

# Risk Preferences and Gender Stereotypes

Thesis by

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## ABSTRACT

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This research thesis focused on the study of the likely effect that risk preferences can have on gender stereotype beliefs. It follows the analysis of individual risk preferences with belief elicitation through the diffusion of an online survey that consisted of the establishment of lotteries with increasing likelihoods of earning a low amount and decreasing likelihoods of earning a high amount; additionally, for the analysis of gender stereotype beliefs, individuals had to state the probability they put on the expected risk-aversion of either a man or a woman, randomly assigned. Likely differences between risk preferences in men and women, from the sample, were proven to be not significant; however, there were significant differences between stereotype beliefs of what is expected of the risk preferences between genders: men are perceived as more risk-seeking than women in the sample. Finally, there are significant divergences in the role of risk preferences in the assessment of gender stereotype beliefs regarding risk-aversion in the representative group, largely addressing the main research question of the role of risk preferences on gender stereotype beliefs.

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## Chapter 1

### Introduction

#### 1.1 Theoretical Framework

Every decision that arises throughout a period implies, to a certain extent, the consideration of threats. The interpretation of threat can be catalogued as a deterrent of determination to bring about maliciousness or harm; mainly, a manifestation of an undetermined phenomenon (Merriam-Webster's Collegiate Dictionary, 1994). Scholtz (2007) identifies fundamental constituents of threat ranging from the determination of explanatory characteristics (e.g., future-oriented, pessimistic apprehension insight), forerunners (e.g., unpredictability, deficient information), and sequels (e.g., distress, disconcertment). For example, *adrenaline junkies* love to expose themselves to situations in which there are higher stakes of endangering their lives, in exchange for the thrill and excitement that comes from the assessment of uncertainty. Behind the consideration of threat, there is a time-component constraint that rules the likelihood of a decision. Azanova et al. (2021) state that, on average, males take more risks than females and sustain it from a behavioural heterogeneity standpoint that is partially modified by neurological factors. This paper reports information about an individual's belief system and consideration of circumstances when facing a decision. Given that a person - in our modern world - is presumed to view risk from a relative egalitarian point of view, it is interesting to establish a hypothesis in which risk preferences are expected to vary between genders due to many constituents, such as stereotypes.

Stereotypes are considered social constructions that are based on the assumption

of characteristics that belong to a specific group. As an illustration, an interesting question to answer would be to ask a specific population sample: why is an *adrenaline junkie* more likely to be associated, socially, with men rather than with women? It might be because men are perceived to be more willing to take risks than women as a consequence of brain activity, especially, in situations of stress; or physical attributes such as height or strength (Sundheim, 2013). Bordalo et al. (2016) and Eckel and Grossman (2008) declare that stereotypes are omnipresent and contextual; some of them might be brutally precise (e.g., Germany and its fondness for beer) while others not at all (e.g., Muslims being labelled as terrorists); stereotypes boost standardized variabilities, even if these are considered small. Altogether, they are often settled and based on a sense of reality (Jussim, 2016). Hilton and von Hippel (1996) consider them to be driven by cognitive motivation towards a specific scenario, as well as, being structured with both a sense of truth yet still a boundless potential of inaccuracy; stereotypes enhance perception by permitting an individual to surpass certain information that is given. Ellemers (2018) extends stereotypical research towards the scope this paper aims to tackle: gender stereotypes; more explicitly, measuring and showing the influence of stereotypes on behaviour and the degree to which one describes itself and others; and, in addition, how they treat and accept to be treated. To give an instance, Kite et al. (2008) show how determination and accomplishment are perceived stronger and more predominantly in men whereas kindness and prudence are contemplated as indicators of collective representation of women.

## 1.2 Literature Review

Traditional microeconomic theory needs to take into account the assessment of the risk an individual is going through, to react to a circumstance that involves decision-making. When analyzing investment strategies, for example, some predictions are based on the intuition that the individual investing must be rational,

hence, choosing a safe low return over a highly volatile one. But, does it always happen from an empiric standpoint? Chetty (2006) analyzes a new measure of estimating risk aversion and, although it goes beyond the scope of this research through the focus on wage elasticity of labour supply and the marginal utility of consumption, it gives rise to further exploration that can be complementary, by stating the importance of testing internally consistent models of risk preferences in which it can be quantified how one domain of behaviour (e.g., risk decision-making under certainty and uncertainty) controls the inferences in another domain (e.g., gender stereotypes). Adjusting arguments such as the one from Rabin (2000) throws light on the implicit limitations of expected utility theory through the demonstration of it being not able to give rise to a fitting high level of medium-stakes risk aversion without coming at a cost of originating unreasonably peaked high-stakes risk aversion. However, what it is aimed here is to measure how different the individual perceptions are regarding risk others are willing to take through a simulated scenario where we can see whether there is a contrast between choices on risk-aversion expectations once an individual is considering someone that is either of their same-sex or different. Bhattacharya and Garrett (2006) defend the fact that individuals exhibit both risk-averse and risk-seeking behaviour (e.g., the same person purchasing an insurance policy and a lottery ticket simultaneously); for instance, when addressing lottery tickets, people trade-off a pessimistic expected return for skewness (the higher the amount at stake, the higher the chance the individual will take part in the transaction, even if there is a lower probability of winning). This research paper tries to provide contrasting responses that may arise from an already settled benchmark (perception of women being more risk-averse than men) of risk aversion and expectation fluctuations when taking into consideration the sex of other individuals and the stereotypes carried along with the decision. Donkers et al. (2001) inspect the contemplation of other variables, such as income or age, that can potentially influence decisions through the reflection of certain attributes an individual has

already settled. This research strives to fill in the gap on the reason behind the risk-preference of an individual through the pondering of sex and personal beliefs regarding stereotypes.

