

SUPPLEMENTAL ONLINE APPENDIX

Appendix 1 Games

Bargaining game	Participants need to bargain over how to distribute something among themselves. The “shrinking pie” is a well-known bargaining framework in which the proposer divides a sum of money with the responder. If the responder rejects the offer, they switch roles and the responder has to make an offer to the first proposer. The game ends when an offer is accepted or when a certain number of rounds has been played. The ultimatum game is a special sort of bargaining game (Linda Babcock and George Loewenstein 1997).
Dictator game	There are two players. One player, the dictator, divides the sum of money between himself/herself and the responder. The responder can only accept the offer (Robert Forsythe et al. 1994).
Investment game / BDM trust game	A trustor decides how much of her/his initial endowment is sent to an anonymous trustee. The amount given to the trustee is then tripled by the organizer of the experiment. The trustee subsequently decides how much of the money is sent back to the trustor and how much she/he keeps for her/himself (Joyce Berg, John Dickhaut, and Kevin McCabe 1995).
Public goods game	Participants can invest in a public or a private good. The private good returns a fixed amount of money per token invested back to the individual. The public good returns money back to the group, regardless of who invests in the public good. The rate of return per token invested in the public good increases and becomes higher than the rate of return of the private goods when the group invests in the public good above the “provision point” (Gerald Marwell and Ruth E. Ames 1979).

Appendix 2 Risk appetite: Specific studies

In a survey of the literature on the gender wage gap, Alison L. Booth (2009) discusses several experimental and survey-based contributions that find gender related differences in risk aversion wherein women are more risk averse than men. These insights suggest that the gender wage gap can be partly explained by these psychological differences between men and women. Booth, however, stresses that these differences are not innate but shaped by the environment in which individuals are placed.

James P. Byrnes, David C. Miller, and William D. Schafer (1999) present the outcomes of a meta-analysis of 150 studies (prior to 1999) in which risk-taking tendencies of men and women are compared. Findings are that male participants are more likely to take risks than women, but this gender difference varies with age and context.

Catherine C. Eckel and Philip J. Grossman (2008b) provide a review of the literature of public goods, ultimatum, and dictator games for evidence of systematic differences in the behavior of men and women. They find that systematic gender differences in behavior only exist in experiments in which participants are not exposed to risk.

Catherine C. Eckel and Philip J. Grossman (2008c) review the literature on risk aversion and focus on gender differences revealed in experiments involving valuations of gambles and/or choices among gambles. Women are found to be more risk averse than men in most studies, but the results depend for a large part on experimental design. Furthermore, the authors note that such differences between studies make comparisons very hard. P. E.

Gustafson (1998) presents a review of a number of empirical studies on differences in risk perception between men and women. Since both quantitative and qualitative approaches provide contradicting results, Gustafson argues that a theoretically informed gender perspective on risk is needed to improve the understanding of women's and men's risk

perceptions. According to Gustafson, gendered practices (segregated work activities) and ideologies (role expectations) reflect underlying gender structures that cause men and women to be exposed to different kinds of risk. Due to these differences, men and women have different perceptions of risk.

Priyanka B. Carr and Claude M. Steele (2010) use a stereotype threat to examine the influence of stereotypes on individuals' decision making. Women behave more risk averse when they are asked for their gender before the exercise and when the exercise is called a math problem than when women have to complete a puzzle-solving exercise and are asked for their gender after completing the tasks. There are no gender differences in decision making in the absence of negative stereotypes about women's abilities. "A result suggesting that similar gender differences observed in previous studies may have arisen not from innate and stable factors, but from powerful but subtle cues of stereotypes embedded in the environment and task instructions" (1414). Jonathan R. Weaver, Joseph A. Vandello, and Jennifer K. Bosson (2013) conduct a financial risk game and point out that men take more financial risks and become more shortsighted when their manhood comes under threat. This effect was smaller when their decision was made anonymously, hence without a reputational effect. Alison L. Booth and Patrick Nolen (2012b) examine whether existing gender stereotypes affect behavior. They investigate students (aged 10 or 11) from single-sex and co-educational schools. Girls from single-sex schools take more risk than girls from co-educational schools and even take as much risk as boys from either a co-educational school or single-sex school. Moreover, girls take more risk when allocated to all-girls groups. The authors suggest that these gender differences are the result of culturally driven norms rather than inherent gender traits, because behaving competitively is socially viewed as male behavior and not female behavior.

Using data from fifteen investment game studies, Gary Charness and Uri Gneezy (2012) find that women make smaller investments in risky assets and consequently appear to be more risk averse than men with regard to financial matters. However, Julie A. Nelson (2013) argues, after a re-examination and extension of these data, that in studies in which risk-taking behavior of men and women differs, only the average score of men and women as a group differs and these differences are not large enough compared with the intra-sex variability to draw conclusions concerning individual levels. The methods and conclusions of Gary Charness and Uri Gneezy (2012) are problematic because they tend to treat gender differences in risk-aversion as a categorical variable on an individual level (Nelson 2013). Ben Jacobsen et al. (2014) examine gender differences in stock holdings, consumer confidence, and other polls in eighteen countries and find that women are more risk averse than men. Also, men are more optimistic about future economic performance of economic indicators than women. This gender difference in optimism also holds for a number of other social variables and might also explain why men hold more equity than women. However, intra-gender differences are large, as very optimistic women hold almost 5 percent more equity than very optimistic men. James Felton, Bryan Gibson, and David M. Sanbonmatsu (2003) examine a sample of sixty-five participants in an experimental stock investment game and find that men make more risky investment choices than women. This difference is primarily due to riskier choices of optimistic men. Female participants show a smaller variance in their portfolio than male participants. The authors suggest that the documented gender difference in investment strategies may be due to a specific subgroup of men, namely optimistic men. “Greater attention to intra-sex variability and inter-sex overlap of distributions would improve the objectivity of economic research, and prevent economic research from contributing to social and economic problems of invidious stereotyping, discrimination, and excessive risk-taking” (Nelson 2013: 3).

