournament option, whilst men reduce their forecast errors by about 20 percent in response changes in the structure of the tournament payoff option. Moreover, men respond statistically significantly to changes in the gender composition of the other experiment participants.

Gender does not predict entry into the tournament for the winner-take-all condition, however, forecasting skill seems to have a large impact on the subjects' decision whether to enter the tournament or not. Whereas weak forecasters tend to avoid the tournament, the situation is reversed in the graduated tournament.

The study finds no evidence that men are more likely than women to enter the tournament too frequently and lower their returns relative to their next best option. Considering the results, the authors conclude that men respond to the option of a more competitive environment, such as the winner-take-all condition, by increasing their effort and thus increasing their performance significantly. Yet, these increases in performance do not lead men to enter the tournament at higher rates. Quite on the contrary, a higher degree of competition in the tournament option causes men to opt for the tournament option less frequently. Such a response may be explained by risk-

aversion, as the variance in returns for the graduated tournament option is lower. Women do not show any significant response to changes in the structure of the payoffs in the tournament option (Vandegrift, Yavas, & Brown, 2004).

4.1.2. Field Studies

U. Gneezy and A. Rustichini (2004) extend Gneezy's work (2003), which reports the results of a laboratory experiment of solving computerized mazes, along a few important dimensions. First, this paper is based on an experimental field study with 140 children from an elementary school in Israel. The children are familiar with the task and procedure from previous experience in the class. They perform the task without knowing that they are part of an experiment, and they are not promised any compensation. Every child has to run twice over a track forty meters long, with their teacher measuring their speed, representing the dependent variable studied. Second, all participants are in the fourth grade, and nine or ten years old. Third, the authors observe an open competition as the children watch the two competitors as they run, and the competitors themselves receive feedback concerning their relative performance during the race, as opposed to receiving feedback only at the end. Finally, the children are not offered any compensation, so that the competition is based on intrinsic motivation.

The precise procedure is the following: first, each child runs once by him/herself; then, in the second round, children are matched in pairs independent of their gender, starting with the two fastest children in the previous race, followed then with the next two fastest children and so forth. This way, children having the same speed are matched into pairs. A separate group of children runs alone a second time in order to provide a control for unobservable additional factors that may cause differences in

the outcome.⁸ Children are told their own speed in the first round, as well as the speed of their competitor in the second race.

In the first round, no gender differences can be observed – boys and girls run at the same speed achieving an average time of 7.672 seconds for girls and 7.693 for boys. Children running alone in the first and the second race improve -0.037 on average; whereby the difference in the improvement of performance between genders is not significant. In the second round, there are 116 children in the competition subgroup, consisting of 63 boys and 53 girls. The average change in time from the first to the second race is -0.081. Whilst boys improve -0.163 on average, girls run slower with a time increase of 0.015 on average, representing a significant difference. Regarding the change in performance in the competitive environment to the gender composition of the pairs, the results reveal that boys' speed is not affected by the gender composition of the group, whilst girls perform worse when competing against girls than against boys.

The main result in this study concerning reaction to competitive incentives replicates the results in Gneezy et al. (2003). Yet it is notable, that girls competing against girls do not improve their performance in the second race relative to the first in this study, which contrasts the results from the maze experiment, in which women's performance in homogenous groups improves relative to the noncompetitive environment. The authors provide a possible explanation as follows: even when two girls compete against each other, the rest of their class, consisting of boys and girls, observes the competition. The researchers find support for the claim that competition increases males' performance relative to females' performance. It is notable that this effect appears in two very different environments – the

⁸ For instance, one gender may get tired faster than the other, or one gender may recover more slowly and thus run more slowly in the second race.

computerized maze-solving task and the running competition – indicating that some strong, robust and general factors are involved (Gneezy & Rustichini, 2004).

J. Price (2008) examines the outcomes of the Mellon Foundation's Graduate Education Initiative (GEI), a competitive fellowship program found in 1991 with the goal of increasing of graduation rates and decreasing the time to degree. The study investigates whether there are gender differences in response to competition and whether these responses depend in the gender mix of the group. Ten institutions at the Andrew Mellon Foundation participate in the GEI, and each of these institutions selects four to six students of its departments to participate in the GEI. Additional 47 control departments, some of these GEI departments and some from other universities, were selected after the program was implemented. GEI awards are competitive and the primary criterion is student's progress toward a degree. The implementation of the GEI in 1991 sent three signals to the students in the participating departments: obtaining a reward would significantly increase the student's funding; only a small fraction of students were getting the awards; and the awards were accorded to the students advancing to candidacy the quickest. Thus, entering students perceived the GEI as a very competitive program.

The results reveal that male graduate students experienced a relative 7 percent decrease in time to candidacy in response to the introduction of the competitive GEI program, whilst women on average experienced no change. Men as well as women responded in a more positive way to the program when a larger part of their group was female. The impact on male students' performance was greatest in departments having a larger fraction of female students; thus men perform better when more of their competitors are women. For female students, the results suppose that competition may have had a slightly positive effect in cohorts largely consisting out of women, whilst a negative impact could be determined in male-dominated cohorts.

According to Gneezy, Niederle, and Rustichini's (2003) hypothesis that if participants hold the view that women are less capable than men, an increase in the fraction of one's female competitors will raise the expectation of winning and hence one's effort. The results reported in Price (2008) are quite similar and suggest that both men and women perceived female students as less capable than male students, indicating a possible negative relationship between effort exerted and the perceived strength of one's competitors.

Moreover, Price's (2008) results suppose that the fellowship program had a stronger and more positive impact on single rather than married students, irrespective of the student's gender. One possible explanation may be that married students face tighter time constraints more frequently, so that when competition is introduced, married students have less excess capacity with which to increase effort. Single men were also found to have more to gain through winning the GEI award than women or married men: winning the GEI award offers an additional benefit to those willing to attract a spouse.

