

The influence of facial masculinity on own and perceived risk aversion

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Abstract

Much research has investigated the differences between men and women with regard to financial risk-taking. It is most often found that women are both more risk averse and are perceived as being so. However, relatively little research has focused on within-gender differences. In general, masculinity negatively affects financial risk aversion, however, this thesis focuses on whether facial masculinity affects financial risk aversion. The hypotheses of this thesis are that facial masculinity affects risk-aversion as well as perceived risk-aversion. We use the Bem sex-role inventory to measure facial masculinity. If an individual is perceived to possess more masculine personality traits based on a facial picture, he or she is perceived as more masculine. The results obtained reveal that facial masculinity does not affect own financial risk-taking; however, a significant effect of facial masculinity on perceived financial risk-taking is found in both men and women. If an individual has a higher perceived facial masculinity, he or she is perceived to be less risk averse when compared to less masculine-looking people, with gender and own risk-taking being additional important variables. The importance of these findings are that they could prove useful in highlighting that masculine looking individuals get perceived differently by financial advisors, employers and others when evaluating the former's risk profile, while masculine and non-masculine looking individuals show no significant difference in risk profiles. Since this is, to the author's knowledge, the first research investigating the effect of facial masculinity on expected risk taking, many more research with respect to this topic can be conducted.

Table of Contents

1. Introduction	3
2. Literature overview	5
2.1 The effect of masculinity on financial risk-taking	6
2.2 The effect of looks on financial risk-taking	9
2.3 The effect of looks on expected financial risk-taking	10
2.4 Hypotheses	11
3. Methodology	12
3.1 Experiment 1	13
3.1.1 Stimuli	13
3.1.2 Participants	14
3.1.3 Procedure	14
3.1.4 Incentives	15
3.2 Experiment 2	15
3.2.1 Stimuli	15
3.2.2 Participants	17
3.2.3 Procedure	17
3.2.4 Incentives	18
3.3 Analyses	18
4. Results	20
4.1 Hypothesis 1	22
4.2 Hypothesis 2	23
5. Conclusion	26
6. Discussion	28
7. References	31
8. Appendix	34

1. Introduction

Financial jobs are often considered to be masculine. As stated by Wyman (2014; p.31), “Women are likely to remain a minority in risk-taking roles at banks. Women traders may simply be regarded as ‘the cautious ones in the corner’ while the men continue to set the overall tone.” Schubert et al. (1999) argue that women have reduced job opportunities because they are offered less risky investment options; this is due to the perception that they may be reluctant to make risky decisions.

The existing literature has extensively investigated whether women are indeed less likely to take risks. Van Dorresteijn (2017) provides an overview of the existing literature on the socio-demographic factors that influence the risk-taking behavior of investors, of which gender was found to be among the most important. It appears that women both perceive situations as being riskier than men do and have a different attitude toward risk. Taken these findings together, women are more risk averse than men (as is the conclusion of the majority of researchers), although, due to some disagreements, it might be preferable to state that gender at least accounts for a minor part of the variance in risk tolerance. However, gender remains a broad subject of investigation within financial risk research.

In a 1974 study, Bem developed the Bem sex-role inventory (BSRI), which is an inventory of characteristics that are perceived as either masculine, feminine, or androgen by American society; this inventory considers willingness to take risks to be a masculine trait. However, it is not the case that masculine traits are found exclusively in men. Bem (1974) states that many individuals display a combination of both masculine and feminine traits; this suggests that the discussion of the effect of gender on risk attitude is not as black and white as the majority of scholars considered in the overview provided by Van Dorresteijn (2017) concluded. In 1997, Twenge found a general trend in stereotypes that has resulted in women having taken on more masculine roles, with men having been compelled to adopt feminine traits over the years. The difference between men and women, while still present, is vastly decreasing. Using masculinity instead of gender as a variable affecting risk tolerance seems to represent a superior approach to investigating risk tolerance differences between men and women.

However, a limitation of substituting gender for sex is that distinguishing between genders is easier than distinguishing between masculine and feminine traits, as the former can be seen and easily identified, while the latter, as found in a study by Meier-Pesti and Penz

(2008), have to be investigated more thoroughly. These authors found that being feminine does not necessarily mean being risk averse but that being masculine promotes risk-taking for both genders. Masculinity seems to mediate the effect of biological sex on financial risk-taking. In Meier-Pesti and Penz's research, levels of masculinity and femininity were measured by means of a questionnaire, which might prove too complicated an approach for everyday practice. An example of everyday practice provided by Eckel and Grossman (2008) is that financial advisors tailor their investment advice based on their own perception of a client's risk attitude using visual characteristics, including his or her masculine and feminine traits. This may result in a different outcome than that which may have occurred had the advice provided been unbiased.

The purpose of this thesis is to investigate the effect of facial masculinity on financial risk-taking. This research is divided into two sections: The first focuses on whether perceived facial masculinity has any effect on an individual's own financial risk-taking. This builds on the research conducted by Meier-Pesti and Penz (2008), who researched the effect of gender based on personal traits, using the same criteria as we use to measure facial masculinity, on financial risk-taking. The second part investigates whether perceived facial masculinity has any effect on expected level of financial risk-taking.

The methodological approach is divided into two sections as well: The first focuses on eliciting the risk-aversion of an individual and taking a facial picture of her or him. The second part involves an independent individual rating the former individual's picture on facial masculinity as well as estimating her or his risk-aversion.

The following chapter provides an overview of the existing literature on the effect of masculinity and appearance on both financial risk-taking and expected financial risk-taking; this discussion is followed by the presentation of the hypotheses. The hypotheses are tested with the help of an experiment, which is thoroughly discussed in the third chapter. Thereafter, the results of this experiment are provided in the fourth chapter, while the final chapters present the conclusion and discussion.

2. Literature overview

This chapter provides an overview of the existing literature on the effects of a masculine appearance on both actual and expected financial risk-taking. The majority of previous research has focused on either the correlation between masculinity and financial risk-taking and the correlation between looks and financial risk-taking; however, not many researchers have focused on the combined effect. To the best of the author's knowledge, there are only two studies, namely those of Apicella et al. (2008) and Xie et al. (2017), that have investigated the relationship between masculine faces and risk-taking.

Apicella et al. (2008) found a positive relationship between facial masculinity and risk-taking in men; the reasoning behind this observation is that men with more masculinized features are accustomed to performing well in a variety of tasks and that men are able to absorb the costs that result when risky actions yield negative outcomes. The limitations of this study, however, are that masculinized facial features were measured only in men and that the facial masculinity score was determined by sexual dimorphism measurements. These measurements include cheekbone prominence, jaw height/lower facial height, lower face height/face height, and face width/lower face height ratios. The weakness of the authors' approach, however, is that it takes specialized knowledge to produce this particular facial masculinity score.

In the other study, conducted by Xie et al. (2017), facial masculinity was determined by measuring the forehead width and height ratio (fWHR). fWHR develops during puberty due to a testosterone peak that is largely responsible for the development of male secondary sex characteristics; this peak notably affects the ratio between facial width and height. Men typically have larger fWHRs than women. Xie et al. (2017) investigated the effects of fWHR, 2D:4D, and time constraints on financial risk-taking. The ratio between the second and fourth fingers (2D:4D) develops during the male pre-birth testosterone peak, which is nine times that of females and contributes to the formation of both the primary and secondary male sex characteristics, affects the length of digits. Testosterone levels present in the uterus are negatively correlated with the ratio between index and ring fingers; men typically have lower 2D:4D ratios than women.

In terms of gender differences with respect to risk-taking, men with high fWHR and low 2D:4D were on average and when compared to women more risk-taking, more likely to overweight small probabilities when gains were high, and were more optimistic about

outcomes, especially when time pressure was involved. Women with high fWHRs and low 2D:4D ratios did the opposite and thus took fewer risks, especially in response to time pressure as found by Xie et al. (2017).