Appendix 3 Risk appetite: Summary table

Contribution	Approach	Are gender difference in risk aversion reported?	Section
Alison L. Booth (2009)	Literature review	-	A
James P. Byrnes, David C. Miller, and William D. Schafer (1999)	Literature review	-	A
Catherine C. Eckel and Philip J. Grossman (2008b)	Literature review	Yes, systematic differences in behavior of men and women are confirmed by experiments but only in situations where risk is absent.	A
Catherine C. Eckel and Philip J. Grossman (2008c)	Literature review	Differences among studies make comparison difficult.	A
P. E. Gustafson (1998)	Literature review		A
Julie Agnew, Pierluigi Balduzzi, and Annika Sundén (2003)	Field data (retirement accounts)	Yes.	B
Daniela Beckmann and Lukas Menkhoff (2008)	Survey of professional fund managers	Yes.	B
Adam S Booiij and Bernard van Praag (2009)	Survey (willingness to pay for lottery ticket)	Yes.	B
Adam S Booiij, Bernard M. S. Van Praag, and Gijs Van de Kuilen (2010)	Experiment (lottery valuation)	Yes, women more risk averse. Result driven by loss aversion and differences in probability weighting.	B
Aurora García-Gallego, Nikolaos Georgantzís, and Ainhoa Jaramillo-Gutiérrez (2012)	Experiment (ultimatum game)	Yes, but do not explain subjects' rejection behavior in salary negotiations.	B

Juan Camilo Cárdenas et al. (2014)	Experiment	Yes, and some evidence for the house money effect.	B
Gary Charness and Uri Gneezy (2012)	Experimental (data retrieved from fifteen other studies)	Women make smaller investments in risky assets.	B
Robert B Durand, Rick Newby, and Jay Sanghani (2008)	Survey (personality gender traits)	Negative relation masculine traits (not necessarily the male sex) and portfolio return.	B
Catherine C. Eckel and Philip J. Grossman (2002)	Experiment (choose among gambles)	Yes, results hold for different experimental designs.	B
Catherine C. Eckel and Philip J. Grossman (2008a)	Experiment (choose among gambles)	Yes, results hold for different experimental designs.	B
Seda Ertac and Mehmet Y Gurdal (2012)	Experiment (risky group decisions)	Yes, women are more risk-averse and are less likely to make decisions on behalf of a group than men.	B
Helga Fehr-Duda, Manuele De Gennaro, and Renate Schubert (2006)	Experiment (lottery choice and investment game)	Yes, due to different valuations of outcomes and probability weights.	B
Bart Frijns, Esther Koellen, and Thorsten Lehnert (2008)	Survey	Yes.	B
Binglin Gong and Chun-Lei Yang (2012)	Experiment (IR and CR task)	Yes, women are more risk averse than man in both societies.	B
John Grable, Ruth Lytton, and Barbara O'Neill (2004)	Survey	Yes.	B
Marja-Liisa Halko, Markku Kaustia, and Elias Alanko (2012)	Survey and data of a bank	Yes.	
Ben Jacobsen et al. (2014)	Field data, polls and surveys	Yes, however very optimistic women are less risk averse than very optimistic men.	B
Matthew R. Kelley and Robert J. Lemke (2015)	Natural experiment, television show		B
Katja Meier-Pesti and Elfriede Penz (2008)	Survey and experiment (masculine attributes)	Yes (masculinity is related to risk taking).	B

Melanie Powell and David Ansic (1997)	Experiment (with different designs)	Yes, irrespective of framing and familiarity.	B
Annika E. Sundén and Brian J. Surette (1998)	Survey (retirement savings)	Yes.	B
Alex Wang (2009)	Survey (financial knowledge)	Yes.	B
Gary Charness and Garance Genicot (2009)	Experiment (risk sharing)	Men are more risk averse than women indicated by higher transfers.	C
Julie R. Agnew et al. (2008)	Experiment (“retirement game”)	Yes, but depends on context of experiment.	D
Alison L. Booth and Patrick Nolen (2012b)	Experiment	Girls from a coed-sex school take less risk while girls from single-sex school take as much risk as boys from either type of school.	D
Lex Borghans et al. (2009)	Experiment (reservation price for unknown bet)	Yes, but depends on level of ambiguity.	D
C. Bram Cadsby and Elizabeth Maynes (2005)	Experiment (corporate takeover game)	Small.	D
Priyanka B. Carr and Claude M. Steele (2010)	Experiment with stereotypes	Gender stereotypes lead to gender differences in decision making.	D
Helga Fehr-Duda et al. (2011)	Experiment (weighing of probabilities)	For women, probability weights are influenced by their mood.	D
James Felton, Bryan Gibson, and David M. Sanbonmatsu (2003)	Experiment (investment game)	Yes, but difference may be caused by subgroup of optimistic men.	D
Antonio Filippin and Paolo Crosetto (2016)	Re-examination of sixty-two studies that use the HL method	Significant gender differences are the exception rather than the rule.	D

Christer Gerdes and Patrik Gränsmark (2010)	Field data (chess games)	A female opponent induces more aggressive play for both men and women.	D
Glenn W. Harrison, Morten I. Lau, and E. Elisabet Rutström (2007)	Experiment (lottery choice)	No.	D
Carmen Keller and Michael Siegrist (2006)	Survey (willingness to invest in stocks)	Mixed.	D
Jamie Brown Kruse and Mark A. Thompson (2003)	Survey and experiment (risk mitigation)	No.	D
Julie A. Nelson (2015)	Re-analysis of Gary Charness and Uri Gneezy (2012)	Men and women differ only in risk taking behavior in means. Moreover, intra-sex variability is high.	D
Julie A. Nelson (2015)	Re-analysis of experiments	Men and women are more similar than different in risk-taking behavior.	D
Renate Schubert et al. (1999)	Experiment (context rich)	Mixed; risk propensity depends on context.	D
Coren L. Apicella et al. (2008)	Experiment (investment game)	Yes, based on testosterone levels.	E
Nicos Nicolaou and Scott Shane (2010)	Genetic factors and occupation	No.	E
Richard Ronay and William von Hippel (2010)	Presence of women	Men take more risk in the presence of attractive women.	E
Paola Sapienza, Luigi Zingales, and Dario Maestripieri (2009)	Testosterone concentrations	Yes, but only gender effect for higher concentrations of testosterone.	E
Steven J. Stanton et al. (2011)	Experiment (testosterone)	U-shaped relation between testosterone and risk preferences. No gender effect.	E

Notes:

A – Background/overview article or literature study

B – Women are found to show risk aversion to a higher extent than men

C – Women are found to show risk aversion to a lesser extent than men

D – Mixed or insignificant results

E – Study takes hormonal instead of gender differences into account

Appendix 4 Overconfidence: Specific studies

Linda Babcock and George Loewenstein attempt to explain impasses in bargaining situations by pointing at the tendency of both parties to “arrive at judgments that reflect a self-serving bias – to conflate what is fair with what benefits oneself” (1997: 110). Although their study does not discuss the relationship between gender and overconfidence (self-serving biases, in this case), it does provide important background information on the role of overconfidence in bargaining situations. The authors use insights from the psychology literature as well as experimental and field research. Their main conclusion is that the self-serving bias is an important determinant of bargaining impasse. Parties have both different interpretations of the situation and different notions of fairness. When expectations are deflated (or, in other words, when participants in the experiments are made aware a priori of the fact that their own weaknesses may be the cause of bargaining impasses), the chances of agreement rise. According to the authors, self-serving biases can better explain impasses than incomplete information.