Siegrist et al. (2002) discuss risk preference predictions and gender stereotypes through an experiment in which lottery gambles were shown to students, and found meaningful results that display gender stereotypes, as well as the consideration of one's feelings playing a role in the riskiness of the final decision. Interestingly, such consideration proved to be overestimated in men and accurately measured for women. Therefore, it leads us to the question of whether stereotypes are a good depiction of both sexes, especially men. Additionally, an article by Grossman and Eckel (2008) examines risk aversion in men and women through abstract gambling experiments that turn out to have results that do not match with the perceived risk aversion of women over men, hence, less consistent. However, the results fluctuate concerning the contextual framework in which individuals are put. Complimentary, Watson and McNaughton (2007) shed light on gender differences in risk aversion, and expected retirement benefits, ending up with significant results that differ when taking into consideration income and age, and controlling for them; confirming how women are, on average, more risk-averse than men.

The motivation of behavioural analysis relies on the identification of an individual's risk preferences when facing a choice, as well as, the change in beliefs as a response to the environment they are confronting, in this case, for example, facing an individual and measuring to which degree their gender and stereotypes carried along play a role in their actions.

### **1.3 Research Question and Hypotheses**

The theoretical problem that is being addressed is risk preferences in-game decisions while having the role of stereotypes as a dependent variable. The empirical



phenomenon that will be analyzed is the degree to which the addition of information an individual can get from an opponent explains the behaviour they conform to, and the better understanding we can gain from the role of stereotypes. Stereotypes are an empirical phenomenon that affects and drives our behaviour, and the basis of such behaviour is a crucial element for the improvement of behavioural economics as a science. The research question turns out to be:

*Do individual risk preferences play a role in assessing gender stereotypes beliefs regarding risk aversion?*

The settlement of such query aims to tackle a novel component that is complimentary and fulfilling to the contributing literature addressed in previous sections. Although several studies have extensively gotten insight into gender stereotypes and their link to risk preferences, most of them have focused on interactive gambling as their game preference choice. Belief elicitation brings about an interesting approach to tackle the main research question since it experimentally pairs each choice a respondent is given with a specific payoff, hence, incentivizing an individual to choose an option that accurately reflects their beliefs (Blanco et al., 2010). The motivation for the already established research question and experimental design is to take a step ahead through the combination of several individuals and interactive scenarios that call for gambling, and the use of probabilities in decision-making that enhances belief elicitation with an incremental tone that involves the addition of information involving risk assessment from both a certainty and an uncertainty decision scheme, as well as several strategies to bring forth their belief and depict variations in chances of winning.

Moving forward towards the arrangement of the first hypothesis:

*$H_0$ : No significant differences between genders when comparing individual risk aversion.*

*$H_a$ : Differences between genders when comparing individual risk aversion.*

The settlement of the first hypothesis will allow the comparison of the individual risk-preference assessment between genders to be able to tell any significant

differences between males and females. It will shed a light on actual figures addressing self-reported risk aversion and the comparison of the sample results with conclusions set by literature mentioned previously, such as the gender differences in risk aversion drawn by Watson and McNaughton (2007), stating that women are, on average, more risk-averse than men.

The second hypothesis:

*H<sub>0</sub>: No significant differences between gender-specific stereotype beliefs regarding risk aversion.*

*H<sub>a</sub>: Differences between gender-specific stereotype beliefs regarding risk aversion.*

The second hypothesis will allow for the comparison of gender-specific stereotype beliefs regarding risk preferences to be able to tell any significant differences between the perception of actions males and females are expected to take. It will help in the comparison of the sample results with conclusions set by the literature mentioned previously, such as the gender-expected differences in risk aversion addressed by Kite et al. (2008), concluding that women are, on average, perceived as more risk-averse than men.

The third hypothesis:

*H<sub>0</sub>: Risk preferences do not play a role in the assessment of gender stereotype beliefs regarding risk aversion.*

*H<sub>a</sub>: Risk preferences do play a role in the assessment of gender stereotype beliefs regarding risk aversion.*

And, the fourth hypothesis:

*H<sub>0</sub>: No significant differences in individual risk preferences between groups in the assessment of gender stereotype beliefs regarding risk aversion.*

*H<sub>a</sub>: Differences in individual risk preferences between groups in the assessment of gender stereotype beliefs regarding risk aversion.*

The third and fourth hypothesis will allow for the address of the main drive for this research, stating whether individual risk preferences play a role in the assess-

ment of gender stereotype beliefs regarding risk aversion while controlling for our manipulation strategy which will be discussed in subsequent sections.

To be confident of the validity and truth behind stereotypes over time, it is important to assess empirically whether a conclusion such as a potential difference between the sexes concerning risk preference decisions can be drawn. Gambling proves to be the easiest measure as it involves a game where multiple people decide on probabilities of winning a certain amount of money (placing an incremental yet lower probability of winning a high amount of money against a higher probability of winning a low one), hence, certain options being safer than others. Additionally, an individual is asked to decide regarding their beliefs regarding the likelihood in probabilities another individual, either of their same or different sex, may take. When making predictions about the probability of choice a third individual may take, individual risk preferences may be expected to play a role, after all, the final decision can be expected to be different if the individual is a woman, due to their greater “risk aversion”.

## 1.4 Relevance and Novelty

It is important and socially relevant to address the role of individual risk preferences in decision making, as it allows for a more accurate description of an individual’s behaviour, something that may not always be easy to do with standard economic theory. The relevance of this proposal is to bring to light the facts about the differences in risk aversion between genders and the probable effect that an implicit assumption within someone’s mind can shape their decision-making process, affecting, for example, the result of a belief.