Direct measurement of the relationship between easily observable facial masculinity and financial risk-taking for both men and women has not been researched previously. To be able to formulate hypotheses for this research, it is first necessary to analyze the effect of masculinity on financial risk-taking. Second, the effect of looks on financial risk-taking is analyzed, and, finally, the effect of masculinity and looks combined on *expected* financial risk-taking is analyzed.

2.1 The effect of masculinity on financial risk-taking

The effect of masculinity on financial risk-taking can be investigated in a variety of ways with respect to the definition of masculinity. One measurement is *nurture* influenced, meaning that masculinity can be measured through, for example, with reference to the industry in which an individual works, as done by Iliyanova (2016). Iliyanova (2016) found that, when gender is added to the model that tries to explain financial risk-taking by masculinity, masculinity is not an important factor in risk aversion anymore. Lemaster and Strough (2014) determined that both social roles and personality traits, that are stereotypically masculine dimensions of gender, are important in understanding willingness to take risks in both men and women. Men and women who reported playing stereotypically masculine social roles had a greater risk tolerance. As argued by Lemaster and Strough (2014), the reason why women exhibit greater financial risk tolerance when occupying stereotypically masculine roles might be due either to them rejecting societal proscriptions concerning how women “should” behave or the possibility that greater tolerance for financial risk actually leads to them rejecting of societal proscriptions about how women “should” behave.

For the purposes of this study, it is critical to consider research focused on the biological masculinity of an individual, the *nature* part of his or her masculinity. One important biological distinction between men and women is the hormone testosterone. Men have higher levels of testosterone, which results in differences in behavior and cognition when compared to women. This difference in behavior and cognition can either go through a permanent adjustment of the brain’s structure and function that occurs before birth or during the early stages of life or it goes as short-term testosterone in circulation that affects the brain; the latter can occur at any stage of life but is particularly common after puberty (Sapienza et

al., 2009). The latter, as found by Stanton et al. (2011), appears to have an effect on financial risk-taking. The authors found that both men and women with high levels of circulating salivary testosterone demonstrated greater risk-taking behavior in the Iowa gambling task, in which an individual's propensity to take risk is examined in the face of monetary rewards and punishments and compared to that of counterparts of the same sex. The effect was larger for women.

Beyond facial masculinity, another approach to visually determining masculinity, as already stated and adopted by, among others, Xie et al. (2017), is measuring the ratio between the second and fourth fingers (2D:4D). Garbarino et al. (2011) found that men both had lower 2D:4D ratios and made more risky choices. However, interestingly, both men and women with smaller 2D:4D ratios were found to made riskier financial choices.

There is no consensus as to whether this effect holds for both men and women equally. Barel (2017) found that the effect of having low 2D:4D was only present in women with higher levels of optimism. In contrast, Drichoutis and Nayga (2015) found that men with low 2D:4D ratios demonstrate risk-loving preferences, while the effect is not as clear for women. Brañas-Garza and Rustichini (2011) also found that the effect of 2D:4D ratio on risk aversion differs in males and females: For males, the 2D:4D ratio is significantly related to reasoning ability and attitude toward risk aversion; a higher ratio is associated with higher risk aversion. For females, the opposite is true, as a higher 2D:4D ratio is associated with lower risk aversion. Apparently, for males, a substantial part of this effect is mediated by the effect of reasoning ability.

Turning to non-laboratory settings, two studies have investigated the effect of masculinity on risk-taking on the trading floor. Coates and Herbert (2008) investigated whether circulating testosterone, as measured in saliva, affects risk-taking. The authors found that, on days when traders made more than their averages, their testosterone levels were higher. Implied volatility was not the cause of these high profits, as testosterone demonstrated no significant correlation with implied volatility. In addition to increasing appetite for risk, testosterone also increased search persistence and fearlessness, which are qualities that influence a trader's performance. The other study on financial traders was conducted by Coates et al. (2009), who investigated whether 2D:4D ratios affect risk-taking. Only men were recruited for this study. The authors' findings seem to indicate that the lower a trader's 2D:4D ratio, the greater his profit and losses (P&L). Experience appeared to have a nonlinear

effect on P&L: In the first two years of trading, P&L increased sharply. If only the experienced traders were taken into account, those with low 2D:4D ratios made on average 5.4 higher P&Ls than high 2D:4D traders. When volatility increased, the lower traders' 2D:4D ratios, the more money they made. In these studies, the conclusions were that masculinity matters. When testosterone levels, both prenatal and current, are high, the risk-taking of financial traders is higher compared to those with low levels of testosterone.

Another approach that can be found in the existing literature to measuring the effect of masculinity on risk-taking is considering whether masculinity affects career choices in the financial sector. Sapienza et al. (2009) found that, when circulating testosterone was high, risk aversion was low for women. This effect did not apply to men, as the results of the authors' research were not found to be significant. The effect between risk aversion and circulating testosterone among women was seven times stronger than for men. At comparable low levels of circulating testosterone (90% of the women and 31% of the men in this study has comparable low testosterone), the authors found a significant negative relationship between testosterone and risk aversion, regardless of gender. It was also found that individuals with high testosterone and low risk aversion were more likely to enter risky careers in finance. These findings suggests that the within-gender effect of the effect of testosterone on risk-taking is more pronounced for women.

Although the results of the studies discussed above seem quite promising, there have also been two studies that have questioned the effect of masculinity on financial risk-taking. As stated previously, Xie et al. (2017) found that no relationship between fWHR and financial risk-taking in expected utility estimations, but, when uncertainty was added to the model, it was found that fWHR has a negative effect on women's risk attitudes but a positive effect on those of men. However, when the research was repeated with respect to outcomes instead of probabilities, the results were inverted, with women with high fWHR and low 2D:4D being found to be less risk averse and men more risk averse. Furthermore, a study conducted by Alonso et al. (2018) indicates that a low 2D:4D ratio has a small insignificant effect on risk preferences. The authors note that they expected the risk elicitation method to have an impact. Whenever no risk-free option was presented, the results appeared to be significant. Thus, a number of external factors, such as whether outcomes or probabilities are used and whether only risk-free options are presented, matter. This makes the sole overall effect of masculinity on financial risk-taking questionable.

In conclusion, the findings of the previous literature, while somewhat mixed, largely indicate that masculinity has an effect on financial risk-taking. The following section investigates whether appearance has any influence on financial risk-taking.

2.2 The effect of looks on financial risk-taking

Not much research has investigated the effect of an individual's appearance on his or her *own* risk-taking. The majority of studies concerning the effect of looks on risk-taking have focused more on how the appearances of *others* affect a person's *own* risk-taking. Dreber et al. (2013) found that men demonstrate a greater propensity to choose a risky opening when playing against an attractive female opponent during a game of chess. Men became more risk-loving, without positive outcomes in terms of performance. Chan (2015) found that men who are in the company of attractive men take greater financial risks compared to those who do not. When men feel the need to compensate for their perceived lack of physical attractiveness, they will demonstrate increased risk-taking behavior. In both studies, the effect only seemed to be present in men, as women did not demonstrate similar behavior. This could be explained with reference to the fact that women find physically attractive men with financial resources desirable. In contrast, men find fertile and youthful women desirable, which might result in risk-taking, but it is unlikely that such risk-taking will extend to financial matters. Arguing backwards, one might propose that being relatively unattractive increases the possibility that a man will be more risk-taking when compared to attractive males, since the latter will not have as great a need to compensate for their appearance. It is expected that this effect will not be present in women, as they cannot compensate for a lack of fertility or youthfulness by means of risk-taking.

The studies referenced above are not directly related to the masculinity of an individual's face; however, the implication of their finding is that there is a need to adjust risk-taking in response to the appearance of others and compared to oneself. However, it is more interesting to determine whether a link exists between appearance and the masculinity factors in section 2.1.