Brad M. Barber and Terrance Odean (2001), in a widely cited study, use a large field dataset to analyze common stock investment of both men and women. Theoretical models predict that overconfident investors trade excessively. Also, psychological research suggests that men are more overconfident than women. The authors find that men trade 45 percent more than women and that trading imposes a higher reduction in net returns for men than for women. This leads the authors to conclude that men are more overconfident than women and that men will trade more and perform worse than women. The study of Barber and Odean provides support for behavioral finance, which assumes heterogenic agents.

Nabanita Datta Gupta, Anders Poulsen, and Marie Claire Villeval (2013) conduct an experiment wherein participants add up numbers or carry out maze games and ex ante choose their reward system – tournament style (competitive) or piece rate (non-competitive). Although there are slight differences, their approach is similar to the contributions of Uri Gneezy and Aldo Rustichini (2004); Uri Gneezy, Muriel Niederle, and Aldo Rustichini (2003); and Muriel Niederle and Lise Vesterlund (2007). The authors find that men choose the tournament style more often (out of overconfidence), and men are likely to choose to compete against other women instead of men, but only when gender information is explicitly mentioned. Hence, the nature of men's behavior is, according to the authors, primarily influenced by social norms. Chivalry is also used by Catherine C. Eckel and Philip J. Grossman (2001) as an explanation for the fact that men behave less aggressively towards women.

Uri Gneezy and Aldo Rustichini (2004) find mixed results for gender differences in overconfidence. These findings are consistent with Uri Gneezy, Muriel Niederle, and Aldo Rustichini (2003), who find that women react less to competitive incentives in terms of increased performance, and also with Muriel Niederle and Lise Vesterlund (2007), who find that compared to men, women avoid competitive schemes, and when forced to compete, they fail to do so appropriately. Christina Günther et al. (2010), however, suggest that the task executed in the laboratory experiment of Uri Gneezy, Muriel Niederle, and Aldo Rustichini (2003) can be considered a male task. In the experiment, participants had to solve maze games in groups of six people and payoffs varied. Christina Günther et al. (2010) use the concept of stereotype threat (the activation of a specific stereotype may negatively impact task performance of the negatively stereotyped group) to explain why the maze game experiment is a male task. Christina Günther et al. (2010) therefore use a “neutral” and a “female” experiment to examine whether the outcomes of Uri Gneezy, Muriel Niederle, and

Aldo Rustichini (2003) can be replicated. The female tasks were related to pattern matching and memory performance. Their findings are that for the male task, the results of Uri Gneezy, Muriel Niederle, and Aldo Rustichini (2003) are replicated. For the neutral task, however, women react as strongly to incentives as men, and for the female task, women react stronger than men. Using stereotype threat as an explanation, the authors suggest that women tend not to compete with men in areas in which they think they will lose, even though such thoughts have no rational grounds. Anna Dreber, Emma von Essen, and Eva Ranehill (2013) also demonstrate that 16–18-year-old boys are more likely to self-select into a competitive payment scheme in the mathematical task (“male” oriented task) than girls of the same age, while there is no gender gap in self-selection in the verbal task (“female” oriented task). The gender gap in mathematical tasks becomes insignificant when controls for actual performance and beliefs about relative performances are added, indicating that girls are more underconfident in math tasks than boys. Furthermore, the contribution of Christina Günther et al. (2010) shows how much of an influence experimental design can have on outcomes of the experiment.

Furthermore, Uri Gneezy, Kenneth L Leonard, and John A List (2009) conduct a controlled experiment to examine the role of nurture in gender differences for competition. The authors compare subjects from a patriarchal society (Maasai in Tanzania) and matrilineal society (Khasi in India) in a simple experimental task because both societies differ in gender roles. Women from the patriarchal society are less competitive than men. However, the effect is reversed in the matrilineal society, where women are more competitive than men. The results seem to indicate that socialization affects competitive behavior. There are no differences in risk-taking behavior between men and women in either society (Uri Gneezy, Kenneth L. Leonard, and John A. List 2009). Steffen Andersen et al. (2013) compare 7–15-year-old children from matrilineal and patriarchal villages in Northeast India. Boys and girls

in both societies compete equally at the age of 7. In the matrilineal society, at the age of 15, there are still no differences in competitive behavior relative to that of the 7 year olds.

However, in the patriarchal society, boys become more competitive and girls become less so around puberty, resulting in a gender gap in competitive behavior between girls and boys.

Some studies examine the biological roots of gender differences in overconfidence (Johnson et al. 2006; Apicella et al. 2011; Buser 2012b; Chen, Katuščák, and Ozdenoren 2012; Pearson and Schipper 2012, 2013). Finally, some examine the influence of the institutional context on gender differences in overconfidence (Beaman et al. 2009; Kleinjans 2009; Wozniak 2009; Ertac and Szentes 2011; Balafoutas and Sutter 2012; Rudman et al. 2012; Niederle, Segal, and Vesterlund 2013; Schrøter Joensen and Skyt Nielsen 2013).