We are at a time in which resources abound; when thinking of an activity, such as simple economic decision-making that does not threaten life: is the risk preference towards aversion more detectable in women than in men? And if so, what is the percentual difference in risk preference between men and women? This is

something interesting to find out, analyze and discuss with what is reported by the scientific literature. Eckel et al. (2021) address the gender leadership gap and the under-representation of women in leadership roles given by social and individual perceptions; it states that stereotypes overestimate the accomplishment gap and highlight the importance of impact evaluation for the right resolution of policies that help improve this situation. This research is motivated by the desire to get to the core of behavioural economics in risk beliefs between genders, the identification of variables addressed when making a choice, and, mainly, the role of risk-aversion and its effect on society's overall efficiency, after all, it is already clear that several empirics show gender differences arising from the awareness of women being depicted as more risk-averse, compassionate, and less competitive and confident than men (Niederle, 2015). What is surprising is how these small social dynamics can affect the overall efficiency of a community, for instance, Inzlicht and Ben-Zeev (2000) confirm that women's performance in math tests decreases with the number of men in their examination room. This research aims to spark the attention on different scenarios that support past evidence such as the one from Eckel and Grossman (2002) where beliefs about contrasts between performance in men and women are more prominent than actual differences in risk aversion. Stereotypes will then turn out to be a threat in several areas such as the financial sector since it enhances the gender gap due to circumstantial hints and its overall economic impact (Tinghög et al., 2021).

## Chapter 2

### Methodology

#### 2.1 Data Description

The basis of this thesis work was to retrieve self-collected data and experimentally approach individuals, mainly, undergraduate students, male and female, from the same age group. They were launched into a survey that showed them information about various game options that consisted of (a) the simulation of several payoffs with given probabilities - the higher the amount of the lottery, the lower chance of winning it -, and (b) their expectation on how likely - on a scale from zero to 100 per cent - was another individual, either a man or a woman, randomly assigned, was likely to choose a certain option. The main focus was to measure their risk assessment and hypothetical scenarios where they considered the risk preferences of others, putting emphasizing their sex. Due to the nature of this paper being based on gender stereotypes, the focus of this experimental design, some questions implicitly mentioned the sex through the introduction of an individual with a name that undoubtedly represents a male and a female, Joe and Maria. The block regarding individual preference assessment given certain lotteries and probabilities helped determine the risk preference of men over women and quantify the percentage difference in risk preferences between sexes. When a question with two lotteries - one riskier than the other - was shown to the person, the probability and the payout of each lottery were strictly clear. Since a set of results was shown to the individual, it was up to them to choose a more or less risky bet. What was even more interesting was how this affected their evaluation when taking into account the belief of other's sex at making that same choice.

The survey was conducted through a software program called Qualtrics, and students were randomly assigned to the same set of bets and information about their beliefs on the probability another individual may choose once their sex is implicitly mentioned. For the development of the plan, a record of people engaged in the questionnaire through a link that was sent to them, only excluding participants that do not specify whether their gender is male or female and unanswered questions. However, due to closer linkages, most of the sample belonged to bachelor students inside the age group that ranged from 18 to 29 years old. Information that involved the presence of another individual risk preference was organized randomly to have an almost equal proportion of people that were facing someone of their same-sex and also different sex.

Regarding the questionnaire, once the participant acknowledges their consent to this research, there was a set of multiple-choice questions that involved demographical and socio-cultural details of the individual for clustering purposes. Individuals were asked for: (1) Gender: Male, Female, Non-Binary/Third Gender, and Prefer Not To Say, (2) Age: Younger than 18, 18 to 29, 30 to 49, 50 to 69, and Older than 69, (3) Highest Level of Education Completed or Enrolled for: No Schooling Completed, Elementary School, High School, Bachelor's Degree, Master's Degree, and PhD, and (4) Place of Residence: In the Netherlands, Outside of the Netherlands but inside the European Union, and Outside of the European Union. Table 2.1 shows the descriptive statistics of the sample and the number of observations. A total of 191 responses were retrieved from which an approximate of 75 per cent of the sample analyzed were done by male and 25 per cent by female individuals, an average of 60 per cent of the sample were people who have or are currently enrolled in a bachelor's program while 68 per cent being between the 18 - 29 age range, and approximately 80 per cent were born outside of Europe.

The experimental design was comprised of the random assignment of participants to a situation in which they assess their beliefs on the risk preferences of either a

Table 2.1: *Descriptive Statistics of sample*

| <b>Variables</b>  | <b>Mean</b> | <b>Observations</b> |
|-------------------|-------------|---------------------|
| <b>Gender</b>     |             |                     |
| Male              | 0.75        | 143                 |
| Female            | 0.25        | 48                  |
| <b>Education</b>  |             |                     |
| Elementary        | 0.02        | 3                   |
| High School       | 0.17        | 32                  |
| Bachelor's        | 0.60        | 115                 |
| Master's          | 0.19        | 37                  |
| PhD               | 0.02        | 4                   |
| <b>Age</b>        |             |                     |
| Younger than 18   | 0.01        | 1                   |
| 18-29             | 0.68        | 129                 |
| 30-49             | 0.25        | 48                  |
| 50-69             | 0.06        | 11                  |
| Older than 69     | 0.01        | 2                   |
| <b>Region</b>     |             |                     |
| In the NL         | 0.13        | 24                  |
| In the EU         | 0.08        | 15                  |
| Outside of the EU | 0.8         | 152                 |

*Notes.* All results in the Mean column is given in proportions on a scale from 0 to 1. For example, a value of 0.75 given in Male means that, 75 per cent of responses were given by male individuals.

man or a woman through the chosen methodology: an online questionnaire (see Appendix A). The next section will give more insight into the settlement of the randomization strategy, consisting of the first group established as the set of individuals that were randomly selected to face someone whose gender was male, and the second group was built upon the set of respondents that faced an opponent whose gender was female since people from the same sex can still expect someone to act in a stereotyped manner.

This thesis will help understand the real behaviour of people at the time of decision-making, according to gender in economic aspects that happen on a day-to-day basis, and how this influences the economy; such as, for example, explaining the differences in consumption between men and women or to predict and explain who is potentially more likely to take action in the economy when facing risky situations such as the acquisition of stocks, promotional purchases during

holidays, etc.