The authors point out that policy makers and administrators need to be aware of an inherent tradeoff between an increase in aggregate outcomes through the use of competition and the achievement of gender equity. Thus, increasing the level of competition within a certain group potentially increases average performance, however, it may also increase the achievement gap between men and women, and as a consequence may also increase the gender wage gap within a certain occupation or industry (Price, 2008).

R. Garratt, C. Weinberger, and N. Johnson (2011) provide evidence of competition aversion in a natural setting somewhere between the simplicity of a laboratory experiment and the full complexity and ambiguity of a labor market. The researchers study the behavior of male and female runners participating at the "State Street Mile"

race. In this race, participants can choose between two different levels of competition: those believing to have superior ability relative to their competitors of the same gender are encouraged to enter a highly competitive race with cash prizes for the top three times in each race. The other participants, namely those who believe to be slow runners or simply preferring a lower level of competition, have to pay the very same entrance fee and run the same course in age-group races without any cash prizes. Four highly competitive “elite” races take place: Women’s and men’s “elite” race for those expecting to run the mile faster than the qualifying standard (QS), which is 4:30 for men and 5:30 for women. And the “elite masters” races for athletes over the age of forty, in which the actual mile times are converted to age-grade times in order to determine the finishing place, allowing runners slowing down with age to enter in an adaptive competition.

The results show, that young men sort themselves almost perfectly according to their times relative to the QS, whilst other groups do not. In order to test the hypothesis that a substantial proportion of young women underestimate their ability and thus do not enter the competitive race, the authors create a subsample of runners, who have already participated in the “State Street Mile” race. If women’s lack of information on their running times were responsible for the women’s frequent absence in the “elite” race, then the more informed subsample would exhibit smaller gender differentials in the tendency to enter the competitive races. Though, quite to the contrary, the more informed runners in the experienced subsample exhibit nearly identical patterns of entry. The younger women in the experienced subsample are even slightly less likely to enter the “elite” races than the typical young woman in the full sample. Thus, the gender differences in entry to competition seem to be the result of preferences rather than lack of information. The researchers find the fastest men and the fastest women are very similar in their

decision to enter competition. The largest difference in behavior can be observed among those who meet the QS but are unlikely to win. Whereas young men in this range are very likely to enter the competition, young women are not. This proposes that young men expect to enjoy the competition for its own sake, whilst young women prefer not to compete unless they are likely to win the race. Among runners having a greater than fifty percent chance of winning a prize, namely those being above the median third place time, each and every young men and young women do enter the competitive race. The participation in the competitive race is nearly universal among young women who are likely to win, however, then it drops off very quickly among those who are comfortable above the QS but unlikely to win. Hence, if competition aversion affects behavior among those, who are unlikely to win, it may not be costly to either men or women.

The authors conduct a comparable analysis for the older runners. The results show that the participation patterns among older men are similar to those of younger women. Older women reveal the most competition aversion of all groups: even many of the fastest age-adjusted women avoid the competitive race. Only 38 percent of those who have a greater than 50 percent chance of winning a prize enter the “elite” race with the consequence, that five of the eighteen cash prizes remained unclaimed as only very few women entered the “elite masters” race for women aged over forty. Thus, this field experiment offers strong evidence that women aged 40-75 exhibit a strong preference to avoid competition.

Those who are most likely to win are the most likely to enter the race in all for groups, and the largest difference in competition-avoidance behaviors are observed among those who meet the QS but are unlikely to win. In this field experiment, young women’s tendency to avoid competition is not too costly, as the observed pattern of choices does not reduce expected payoffs drastically. However, among older women

in the sample, competition aversion exerts substantial economic cost (Garratt, Weinberger, & Johnson, 2011).

Taking into account the previous results, it seems alluring to generalize that “men are more responsive to competition than women”. Nevertheless, many open questions still remain. How sensitive are the results to the examined task? Does the gender composition of the group matter? Whereas women did react to competition in single sex groups in the maze study, they did not in groups of mixed gender. In the children’s school racing study gender composition of the group had no effects on the results. In Datta Gupta, Poulsen, and Villeval’s (2005) adapted maze study, men seemed to compete more against men than against women, unless a female competitor chose to compete as well.

4.2. Self-selection

Both the maze and the school race studies focused on gender differences in reaction to competition. Given the fact that men and women may rationally anticipate the observed gender differences in competition aversion, they may base their decision whether to enter competitive settings on these assumptions and thus choose different environments. Several papers have examined gender differences in the choice of different compensation schemes by the use of experiments, in which each participant had the choice between a piece-rate scheme or a competitive winner-take-all tournament.

M. Niederle and L. Vesterlund (2007) contribute to a literature trying to understand why women are underrepresented in many high-profile jobs and across entire professions by examining whether men and women of the same ability differ in their choice of entering a competitive environment. The objective of their paper is to

investigate whether men and women differ in their preferences for competitive environments and how such gender differences impact economic outcomes. The researchers focus on self-selection rather than on gender differences in performance under an exogenously given incentive scheme: they examine whether men and women of equal performance are equally willing to select into a competition. To do so, they use a controlled laboratory experiment, in which participants have to choose between a competitive and a noncompetitive compensation scheme in a nondiscriminatory environment. Such an environment enables the authors to objectively measure performance and it secures that the time commitment is the same under both compensation schemes. The researchers consider four different possible explanations to determine what may cause men and women of equal ability to differ in their propensity to enter a competitive environment: Men may enter the tournament more frequently than women as they may like to compete, as they may be more overconfident, as they may be less risk-averse, or as they may be less averse to feedback.