Appendix 5 Overconfidence: Summary table

Contribution	Approach	Are gender differences in overconfidence reported?	Section
Linda Babcock and George Loewenstein (1997)	Theoretical contribution on self-serving biases	-	A
Brad M. Barber and Terrance Odean (2001)	Field data	Yes, men trade more than women and men are thus more overconfident.	B
Claes Bengtsson, Mats Persson, and Peter Willenhag (2005)	Field data (exam results)	Yes, men more overconfident and aim for higher grades than women.	B
Sylvia Beyer (1990)	Experiment with ex ante self-reporting	Yes, men overestimate their performance and women underestimate their performance, especially for masculine tasks.	B
Gokul Bhandari and Richard Deaves (2006)	Survey data	Yes, highly educated males are more overconfident.	B
Timothy N. Cason, William A. Masters, and Roman M. Sheremeta (2010)	Experiment	Yes, men are more likely to enter a competition, this may be due to differences in self-confidence.	B
L. Dahlbom et al. (2011)	Survey (estimation of math grades)	Men are overconfident and women underconfident.	B
Megan Endres (2006)	Experiment	Yes, men risk more resources in complex tasks. Self-reported competence is affected by the difficulty of the task more for women than for men.	B
John R. Graham, Campbell R. Harvey, and Hai Huang (2009)	Survey	Yes, male investors are more confident.	B
Mark Grinblatt and Matti Keloharju (2009)	Field data	Men trade more often than women (no link made with overconfidence).	B
Nabanita Datta Gupta, Anders Poulsen, and Marie-Claire Villeval (2005)	Experiments (maze game and summation) with different reward systems	Men more often choose the tournament reward style and are thus more overconfident.	B

Robin M Hogarth, Natalia Karelaia, and Carlos Andrés Trujillo (2012)	Field data (TV show)	Women earn less and leaving the game sooner.	B
Linda Kamas and Anne Preston (2012)	Experiment	Men are more confident (rank themselves higher relative to other) than women.	B
Mary A. Lundeberg, Paul W. Fox, and Judith Puncochar (1994)	Survey (confidence in accuracy exam question)	Confidence is context dependent. In domains such as learning, no differences are found while in mathematics men are more overconfident than women.	B
Muriel Niederle and Lise Vesterlund (2007)	Experiment with different reward styles	Yes, men are more likely to select the tournament style than women and are thus more overconfident.	B
Briony D. Pulford and Andrew M. Colman (1997)	Experiment (general knowledge questions with feedback)	Yes, men are more overconfident than women but also more accurate in their estimations.	B
Matthias Sutter and Daniela Rützler (2010)	Experiment (math and running match)	Yes, boys are more likely to choose competitive reward style.	B
Donald Vandegrift and Abdullah Yavas (2009)	Experiment with different reward styles	Yes, men are more likely to select the tournament style than women and are thus more overconfident.	B
Steffen Andersen et al. (2013)	Experiment in two societies	Mixed results. No gender gap in the matrilineal society, but boys compete more in the patriarchal society.	D
Kate Antonovics, Peter Arcidiacono, and Randall Walsh (2009)	Natural and lab experiment	Mixed results. Depends on amount of stake, age, and gender of opponent.	D
Loukas Balafoutas, Rudolf Kerschbamer, and Matthias Sutter (2012)	Experiment with distributional preferences	Gender differences in competitiveness are affected by factors related to gender.	D
Daniela Beckmann and Lukas Menkhoff (2008)	Survey	Very weak.	D
Alison L. Booth and Patrick Nolen (2012a)	Controlled and field experiment	Boys are more competitive than girls. Girls from single-sex schools are more competitive than girls from coeducational schools.	D
Juan-Camilo Cárdenas et al. (2012)	Experiment in four task (female and	Mixed results. Depends on country.	D

	male-orientated tasks)		
David Cesarini, Örjan Sandewall, and Magnus Johannesson (2006)	Experiment	Depends on way information is presented. When interval measures are used, women are more overconfident than men. With frequency information, there is no difference.	D
Shelley J. Correll (2001)	Survey data	Depends on task. Men assess their own competence higher than women in math, but in verbal tasks there is no gender difference.	D
Christopher Cotton, Frank McIntyre, and Joseph Price (2013)	Experiment	Men outperform women in first rounds, but this reverses in later rounds.	D
Richard Deaves, Erik Lüders, and Guo Ying Luo (2009)	Experiment	No relation gender and trading activity.	D
Anna Dreber, Emma von Essen, and Eva Ranehill (2011)	Experiment with male- and female-orientated tasks	No gender differences in competitive behavior.	D
Anna Dreber, Emma von Essen, and Eva Ranehill (2013)	Experiment with male- and female-orientated tasks	No gender gap in the female-orientated task, while men compete more in the male-orientated task.	D
Jeffrey A Flory, Andreas Leibbrandt, and John A List (2015)	Field experiment	Gender differences in preferences for competition depend on different factors.	D
Roland G. Fryer, Steven D. Levitt, and John A. List (2008)	Experiment with stereotype threat	Women outperform men in the stereotype treatment, but when financial incentives are included, men outperform women.	D
Uri Gneezy and Aldo Rustichini (2004)	Field experiment	Women react less to competitive incentives.	D
Uri Gneezy, Muriel Niederle, and Aldo Rustichini (2003)	Experiment (maze games)	Women react less to competitive incentives.	D
Uri Gneezy, Kenneth L. Leonard, and John A. List (2009)	Controlled experiment in two societies	In the matrilineal society, women are more competitive than men, but there are no gender differences in the patriarchal society.	D
Christina Günther et al. (2010)	Experiment (variety of “male” and “female” games)	Reaction to incentives depends on game type.	D

Nabanita Datta Gupta, Anders Poulsen, and Marie Claire Villeval (2013)	Experiment with different reward styles	Gender differences in competitive behavior depend on incentives and if participants can choose the opponent.	D
Radosveta Ivanova-Stenzel and Dorothea Kübler (2011)	Computer game experiment with same- and mixed-gender groups	Mixed results, depends on gender diversity and degree of competition.	D
Johan C. Karremans et al. (2009)	Experiment with gender of opponent	Men's cognitive performances decrease after an interaction with the opposite sex.	D
Michał Krawczyk (2012)	Predictions about ability and incentives	Men are more confident but monetary rewards influence especially women's predictions about ability.	D
Victor Lavy (2013)	Field study	No significant gender gap in competitiveness.	D
Ulrich Mayr et al. (2012)	Experiment	Men are more competitive than women but this is not due to gender differences in confidence.	D
Julia Müller and Christiane Schwieren (2012)	Personality factors and competitive behavior	Competitive behavior is mediated by neuroticism.	D
Sanne Nauts et al. (2012)	Experiment	Men's cognitive performance decreases in a pseudo-interaction or when men merely anticipate an interaction with a woman.	D
Lena Nekby, Peter Skogman Thoursie, and Lars Vahtrik (2008)	Field data (running match)	In male-dominated situations, competition improves performance for both sexes (see Uri Gneezy and Aldo Rustichini [2004]).	D
Muriel Niederle and Lise Vesterlund (2007)	Experiment (adding up numbers)	Women react less to competitive incentives.	D
Devin G. Pope and Justin R. Sydnor (2010)	Geographical variations and gender performance	Gender-unequal states have larger gender gaps than gender-equal states.	D
Joseph Price (2008)	Natural experiment	Yes, men compete more, and women's performance depends on gender mix.	D
Anya C. Samak (2013)	Experiment	No, equal rates of self-confidence.	D
Alice Wieland and Rakesh Sarin (2012)	Experiment	Gender differences in the decision to compete depend on the domain.	D