## 2.2 Research Method and Structure

After the consent and socio-cultural demographical questions were answered by participants, the questionnaire was shaped by two blocks. The first block is Individual Risk-Preferences: composed of three binary multiple-choice questions on whether the individual would state a preference on a lottery ticket with a prize of thirty and five euros, respectively. The slight deviations are the probabilities, Holt and Laury (2002) inspired this risk elicitation method where the safer lottery (€5) had a higher probability than winning the riskier one (€30), however, the three questions showed an incremental chance benefitting the riskier choice with probabilities of  $1/9$ ,  $2/9$ , and  $3/9$  while the safer choice showed decreasing probabilities of  $8/9$ ,  $7/9$ , and  $6/9$ , respectively. The reason why this method was chosen was that the convergences in probabilities between questions tried to unveil the risk preference of an individual and how much it fluctuates when stakes are higher; by using an amount of five and thirty euros as payoffs, it is possible to incentivize an individual and prevent them from opting for a risk-seeking behaviour that is common when facing, for example, lotteries with very low payoffs, alternatively, since most respondents were expected to be students, five and thirty euros seemed like a reasonable amount of money that would create enough importance when deciding between them. The second block is Gender Stereotype Beliefs: formed by four scale questions on a hypothetical setting where the respondent decides on his or her own beliefs when considering the choice an individual, either a woman or a man, randomly and equally allocated, may make on the same lottery options. The scale ranged from zero to 100 percentage points and asked for the likelihood the respondent may have regarding the individual in consideration, either Joe or Maria, on choosing the safer bet over the riskier one in four different scenarios where the riskier choice had probabilities of  $1/9$ ,



2/9, 3/9, and 4/9 of winning 30 euros while the safer choice showed decreasing probabilities of 8/9, 7/9, 6/9, and 5/9 of winning 5 euros, respectively. In this block, it was possible to intentionally tell the potential role of stereotypes and related differences.

The block of Individual Risk-Preferences was aimed to measure, on a generic level, the risk aversion of individuals without explicit consideration of facing a particular opponent. This approach represents the address of risk directly, for respondents to have the chance to state their introspective convictions with both a straightforward monetary incentive of either thirty or five euros. Although Nelson (2014) and Zizzo (2010) argue that a presumed limitation of this type of structure is driven by its all-encompassing nature potentially leading to a rather uncaring examination of one's true risk preferences because they are not receiving any actual payoff per se, it does, shed light on the intuitive risk assessment an individual has when taking into consideration a potential sum of money they can get and discerning once probabilities of risk are evaluated. To further the research on the presumed differences in what is believed that a man or a woman would do in situations of risk, hence, having the regression depicted from the dependent variable of beliefs, the block of Gender Stereotype Beliefs tried to expose respondents to a situation where they are shown the same monetary payoffs, but solely considering the risk-preference of another individual, making it more likely for the individual to think carefully about the risks a peer may take. This individual conviction extends the work motivated by Trautmann and van de Kuilen (2011) and Schlag et al. (2014) regarding belief elicitation and methods aimed to incentivize individuals in a competitive setting. As we already know, there is always a behavioural component that differs from an individual always acting according to rationality. Ultimately, what is tried to be measured is the belief of the respondent and the potential effect on stereotypical gender considerations to link results to the research question and test out the hypothesis.

The strategy in this experiment was focused on the randomization throughout

the process of data, in other words, working with the random allocation of half of the respondents to face a male individual, and the other half to a female individual. Randomization was also made on the order and structure of the survey shown, hence, half of the respondents were shown the Individual Risk-Preferences block first while the other half had the Gender Stereotype Beliefs first, to allow the observation of order effects. In this scenario, we create dummy variables for the regression since they can simplify the analysis by taking into consideration both the first (Joe) and second (Maria) group, and represent either risk-seeking or risk-averse behaviour, hence, allowing for one regression to be made that can successfully represent either of the groups. The dummy variable method was partially motivated by the approach undertaken by Hellerstein et al. (2013) where regressions were made to categorize each of the five sessions of an experiment that had the intention to test farmers' risk aversion and their likelihood to acquire crop insurance. However, one potential disadvantage of using dummy variables is that although it correctly states whether an individual considered the beliefs of either Joe or Maria (randomization); it can be more complex to accurately measure whether an individual is risk-seeking (1) or risk-averse (0), being that risk-aversion is measured generically: through the settlement that if at least  $2/3$  of the answers in the first block are with the prize of thirty euros, risk-seeking behaviour will be one, and zero otherwise. The dummy variable that was created stated whether the individual is categorized under its participation in either the first (assessing Joe's risk) or second (assessing Maria's risk) group. In the block of Gender Stereotypes Beliefs, people that considered an individual of the male sex (Joe) will be considered as be part of the first group while those who were appraising a person of the female sex (Maria) will be considered to be in the second group since it successfully measures the stereotypical gender gap we aim to address. This randomization was to control for potential fluctuations in gender beliefs regarding risk-aversion individuals while taking into consideration their individual risk assessment. Having both assessments is crucial since an indi-