A total of twenty groups, each consisting of two men and two women, have to complete a real task, namely adding up sets of five two-digit numbers for five minutes. Participants have to solve as many problems as they can. The authors selected this task, as it requires both skill and effort and research had not found any gender differences in ability on easy math tests. Participants are aware of their absolute performance throughout the experiment, however, they are not informed about their relative performance until the end of the experiment and so they do not know whether they perform better or worse than the other participants in their group. Participants have to complete four tasks: the first task with a piece-rate compensation scheme, the second task with a tournament compensation scheme, in the third task participants select which of the two compensation schemes they want

to apply to their future performance, and in the forth task participants have to choose a compensation scheme for their past piece-rate performance. This last task is used to determine whether the gender gap in tournament entry is caused by gender differences in preference for performing in a competitive environment, or if general factors such as differences in overconfidence, risk- or feedback-aversion account for this gender gap. At the end of the experiment, participants are asked to guess their rank in the piece-rate of the first task and in the tournament of the second task, whereat participants receive a payment for each correct guess.

The results reveal – as expected – no gender difference in performance under the piece-rate or under the tournament. Both genders perform significantly better under the tournament than under the piece-rate, however, this improvement may not be caused solely by the different performance incentives under the tournament, but by learning. The similar performances of men and women result in equal probabilities for both men and women to win the tournament. Regarding the decision whether to enter the tournament or not in task three, it has to be underlined that choosing the tournament depends on the participant's beliefs in his or her own ability, but it does not depend on beliefs about other participants' choice of compensation schemes. Despite the absence of gender differences in performance, women and men differ significantly in their choices of compensation schemes: whereas only 35 percent of women opt for the tournament, 73 percent of men do. For women no significant differences in performance between those entering and those not entering the tournament can be found. For males, however, the tournament performance is slightly higher for those entering the tournament. A probit regression reveals: the performance of the participants under the two compensation schemes does not significantly affect the decision whether to enter the tournament, yet the participant's gender does. Controlling for past performance indicates that

performance has at most a small effect on tournament entry, and for every level of performance, men are more likely to enter the tournament. Even women in the highest performance quartile have a lower propensity to opt for the tournament than men in the lowest performance quartile. Thus, low-performing men enter the tournament too often, whilst high-performing women enter it too rarely. Furthermore, concerning the costs associated with payoff-inferior choices of compensation schemes, more women than men fail to enter the tournament when they should, and more men than women enter when they should not. Therefore, the cost of under-entry is higher for women, whilst the cost of over-entry is higher for men. As the cost of over-entry is lower than the cost of under-entry, the total costs of payoff-inferior decisions are higher for women than for men. The results thus far show that equally performing men and women differ substantially in their tournament-entry decision: whilst men seem to embrace competition, women shy away from it.

Regarding the rank-guessing question at the end of the experiment, both men and women are overconfident relative to their actual rank. Whereas 75 percent of males think they are best in their group, only 43 percent of females share this view. Tournament entry decisions are positively correlated with the participant's beliefs on relative performance, though substantial gender differences remain. After controlling for both absolute and believed relative performance, women still remain significantly less likely to enter the tournament. Men's greater overconfidence helps to explain why equally performing women and men select different compensation schemes, however, most of the gender gap still remains unexplained.

Although there are no gender differences in performance, men are more than twice as likely than women to enter the tournament. The authors suggest that there may be two additional reasons why women may not be well represented in competitive jobs.

Firstly, in mixed-gender competitions under some circumstances men's performance is superior to that of women. Secondly, even if men and women are equally successful in competitive environments, women may not enter the competition at the same rate as men given they have a choice. The researchers conclude that the gender gap in tournament entry seems to be primarily caused by men being substantially more overconfident than women, and by gender differences in the preferences for performing in a competitive environment (Niederle & Vesterlund, 2007).

4.3. Bargaining

Bargaining represents another area in which avoiding competition may have strong impacts on the outcomes. Competitiveness involves concerns about one's own outcomes in a conflict by making large demands of one's opponent, whilst on the contrary, cooperativeness involves concerns for the outcomes of the other party. Thus cooperativeness implies some sort of a social preference as already discussed above. These two motivations are not mutually exclusive so that many interactions may involve both. Some psychological research documents small but significant gender effects in negotiation performance. However, similar to the selection into more or less competitive settings, the decision whether to initiate or take part in negotiation may help to understand economic outcomes (Croson & Gneezy, 2009).

L. Babcock and S. Laschever (2003) claim that women avoid competitive negotiation situations compared to men. Whereas directly asking for what you want is a rather male strategy, women tend to use other strategies to achieve what they want: women use collaborative approaches more frequently than men, or they ask for things indirectly which sometimes has the disadvantage in our male-dominated work culture, that women's strategies are misinterpreted and thus leaves them misunderstood. In addition to this, many women avoid negotiations sometimes even

in situations in which they know that negotiations are appropriate and expected. Babcock's (2003) internet survey reveals that many women feel more uncomfortable than the average man to use negotiations to advance their interests. The penalties for not negotiating exceed the monetary ones: women may not only sacrifice additional income, they may also sacrifice some of their employer's regard too (Babcock & Laschever, 2003).

Small et al. (2007) examine how gender and frames differentially affect the initiation of negotiations. The researchers conduct a laboratory experiment where participants are told that they will receive between \$3 and \$10 for their participation. At the end of the experiment, an experimenter gives \$3 to each participant and asks whether this is OK. Each participant may receive \$10, but only if he or she initiates a negotiation with the experimenter. If the participant accepts the offer, or just complains about the offer without asking for more money, then the payment remains at the minimum of \$3. Whereas only 2.5 percent of women request more money, 23 percent of men do so. Moreover, participants are asked about their thoughts and feelings about negotiating and about asking for things for themselves. The researchers find that women have a much more negative view of negotiating for things than of asking for things, whereas men do not behave differently in these two frames (Small, Babcock, Gelfand, & Gettman, 2007).