Coren L. Apicella et al. (2011)	Hormonal variables and self-reported competitiveness	Only male subjects, no significant relation.	E
Thomas Buser (2012b)	Menstrual cycle and competitive behavior	Progesterone and estrogen negatively affect competitiveness.	E
Yan Chen, Peter Katusčák, and Emre Ozdenoren (2012)	Contraceptives and bidding behavior	Hormonal contraceptives influence women's bidding behavior.	E
Matthew Pearson and Burkhard C. Schipper (2012)	Digit ratio and competitive bidding behavior	No correlation between bidding behavior and profits and digit ratio.	E
Matthew Pearson and Burkhard C. Schipper (2013)	Menstrual cycle, contraceptives, and bidding behavior	Phases in the menstrual cycle influence bidding behavior of women.	E
Dominic D. P. Johnson et al. (2006)	Testosterone levels in experiment	Men are more overconfident than women. No clear relation with testosterone.	E
David Wozniak (2009)	Menstrual cycle and performance feedback on competitive behavior	Menstrual cycle influences competitive behavior while there is no gender gap in competitiveness when participants get relative performance feedback.	E
Loukas Balafoutas and Matthias Sutter (2012)	Influence of affirmative action	Affirmative policy actions can close the gender gap in competitive behavior.	F
Lori Beaman et al. (2009)	Effect of affirmative action	Gender quota reduces stereotypes about gender roles and improves the evaluation of female leaders.	F
Seda Ertac and Balazs Szentes (2011)	Experiment with number-adding task	Gender gap disappears due to performance feedback.	F
Juanna Schrøter Joensen and Helena Skyt Nielsen (2013)	Reducing barriers of choosing advanced math	Significantly more women choose advanced math with positive effects.	F
Kristin J. Kleinjans (2009)	Effect of gender differences	Gender gap explains some part of segregation in occupational fields and women's lower educational achievement.	F

Muriel Niederle, Carmit Segal, and Lise Vesterlund (2013)	Affirmative action and competitiveness	Affirmative policy causes women to increase their entry in competitions.	F
Laurie A. Rudman et al. (2012)	Motives for backlash	Defending the gender hierarchy is a primary motive for backlash.	F

Notes:

A – Background/overview article or literature study

B – Women are found to show overconfidence to a lesser extent than men

C – Women are found to show overconfidence to a greater extent than men

D – Mixed or insignificant results

E – Study takes hormonal differences into account or gender-interactions effects

F – Study investigates effects of institutional framework

Appendix 6 Altruism: Specific studies

In a widely cited article, Rachel Croson and Uri Gneezy (2009) present a review of gender differences in economic experiments. One of their main arguments is that varieties in both the design and implementation of an experiment may affect the behavior of participants differently. “Some examples of these design and implementation differences include economic variables like the size of the payoffs, the price of altruism, or the repetition of the game, and psychological variables like the amount of anonymity between counterparts, the amount of anonymity between the participant and the experimenter, and the way that the situation is described” (Croson and Gneezy 2009: 463). Croson and Gneezy discuss altruism in the wider context of social preferences wherein one’s own utility is a function of another person’s utility (see also James C. Cox, Daniel Friedman, and Vjollca Sadiraj [2008] and the introduction in Lucy Ackert et al. [2011]). The authors note that in some experiments, women are found to be more altruistic than men, but in others, less so. These conflicting results are explained by the proposition that women are more sensitive to cues in the experimental context than men are (Rachel Croson and Uri Gneezy 2009). Furthermore, the authors note that the structure of an ultimatum game can reveal altruistic motives but also risk-aversion motives. The design of dictator game experiments is better than ultimatum games according to Croson and Gneezy (2009) since dictator games do not reflect risk-related concerns of participants. Stefano DellaVigna et al. (2013) demonstrate the importance of the experimental context and urge to look further than differences in means between men and women to better understand gender differences. They examine the within-gender heterogeneity in altruistic behavior using a field experiment and conclude that women are more likely to be on the

margin of giving and therefore sensitive to an extra push. Women give significantly less than men when there is a simple option to avoid a given request. However, men and women give the same amount of money when they cannot avoid a giving request. Women are also more sensitive to social pressures than men.

A field ultimatum experiment conducted by Werner Güth, Carsten Schmidt, and Matthias Sutter (2007) is discussed by Rachel Croson and Uri Gneezy (2009) as an example of a study in which design affects behavior. The proposer offers to split a pie between her/himself, the responder who can either accept or reject the offer, and a dummy player with no decision authority. The experiment shows that women are more likely to propose an equal three-way split than men and therefore suggests that women are more altruistic (Werner Güth, Carsten Schmidt, and Matthias Sutter 2007). However, as Croson and Gneezy point out, these gender differences in behavior may also follow from the design of the ultimatum game to which both sexes respond in a different manner: behavioral differences may be due to competing motives of risk aversion and altruism. According to Croson and Gneezy, dictator games provide an alternative way of identifying gender-related behavioral differences with regard to altruism (Rachel Croson and Uri Gneezy 2009). In a dictator game, the responder can only accept the offer made by the proponent, and, therefore, the game reflects an allocation problem. Furthermore, Erin L. Krupka and Roberto A. Weber (2013) point out that social norms are relatively absent in economics because they are hard to measure, and when they are used, they usually serve as an explanation for differences in behavior for outcomes that are difficult to interpret. They demonstrate that changes in socially appropriate behavior in several dictator games are due to differences in social norms and the preference to conform to these social norms, which cannot be explained by social preferences.