vidual that behaves in a risk-averse manner when making an individual choice in the first block, for instance, might consider another individual to have a relatively similar risk preference. Besides the settlement of a dummy reflecting whether an individual was part of the first or second group, there is the presence of a variable that reflects risk preference measured by the answers, on a general level, made in the Individual Risk-Preferences block, if at least  $2/3$  of the answers aimed at the lottery with the prize of thirty euros, the dummy variable of risk-seeking behaviour will be one, while, on the contrary, if at least  $2/3$  of most responses were on the preference of the lottery with the prize of five euros, the dummy risk-preference variable will be considered zero, reflecting risk-aversion. Likewise, for the assessment of the block of Gender Stereotypes Beliefs, beliefs were measured in the same way as explained for the block of Individual Risk-Preferences, with a small difference in proportions: if at least  $3/4$  of most responses established a likelihood larger or equal than 50 per cent benefiting the lottery with the prize of five euros, the dummy gender-belief risk-preference variable will be considered zero, reflecting risk-aversion, and if the probability mentioned is less than 50 per cent in  $3/4$  of most responses aiming at the lottery with the prize of five euros, the dummy variable of gender-belief risk-seeking behaviour will be one. Table 2.2 shows the descriptive statistics of the sample with the measures explained above. Regarding the first group, an average of 40 per cent were part of it, giving a total of 76 respondents, and 115 for the second group. The average individual risk was measured on a general level, for both sexes, showing an overall mean of 0.59, where zero reflects risk-aversion, and one risk-seeking behaviour, hence, a sample that is slightly more motivated to choose the riskier choice. When looking at gender-specific individual risk assessments, females had an average individual risk of 0.58 while males had a value of 0.59 in the sample, however, no deduction can be made yet until results are shown in later sections. Results from the Individual Risk-Preferences block show that there is a very slight difference in risk assessment between genders in the sample. Average gender risk belief was measured

through the average of the risk-preference beliefs in each question, for instance, if Maria was thought to be risk averse in three out of four of the questions in the Gender Stereotypes Beliefs block, then the average belief would be  $1/4$ . The average gender risk belief was then measured for both sexes, and then the average of both was calculated showing an overall mean of 0.55, where zero reflects risk-aversion, and one risk-seeking behaviour, hence, a sample that expects others to act vaguely less riskier when shown the aforementioned bets. Nevertheless, when looking at gender-specific risk beliefs, females had an average risk belief of 0.4 while males had a value of 0.65. Results from the Gender Stereotypes Beliefs block show that women are more perceived to take a risk-averse action when considering the established lotteries.

Table 2.2: *Descriptive Statistics of sample on treatment and risk assessment*

| Variables                     | Mean | Observations |
|-------------------------------|------|--------------|
| <b>Randomization</b>          |      |              |
| First group (Joe)             | 0.4  | 76           |
| Second group (Maria)          | 0.6  | 115          |
| <b>Important Variables</b>    |      |              |
| Avg. Individual-Risk          | 0.59 | 191          |
| Avg. Individual-Risk (Female) | 0.58 | 48           |
| Avg. Individual-Risk (Male)   | 0.59 | 143          |
| Avg. Gender Risk-Belief       | 0.55 | 191          |
| Avg. Female Risk-Belief       | 0.40 | 73           |
| Avg. Male Risk-Belief         | 0.65 | 118          |

*Notes.* All results in the Mean columns are given in proportions on a scale from 0 to 1. For a value of 0.4 given in Treatment means that, 40 per cent of respondents were given treatment. However, the Important Variables section states the averages on risk-preferences: 0 reflecting risk-aversion, and 1 mirroring risk-seeking behaviour.

To test for randomization success, a Chi-Squared test to determine whether there are any contrasts in the observational values of the socio-cultural and demographical variables was made, in addition to, a difference of means T-test to check for risk-preference differences between the first and second group and see whether they are weighty.

The following statement reflects the portrayal of the first hypothesis, where a two-

sample T-test for the difference of means was used to check for any significant differences in individual risk preferences between men and women in the sample.

$H_0$ : Average Individual-Risk for Females = Average Individual-Risk for Males

$H_a$ : Average Individual-Risk for Females  $\neq$  Average Individual-Risk for Males

Secondly, the following statement reflects the depiction of the second hypothesis, where a two-sample T-test for the difference of means was used to check for any significant differences in gender-specific risk beliefs among men and women in the sample.

$H_0$ : Average Female-Risk Belief = Average Male-Risk Belief

$H_a$ : Average Female-Risk Belief  $\neq$  Average Male-Risk Belief

Equation 2.1 reflects the regression portrayal of the third hypothesis, where  $Y_i$  is the outcome variable “Gender-Stereotype Belief” measured by the results from the assessment explained in the previous paragraphs, more specifically, in the Gender Stereotype Beliefs block (either emphasizing risk-seeking (1) or risk-averse behavior (0)),  $\alpha$  is the constant variable,  $\beta_1$  is the explanatory variable coefficient that shows the impact change in the explanatory variable ( $T_i$ ) on output variable ( $Y_i$ ),  $T_i$  is the dummy variable equaling 1 if the individual is allocated to the first group or 0 if it is allocated to the second group,  $\beta_2$  is the explanatory variable coefficient that shows the impact change in the explanatory variable ( $X_i$ ) on output variable ( $Y_i$ ),  $X_i$  is the dummy variable equaling 1 if the individual was considered as risk-averse (0) or risk-seeking (1) from the Individual Risk-Preferences block, and  $\epsilon_i$  the error term.

$$Y_i = \alpha + \beta_1 T_i + \beta_2 X_i + \epsilon_i \quad (2.1)$$

Equation 2.2 reflects the regression portrayal of the fourth hypothesis, where  $Y_i$  is the outcome variable “Gender-Stereotype Belief” measured by the results from the assessment explained in the previous paragraphs,  $\alpha$  is the constant variable,  $\beta_1$  is the explanatory variable coefficient that shows the impact change in the explanatory variable ( $T_i$ ) on output variable ( $Y_i$ ),  $T_i$  is the dummy variable equal-

ing 1 if the individual is allocated to the first group or 0 if it is allocated to the second group,  $\beta_2$  is the explanatory variable coefficient that shows the impact change in the explanatory variable ( $X_i$ ) on output variable ( $Y_i$ ),  $X_i$  is the dummy variable equaling 1 if the individual was considered as risk-averse (0) or risk-seeking (1) from the Individual Risk-Preferences block,  $\beta_3$  is the explanatory variable coefficient that shows how the impact of individual risk-preferences on gender-stereotype belief differs for people in the first and second group (interaction term), and  $\epsilon_i$  the error term.

$$Y_i = \alpha + \beta_1 T_i + \beta_2 X_i + \beta_3 X_i T_i + \epsilon_i \quad (2.2)$$

Methods used to analyze are T-tests to compare the means of treatment and control groups for gender-risk beliefs and Chi-square tests for socio-cultural demographics to look for significant differences. Afterwards, an Ordinary Least Squares (OLS) regression was used to estimate the coefficients since it allowed the measurement of the relationship between the randomization variable ( $T_i$ ) and the explanatory variable ( $X_i$ ) on the dependent variable ( $Y_i$ ) through the minimization of the sum of squares in the difference between observed and predicted values.