Hence, in bargaining situations, women tend to exhibit less competitive behavior than men. Once females are in a negotiation situation their behavior does not differ than much from that of males, however, females' propensity to engage in a negotiation at all differs significantly from that of males' (Croson & Gneezy, 2009).

4.4. Why are Men More Competitive than Women?

Even after reviewing gender differences in social, risk and competition preferences, the question why we observe this gender difference in attitudes and behavior still remains. The remainder of this section briefly presents some further possible explanations.

H. Bowles, L. Babcock, and L. Lai (2007) conduct experiments showing that the differential treatment men and women face may explain gender differences in the propensity to initiate negotiations when they attempt to negotiate. Their results show that participants penalize female job candidates more than male candidates for initiating negotiations. Whereas male evaluators are found to penalize female candidates more than male candidates for initiating negotiations; female evaluators penalize all candidates for initiating negotiations. Due to nervousness, women tend to be less inclined than men to negotiate, when facing male evaluators. However, when the evaluator is a woman, no gender differences are observed (Bowles, Babcock, & Lai, 2007).

Furthermore, women tend to make choices with greater consideration of the circumstances surrounding the decision. Men are more likely to make decisions on principle, whilst women seem to be more responsive to changes in the parameters of the decision-making process. Eckel and Grossman (1996) argue that if women's social norms differ significantly from those of the „economic man“, then we may observe substantial differences in their economic behavior. Their results suggest that if men are more rigid in their reservation wage, they stick to a given wage regardless of general economic circumstances, such as the unemployment rate or the economic well being of the industry in general. Quite on the contrary, women may be more flexible and thus adjust their reservation wage to reflect these economic factors,

so that this difference in behavior may result or contribute to lower wages for women on average (Eckel & Grossman, 1996).

W. Harbaugh, K. Krause, and S. Liday Jr. (2002) offer an additional set of data from bargaining experiments with children. The authors study the development of bargaining behavior of children aged from seven to eighteen by the use of dictator and ultimatum games. Significant difference in behavior in both games across age, sex, and height are found. In both the dictator game and the ultimatum game, children make and accept substantially smaller proposals relative to adults. Despite acting strategically, the youngest children are found to make and accept the lowest proposals and thus exhibit the highest acceptance rates. Bargaining behavior changes systematically with age, whereas the bigger part of this change seems to be related to changes in preferences for fairness, rather than bargaining ability. Whilst younger boys and girls make the same dictator offers, older girls make more generous proposals than older boys do. The researchers thus conclude, that these gender differences may have an environmental cause as they only exhibit later in life (Harbaugh, Krause, & Liday Jr., 2002).

U. Gneezy, K. Leonard, and J. List (2006) use an experimental task to explore whether there are gender differences in the decision to enter a competitive environment across two distinct societies: the Maasai in Tanzania and the Khasi in India. The unique aspect of these two civilizations is that the Maasai represent a textbook example of a patriarchal society, whilst the Khasi are a matrilineal, monogamous society where inheritance and clan membership always follow the female lineage through the youngest daughter. The Khasi women, however, do not generally assume the roles held by men in patriarchal societies, such as becoming warriors or hunters, yet they always live in households in which they themselves or their mother have

authority over most household decisions. The Khasi husband has no authority or property and they are expected to work for the gain of his wife's family. An important feature of the Khasi society is that the return to unverifiable investment in girls' human capital is retained within the household, whilst in other cultures only the verifiable component of investment can be retained through bride price or dowry.

Contrary, among the Maasai, age and cattle dominate the social structure. Polygamy is the most common form of marriage and wives are said to be less important to a man than his cattle. Moreover, women receive less education than men, and when a Maasai wife's husband is absent, she is even required to seek permission from an elder male before she travels any significant distance, seeks health care, or makes any other important decision.

The researchers conduct the experiment in similar conditions within both societies. The participants' task is to toss a tennis ball ten times into a bucket that is set 3 meters from them, and a successful shot requires the tennis ball to enter and stay in the bucket. This task was chosen as no gender differences in ability were expected, and it is simple to explain and implement. Participants are matched into groups of two anonymously and then each of them has to decide in which manner they would like to be paid for their performance. The first option is that participants are paid X per successful shot, regardless of the other participant's performance. The second option is that participants are paid $3X$ per successful shot if they outperform their co-participant. Across both societies the X is set equally to the average day wage rate of roughly \$0.50.

Roughly half of the Khasi subjects choose the competitive environment, whereas only 38 percent of the Maasai opt to compete. Among the Maasai, half of the men and only a quarter of the women select to compete, whilst among the Khasi, women choose the competition much more often than Khasi men: 54 percent of Khasi

women compared to 39 percent of Khasi men opt for the competitive incentive scheme. Surprisingly, even more Khasi women (54%) compared to 50 percent of the Maasai men select the competition. The data provides a piece of evidence that existing societal structure and socialization is crucially linked to the observed gender differences in competitive behavior and thus the authors argue that “nurture matters”. Furthermore, the authors conclude that if the social stigma is that females are inferior in competitive environments, then females will avoid competitive situations (Gneezy, Leonard, & List, 2006).

S. Colarelli, J. Spranger, and M. Hechanova (2006) offer a piece of evidence for an opposing view, namely that gender differences are based on genetic differences, hence “nature” plays an important role as well. Females have always been the scarcer reproductive resource and at any given time, there are more reproductive viable men than women in a population. Furthermore, women’s reproductive capacity is limited by gestation, birth, lactation, and menopause. Whilst physiological constraints limit women to bearing a maximum of about ten to fifteen children, men may father dozens of children, such as in polygamous societies. Thus, females’ reproductive interests are more selective than males and they try to select “high quality” males whenever possible. In order to gain a desirable woman, men had to and still have to compete with one another to display their qualities that females value in a mate, such as good genes, and the ability to provide protection and provisioning for offspring. Under these conditions, women depend on men as providers and protectors, whereas men are used to competition (Colarelli, Spranger, & Hechanova, 2006).