David Reinstein and Gerhard Riener (2012) examine motivations for charitable giving and whether social context affects altruistic decision making. They conduct a laboratory

experiment in which social norms are present and participants can donate a part of their endowment to a real charity. The authors conclude that a subject (leader) donates more when his/her identity and donation will be revealed to another subject (follower). This effect is larger when the information is given to the follower before the follower has to decide how much to donate. “These findings provide some evidence that individuals’ utility comes not only from their own contributions, but also from their impact on the total amount contributed” (240). Moreover, the follower donates significantly more when the leader’s identity and donation is revealed to the follower, especially when the leader is a woman.

Catherine Eckel, Angela C. M. De Oliveira, and Philip J. Grossman (2008) provide a review of the experimental literature on gender differences in negotiation in the context of dictator and ultimatum games. The authors conclude that the advantage of a laboratory setting (the isolation of a single element of behavior) is at the same time a limitation. Gender differences in behavior cannot be seen only through a “decision lens,” but, in addition, factors such as underlying feelings or attitudes must be taken into account (Catherine Eckel, Angela C. M. De Oliveira, and Philip J. Grossman 2008). Overall, the authors conclude with regard to altruism that the reviewed studies show that women tend to be more egalitarian than men but also that women tend to be more sensitive to the context of negotiation. Furthermore, women tend to ask less than men in negotiations and stereotyping affects the outcome of negotiations.

Appendix 7 Altruism: Summary table

Contribution	Approach	Are gender differences in altruism reported?	Section
James Andreoni and B. Douglas Bernheim (2009)	Dictator game	Subject wants to be perceived as fair by others, regardless of gender.	A
Rachel Croson and Uri Gneezy (2009)	Review	Yes, but women are more sensitive to experimental context.	A
Collin F. Camerer (2011)	Review	Altruistic behavior may partly be the result of the willingness to conform to a specific social norm, regardless of gender.	A
Catherine Eckel, Angela C. M. De Oliveira, and Philip J. Grossman (2008)	Review	Yes, women are more egalitarian, but behavior is context-dependent.	A
Erin L. Krupka and Roberto A. Weber (2013)	Experiment	Changes in socially appropriate behavior are due to differences in social norms and the preference to conform to these, regardless of gender.	A
David Reinstein and Gerhard Riener (2012)	Experiment	Social context affects outcomes and subjects donate more to female leaders.	A
Fernando Aguiar et al. (2009)	Dictator game	Yes, women are <i>expected</i> to behave more altruistic.	B
Anne Boschini, Astri Muren, and Mats Persson (2012)	Dictator game	Yes, men are less altruistic than women in mixed-gender environments with gender priming.	B
C. Bram Cadsby et al. (2007)	Public goods game	Yes, culture also plays role.	B
Gary Charness and Aldo Rustichini (2011)	Prisoners' dilemma with observation	Yes.	B
Catherine C. Eckel and Philip J. Grossman (1998)	Dictator game (anonymous)	Yes.	B

Catherine C. Eckel and Philip J. Grossman (2001)	Ultimatum game	Yes, women are more generous than men and women's offers are more likely to be accepted.	B
Werner Güth and Oliver Kirchkamp (2012)	Dictator game	Yes, women are more generous than men.	B
Werner Güth, Carsten Schmidt, and Matthias Sutter (2007)	Ultimatum game	Yes.	B
Matthias Heinz, Steffen Juranek, and Holger A. Rau (2012)	Dictator game (with a real-effort task and a lottery task)	Yes, women's taking rate depends on recipients' performance, while men are indifferent.	B
Daniel Houser and Daniel Schunk (2009)	Dictator game	Yes, men's altruistic behavior decreases in a competitive environment, while women's behavior is unaffected.	B
Irving M. Lane and Lawrence A. Messe (1971)	Dictator game	Yes.	B
Richard Lippa (2010)	Survey	Yes (gender effect for "agreeableness").	B
Carl Mellström and Magnus Johannesson (2008)	Field experiment	Yes.	B
Reinhard Selten and Axel Ockenfels (1998)	Dictator game	Yes.	B
Sivert Straume and Magnus Odøen (2010)	Survey	Yes.	B
Sean Valentine et al. (2009)	Survey	Yes, for elder women.	B
Lisa Anderson, Francis DiTraglia, and Jeffrey Gerlach (2011)	Public goods experiment	Yes; men are <i>more</i> altruistic than women.	C
Avner Ben-Ner et al. (2004a)	Dictator game	Weak effect of men sending more.	C
Avner Ben-Ner, Fanmin Kong, and Louis Putterman (2004b)	Dictator game	Yes, women give <i>less</i> to other women and on average share less.	C
Stefano DellaVigna et al. 2013	Field experiment	Women to give more in certain situations, but not in others, and are also more sensitive to social cues.	C

Mark Van Vugt, David De Cremer, and Dirk P Janssen (2007)	Three experiments	Yes, men increase their altruist behavior during intergroup competition while women's behavior is unaffected.	C
Michael S. Visser and Matthew R. Roelofs (2011)	Dictator game	Yes, men give less and are less sensitive to price changes. Personality characteristics explain these differences.	C
Max Albert et al. (2007)	Prisoners' dilemma and trust game	No.	D
James Andreoni and Lise Vesterlund (2001)	Dictator game	Mixed: extent of altruism depends on costs of altruism.	D
Avner Ben-Ner et al. (2009)	Dictator game	No.	D
Gary E. Bolton and Elena Katok (1995)	Dictator game	No.	D
C. Bram Cadsby and Elizabeth Maynes (1998)	Public goods game	Limited results; women better coordinate their behavior.	D
C. Cadsby, Maroš Servátka, and Fei Song (2010)	Dictator game	No, only for one treatment.	D
Juan-Camilo Cárdenas et al. (2012)	Prisoner's dilemma	Mixed results for Sweden and Colombia.	D
Marco E. Castillo and Philip J. Cross (2008)	Dictator game and ultimatum game	Mixed results, intra-gender differences.	D
Michael Conlin, Michael Lynn, and Ted O'Donoghue (2003)	Survey data	Yes, but only toward male waiters.	D
James C. Cox and Cary A. Deck (2006)	Trust and dictator games	Limited, context affects decision.	D
John Duffy and Tatiana Kornienko (2010)	Dictator game	No.	D
Martin Dufwenberg and Astri Muren (2006a)	Dictator game	No (although more money is donated <i>to</i> women).	D
Martin Dufwenberg and Astri Muren (2006b)	Dictator game	Mixed results.	D
Catherine C. Eckel and Philip J. Grossman (1996)	Dictator game (punishment)	Yes, but female behavior dependent on price of fairness.	D