Due to the fact that the Gender Stereotype Beliefs block worked with multi-item scales to measure their beliefs by stating a probability from a range of zero to 100 percentage points four times: first-scale being the probability of choosing a possibility of 8/9 to earn five euros over a possibility of 1/9 to earn thirty euros, second-scale being the probability of choosing a possibility of 7/9 to earn five euros over a possibility of 2/9 to earn thirty euros, third-scale being the probability of choosing a possibility of 6/9 to earn five euros over a possibility of 3/9 to earn thirty euros, and fourth-scale being the probability of choosing a possibility of 5/9 to earn five euros over a possibility of 4/9 to earn thirty euros.

## Chapter 3

### Analysis

#### 3.1 Examination of Results and Interpretation

Table 3.1 shows the results depicting the two-sample T-test for the difference of means used to check for any significant differences in individual risk preferences between men and women in the sample. There's only an estimate of around 10 per cent possibility that the null hypothesis (Average Individual-Risk for Females = Average Individual-Risk for Males) is true given the dataset. Overall, we have a p-value that is not statistically significant (p-value larger than 0.1), hence, no strong evidence supports the rejection of the first null hypothesis.

Table 3.1: *Two-sample T-test results for first hypothesis*

| <b>Group</b> | <b>Obs.</b> | <b>Mean</b> | <b>Std.<br/>Dev.</b> | <b>T-cal.</b> | <b>T-crit.</b> | <b>df</b> | <b>P-<br/>value</b> |
|--------------|-------------|-------------|----------------------|---------------|----------------|-----------|---------------------|
| Female       | 48          | 0.58        | 0.41                 | -0.13         | 1.66           | 189       | 0.90                |
| Male         | 143         | 0.59        | 0.4                  |               |                |           |                     |

*Notes.* Significance: \* p less than 0.05, \*\* p less than 0.01, \*\*\* p less than 0.001 (strong evidence).

Table 3.2 shows the results depicting the two-sample T-test for the difference of means addressing the second hypothesis, checking for any significant differences in gender-specific risk beliefs on men and women in the sample. The P-value is less than 0.1 and 0.05 hence it is statistically significant and the null hypothesis can be rejected. There is strong evidence that supports a difference in the beliefs of what is expected of the risk preferences between genders. Women are perceived as more risk averse than men in the sample.

Table 3.2: *Two-sample T-test results for second hypothesis*

| Group  | Obs. | Mean | Std. Dev. | T-cal. | T-crit. | df  | P-value |
|--------|------|------|-----------|--------|---------|-----|---------|
| Female | 73   | 0.40 | 0.34      | -4.54  | 1.66    | 189 | 0.0***  |
| Male   | 118  | 0.65 | 0.38      |        |         |     |         |

*Notes.* Significance: \* p less than 0.05, \*\* p less than 0.01, \*\*\* p less than 0.001 (strong evidence).

The regression model is shown in Table 3.3, managing to test the main concern of the paper, in which the null hypothesis discloses no significant difference in the role of risk preferences in the assessment of gender stereotype beliefs. The coefficient  $\alpha$  is statistically significant and suggests the average risk-preference assessment that was retrieved from the second group, that is, all participants that were assigned to mention their beliefs when facing an individual of the female sex while controlling for the effect of the average individual risk measured by the respondent. Moreover, the coefficient of the first group,  $\beta_1$ , shows the change in the average gender-stereotype belief assessment once participants take into consideration gender beliefs on risk regarding the male sex, however, the coefficient is not statistically significant, meaning significant differences between first and second group cannot be concluded since it does not fall within the 90 per cent significance level. On the other hand,  $\beta_2$  shows the change in the average gender-stereotype belief assessment once average individual risk preferences are taken into account, the coefficient is statistically significant, hence, individuals with a high individual risk-assessment (signalling risk-seeking behaviour) will affect their gender-stereotype belief assessment by expecting them to be more likely to take risks, regardless of whether they are male or female. By checking on the significance level of the average individual-risk coefficient being less than 0.1, it was possible to reject the third null hypothesis that there is no significant difference in the role of risk preferences in the assessment of gender-stereotype beliefs regarding risk aversion while concluding that the difference in gender stereotype beliefs is not significant between the first and second groups. This introduces compelling awareness to the main question of “*Do individual risk preferences play a role in*



*assessing gender stereotypes beliefs regarding risk aversion?”* since it is a manifestation that individual risk preferences as analyzed in the questionnaire may lead to people considering them when assessing for gender-beliefs regarding risk.

Table 3.3: *Regression Results for Hypothesis 3*

|                      | <b>Gender-Stereotype Belief</b> |
|----------------------|---------------------------------|
| Constant             | 0.36***<br>(0.06)               |
| First group (Joe)    | -0.08<br>(0.05)                 |
| Avg. Individual-Risk | 0.37***<br>(0.07)               |
| Observations         | 191                             |

*Notes.* Significance: \* p less than 0.05, \*\* p less than 0.01, \*\*\* p less than 0.001 (strong evidence).