Many evolutionary biologists and psychologists, from Charles Darwin through today, view that the basic structure of the human brain is genetically determined, so that the regularities of human behavior and the consistent differences between male and

females psychology may be inherited characteristics. According to this approach, men and women adopted different strategies at some point in human history in order to maximize the fitness of their genes. Thus, genetic or hormonal differences could possibly result in women's lower competitiveness relative to that of men (Croson & Gneezy, 2009).

Considering mammals, intra-sexual selection involves the competition between members of one sex for mates. It is generally assumed that intra-sexual selection almost invariably involves competition between males, whilst females exercise a choice, and not the reverse. Thus, males are eager to pair with any female, whilst females exert at least a passive choice. A.J. Bateman (1948) concludes that this intramasculine selection and related effects may have influenced the evolution of animals and plants in various ways (Bateman, 1948).

J. Manning and R. Taylor (2001) draw a parallel between abilities that are useful in intra-sexual competition and those that are associated with success in sport. Football players and other sportsmen enjoy high status and frequently also substantial earnings, so this high status and wealth are attributes of interest to women in their choice of a mate. The researchers find ability in sports, high sperm counts and testosterone concentrations to be positively correlated. Moreover, they suggest that prenatal and adult testosterone promotes the development and maintenance of traits that are useful in sports, in athletics disciplines as well as in male: male fighting (Manning & Taylor, 2001).

Further support for this explanation is offered in studies of the effect of biological measurements on behavior. Human hormones, such as testosterone and cortisol, are produced differently in the male and female bodies. These hormones both play a

substantial role in behaviors important in competition. H. Bateup et al. (2002) offer a good overview about the hormonal differences between men and women. Considering males, testosterone develops the male brain for aggressive or dominant behavior, improves men's psychomotor function and coordination, increases cognitive performance and individuals are willing to take more risk. Cortisol influences aggression, arousal, and the mobilization of physiological resources to deal with impending threat or challenge. As far as women are concerned, it is known that women produce five to seven times less testosterone than men. Moreover, women's responses to challenges are more defensive in nature than men's: whilst women tend to befriending and creating networks providing resources and protection for them and their offspring, men are more likely to be more aggressive (Bateup, Booth, Shirtcliff, & Granger, 2002).

D. Wozniak et al. (2010) argue that the observed gender differences in competitive, risk, and investment behavior may arise from hormonal differences between men and women. Neuroendocrinology has demonstrated the existence of hormonal effects on brain activity. Hormones stimulate certain areas of the human brain, whereat these areas have been linked with mood, memory, and the anticipation and receipt of monetary rewards. Thus occurring hormonal fluctuations may affect the evaluation of outcomes and consequently the decision-making process. In addition to this, female steroid hormones have large predictable fluctuations across the menstrual cycle. The researchers find that women in the low-hormone phase are less likely to enter competitive environments than women in a non-low-hormone phase of the menstrual cycle (Wozniak, Harbaugh, & Mayr, 2010). Hormonal fluctuations also contribute to the premenstrual syndrome effects having substantial economic consequences. By the use of detailed employee data from a large Italian bank it could be shown that absences for women below the age of 45 tend to follow a

28-day cycle, while the absences of men and women older than 45 do not. These 28-day cycle absences account for about one third of the gender gap in employment absences at the firm (Ichino & Moretti, 2009).

Y. Chen, P. Katuščák, and E. Ozdenoren (2009) examine whether gender differences and menstrual cycle affect female auction behavior. They find that women bid significantly higher and earn significantly less than men do in the first-price sealed bid auctions, whilst there are no gender differences in bidding in the second-price auctions. A sine-like pattern of bidding in the first-price auction is found throughout the menstrual cycle, with higher bids in the follicular phase and lower bids in the luteal phase. Their results reveal that the menstrual cycle really affects female decision-making behavior as well in strategic and non-strategic environments. Thus it might be beneficial for women to know how their decision-making systematically varies during the cycle, so that they can time key decisions better. This may lead to better decisions in investment, negotiations and other competitive situations, so that women's earnings and social positions may increase. Women using the pill as oral contraceptive even exhibit a much more variable sine-like bidding behavior throughout the menstrual cycle with significant higher bids in the follicular phase and significantly lower bids in the luteal phase of the cycle relative to the mean bids (Chen, Katuščák, & Ozdenoren, 2009).

Thus, this study demonstrates once again that "nature matters" as well. Considering all these findings from above, one has to conclude that both nature as well as nurture are responsible for the observed gender differences in competitive behavior. Further research will be needed to disentangle these two factors, to quantify the weight of each factor and to examine the interaction of the two forces.

5. Conclusion

This work gives insights into gender differences in preferences, in risk and competition behavior that lead to the observed differences in the labor market, such as the gender gap in top management positions and to the glass ceiling effect. Experimental studies have been reviewed and with some exceptions fundamental differences between men and women have been documented.

Several studies indicated that female social preferences were different from those of males; however the results of these studies were somewhat inconsistent. Women's increased context-sensitivity was found to cause inconsistent gender differences in social preferences. As the utility functions, which players of both genders aim to maximize, differ across the sexes: male utility functions seem to be less sensitive to the conditions of the experiment, information about the other party and the other party's action than those of women. Thus inconsistent results were observed: sometimes men appeared more altruistic than women and other times, women's behavior was more other-regarding, but primarily, women's behavior was more context-dependent than that of men. In a nutshell, women's behavior was observed as more sensitive to social cues and thus more variable than men's.

Concerning risk behavior, most laboratory experiments and field studies revealed that women are more risk-averse, with important exceptions for managerial population. A list of possible mechanisms behind these findings, such as emotions, overconfidence, and framing, were presented above.

