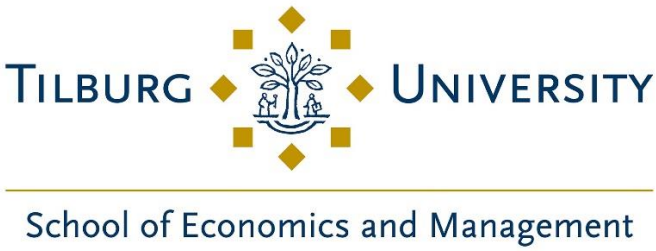

MASTER THESIS

Does Masculinity Affect Financial Risk Taking and Behavior?
A Study on Dutch CentERpanel Data

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Abstract

It is often assumed that women are more risk averse than men. This is what results from risk attitude questionnaires. However, there is no clear agreement on whether these questionnaires measure true risk tolerance. Recently, it has been suggested that the outcomes of risk questionnaires are biased by gender stereotyping. This paper investigates whether masculinity, as an observed characteristic, affects the risk aversion and financial investment decisions of individuals. In this analysis, I use the industry of the pension fund of respondents to the CentER panel survey from 2015 as a proxy for masculinity. I find that while masculinity does not mitigate the gender gap in risk tolerance, it has an impact on the portfolio allocation decisions of single investors, who are not living with a partner. The empirical results suggest that self-assessed financial risk taking is not necessary a good predictor of actual investment behavior for all investors. The findings contribute to the research on whether the household or individual level of decision making is the relevant unit of investment.

Keywords: Behavioral finance; Gender; Masculinity; Risk aversion; Investment decisions

Contents

Chapter 1: Introduction

1.1. Problem statement

The field of behavioral economics concerns the real-life application of financial theory and adds to the notion that investors are not as rational as the mean-variance portfolio theory of Markowitz (1952) initially suggested. Traditional economic theory suggests that investors hold diversified portfolios of assets regardless of the degree of their individual risk aversion. However, empirical studies frequently find that most private households own only a small subset of available assets (Hochguertel et al, 1997; Campbell, 2006). Understanding the reasons behind the (under) diversification behavior of private households is highly relevant for both policymakers and the financial services industry (Barasinska et al 2009). Not only this, but individual investors seem to not diversify within the securities they hold, with substantial amounts invested in stock of companies in the same industry as the investors' employer (Doskeland and Hvide, 2011).

Furthermore, women are reported to participate less in the stock market, leading to larger chance of portfolio under-diversification for female investors, while men seem to trade excessively, resulting in overall lower returns, compared to women (Barber and Odean, 2001). Among the suggested explanations for this gender gap in investing are differences in preferences, such as women exhibiting higher risk aversion (e.g. Eckel and Grossman, 2002; Croson and Gneezy, 2009), and women being more conservative than men (Green et al, 2009); and differences in abilities such as financial literacy and education (Lusardi and Mitchell, 2008). In fact, the gender gap in financial literacy worldwide is so pronounce that the OECD has called for actions for addressing women's and girls' needs for knowledge of and confidence in financial issues, short- and long-term financial goals and better access to financial products and services (OECD, 2013).

It is important to identify the reasons behind women's under-representation on the financial markets. It seems that even though the involvement of women in household financial decision-making is increasing, one of the areas where decisions are husband-dominated, is participation in investment funds and shares (Meier et al, 1999). When the husband in a household has financial expertise, the investment decision is dominated by him, but when it is the wife who has expertise, the decision is made jointly (Meier et al, 1999), suggesting that women shy away from taking sole responsibility for risky financial decisions. Moreover, from the ones who do take risky decisions, 50% of high achieving women in executive positions are childless or not even married, compared

to only 19% of men in similar positions (Hewlett, 2001). This suggests that women have to give up more in order to achieve the same career success as men do.

However, other empirical studies suggest that the gender gap in investing is driven by a sub-sample of optimistic men (Felton et al, 2003), rather than by the higher risk aversion of women. It has been argued that previous reported differences in risk aversion are due to self-assessment where women consider themselves risk averse, while Brighetti and Lucarelli (2013) find no physiological response difference between men and women when dealing with a risky task in a laboratory setting. Another suggestion is that women pursue a more risk averse image as a consequence of social expectations, and mainly act as less risk tolerant when reminded of their gender (Carr and Steele, 2010), or when in an environment with men (Booth et al., 2014).