Table 3.4 tests the fourth hypothesis regarding any significant differences that can exist in individual risk preferences between groups when assessing gender stereotype beliefs regarding risk aversion. The constant is interpreted as the average gender-stereotype belief on risk preferences when the participant is in the first group. After adding average individual risk and the interaction term of average individual risk and participation on either the first or second group to the model, the coefficient of the participation in the first group (Joe) variable is different by being 0.22 points higher but still not significant, indicating a negative bias as a result of leaving the interaction variables out of the regression model. However, the coefficient of the average individual risk is still significant at the 90 per cent significance level, as well as the coefficient for the interaction term. The interpretation of the coefficient of the interaction effect will determine the result of the fourth hypothesis. Since we can confirm that the coefficients are significant for the interaction term, we, therefore, reject the null hypothesis that there are significant differences in individual risk preferences between groups in the assessment of gender stereotype beliefs regarding risk aversion.

Table 3.4: *Regression Results for Hypothesis 4*

|                                   | <b>Gender-Stereotype Belief</b> |
|-----------------------------------|---------------------------------|
| Constant                          | 0.25***<br>(0.06)               |
| First group (Joe)                 | 0.14<br>(0.09)                  |
| Avg. Individual-Risk              | 0.54***<br>(0.08)               |
| Avg. Indiv.Risk * 1st group (Joe) | -0.41***<br>(0.13)              |
| Observations                      | 191                             |

*Notes.* Significance: \* p less than 0.05, \*\* p less than 0.01, \*\*\* p less than 0.001 (strong evidence).

It is important to show the randomization check for the third hypothesis. Tables 3.5 and 3.6 manage to depict that there are no significant contrasts between the first and second groups by using a 90 per cent significance level since the main purpose was not to have a stringent confidence interval (e.g., 95 per cent) due to the number of observations. This approach let not only large differences be relevant. The T-test allowed us to spot any differences in gender stereotype beliefs between the first and second groups and showed a successful randomization strategy.

After the confirmation of a successful randomization approach regarding both socio-demographical variable assessment and the favourable outcome deriving from the randomization strategy for gender stereotype beliefs, it was possible to go on towards the regression analysis of the framework established in the previous chapter.

Table 3.5: *Randomization Check for Demographics*

| Variable          | First group (Joe) | Second group (Maria) | Chi-Square | P-value |
|-------------------|-------------------|----------------------|------------|---------|
| <b>Gender</b>     |                   |                      |            |         |
| Male              | 58                | 85                   | 0.14       | 0.71    |
| Female            | 18                | 30                   |            |         |
| <b>Education</b>  |                   |                      |            |         |
| Elementary        | 0                 | 3                    | 5.49       | 0.24    |
| High School       | 16                | 16                   |            |         |
| Bachelor's        | 48                | 67                   |            |         |
| Master's          | 11                | 26                   |            |         |
| PhD               | 1                 | 3                    |            |         |
| <b>Age</b>        |                   |                      |            |         |
| Younger than 18   | 0                 | 1                    | 1.42       | 0.84    |
| 18-29             | 54                | 75                   |            |         |
| 30-49             | 17                | 31                   |            |         |
| 50-69             | 4                 | 7                    |            |         |
| Older than 69     | 1                 | 1                    |            |         |
| <b>Region</b>     |                   |                      |            |         |
| In the NL         | 9                 | 15                   | 0.38       | 0.83    |
| In the EU         | 5                 | 10                   |            |         |
| Outside of the EU | 62                | 90                   |            |         |

*Notes.* Significance: \* p less than 0.05, \*\* p less than 0.01, \*\*\* p less than 0.001 (strong evidence).

Table 3.6: *Manipulation check for gender-stereotype beliefs*

|                           | First group (Joe) | Second group (Maria) | Difference (M-J) |
|---------------------------|-------------------|----------------------|------------------|
| Gender-stereotype beliefs | 0.45              | 0.62                 | 0.17**           |
| Observations              | 76                | 115                  | 39               |

*Notes.* Significance: \* p less than 0.05, \*\* p less than 0.01, \*\*\* p less than 0.001 (strong evidence).

## Chapter 4

### Conclusions

#### 4.1 Summary

This thesis experimentally tested whether people's decisions are driven or influenced by gender stereotypes when facing a simulative scenario that presents higher stakes of winning a lower amount of money (€5) and lower stakes of winning a higher amount of money (€30), as well as, the perception and belief they have on the likelihood of the action a person from a specific gender may take regarding the lotteries that they have been shown (Joe or Maria). The majority of the people in the sample were born outside of the European Union, with the bulk being bachelor's degree students.

It is important to bare in mind that individual risk preferences are explanatory of the differences in beliefs. Some extremely risk-averse individuals may expect other individuals to have the same or a relatively similar risk preference. As seen in the results, there was not enough evidence to reject the first null hypothesis, which establishes that there are no significant differences between genders when comparing individual risk aversion; however, there was enough evidence to reject the second null hypothesis which establishes that there are no significant differences between gender-specific stereotype beliefs regarding risk aversion, hence in the sample, women were perceived to be less risk-seeking than men.

The randomization check was successful since there were no significant differences between the first (Joe) and second (Maria) groups, as well as no significant differences between the gender stereotype beliefs between both groups.

The main research question " *Do individual risk preferences play a role in assess-*

*ing gender stereotypes beliefs regarding risk aversion?*” was tested using the third hypothesis. The third hypothesis focuses on whether risk preferences play a role in the assessment of gender stereotype beliefs regarding risk aversion. This hypothesis was tested using an ordinary least squares (OLS) regression with dummy variables reflecting individual risk preference and whether the individual assessed the situation of a man (Joe) or a woman (Maria). The dependent variable was ”Gender Stereotype Belief” and the dummy stating average individual risk was significant with a coefficient of 0.37, hence, all the individuals considered to be risk averse are more likely to overestimate gender stereotype beliefs regarding risk preferences. The results from the regression lead to the conclusion that there are significant differences in the role of risk preferences in the assessment of gender stereotype beliefs since the significance level was less than 0.1. The coefficient of the dummy variable stating whether an individual faced the situation of Joe or Maria was not significant, meaning there were no significant differences between the two groups in the sample when assessing gender stereotype beliefs. Additionally, the test of the fourth hypothesis help shed light on the fact that more risk-seeking participants are the ones driving the depicted results.