Masculinity is related to attractiveness, as was found by Heilman and Saruwatari (1979). In studying chess games, Dreber et al. (2013) found a positive but insignificant relationship between physical attractiveness and propensity to take risks. However, Penton-Voak and Chen (2004) found the opposite result, namely that the masculine faces used in their experiment were not necessarily viewed as more attractive. Penton-Voak and Chen (2004)

also found that men with high levels of testosterone in their saliva have significantly more masculinized faces, with the effect being more pronounced with higher levels of testosterone. As noted in Section 2.1, testosterone has an effect on risk-taking. Although this phenomenon was not directly studied by Penton-Voak and Chen, the finding that testosterone has an effect on both risk-taking and masculinization of faces remains applicable to this study. Using images of men with high testosterone, Apicella et al. (2008) found that such individuals are viewed as having more masculinized faces than men with low testosterone. In addition, the authors found a positive relationship between risk-taking and testosterone: Masculine men take more risks because they are expected to do so and are expected to succeed (Apicella et al., 2008)

It might be argued that, as both financial risk-taking and the extent to which faces are masculinized are affected by testosterone, it may be possible to find a relationship without necessarily establishing a link between masculinized faces and risk-taking. It would still be important to determine whether an actual relationship exists, as this finding could prove useful for financial advisors or employers when evaluating someone's risk profile. In the following section elaborates on expected financial risk-taking.

2.3 The effect of looks on expected financial risk-taking

Expected financial risk-taking is important in the sense that, as noted in the first chapter, it can influence the advice that an individual receives, as well as his or her career options. Eckel and Grossman (2008) found that, on average, individuals of both sexes believe that other people, especially women, are more risk averse than they actually are. Neither men nor women demonstrated superior performance in predicting the target's risk preference. Each sex was slightly more accurate in making predictions for its own members than those of the opposite sex. Furthermore, there was a case of "false consensus bias," which means that a person's prediction of the behavior of others is affected by their own behavior. The riskier a subject's own choice was, the riskier he or she assumed the other's to be. The results indicated that subjects do pay attention to the visible characteristics of others and that stereotyping was present, although the accuracy of predictions appeared to be only slightly higher than chance.

Hsee and Weber (1997) found that participants predicted others to be more risk-seeking than themselves, as their predictions of others were based partly on their own risk preferences and partly on risk neutrality. When people were presented in a vivid manner,

others predict them to be more like themselves, while, when people are abstract, they are predicted to be more risk-neutral.

In addition, Ball et al. (2010) found that people's perceptions of others' risk attitudes are linked to stereotypes concerning gender and strength and tend to magnify these underlying stereotypes. With regards to strength, physically stronger, taller, and attractive men are expected to be more risk-taking. In contrast, attractive women are perceived to be more risk averse, while, in reality, attractive people in general are more risk averse. Wang (1994), as reported in Ball et al. (2010), reports evidence that women are offered lower risk and lower expected return investments than those offered to men by investment brokers. Although men indeed choose riskier gambles, the underlying gender difference is exaggerated. Still, Ball et al. (2010) found within-gender differences in expected risk-taking, with predictions for women being affected by attractiveness and those for men by predictions of strength.

It can be concluded that people use the visual characteristics of others to adjust their own perceived financial risk-taking of others, with their own risk preference used as a benchmark. Having established that masculinity and looks affects risk-taking and the latter affects expected financial risk-taking as well, it is possible to formulate hypotheses which are presented in the following section.

2.4 Hypotheses

This research investigates the relationship between facial masculinity and financial risk-taking. With regard to the first hypothesis, it was found in the existing literature that masculinity positively correlates with risk-taking and that looks clearly matter when it comes to risk-taking, although the direction of the correlation has not yet been identified. Still, due to the effect of both determinants being present, the first hypothesis for this research is formulated as follows:

H1: Participants with higher perceived facial masculinity are more risk-taking.

With regard to the second hypothesis, it was found in the existing literature that, while people do not accurately predict others' risk choices, they are still influenced by stereotypes. Since willingness to take risks is considered to be a masculine trait, the second hypothesis for this research is formulated as follows:

H2: Participants with higher perceived facial masculinity are believed to be more risk-taking by others.

3. Methodology

This thesis uses two experiments to assess the two hypotheses. In the first experiment (Appendix A), the risk aversion of participants will be elicited and pictures of participant's faces will be taken to be used in experiment two. In the second experiment (Appendix B), the facial pictures will be given an independent masculinity rating and an estimated financial risk aversion so both the effect of facial masculinity on financial risk-taking as on *expected* financial risk-taking can be analyzed.

The elicitation of risk attitudes is done in both experiments. The method used for the elicitation of risk attitudes is the Multiple Price List (MPL). The method has to be replicated for the elicitation of the perception of other's risk attitudes in experiment 2 so it has to be rather easy, especially since the respondents in experiment 2 will not be selected on educational background and that appears to be of importance. When mathematical ability is low and the task too difficult, participants exhibit noisier behavior, as was found by Dave et al. (2007). They noted that the widely used Holt and Laury framework appeared to be too difficult for people with low mathematical abilities, so an easier variation of the MPL was used in which a risk free option had to be included, as was noted by Alonso et al. (2018) as a limitation of previous researches done. On top of that, this format was used by Hsee and Weber (1997) but with different numbers. They argued that this format has greater ecological validity in the sense that in most real world decisions people have to make choices rather than giving probability estimates or state their certainty equivalent.

Figure 1. The multiple price list format used in both experiments.

50% \$20			
50% \$0	☐	☐	\$6
50% \$20			
50% \$0	☐	☐	\$7
50% \$20			
50% \$0	☐	☐	\$7.50
50% \$20			
50% \$0	☐	☐	\$8
50% \$20			
50% \$0	☐	☐	\$8.50
50% \$20			
50% \$0	☐	☐	\$9
50% \$20			
50% \$0	☐	☐	\$9.50
50% \$20			
50% \$0	☐	☐	\$10
50% \$20			
50% \$0	☐	☐	\$11
50% \$20			
50% \$0	☐	☐	\$13

The MPL format used was one in which the participant has to choose between a hypothetical lottery and a hypothetical ‘certain’ pay-off. The lottery always had the same format, namely a probability of 50% that the outcome was \$20 and a probability of 50% that the outcome was \$0. The only thing changing in this MPL was the certain pay-off. The certain pay-off was between \$6 and \$13 with different intervals (ranging between \$0.50 and \$2) divided into 10 lines. For every line, the option between the lottery and certain pay-off was made. The certainty equivalent, that is the minimum amount the participant is willing to accept instead of doing the lottery, is translated into a person’s risk attitude. When the person chooses \$10 as their certainty equivalent it means that they are risk neutral, due to the lottery’s expected pay-off ($50\% * \$20 + 50\% * \0) being the same as the chosen amount. A person picking a higher amount than \$10 is risk-seeking, while a person picking a lower amount than \$10 is risk averse.

There are three possible disadvantages of the MPL stated by Andersen et al. (2006). The first is that only interval responses are measured, rather than precise point valuations, which is something not found to be problematic by other researchers using an MPL. The second is that potential inconsistent preferences can occur when participants switch back and forth from row to row. The last one is that the method could include a framing effects in which subjects are drawn to the middle of the ordered table irrespective of their own preference. The second and the third step are taken care off in the sense of participants not being allowed to switch more than once from row to row and that the certain pay-offs which participants can choose do not range from \$0 to \$20 but from \$6 to \$13, which is skewed to the left to reflect people’s overall tension to be risk averse. Participants not being allowed to switch more than once is actually beneficial since it can be used as an attention check in experiment 2 as will be further elaborated in section 3.2.

3.1 Experiment 1

3.1.1 Stimuli

The participants had to fill in the MPL risk elicitation task described above as well as the Bem’s sex role inventory (BSRI). The BSRI was seen to be the best measurement for masculinity and femininity by Meier-Pesti and Penz (2008) who researched the relationship between personal masculinity and financial risk-taking. There were 60 items, divided in 20 masculine, feminine and neutral items, used in the questionnaire. Meier-Pesti and Penz found that femininity was not related to financial risk-taking. The literature used in chapter 2 also

focuses mainly on masculinity instead of femininity. Due to these factors, it was chosen to only ask for the 20 masculine traits in the questionnaire.