It was shown that the stereotypical view that women are more risk-averse, which has been derived from the observation of non-managerial populations, may not apply to the managerial population, consisting of men and women who exhibit similar risk-

propensity and take decisions of equal quality. Still women are often excluded from managerial positions of authority and leadership due to these stereotypes.

The third section reviewed competition behavior and found that women's preferences for competition are lower than men's in purely competitive situations as well as in bargaining settings. As much modern economic life involves competition in some form or another, differences in the willingness to compete may have a large impact on economic outcomes and thus result in the observed gender wage gap and women's underrepresentation in positions of authority and leadership. Extant research does not allow to answer the important question whether the observed gender differences in competitive behavior are ingrained (*nature*) or taught (*nurture*) satisfactorily. This study has presented evidence in favor of both explanations. Future research should try to identify the relative weights of these two factors.

In summary, three types of preferences which differ between men and women are identified and reviewed. Each of these has implications for the economic decisions taken by men and women in the labor and product markets. Further research is needed to get a closer insight in gender differences in preferences and thus in the underlying utility functions in order to understand the economic outcomes on labor and product markets better.

This work has used laboratory experiments as well as field studies to gain insight in gender differences in risk and competition behavior. Therefore, it is important to be aware of the limitations of this methodological approach: both experiments only hold internal validity but are (still) lacking external validity, so that the results can not simply be generalized to the entire population. This may also represent the reason

why the extant literature does not provide a clear answer to the question why there is only a smaller number of women in high management positions.

6. References

6.1. Bibliography

- Andreoni, J., & Vesterlund, L. (2001). Which is the fair sex? Gender differences in altruism. *Quarterly Journal of Economics*, 116 (1), 293-312.
- Arch, E. (1993). Risk-taking: A motivational basis for sex differences. *Psychological Reports*, 73 (3), 6-11.
- Atkinson, S. M., Baird, S. B., & Frye, M. B. (2003). Do female mutual fund managers manage differently? *Journal of Financial Research*, 26 (1), 1-18.
- Babcock, L., & Laschever, S. (2003). *Women don't ask: negotiation and the gender divide*. Princeton and Oxford: Princeton University Press.
- Bajtelsmit, V. L., & Bernasek, A. (1996). Why Do Women Invest Differently Than Men? *Financial Counseling and Planning*, 7, 1-10.
- Bajtelsmit, V. L., Bernasek, A., & Jianakoplos, N. A. (1999). Gender differences in defined contribution pension decisions. *Financial Services Review*, 8, 1-10.
- Bajtelsmit, V. L., & VanDerhei, J. L. (1997). Risk-aversion and Pension investment choices. In *Positioning pensions for the twenty-first century* (pp. 45-66). Philadelphia: Gordon, Michael S.; Mitchell, Olivia S.; Twinney, Marc M.;
- Bateman, A. J. (1948). Intra-sexual selection in *Drosophila*. *Heredity*, 2, 349-368.
- Bateup, H. S., Booth, A., Shirtcliff, E. A., & Granger, D. A. (2002). Testosterone, cortisol, and women's competition. *Evolution and Human Behavior*, 23 (3), 181-192.
- Ben-Ner, A., Kong, F., & Putterman, L. (2004). Share and share alike? Gender-pairing, personality, and cognitive ability as determinants of giving. *Journal of Economic Psychology*, 25 (5), 581-589.
- Bernasek, A., & Bajtelsmit, V. L. (2002). Predictors of women's involvement in household financial decision-making. *Financial Counseling and Planning*, 13 (2), 39-48.
- Bertrand, M., & Hallock, K. (2001). The gender gap in top corporate jobs. *Industrial and Labor Relations Review*, 55 (1), 3-21.
- Birley, S. (1989). Female entrepreneurs: are they really different? *Journal of Small Business Management*, 27 (1), 32-37.

- Blau, F. D., & Kahn, L. M. (2000). Gender differences in pay. *Journal of Economic Perspectives*, 14 (4), 75-99.
- Block, J. H. (1983). Differential premises: arising from differential socialization of the sexes: some conjectures. *Child Development*, 54 (6), 1335-1354.
- Bolton, G. E., & Katok, E. (1995). An experimental test for gender differences in beneficent behavior. *Economic Letters*, 48 (3-4), 287-92.
- Bowles, H. R., Babcock, L., & Lai, L. (2007). Social incentives for gender differences in the propensity to initiate negotiations: sometimes it does hurt to ask. *Organizational Behavior and Human Decision Processes*, 103 (1), 84-103.
- Booth, A. L. (2009). Gender and competition. *Labour Economics*, 16, 599-606.
- Chen, Y., Katuščák, P., & Ozdenoren, E. (20. May 2009). Why can't women bid more like a man. *unpublished*.
- Colarelli, S. M., Spranger, J. L., & Hechanova, M. R. (2006). Women, power, and sex composition in small groups: and evolutionary perspective. *Journal of Organizational Behavior*, 27, 163-184.
- Croson, R., & Gneezy, U. (2009). Gender differences in preferences. *Journal of Economic Literature*, 47 (2), 1-27.
- Cross, F. B. (1998). Facts and values in risk assessment. *Reliability Engineering and System Safety*, 59 (1), 27-40.
- Cutter, S. L., Tiefenbacher, J., & Solecki, W. D. (1992). En-gendered fears: femininity and technological risk perception. *Organization & Environment*, 6 (1), 5-22.
- Eckel, C. C., & Grossman, P. J. (1996). The relative price of fairness: gender differences in a punishment game. *Journal of Economic Behavior & Organization*, 30 (2), 143-158.
- Eckel, C. C., & Grossman, P. J. (1998). Are women less selfish than men? Evidence from dictator experiments. *Economic Journal*, 108 (448), 726-735.
- Eckel, C. C., & Grossman, P. J. (2001). Chivalry and solidarity in ultimatum games. *Economic Inquiry*, 39 (2), 171-188.
- Eckel, C. C., & Grossman, P. J. (2002). Sex differences and statistical stereotyping in attitudes toward financial risk. *Evolution and Human Behavior*, 23 (4), 281-295.
- Eckel, C. C., & Grossman, P. J. (2008). Men, women and risk-aversion: experimental evidence. In C. Plott, & V. Smith, *Handbook of Experimental Economics Results*, Volume 1 (1061-73). New York: Elsevier.