## **4.2 Recommendations and Limitations**

Taking these findings into consideration, it is important to retrieve conclusions that can set a clearer picture of the main research question and go on with recommendations for the improvement of the research.

The results show that, in terms of internal validity, or the validity of the models used and their accuracy, there is an existing issue that may have arisen from the data due to a possible lack of statistical power since the sample size was relatively small. Results could have been impeded and it would have been possible to have more accuracy with bigger sample size and a larger proportion of women participating in the sample.

Due to this, we cannot conclude that risk preferences do play a significant role in gender stereotype beliefs since the difference may be significant with larger sample size. Although the randomization strategy worked well as shown in the randomization check, there may have been certain omitted variables that were not taken into account such as an individual's income. Because no differences were checked in variables such as income there might be ingrained contrasts between the first and second group that were not controlled for. Taking the limitations of the models into consideration, these findings can be relevant to other populations with a similar distribution of characteristics. Hence, results can only be applied to populations who are in the Age group of 18 - 29 years and who are also bachelor's students. In addition to that, results are applicable to risk preferences and gender stereotype beliefs if measured in the same way. Similarly, perhaps a more meaningful definition of gender stereotype beliefs requires observation of an interactive game between respondents. The results in this thesis can only be applied to the definition of gender stereotype belief and individual risk preference that is measured with the same methodology as explained in previous sections. The research could have been developed more thoroughly if individuals would have actually received monetary payoffs and were also exposed to the interactive scenario mentioned, hence, allowing for the research to become more adaptable and statistically more valid.

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## APPENDICES

### A Survey Questionnaire

Thesis Final

Start of Block: Consent

Question 1

Dear participant: Many thanks in advance for participating in this questionnaire. This research is conducted by a student at the Erasmus University in Rotterdam for final thesis assessment. Answers are completely confidential. Participation is voluntary and the data collection of this survey will be completely anonymous. The data will only be used for research purposes and will be deleted after 8 weeks. Please answer to the best of your abilities. If you have any questions, concerns, or complaints regarding this survey please contact 523257cz@student.eur.nl.

Thank you in advance.

Claudia

I state that I am voluntarily participating and agree to my responses being anonymously processed for research purposes only. (1)

End of Block: Consent

## Start of Block: Socio-Cultural and Demographical

## Question 2

What is your gender?

- Male (1)
- Female (2)
- Non-Binary / Third Gender (3)
- Prefer Not To Say (4)

## Question 3

What is your age?

- < 18(1)
- 18 – 29(2)
- 30 – 49(3)
- 50 – 69(4)
- > 69(5)

## Question 4

What is the highest level of education you have completed? If currently enrolled, choose the one you are currently enrolled for.

- No Schooling Completed (1)
- Elementary School (2)
- High School (3)
- Bachelor's Degree (4)
- Master's Degree (5)
- Ph.D. (6)

## Question 5

Where do were you born?

- In the Netherlands (1)
- Outside of the Netherlands, European Union (2)
- Outside of the Europe Union (3)

End of Block: Socio-Cultural and Demographical

Start of Block: Risk-Preferences

## Question 6

You are given a set of probabilities and potential payoffs.

You are asked to make a preference of one choice over the other.

- Probability of  $1/9$  to earn €30 (1)
- Probability of  $8/9$  to earn €5 (3)

## Question 7

You are given a set of probabilities and potential payoffs.

You are asked to make a preference of one choice over the other.

- Probability of  $2/9$  to earn €30 (1)
- Probability of  $7/9$  to earn €5 (2)

## Question 8

You are given a set of probabilities and potential payoffs.

You are asked to make a preference of one choice over the other.

- o Probability of 3/9 to earn €30 (1)
- o Probability of 6/9 to earn €5 (2)

End of Block: Risk-Preferences

Start of Block: Gender Stereotype Beliefs (Female)

Question 9

How likely do you think Maria is to choose option B over A in the following scenario:

Option A: probability of 1/9 to earn €30

Option B: probability of 8/9 to earn €5

Question 10

How likely do you think Maria is to choose option B over A in the following scenario:

Option A: probability of 2/9 to earn €30

Option B: probability of 7/9 to earn €5

Question 11

How likely do you think Maria is to choose option B over A in the following scenario:

Option A: probability of 3/9 to earn €30

Option B: probability of 6/9 to earn €5

Question 12

How likely do you think Maria is to choose option B over A in the following scenario:

Option A: probability of 4/9 to earn €30

Option B: probability of 5/9 to earn €5

End of Block: Gender Stereotype Beliefs (Female)

Start of Block: Gender Stereotypes Beliefs (Male)

Question 13

How likely do you think Joe is to choose option B over A in the following scenario:

Option A: probability of 1/9 to earn €30

Option B: probability of 8/9 to earn €5

Question 14

How likely do you think Joe is to choose option B over A in the following scenario:

Option A: probability of 2/9 to earn €30

Option B: probability of 7/9 to earn €5

Question 15

How likely do you think Joe is to choose option B over A in the following scenario:

Option A: probability of 3/9 to earn €30

Option B: probability of 6/9 to earn €5

Question 16

How likely do you think Joe is to choose option B over A in the following scenario:

Option A: probability of 4/9 to earn €30

Option B: probability of 5/9 to earn €5

End of Block: Gender Stereotypes Beliefs (Male)

End of survey.