Asking about the masculine personality traits was not of importance for this part of the experiment but solely is used as an incentive in experiment 2. This will be further elaborated in section 3.2.

3.1.2 Participants

The participants needed to meet certain properties for us to be able to isolate the effect of facial masculinity on financial risk-taking in the most efficient way. Van Dorresteijn (2016) constructed an overview of existing literature on socio-demographic factors determining risk-taking behavior of investors. She found that education is the most influential variable affecting risk-taking behavior. Wealth/income, age and gender appearing to be of moderate importance as well. Except for gender, it is favored for the other variables to be equal for participants to limit possible external factors. The target participants selected are all students (college/university) of Dutch ethnicity. They are all the same in obtaining a higher level of education, having relative low incomes and being about the same age. In the literature overview of van Dorresteijn (2006) is stated that ethnicity has just a minor impact on financial risk-taking. But on top of that, it was found that ethnicity is actually an important judgment factor. Wilson and Eckel (2006) found that ethnicity has an, approaching significant, negative impact in the sense of that in the ultimatum game experiment done by Wilson and Eckel less was returned to Asian participants. Thus, to eliminate a possible external judgment effect for experiment 2 ethnicity is also kept the same. In total, 58 students participated (27 men, 31 women) and the average age was $M = 22.17$ with the youngest being 18 and the oldest being 27 years old.

3.1.3 Procedure

Respondents were recruited in Nijmegen and Wageningen from the 6th to the 8th of June 2018. Participants received a printed survey with an introduction text, the risk elicitation task and the 20 masculinity personality items as can be found in Appendix A. In the beginning participants were asked if a picture was allowed to be taken after finishing the survey and they signed at the end of the survey that their picture could be used for the second part of this experiment. It was thoroughly highlighted that the picture and data would only be used for this master's thesis and would be dealt with confidentially. The pictures taken of the participants were facial ones filtered black and white. Sometimes the brightness was adjusted

a bit due to the recruitment places having bad lighting. Wilson and Eckel (2006) found that smiling invites trust. In a study by Ellis and Das (2011) it was found that smiling is most pronounced in girls who have the most feminine physical appearances while there was found no corresponding relationship between femininity or masculinity among boys. Whether the subjects were wearing glasses had no effect. Therefore, participants were asked to look neutral and not to smile on their picture taken.

3.1.4 Incentives

Questionnaires were hypothetical and no monetary payments were made as to incentivize the participants.

3.2 Experiment 2

3.2.1 Stimuli

During experiment 2 first the financial risk-taking of the participants going to estimate the expected risk-taking and facial masculinity of the photographed participants was measured with the same MPL method used in experiment 1. Ball et al. (2010) namely found that there is a false consensus bias present. This means that predictors estimate others to behave more like themselves. If such an effect is found for, it has to be corrected for.

The second task for the participants of experiment 2 is to estimate the choices made in the MPL task by the photographed participants of experiment 1. The only information provided was the photograph and a recall of how the task worked. The results from this part are the expected financial risk-taking.

The method of measuring the facial masculinity, the third task, is mainly based on the study done by Meier-Pesti and Penz in 2008. They measured the effect of masculinity on risk-taking for both men and women as well. The main difference between their and this study is that in their study masculinity is measured by questionnaire filled in by the participants themselves. Their masculine personality traits are used as an independent variable. In this study masculinity will be measured by ratings of participants' faces and used as an independent variable affecting risk aversion. Alternatively, it could have been chosen to use the method used by Apicella et al. (2008), in which facial masculinity was determined by sexual dimorphism measurements, or it could have been chosen to present two faces side by side and ask which of the two faces presented was "more masculine" as was done by Penton-Voak and Chen (2004). It was specifically chosen to look whether people observe male

characteristics in people's faces due to the fact that risk-taking is viewed as one of the male personal characteristic according to the BSRI and was already used in Meier-Pesti and Penz's (2008) study with significant results.

Figure 2. The Bem's Sex Role Inventory masculine personality traits survey used in both experiments

	Very well	Well	Somewhat well	Somewhat well	Well	Very well	
Act as a leader	☐	☐	☐	☐	☐	☐	Act as a follower
Aggressive	☐	☐	☐	☐	☐	☐	Nonaggressive
Ambitious	☐	☐	☐	☐	☐	☐	Unambitious
Analytical	☐	☐	☐	☐	☐	☐	Chaotic
Assertive	☐	☐	☐	☐	☐	☐	Unassertive
Athletic	☐	☐	☐	☐	☐	☐	Nonathletic
Competitive	☐	☐	☐	☐	☐	☐	Noncompetitive
Defends own belief	☐	☐	☐	☐	☐	☐	Does not defend own belief
Dominant	☐	☐	☐	☐	☐	☐	Inferior
Forceful	☐	☐	☐	☐	☐	☐	Unforceful
Has leadership abilities	☐	☐	☐	☐	☐	☐	Does not have leadership abilities
Independent	☐	☐	☐	☐	☐	☐	Dependent
Individualistic	☐	☐	☐	☐	☐	☐	Collectivistic
Makes decisions easily	☐	☐	☐	☐	☐	☐	Makes decisions with difficulty
Masculine	☐	☐	☐	☐	☐	☐	Feminine
Self-reliant	☐	☐	☐	☐	☐	☐	Reliant
Self-sufficient	☐	☐	☐	☐	☐	☐	Unable
Strong personality	☐	☐	☐	☐	☐	☐	Weak personality
Willing to take a stand	☐	☐	☐	☐	☐	☐	Unwilling to take a stand
Willing to take risks	☐	☐	☐	☐	☐	☐	Unwilling to take risks

The MTurk respondents had to indicate by how much the 20 masculine personality traits were found in the photographed respondents on a 6 point scale with the masculine trait on the left side and an antonym of said masculinity trait on the right side. This differs from Meier-Pesti and Penz who used a variation in which no antonyms were shown and the options ranged between never or almost never true to always or almost always true. The survey design, with the exception of the 20 BSRI masculinity items which did not change, was inspired by Wilson and Eckel (2006) who let independent raters rate participants' attractiveness, among others. We felt like placing someone between, for example, "athletic" and "unatheltic" would be easier to do than place someone between "never or almost never athletic" and "almost or almost always athletic".

3.2.2 Participants

For this part of this study a lot of independent raters were needed to get an overall reliable score on expected risk aversion as well as the perceived facial masculinity. There were no selection criteria for participants since no particular participants' group is found to do a better job in predicting expected risk attitudes. Neither men or women did better in predicting the target's choice for risk (Eckel and Grossman, 2008). It was found by Penton-Voak and Chen (2004) that there was no difference between male and female participants in rating facial masculinity. However, when judging physical appearance with respect to beauty, there was found to be consensus. Dreber et al. (2013) found that women give higher rates than men, with regards to physical appearance. This was also found by Wilson and Eckel (2006). It thus has to be taken into account that for example a woman might view a participant as "very aggressive" while a man views that same person as "somewhat aggressive". It has to be noted that the evidence found was about physical attractiveness and not masculinity scores. Still, this will be further looked into in chapter 4.

In total, 628 people participated (232 men, 396 women), and the average age was $M = 36.72$ ($SD = 12.14$). All participants were from the United States and had a Human Intelligence Task (HIT) acceptance rate of at least 90%, which was a requirement for the participants to be selected for the HIT.

3.2.3 Procedure

Respondents (hereafter workers) were recruited through Amazon Mechanical Turk (MTurk) and were directed to Qualtrics to rate 2 randomized participants per task. Participants are allowed to take part in just one task. MTurk has been used by other researchers to rate pictures. So let Dreber et al. (2013) rate workers pictures of the chess players used in their experiment. MTurk is found to be a reliable source of data of which the representative subject pool is closer than when using university students (Paolacci et al., 2010). In addition, workers are found to be internally motivated. Payment does not affect data quality, only the speed at which the data is collected (Buhrmester, 2010).