- Estes, R., & Hosseini, J. (1988). The gender gap on Wall Street: an empirical analysis of confidence in investment decision-making. *Journal of Psychology*, 122 (6), 577-590.
- Datta Gupta, N., Poulsen, A., & Villeval, M.-C. (2005). Male and female competitive behavior: experimental evidence. *Discussion Paper Series - IZA DP No. 1833*, 1-35. Bonn, Germany: IZA - Forschungsinstitut zur Zukunft der Arbeit / Institute for the Study of Labor.
- Dickinson, D. L., & Tiefenthaler, J. (2002). What is fair? Experimental evidence. *Southern Economic Journal*, 69 (2), 414-428.
- Dufwenberg, M., & Muren, A. (2006a). Gender Composition in teams. *Journal of Economic Behavior and Organization*, 61 (1), 50-54.
- Dufwenberg, M., & Muren, A. (2006b). Generosity, anonymity, gender. *Journal of Economic Behavior and Organization*, 61 (1), 42-49.
- Dwyer, P. D., Gilkeson, J. H., & List, J. A. (2002). Gender differences in revealed risk-taking evidence from mutual fund investors. *Economic Letters*, 76, 151-158.
- Fehr-Duda, H., De Gennaro, M., & Schubert, R. (2006). Gender, financial risk, and probability weights. *Theory and Decision*, 60, 283-313.
- Finucane, M. L., Slovic, P., Mertz, C. K., Flynn, J., & Satterfield, T. A. (2000). Gender, race, and perceived risk: the "white male" effect. *Health, Risk and Society*, 2 (2), 159-172.
- Fujita, F., Diener, E., & Sandvik, E. (1991). Gender differences in negative affect and well-being: the case for emotional intensity. *Journal of Personality and Social Psychology*, 61 (3), 427-434.
- Garratt, R. J., Weinberger, C., & Johnson, N. (2011). The State Street Mile: age and gender differences in competition aversion in the field. *Economic Inquiry*, 1-10.
- Gneezy, U., & Rustichini, A. (2004). Gender and competition at a young age. *American Economic Review*, 94 (2), 377-381.
- Gneezy, U., Leonard, K. L., & List, J. A. (June 2006). Gender differences in competition: the role of socialization. *Unpublished*.
- Gneezy, U., Niederle, M., & Rustichini, A. (2003). Performance in competitive environments: gender differences. *Quarterly Journal of Economics*, 118 (3), 1049-1074.
- Grossman, M., & Wood, W. (1993). Sex differences in intensity of emotional experience: a social role interpretation. *Journal of Personality and Social Psychology*, 65 (5), 1010-1022.
- Güth, W., Schmidt, C., & Sutter, M. (2007). Bargaining outside the lab - a newspaper experiment of a three-person ultimatum game. *Economic Journal*, 117 (518), 449-469.

- Gustafson, P. E. (1998). Gender differences in risk perception: theoretical and methodological perspectives. *Risk Analysis*, 18 (6), 805-811.
- Gysler, M., Kruse, J. B., & Schubert, R. (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, W. T., Krause, K., & Liday Jr., S. G. (2002). Bargaining by children. *University of Oregon Economics Department Working Paper 2002-4*.
- Hartog, J., Ferrer-i-Carbonell, A., & Jonker, N. (2002). Linking measured risk-aversion to individual characteristics. *KYKLOS*, 55 (1), 3-26.
- Hinz, R. P., McCarthy, D. D., & Turner, J. A. (1997). Are women conservative investors? Gender differences in participant-directed pension investments. In *Positioning pensions for the twenty-first century* (pp. 91-103). Philadelphia: Gordon, Michael S.; Mitchell, Olivia S.; Twinney, Marc M.;
- Ichino, A., & Moretti, E. (2009). Biological gender differences, abstemiousness and the earnings gap. *American Economic Journal*, 1 (1), 183-218.
- Jianakoplos, N. A., & Bernasek, A. (1998). Are women more risk-averse? *Economic Inquiry*, 36 (4), 620-630.
- Johnson, J., & Powell, P. (1994). Decision-making, risk and gender: are managers different? *British Journal of Management*, 5 (2), 123-38.
- Lerner, J. S., Gonzalez, R. M., Small, D. A., & Fischhoff, B. (2003). Effects of fear and anger on perceived risks of terrorism - A national field experiment. *Psychological Science*, 14 (2), 144-150.
- Loewenstein, G. F., Weber, E. U., Hsee, C. K., & Welche, N. (2001). Risk as feelings. *Psychological Bulletin*, 127 (2), 267-286.
- Lundeberg, M. A., Fox, P. W., & Puncochar, J. (1994). Highly confident but wrong: gender differences and similarities in confidence judgements. *Journal of Educational Psychology*, 86 (1), 114-121.
- Manning, J. R., & Taylor, R. P. (2001). Second to fourth digit ratio and male ability in sport: implications for sexual selection in humans. *Evolution and Human Behavior*, 22 (1), 61-69.
- Masters, R., & Meier, R. (1988). Sex differences and risk-taking propensity of entrepreneurs. *Journal of Small Business Management*, 26 (1), 31-35.
- Niederle, M., & Vesterlund, L. (2007). Do women shy away from competition? Do men compete too much? *Quarterly Journal of Economics*, 122 (3), 1067-1101.
- Niederle, M., & Vesterlund, L. (2008). Gender differences in competition. *Negotiation Journal*, 24 (4), 447-463.