Fiona Greig and Iris Bohnet (2009)	Public goods game	Mixed results; in mixed groups women contribute less to the social group.	D
Håkan J. Holm (2000)	Battle of sexes game	No.	D
Janet Shibley Hyde (2005)	Analysis of meta-analyses	Men and women are similar on most, but not all, psychological variables, including social behavior, personality, cognitive abilities, and psychological well-being.	D
Linda Kamas, Anne Preston, and Sandy Baum (2008)	Dictator game	Yes, but mixed groups are even more altruistic.	D
Peter Martinsson et al. (2011)	Dictator game	Boys are more altruistic and girls are more difference averse, but preferences differ with age.	D
Andreas Ortmann and Lisa K. Tichy (1999)	Prisoner's dilemma-type game	Women co-operate more than men in the first round, but this difference disappears in the last round.	D
Sara J. Solnick (2001)	Ultimatum game	Men and women make equal offers, but the responder's gender affects the behavior of the proposer.	D
Matthias Sutter et al. (2009)	Bargaining game	No, gender pairing also reduces efficiency.	D
Soo Hong Chew, Richard P. Ebstein, and Songfa Zhong (2013)	Ultimatum game	Sew-hormone genes affect gender differences in fairness preference.	E
Bram Van den Bergh and Siegfried Dewitte (2006)	Ultimatum game and digit ratios	Men with lower digit ratios are more likely to accept unfair distributions in sex-related environments.	E

Notes:

A – Background/overview article or literature study

B – Women are found to show altruism to a greater extent than men

C – Women are found to show altruism to a lesser extent than men

D – Mixed or insignificant results

E – Study takes hormonal differences instead of gender differences into account

Appendix 8 Trust: Specific studies

Thomas Baumgartner et al. (2008) conduct a modified BDM game and a lottery game to examine neural mechanisms of trusting behavior. Participants are administered oxytocin – a neuropeptide that is believed to increase trust among humans – and are examined with fMRI scans. The authors find in the trust game that when a trustor’s trust is violated, the trustor’s trusting behavior decreases. However, no change in trusting behavior is observed for participants who are administered oxytocin. The authors find that this difference in trust is associated with a reduced activation in the amygdala and the dorsal striatum. This result holds only for the trust game; responses to non-social risks in the risk game are not mediated by the administration of oxytocin. These findings are in line with Michael Kosfeld et al. (2005) who find that oxytocin contributes to a reduction of fear of social betrayal (Thomas Baumgartner et al. 2008).

The experimental design of Joyce Berg, John Dickhaut, and Kevin McCabe (1995) measures trust controls for other explanations of behavior, such as reputation effects, contractual pre-commitments, and punishment threats. The authors find that reciprocity is a basic element of human behavior. This reciprocity is accounted for in the trust extended to an anonymous counterpart. The authors also include a “social history” treatment wherein the participants ex ante receive information about the results of the “no history” treatment. From this experiment, the authors identify conditions that strengthen the relationship between trust and reciprocity. Among these conditions is forward signaling; sending money in an investment game may be essential for reciprocity.

Fabian Bornhorst et al. (2010) play a trust game in which trust and reciprocity can build up and evolve. They investigate Ph.D. students of different European nationalities who

are classified into groups of five and have repeated interactions. Participants know each other's age, gender, nationality, and number of siblings and have to decide with whom within their group they want to play the trust game. The authors find significant differences in trust and trustworthiness between different regions of origin (Northern or Southern Europe) and find no regional discrimination. The region of origin affects the degree of success in the experiment: subjects from Northern Europe earn significantly more than Southern European subjects. The authors conclude that cultural differences, which they see as a set of social norms and individual beliefs, affect economic outcomes.

According to Andreas Ortmann, John Fitzgerald, and Carl Boeing (2000), the “social history” treatment in the experiment of Joyce Berg, John Dickhaut, and Kevin McCabe (1995) may have been subject to framing issues that may have influenced the behavior of participants. The authors conduct a modified BDM experiment wherein the way information is presented to participants is modified. To make sure that participants understand in what kind of experiment they are involved, a questionnaire is used. These modifications do not impact the amount participants send to each other in the experiment. Therefore, the findings of the original BDM experiment are found to be robust.

Catherine C. Eckel and Rick K. Wilson (2004) examine the relationship between risk attitudes and the decision to trust other people using a binary trust game based on BDM, risky games, and self-reporting surveys. According to the authors, one's own risk attitudes will determine the willingness to trust unknown other persons. The authors find no constant relation between trust and behavioral risk measures. The trust decision is influenced by self-reported risk attitudes: when using survey-based risk measures (“Zuckerman sensation seeking scale” and additional control variables), the authors find a very weak relation between risk aversion and the decision to trust. The subjects' risk appetite, which are revealed by risky choice tasks, are however not related to the decision to trust.

Edward L. Glaeser et al. (2000) conduct several experiments with monetary rewards and measure subjects' attitudes, background information, and social connectedness in order to identify situational and individual correlates of trust. The authors find that the standard attitudinal survey questions about trust predict trustworthiness better than trusting behavior. From their experiments, the authors find that trusting behavior is determined by an index of past trusting behavior. The authors control for gender differences in trusting behavior, but find large standard errors and therefore an insignificant correlation between gender and amount sent. The authors conclude, "in summary, to determine whether someone is trusting, ask him about specific instances of past trusting behaviors. To determine whether someone is trustworthy, ask him if he trusts others" (840).

James C. Cox (2004) conducts one BDM game and two dictator game experiments (N=64, with 32 pairs) to identify trusting and reciprocating behavior. The author's main argument is that with single-game designs, one cannot tell apart transfers resulting from trust or reciprocity and transfers resulting from other-regarding preferences that are not conditional on the behavior of others. A multi-game design can discriminate between these two origins of transfers. The author finds evidence for altruistic other-regarding preferences, trust, and reciprocity. Although this article does not study gender differences, it is an important contribution for its focus on multi-game designs.

Michael Kosfeld et al. (2005) conduct a trust game with real monetary rewards wherein a subset of participants receives a dose of the neuropeptide oxytocin. Participants who received the treatment displayed more trust in others than the control group. The authors also show, by replacing the second player in the trust game with a random mechanism, that the positive effect of oxytocin on trust is not due to an increased readiness to bear risk.