Although its evidence of being a reliable source of data, a weakness of MTurk remains that workers just randomly fill in the survey without paying attention to the task. We attempted to take care of this by including three attention checks. First, one of the lines in the survey reads "Attention check, please leave empty." Only when this line was indeed left empty the data was deemed usable and the workers were paid. Second, as stated in section

3.1.1, the MPL method chosen is used as an attention check as well. When people prefer an amount over a lottery, they cannot prefer the same lottery over a higher amount. That this is an illogic thing to do was explained in the question as can be seen in Appendix B. Still, it can be that people have incomplete preferences, but due to the attention being drawn to the fact that switching sides more than once does not make sense indicates that people either did not understand the task or were simply not paying sufficient attention. Due to these two possible reasons people switching lines back and forth were excluded from the experiment. The final reason to exclude filled in surveys from workers was when not all questions were answered and left blank. Due to these checks we had to delete 289 of the 917 surveys from the dataset.

3.2.4 Incentives

Workers received a \$0.05 compensation for completing the task. They were incentivized by the fact that out all of workers 100 participants were going to be randomly selected and their answers would be compared to the photographed participants' answers. For every MPL task estimated correctly, they could receive an additional \$0.05. For every personality trait estimated correctly, they could receive an additional \$0.01. If everything was estimated correctly an additional \$0.50 was earned as a bonus.

3.3 Analyses

There will be two separate analyses to test these results. The first analysis will measure the effect of facial masculinity on financial risk aversion and the second analysis the effect of perceived masculinity on expected financial risk aversion. This means there will be three main variables of which *expected* as well as *actual* financial risk aversion are dependent variables and facial masculinity is the independent in both regressions.

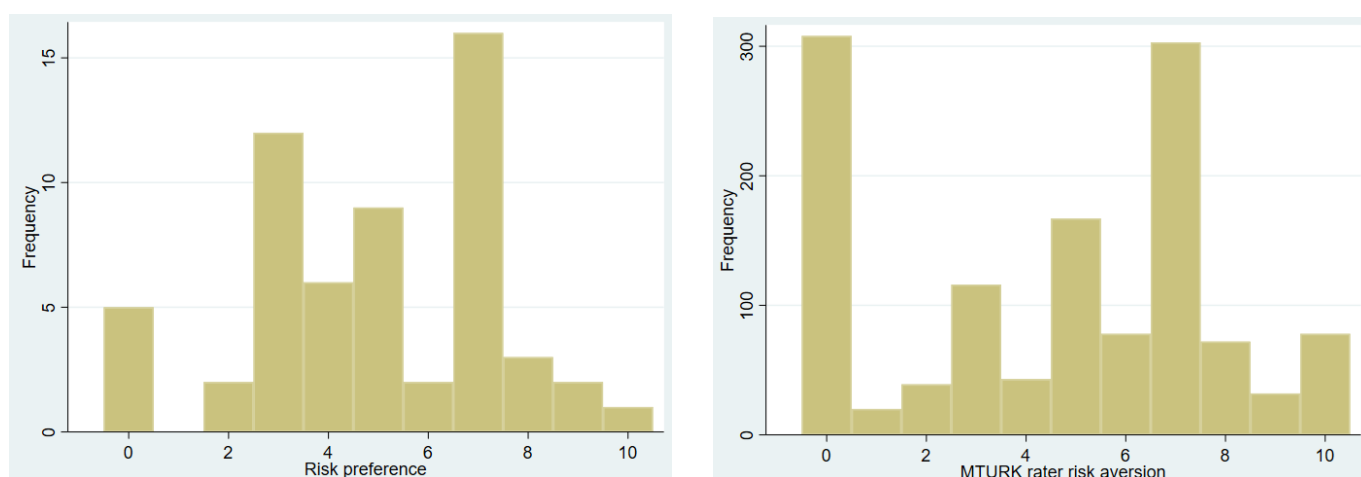
The (expected) financial risk aversion will be calculated by calculating the number of times the risky option was chosen as a proxy for risk attitudes. All the risky options added up together gives a risk profile. The higher the risk profile number the less risk averse a person was.

The facial masculinity score will be the sum of all 20 items. When a masculinity trait is perceived to be present in someone's facial appearance and the worker picked the option "very well" on the left side of the survey where the masculinity traits are listed, that masculinity trait gets a "1". When a masculinity trait is rated to be not present in someone's facial appearance and the worker picks the option "very well" on the right side of the survey

where the antonym traits are listed, that masculinity trait gets a “6”. Thus, the lower the score, the more masculine a person’s face appears to be.

The statistical analysis used is the marginalized Tobit regression. This is due to the fact that the dependent variables are left and right censored. The minimum certainty payoff people can pick is \$6 and the maximum is \$13. People can actually be more or less risk averse than these options given and those people will pick the most extreme options. This might give fat tails in the results. It can be seen in Graph 1 that, although this limitation was less a problem for student participants, for both the participants as the workers there is some indication of fat tails. People choose the most risk free option, but could not possibly choose an even more risk-free option since such an option was not included. Consequently, the results cluster at the value 0. The Tobit regression takes this into account. The lower limit 0 and upper limit 10 is chosen for the Tobit regressions.

Graph 1. The chosen elicitation task by participants (left) and MTurk workers (right).



4. Results

In this chapter the results of the experiment conducted are shown. First, some basic checks are performed; the results thereof are provided in Table 1, below.

Table 1. Summary of the statistics concerning the decisions made by participants and MTurk workers.

		Min	Max	Average	Median	Wilcoxon rank-sum test
Own risk aversion (participants)	Female	0	9	4.48	4	0.1276
	Male	0	10	5.41	7	
Perceived risk aversion	Female	0	10	4.81	5	0.0000
	Male	0	10	5.83	7	
Own risk aversion (MTurk workers)	Female	0	10	4,27	5	0.0001
	Male	0	10	4,97	6	
Perceived facial masculinity	Female	49.43	69.76	59.15	58.78	0.0001
	Male	41.52	66.24	55.03	54.85	

Wilcoxon rank-sum test value > 0.05 means there is no significant difference between groups.

The Wilcoxon rank-sum test is used to determine whether the variables are the same for both genders. If the p-value is greater than 0.05, it means that there is no statistically significant evidence that there is a difference between the selected groups. The majority of existing studies have found that women are more risk averse than men; this effect can be found in the group of MTurk workers (0.0001) but not in the group of participants (0.1276). Still, although the participants do not differ in their risk aversion, the MTurk workers perceive risk aversion as differing between the male and female participants (0.0000). Furthermore, as expected, men score higher on facial masculinity than women (0.0001).

It was also found in the literature that women and men rate participants differently. It was found in both Wilson and Eckel (2006) and Dreber et al. (2013) that women rate, in comparison to men, others to be more attractive. This was checked for and was not found to be the case in this experiment, as can be seen in Table 2. All of the Wilcoxon rank-sum test p-values exceed 0.05. Although men rate women as being less masculine and women rate men as being more masculine, the differences appear to be insignificant. In addition, it was also checked whether men or women were more biased toward a specific gender with regard to risk aversion. This means, for example, that men may expect women to be more risk averse than women consider other women to be. Both men and women view other men and women as evenly risk averse on average. No corrections were made on these findings.

Table 2. Summary of gender differences with regards to perception.

	Perceived by	Min	Max	Average	Median	Wilcoxon rank-sum test
Men's perceived risk aversion	Female	0	10	5.97	7	0.1313
	Male	0	10	5.59	7	
Women's perceived risk aversion	Female	0	10	4.76	5	0.4648
	Male	0	10	4.90	5	
Men's perceived masculinity	Female	20	112	54.66	55	0.4462
	Male	20	110	55.69	57	
Women's perceived masculinity	Female	27	105	58.24	58	0.1057
	Male	20	117	60.33	60	

Wilcoxon rank-sum test > 0.05 means there is no significant difference between groups.