- Powell, M., & Ansic, D. (1997). Gender differences in risk behaviour in financial decision-making: an experimental analysis. *Journal of Economic Psychology*, 18 (6), 605-628.
- Price, J. (2008). Gender differences in the response to competition. *Industrial & Labor Relations Review*, 61 (3), 318-333.
- Rapoport, A., & Chammah, A. M. (1965). Sex differences in factors contributing to the level of cooperation in the prisoner's dilemma game. *Journal of Personality and Social Psychology*, 2 (6), 831-838.
- Rottenstein, Y., & Hsee, C. K. (2001). Money, kisses, and electric shocks: on the affective psychology of risk. *Psychological Science*, 12 (3), 185-190.
- Schubert, R., Brown, M., Gysler, M., & Brachinger, H. W. (1999). Financial decision-making: are women really more risk-averse? *American Economic Review*, 89 (2), 381-385.
- Selten, R., & Ockenfels, A. (1998). An experimental solidarity game. *Journal of Economic Behavior and Organization*, 34 (4), 517-539.
- Small, D. A., Babcock, L., Gelfand, M., & Gettman, H. (2007). Who goes to the bargaining table? The influence of gender and framing on the initiation of negotiation. *Journal of Personality and Social Psychology*, 93 (4), 600-613.
- Soll, J. B., & Klayman, J. (2004). Overconfidence in interval estimates. *Journal of Experimental Psychology*, 30 (2), 299-314.
- Solnick, S. J. (2001). Gender differences in the ultimatum game. *Economic Inquiry*, 39 (2), 189-200.
- Sundén, A. E., & Surette, B. J. (1998). Gender differences in the allocation of assets in retirement savings plans. *American Economic Review*, 88 (2), 207-211.
- Vandegrift, D., Yavas, A., & Brown, P. M. (2004). Men, women, and competition: an experimental test of labor market behavior. *2004 North American Meeting of the Economic Science Association*.
- Wozniak, D., Harbaugh, W. T., & Mayr, U. (2010). Choice about competition: differences by gender and hormonal fluctuations, and the role of relative performance feedback. *Working Paper Series*.

6.2. Online Resources

Writer's Dreamtools (2012): Quotes Witty And Wise: "Josh Billings",
<http://www.writersdreamtools.com/view/guest/authors.asp?AuthorID=764>, accessed on 02.11.2012.

Curriculum Vitae

Constanze Miriam Müller

Bakk.rer.soc.oec. Bakk.rer.soc.oec.

born on December 13th in Vienna, Austria

Austrian citizen



Education

Since 03/2010	Master-Studies of Business Administration, University of Vienna
08/2010	Utrecht University Summer School – Econometrics, Utrecht, The Netherlands
10/2007 – 03/2010	Bachelor-Studies of Business Administration, Bachelor degree – 04.03.2010, grade point average: 1.52, University of Vienna
10/2006 – 07/2012	Bachelor-Studies of Economics, University of Vienna Bachelor degree – 28.08.2012, grade point average: 1.80, University of Vienna
09/1998 – 06/2006	Grammar School, A-levels with distinction – 17.06.2006, grade point average: 1.0, BRG Schuhmeierplatz, Vienna, Austria
09/1994 – 06/1998	Elementary School, grade point average: 1.0, VHS Wichtelgasse, Vienna, Austria

Achievements

01/2012	Merit scholarship of the Austrian Ministry of Science Grant for outstanding achievements in 2010/2011
01/2011	Merit scholarship of the Austrian Ministry of Science Grant for outstanding achievements in 2009/2010
10/2010	Admission to the High Potential Program „Talents Community“ for 25 students of all fields of study of the University of Vienna
07/2010	Accenture Campus Challenge; 2 nd place in the finals in Kronberg (Germany)
06/2010	Merit scholarship from Foundations and investment funds from private foundations - Grant for outstanding achievements in 2009
06/2010	Admission to the High Potential Program „Class of Excellence“ for 20 students of the Department of Economics and Business Administration of the University of Vienna
01/2010	Merit scholarship of the Austrian Ministry of Science Grant for outstanding achievements in 2008/2009
06/2009	Merit scholarship from Foundations and investment funds from private foundations - Grant for outstanding achievements in 2008
01/2009	Merit scholarship of the Austrian Ministry of Science Grant for outstanding achievements in 2007/2008
11/2008	“Best of the Best 2008”; 2 nd Place among Business undergraduates
05/2006	Participation in the international Cicero-Competition (Latin translation contest) in Arpino (Italy)

Work experience

10/2009 – 02/2011

Chair for International Personnel Management

Prof. Dr. Oliver Fabel, M.A.

University of Vienna

Research Assistant

- Preparation and Administration of an introductory course
- Research assistance and data collection

04/2010 – 07/2010

Energie-Control GmbH

(Regulator of the Austrian energy markets)

Dr. Johannes Mayer

Department of Economics

Research Assistant

- Data collection and processing for an Energy Spot-Price Modell
- Econometric and graphic Analyses in EViews

10/2008 – 06/2009

Chair for Financial Services and Public Utility Management

Prof. Dr. Jörg Finsinger

University of Vienna

Research Assistant

- Compile lecture notes and presentations
- Research on Financial Services

Skills

Language Skills:

Native: German

Excellent: English, French

Basic: Italian

IT Skills:

Excellent knowledge – MacOS, MS Office, Adobe Photoshop

Basic knowledge – Stata, SPSS

Other:

Paramedic at the Red Cross of Vienna

Interests

Emergency Medical Services, Pinball, Photography, Travelling, Skiing.