Christiane Schwieren and Matthias Sutter (2008) use two versions of a one-shot trust game (based on BDM, N=240) to examine gender differences in trust in another person's

cooperation or ability (in a mathematical test). The authors find no gender differences with regard to trust in the cooperation of the other subject, a result similar to Rachel Croson and Nancy Buchan (1999). The authors also find that women's reciprocity to men is larger than to women, but this difference is only weakly significant. According to the authors, this finding to some extent hints at more cooperative behavior in mixed-gender groups than in same-gender groups. With respect to trust in another person's ability, the authors find a strong gender effect: "men trust more in the (mathematical) abilities of their interaction partners, in particular of women, than women do" (Schwieren and Sutter 2008: 496). The authors point to the study of James Andreoni and Lise Vesterlund (2001) who find that men's behavior in bargaining games is more sensitive to the costs of altruism than women's behavior. In their conclusion, the authors note that the effects of gender on trust are perhaps too complex to be analyzed by means of the standard BDM game alone. Future research should also incorporate the effect of gender on a wider variety of skills than simple cooperation or mathematical ability (Schwieren and Sutter 2008). Tore Ellingsen et al. (2012) examine the effect of framing and point out that participants are more likely to cooperate when the name of the game is called a "community game" (interest of the community) instead of a "stock market game" (individual's interest). Social framing affects participants' beliefs about the actions of others, rather than their social preferences.

Some studies examine biological differences in trusting behavior (Zak et al. 2005; Buser 2012a). Finally, some studies report on differences in trustworthiness, generally finding that women are preferred as trustees over men (Holm and Engfeld 2005; Holm and Nystedt 2005).

Appendix 9 Trust: Summary table

Contribution	Approach	Are gender differences in trusting behavior reported?	Section
Thomas Baumgartner et al. (2008)	Experiment (oxytocin)	Oxytocin has a positive effect on trusting behavior.	A
Joyce Berg, John Dickhaut, and Kevin McCabe (1995)	Investment game (the “classic” BDM trust game)	No discussion of gender. Cultural differences affect behavior.	A
Fabian Bornhorst et al. (2010)	Trust game	No discussion of gender.	A
James C. Cox (2004)	Experiment (BDM and dictator games)	No discussion of gender differences.	A
Catherine C. Eckel and Rick K. Wilson (2004)	Experiment (BDM and risk game) and survey	No discussion of gender (authors find no constant relation between trusting behavior and behavioral risk measures).	A
Tore Ellingsen et al. (2012)	Experiment	Social framing affects participants’ beliefs about the actions of others, rather than their social preferences.	A
Edward L. Glaeser et al. (2000)	Experiment	Trusting behavior is determined mainly by index of past trusting behavior. Authors do not explicitly report gender differences.	A
Andreas Ortmann, John Fitzgerald, and Carl Boeing (2000)	Experiment (BDM with modifications)	No discussion of gender (reports robustness of BDM).	A
Michael Kosfeld et al. (2005)	Experiment (oxytocin)	Oxytocin increases trust in other humans.	A
Alvin Etang, David Fielding, and Stephen Knowles (2011)	Experiment (trust, risk, and dictator in Cameroon)	Yes, women send more money in the trust game.	B

Nancy R. Buchan, Rachel T. A. Croson, and Sara Solnick (2008)	Experiment: BDM	Men are more trusting than women. Women are more trustworthy than men.	C
Ananish Chaudhuri and Lata Gangadharan (2007)	Experiment: Modified BDM and dictator game (control treatment)	Men are more trusting than women.	C
Ellen Garbarino and Robert Slonim (2009)	Modified online BDM experiment	Men are more trusting than men. Reciprocity depends on age and gender. Women are more trusted than men overall.	C
Laura Schechter (2007)	Experiments: Trust (based on BDM) and risk game in Paraguay	Men trust more than women but this result is driven primarily by risk preference instead of different levels of trust.	C
Iris Bohnet and Richard Zeckhauser (2004)	Experiment: Decision, trust and dictator game	No gender difference in trusting behavior in decision game. Women are considered to be more trustworthy than men.	D
Aurélie Bonein and Daniel Serra (2009)	Experiment: BDM with different treatments (yes/no gender disclosure)	No gender difference in trusting behavior, regardless of trustee gender.	D
Nancy R. Buchan, Eric J. Johnson, and Rachel T. A. Croson (2006)	Experiment (BDM)	No difference.	D
Ananish Chaudhuri, Tirnud Paichayontvijit, and Lifeng Shen (2013)	Investment game	Mixed results, depends on number of rounds.	D
Rachel Croson and Nancy Buchan (1999)	Experiment: BDM (in different countries)	No gender difference in sending behavior. Women reciprocate more.	D

Anthony M Evans, Ursula Athenstaedt, and Joachim I Krueger (2013)	Cross-sectional experiment	The gender gap in trust behavior differs with age.	D
Anthony M. Evans and William Revelle (2008)	Survey and experiment (BDM)	Mixed results: men are more trusting and trustworthy in the survey. No difference in the experiment.	D
Mary Rigdon (2009)	Experiment: "Contracting game"	Mixed: gender difference in investment depends on ex post incentives. No differences without incentives.	D
Christiane Schwieren and Matthias Sutter (2008)	Experiment: Modified BDM	Trust in other's cooperation: no gender effect. Trust in other's math ability: men more trusting.	D
Robert Slonim and Ellen Garbarino (2008)	Experiment: Trust and Modified Dictator Game	Mixed results: behavior depends on the amount of information, and women send less in trust game.	D
Robert Slonim and Pablo Guillen (2010)	Experiment: Modified BDM (yes/no partner selection)	Yes, decision makers prefer to send to partner of opposite sex.	D
Thomas Buser (2012a)	Digit ratio (2D:4D) and menstrual cycle in trust game	Biological factors influence preferences in trust.	E
Paul J. Zak et al. (2005)	Testosterone and distrust	Men, not women, respond to distrust with increased DHT levels.	E
Håkan Holm and Paul Nystedt (2005)	Survey (mail based BDM)	No mention of gender differences in trusting behavior. Women are more trustworthy than men.	F

Notes:

A – Background/overview article or literature study

B – Women are found to show trusting behavior to a greater extent than men

C – Women are found to show trusting behavior to a lesser extent than men

D – Mixed or insignificant results

E – Study takes hormonal differences instead of gender differences into account

F – Study reports only a difference in trustworthiness, not trusting behavior

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