After having checked for possible controllable effects within the data, another independent variable was added to assess Hypothesis 2. This variable is based on the self-other discrepancy identified by Hsee and Weber (1997), as described in Chapter 2.3. Since people's own risk aversion affects their predictions of others' risk aversion, the workers' risk aversion was added to the model. The regressions conducted are as follows:

$$H1: \text{own financial risk aversion} = \alpha + \beta_1 * \text{perceived facial masculinity} + \beta_2 * \text{gender}$$

$$H2: \text{perceived financial risk aversion} = \alpha + \beta_1 * \text{perceived facial masculinity} + \beta_2 * \text{gender} + \beta_3 * \text{own financial risk aversion} + \epsilon$$

In a further attempt to find statistical support for perceived facial masculinity having an effect on both perceived and own financial risk aversion, additional independent variables were used. In the first additional analysis, an interaction variable, namely gender times masculinity was added to the model. The additional interaction variable are as follows:

$$\beta * \text{participant's gender} * \text{participant's facial masculinity}$$

In addition, a dummy variable that referred to whether participants were above or below the median perceived facial masculinity was used to analyze whether there was a significant difference between both groups with respect to (perceived) financial risk aversion. This was done with a Wilcoxon rank-sum test in which individuals with appearances above and below the perceived facial median are the groups compared. The rank-sum test was performed separately for each gender. Using this approach, it was possible to determine

whether men and women with higher perceived facial masculinity are less risk averse without having to address the endogeneity problem.

The next section of this chapter is devoted to the testing of Hypotheses 1 and 2.

4.1 Hypothesis 1

The outcomes of the Tobit regressions, with the dependent variable risk aversion, the independent variables perceived masculinity rate and gender, and the interaction variable masculinity times gender, are presented in Table 3. The results of the rank-sum test, distinguishing between above and below the perceived facial masculinity median is presented in Table 4.

Table 3. Regressions on Hypothesis 1.

*The first regression investigates the effect of perceived masculinity and gender on own risk aversion. In the second regression, the interaction variable perceived masculinity * female is added to the model.*

	Own risk aversion	Own risk aversion
Perceived masculinity	-0.00977 (-0.15)	-0.00796 (-0.10)
Female	-0.956 (-1,27)	-0.644 (-0.08)
Perceived masculinity * Female		-0.00541 (-0.04)
Constant	5.912 (1.61)	5.812 (1.3)

*t statistics in parentheses: * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$*

Neither facial masculinity nor gender appears to have a significant effect on a person's risk aversion when only those independent variables are included in the model. Although the literature indicated that both gender and masculinity have independent effects on risk aversion and facial masculinity, no relationship is found between these two independent variables and financial risk aversion within the methodology employed in this research.

Adding the interaction variable perceived facial masculinity times gender did not improve the results. Still, no significant evidence indicating that gender or masculinity has any effect on financial risk aversion was found; this does not differ within gender, as would have been proven with the inclusion of the interaction variable.

Table 4. Rank-sum test of the effect between participants scoring above and below perceived facial masculinity on financial risk-taking.

	Own risk aversion of participants scoring above median on perceived masculinity		Own risk aversion of participants scoring below median on perceived masculinity		Wilcoxon rank-sum test
	Average	Median	Average	Median	
Female	4.27	4	5	5	0.5877
Male	5.92	7	4.92	5	0.3917

Wilcoxon rank-sum test > 0.05 means there is no significant difference between groups.

Finally, for Hypothesis 1, the perceived facial masculinity scores of men and women were values above or below the median. It is noticeable that more masculine men take more risks compared to less masculine men but that more masculine women take fewer risks than less masculine women. However, the p-value is greater than 0.05 in both rank-sum tests, which indicates that there is no statistically significant evidence that a difference exists between men and women with either above or below median perceived facial masculinity with regard to financial risk aversion.

4.2 Hypothesis 2

The outcomes of the Tobit regressions, with the dependent variable expected risk aversion, the independent variables masculinity rate and gender, the interaction variable masculinity times gender, and the results of the rank-sum test, distinguishing between above and below the perceived facial masculinity median are presented in Tables 5 and 6.

Table 5. Regression on Hypothesis 2.

The first regression looks for the effects of perceived masculinity, gender, and own risk aversion on perceived risk aversion. In the second regression, the interaction variable perceived masculinity * female is added to the model.

	Perceived risk aversion	Perceived risk aversion
Perceived masculinity	-0.0226** (-3.10)	-0.0241* (-2.37)
Female	-1.109*** (-4.77)	-1.288 (-1.49)
Perceived masculinity * Female		0.00313 (0.22)
Worker's own risk aversion	0.315*** (8.65)	0.315*** (8.66)
Constant	5.717*** (19.61)	5.800*** (9.61)

t statistics in parentheses: * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

The results for Hypothesis 2 are more promising. Besides worker's own risk aversion and gender (female=1 and men=0) having a significant negative effect on expected risk aversion and the fact that people visually perceive others to be less risk averse than themselves, which are all findings that were previously identified in the literature, the effect of perceived facial masculinity on perceived financial risk aversion is found to be significant. Again, a higher facial masculinity rate means that an individual is perceived as possessing fewer male characteristics, while a higher risk aversion (a lower score) means that an individual is less willing to take risks. A negative effect means that the more masculine a person looks (the lower his or her masculinity score), the lower his or her risk aversion is expected to be (the higher the expected risk score).

A coefficient of only -0.02256 does not seem significant, but it actually is, particularly when bearing in mind the fact that the masculinity scale consists of 20 items measured using a six-point scale. If an individual has a markedly masculine appearance and a worker perceives that person as scoring "very well" on all masculinity traits, that individual will have a masculinity rate of 20. If an individual has a markedly non-masculine appearance and a worker perceives that person as scoring "very well" on all of the antonyms of the masculinity traits, that person will have a masculinity score of 120. This yields a difference of 100 points. Thus, workers will expect a masculine-looking person to take on average more than two financial risk-free options less than a non-masculine looking person. This result suggests that,

regardless of gender (as that variable is also included in the model), when a person has a more masculine appearance, he or she is expected to take significantly more financial risks.

Adding the independent interaction variable perceived facial masculinity times gender does not improve the model in terms of significance. The interaction variable has an insignificant effect on expected financial risk aversion. Furthermore, adding the interaction effect to the model decreases the significance of the variables gender and perceived facial masculinity. However, it is more important to determine whether the model that includes the interaction variable is more fit than the model without the interaction variable. Normally, the R^2 between models would be compared; in nonlinear models such as the Tobit model, a pseudo- R^2 is computed. The results for the pseudo- R^2 , due to it having completely different properties to an OLS- R^2 , are not discussed in detail. However, the fact that the pseudo- R^2 increases by only 0.0001 when including the interaction variable suggests that it does not drastically improve the model.

Table 6. Rank-sum test of the effect between above and below perceived facial masculinity on perceived financial risk-taking.

	Perceived risk aversion of participants scoring above median on perceived masculinity		Perceived risk aversion of participants scoring below median on perceived masculinity		Wilcoxon rank-sum test
	Average	Median	Average	Median	
Female	5.04	5	4.60	5	0.0824
Male	6.04	7	5.63	6.5	0.0715

Wilcoxon rank-sum test > 0.05 means there is no significant difference between groups.

Finally, for Hypothesis 2, when men and women's faces are perceived as above median in terms of masculinity, they are perceived as being less risk averse than their less masculine counterparts. However, as the p-value is slightly greater than 0.05 in both rank-sum tests, it indicates that there is no significant evidence that a difference exists between men and women with either above or below median perceived facial masculinity with regard to perceived financial risk aversion. In conclusion, with regards to the effect of facial masculinity on perceived financial risk aversion, it does not matter whether a participant is male or female; however, regardless of gender, masculinity is found to have a significant effect on perceived risk-taking.

5. Conclusion

This research examined whether perceived facial masculinity has an effect on both financial risk aversion and perceived financial risk aversion. (Perceived) financial risk aversion is important due to the fact that it influences everyday uncertain decisions concerning money. The difference between sexes when it comes to financial risk aversion has not been overlooked by researchers; however, the differences in financial risk aversion in terms of within-gender differences, as men and women have combinations of masculine and feminine traits, have not been investigated to the same extent. The evidence found in the existing literature indicates that there are indeed within-gender differences with regard to both financial risk aversion and the advice given when an individual's risk preference is perceived.

The results of this research indicate that perceived facial masculinity does not have a significant effect on financial risk aversion for both sexes. Hypothesis 1: *Participants with higher perceived facial masculinity are more risk-taking*, is rejected. In previous literature, it was found that prenatal and current testosterone affect financial risk aversion. However, this effect was not found for pubertal testosterone. Apicella et al. (2008) and Xie et al. (2017) found a significance effect of facial masculinity on financial risk-taking; however, in this study, the effect was not found to be significant. Even had this effect appeared to be present, it would still be unclear whether a masculine appearance directly leads to lower financial risk aversion or whether facial masculinity is associated with other traits, such as aggression, that directly influence financial risk aversion, as noted by Apicella et al. (2015). This area of investigation, however, is beyond the scope of this research.

The group of participants used for this research demonstrated no difference between men and women in financial risk aversion, but men were in general perceived to be less risk averse. More specifically, perceived facial masculinity has a significant effect on perceived financial risk-taking for both sexes. When people of both sexes were perceived to be more masculine in appearance than others, they were also perceived to be less risk averse compared to less masculine-looking people. Hypothesis 2: *Participants with higher perceived facial masculinity are believed to be more risk-taking by others*, cannot be rejected.

Apicella et al. (2008) explain that masculine men are expected by others to take more risks, although their research focused on own financial risk aversion, as opposed to perceived financial risk aversion. No explanation is given for the behavior of women, as they were not included in the experiment conducted by Apicella et al. (2008). The general expectation of

masculine people to be less risk averse can be linked back to the BSRI, a masculinity index based on American social expectations, in which risk-taking is also a trait that is included on the masculinity index. In general, risk-taking is perceived by American society to be a personality trait that is more desirable for men. Thus, it would be logical to think that, when someone is perceived as being more masculine, the expectation that he or she will be more risk-taking is automatically mitigated by others. This is, however, only an assumption, as no further questions concerning the motivations behind the options chosen in the experiment were asked. Furthermore, it was also found that gender and own risk aversion also affect people's perceptions of the perceived financial risk-taking of others, which is in accordance with the existing literature.

6. Discussion

Thus far, the only studies that have examined the relevance of facial masculinity with regard to financial risk-taking were those conducted by Apicella et al. (2008) and Xie et al. (2017). Apicella et al. (2008) used complicated measurements to compute participants' facial masculinity. In the study conducted by Xie et al. (2017), the authors used forehead width height ratios, which are linked to a peak in testosterone that occurs during puberty. This thesis sought a more intuitive approach to measurement. Facial masculinity was expressed in the sense of whether a person appeared to possess more typically male characteristics, as identified by Bem (1974), in comparison to others. One may inquire as to why another masculinity scale index was not used. The arguments of Meier-Pesti and Penz (2008), who found an effect between masculine personality and financial risk-taking when using the same masculinity index, are taken as a guideline.

Most other inventories selected male characteristics based on the extent to which a characteristic was present in men. In Bem's inventory (1974), a personality trait is qualified as masculine if it is more desirable for men than women in American society. When rating an individual's masculinity based on looks, it is more important that others perceive a characteristic to be masculine than whether or not it is indeed a personality trait that is more present in men. That is the reason the BSRI was chosen above other masculinity inventories.

Using an index consisting of 20 items was also preferred over simply letting respondents pick which of two people was more masculine, as was done by Penton-Voak and Chen (2004) when determining attractiveness. This was due to practical reasons: For Voak and Chen's determining attractiveness approach to be used in this experiment, the group of men and women should have been separated, as doing so will yield more reliable results. When a man is compared to a woman, he will obviously be perceived as more masculine, but, when he is compared with members of his own gender, completely different results may be produced. In this experiment, the overall masculinity rate differed between genders, but this is to be expected. Still, men and women can be rated on masculinity when compared to members of both the same and the other sex. In everyday practice, a person will not be selected for financial advice with reference to his or her gender, and a financial advisor does not determine who enters his or her office. As was stated as the practical relevance, differences in perceived financial risk aversion among people result in different financial advice, as such advice may be based on financial advisors' perceptions of clients' risk-taking attitude based on their visual characteristics (Eckel and Grossman, 2008). Using this more

complex measurement makes it possible to minimize the dependent effect of gender on perceived facial masculinity, as it is underpinned by the insignificant interaction variable gender times perceived facial masculinity.

However, the use of other methods for measuring perceived facial masculinity is not discouraged; it may prove interesting to use other methods of measurement in future research in order to determine whether doing so would generate a different outcome when compared to this research.

Another suggestion for future research would be to consider employing another method of recruiting participants. Due to limited financial resources, the individuals who participated in the first part of the experiment were not paid. Since this part of the experiment involved a relatively trivial task, it was expected that the participants would remain sufficiently internally motivated to truthfully answer the questions provided in the risk elicitation task. The second part of the experiment, in which the participants were Mechanical Turk workers, proved more problematic. Although three attention checks were added to the survey, it is doubtful whether all of the data obtained was equally usable. For example, women occasionally received a perceived masculinity rate of 20, which means that they scored the highest on all masculine characteristics, meaning that they were perceived as significantly more masculine than the majority of the male population. Still, such data could not be deleted due to the fact that the participants passed all of the attention checks; furthermore, it would have been ethically irresponsible to delete data on suspicion.

The inability to delete suspicious data probably did more damage to Hypothesis 1 than to Hypothesis 2. The only data generated by MTurk workers that was used for Hypothesis 1 was an average masculinity score. When workers randomly clicked on the perceived masculinity questionnaire and it yielded extremely random outcomes, the average masculinity score would slightly shift to a certain direction. The average masculinity score would thus be always rounded slightly more to the middle than would be the case in reality, as one would expect the extreme random outcomes to be evenly distributed to the left and right of the scale. For Hypothesis 2, all perceived masculinity scores were used separately in the regression, with data on perceived financial risk-taking and own financial risk-taking also being used separately. Extreme random outcomes were thus treated as separate values and did not negatively affect a variable that was used as one of the only two independent variables for

Hypothesis 1. Still, the limitation of having used MTurk workers most likely did harm to the results of this thesis.

In general, Hypothesis 2 is better substantiated than Hypothesis 1. This is due to the fact that Hypothesis 2 was mainly concerned with perception. It was already found in previous literature that the visual characteristics of people have an effect on their perceived risk aversion, however, the existing research on the effect between facial masculinity and financial risk-taking is limited. Interestingly enough, as concluded previously, whether an individual perceives someone else as more masculine has a negative effect of the former's perception of the latter's perceived risk aversion. Hypothesis 1, however, was concerned with an individual's perception over someone else's facial masculinity. A financial risk-taker can perceive another individual's facial masculinity as being on an entirely different masculinity level, and this can lead to totally different outcomes when masculinity affects financial risk-taking, as facial masculinity affects variables such as confidence. This is a limitation with regards to Hypothesis 1.

Since Hypothesis 2 is better substantiated than Hypothesis 1, the suggestion is that future research should focus on the effect of masculinity, or perhaps other facial triggers, on perceived financial risk taking. It was already found in this thesis that perceived facial masculinity has an effect on perceived financial risk taking. To eliminate financial advisors and employers discriminating between people on perceived risk-aversion, perhaps some other specific topics like the effect of masculine appearance or masculine attitude on perceived financial risk aversion might be investigated by future research. This thesis suggests that something more is going on than just a black-and-white bias between men and women on perceived financial risk aversion, but more evidence is wished for.

7. References

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8. Appendix

A

Experiment 1

SURVEY INSTRUCTIONS

Thank you for participating in this survey. My name is Iris Sterks and I am currently writing my Master thesis about financial risk-taking. The survey you are about to answer contains one hypothetical financial decision and one questionnaire asking you to evaluate 20 personality traits for yourself. The survey will take about 5 minutes to complete and after that a picture of you will be taken. Try not to smile in the picture. Two pictures will be taken and the one you prefer will be used. Your answers and your picture are treated confidentially and will not be used for anything besides this Master thesis. You can ask me any additional questions if needed.

FINANCIAL DECISION SELECTION SHEET

Mark your choice selection with an **X** for either the lottery or certain payoff in the last two columns. In the first row you have to choose between either a certain payoff of €6 or a lottery that would hypothetically give you €20 with 50% chance or €0 with 50% chance. Starting the second row the lottery stays the same (50% €20, 50% €0), but the certain payoff is different for each row.

Option		Your choice	
Lottery	Certain Payoff	Lottery	Certain Payoff
50% €20 50% €0	100% €6	☐	☐
50% €20 50% €0	100% €7	☐	☐
50% €20 50% €0	100% €7.50	☐	☐
50% €20 50% €0	100% €8	☐	☐
50% €20 50% €0	100% €8.50	☐	☐
50% €20 50% €0	100% €9	☐	☐
50% €20 50% €0	100% €9.50	☐	☐
50% €20 50% €0	100% €10	☐	☐
50% €20 50% €0	100% €11	☐	☐
50% €20 50% €0	100% €13	☐	☐

PERSONALITY TRAIT SELECTION SHEET

Please indicate how well each of the following personality characteristics describes yourself.

	Very well	Well	Somewhat Well	Somewhat Well	Well	Very Well	
Act as a leader	O	O	O	O	O	O	Act as a follower
Aggressive	O	O	O	O	O	O	Calm
Ambitious	O	O	O	O	O	O	Content
Analytical	O	O	O	O	O	O	Chaotic
Assertive	O	O	O	O	O	O	Unsure
Athletic	O	O	O	O	O	O	Nonathletic
Competitive	O	O	O	O	O	O	Noncompetitive
Defends own belief	O	O	O	O	O	O	Does not defend own belief
Dominant	O	O	O	O	O	O	Modest
Forceful	O	O	O	O	O	O	Feeble
Has leadership abilities	O	O	O	O	O	O	Does not have leadership abilities
Independent	O	O	O	O	O	O	Dependent
Individualistic	O	O	O	O	O	O	Collectivistic
Makes decisions easily	O	O	O	O	O	O	Makes decisions with difficulty
Masculine	O	O	O	O	O	O	Feminine
Self-reliant	O	O	O	O	O	O	Uncertain about self
Self-sufficient	O	O	O	O	O	O	Unable
Strong personality	O	O	O	O	O	O	Weak personality
Willing to take a stand	O	O	O	O	O	O	Unwilling to take a stand
Willing to take risks	O	O	O	O	O	O	Unwilling to take risks

PERSONAL INFO

Gender:

Age:.....

Highest level of education:

Year of education:

Ethnicity:

I allow the picture taken and this survey to be used for this Master Thesis

THANK YOU FOR PARTICIPATING!

Photo number:

B

Experiment 2

In this survey you will face three tasks. If you think carefully and make good decisions you may earn additional money (100 MTurkers will be randomly selected). The survey will take about **5 minutes**. Your identity and answers will be kept safely and anonymous, and will not be used for anything besides this Master thesis.

In this task, you will face 10 rows. In each row you will be asked to choose between a lottery and a fixed amount of money. The lottery is the same across all rows. It pays out \$20 or \$0 with equal chance. For each row, you are asked to indicate whether you would prefer to play the lottery or to receive the fixed amount of money. The fixed payment increases from \$6 in the first row to \$13 in the last row. Most likely, you will begin by choosing the lottery when the sure amount is small, and at a certain point switch to the sure amount as the latter is sufficiently large.

Please note: it makes no sense to switch back and forth several times between lottery and fixed amount!

50% \$20 50% \$0	☐ ☐	\$6
50% \$20 50% \$0	☐ ☐	\$7
50% \$20 50% \$0	☐ ☐	\$7.50
50% \$20 50% \$0	☐ ☐	\$8
50% \$20 50% \$0	☐ ☐	\$8.50
50% \$20 50% \$0	☐ ☐	\$9
50% \$20 50% \$0	☐ ☐	\$9.50
50% \$20 50% \$0	☐ ☐	\$10
50% \$20 50% \$0	☐ ☐	\$11
50% \$20 50% \$0	☐ ☐	\$13

You now face a new task. Below you see a picture of a person. He/she has also finished the task that you have faced. Your task is to estimate what this person have decided. Correct estimation gives you chance to earn additional money (\$0.05).



Recall: this person faced 10 rows. In each row he/she was asked to choose between a lottery and a sure amount of money. The lottery is the same across all rows. It pays out \$20 or \$0 with equal chance. For each row, he/she was asked to indicate whether he/she would prefer to play the lottery or to receive the sure amount of money. The sure payment increases from \$6 in the first row to \$13 in the last row.

50% \$20 50% \$0	☐ ☐	\$6
50% \$20 50% \$0	☐ ☐	\$7
50% \$20 50% \$0	☐ ☐	\$7.50
50% \$20 50% \$0	☐ ☐	\$8
50% \$20 50% \$0	☐ ☐	\$8.50
50% \$20 50% \$0	☐ ☐	\$9
50% \$20 50% \$0	☐ ☐	\$9.50
50% \$20 50% \$0	☐ ☐	\$10
50% \$20 50% \$0	☐ ☐	\$11
50% \$20 50% \$0	☐ ☐	\$13

This is the final task. In this task you see a picture of a person. Please **try to estimate** this person's personality. He/she also filled in this personality questionnaire. You will earn an additional amount of money if your estimations match their answers (\$0.01 per personality trait).



	Very well	Well	Somewhat well	Somewhat well	Well	Very well	
Act as a leader	☐	☐	☐	☐	☐	☐	Act as a follower
Aggressive	☐	☐	☐	☐	☐	☐	Nonaggressive
Ambitious	☐	☐	☐	☐	☐	☐	Unambitious
Analytical	☐	☐	☐	☐	☐	☐	Chaotic
Assertive	☐	☐	☐	☐	☐	☐	Unassertive
Athletic	☐	☐	☐	☐	☐	☐	Nonathletic
Competitive	☐	☐	☐	☐	☐	☐	Noncompetitive
Defends own belief	☐	☐	☐	☐	☐	☐	Does not defend own belief
Dominant	☐	☐	☐	☐	☐	☐	Inferior
Forceful	☐	☐	☐	☐	☐	☐	Unforceful
Has leadership abilities	☐	☐	☐	☐	☐	☐	Does not have leadership abilities
Independent	☐	☐	☐	☐	☐	☐	Dependent
Individualistic	☐	☐	☐	☐	☐	☐	Collectivistic
Makes decisions easily	☐	☐	☐	☐	☐	☐	Makes decisions with difficulty
Masculine	☐	☐	☐	☐	☐	☐	Feminine
Self-reliant	☐	☐	☐	☐	☐	☐	Reliant
Self-sufficient	☐	☐	☐	☐	☐	☐	Unable
Strong personality	☐	☐	☐	☐	☐	☐	Weak personality
Willing to take a stand	☐	☐	☐	☐	☐	☐	Unwilling to take a stand
Willing to take risks	☐	☐	☐	☐	☐	☐	Unwilling to take risks
Attention check, please leave empty	☐	☐	☐	☐	☐	☐	Attention check, please leave empty