Evidently, there is not yet clear evidence for the gender gap in financial decision making, since previous research has yielded contradictive results. In this paper I study whether a previously overlooked variable could help in explaining the gender differences in risk preferences. I investigate whether masculinity as an observed characteristic of individuals is a factor affecting the risk aversion and investment choices of people. My analysis should help for better understanding of the gender gap in investment and asset allocation preferences of individual investors. Previous factors, including demographic ones (e.g. age and education), socio-economic (e.g. income), and personal preferences (e.g. risk attitudes) have helped decrease, but not fully close the gender gap in finance (Hibbert et al, 2013; Bernasek and Shwiff, 2001; Jianakoplos and Bernasek, 1998). My analysis stems from the fact that the ‘gender’ in ‘gender gap’ is wrongly taken as a physiological difference between men and women, rather than a socially developed characteristic.

1.2. Conceptual Framework

Is the common finding of women being more risk averse than men, biased due to an omitted variable, namely masculinity? Are the gender differences previously reported due to nurture, rather than nature differences?

Figure 1. Conceptual framework

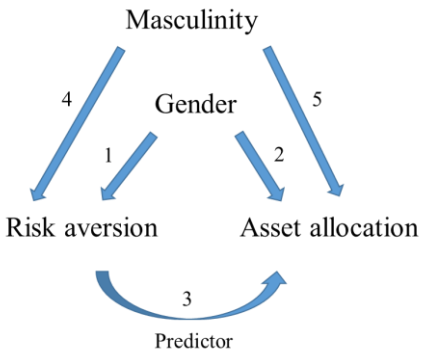


Figure 1 displays the conceptual framework of this paper. It is based on the idea that gender influences both the risk aversion and asset allocation decisions of individuals, as presented by links 1 and 2. I will study whether, instead masculinity is the factor affecting those, as represented by links 4 and 5, and masculinity being the omitted factor of previous research. In addition, I will study whether risk aversion is a good predictor of asset allocation choices (link 3), by comparing whether the empirical findings from the analysis on the two different risk attitude measures yield consistent results. The research questions are as follow:

1/ Does masculinity affect financial risk attitude?
2/ Does masculinity affect asset allocation preferences?
3/ Is there a difference in the findings when risk aversion is measured by self-assessed versus observed financial risk taking?

1.3. Theoretical and practical relevance

This paper will contribute to the empirical research on individual differences in risk preferences. The notion of risk aversion is an important component for a range of economic topics, among others consumer behavior (e.g. Hersch, 1996; Ghosh and Ray, 1997; Garbarino and Strahilevitz, 2004; Bae and Lee, 2011), managerial and leadership styles (e.g. Johnson and Powell, 1994; Atkinson et al, 2003), entrepreneurship (e.g. Masters and Meier, 1988; Dawson and Henley, 2015), investments (e.g. Sunden and Surette, 1998; Barber and Odean, 2001; Olsen and Cox, 2001), and creating adequate financial products and services (e.g. Powell and Ansic, 1997). Previously gender has been found to be the main determinant of risk aversion, but can it be that masculinity as a personal characteristic is the one that influences the choices of men and women? Sapienza et

al (2009) find that while risk tolerance is associated with higher testosterone, found in larger quantities in men, when they compare the individuals with the same lower levels of testosterone, the gender gap disappears.

Additionally, this paper will contribute to the research of Meier-Pesti and Penz (2008), and Booth and Nolen (2012) on the nature-nurture debate of whether biological, or social factors affect to a greater extend individuals' risk preferences. Throughout the past 30 years women have showed increased masculinity traits (characteristics deemed attractive in men, such as being competitive, ambitious, and self-reliant, according to Bem's (1974) Sex-Role Inventory), and at the same time they are taking over traditionally male occupations[1]. Using career as a proxy for masculinity, this paper will contribute to the research of whether (professional) environment decreases the gender gap in financial risk taking.

Elaborating on the career choice as a possible explanatory variable for the gender gap in risk aversion, traditional research has found that women and men are socially and culturally influenced to follow stereotypically female or male-concentrated occupations respectively (Preston, 1997). This is an argument, some use to explain the famously quoted gender wage gap of women earning 77 cents for every dollar a man makes[2], or 83 cents as taken from 2016 statistics[3]. The latest OECD report[4] on gender wage gap per country shows decreasing, but persistent gap, with the smallest gap for New Zealand (6%), and the largest for Korea (37%) among the 35 OECD countries. The Netherlands rank among the top 5 largest gaps with 20% lower average wages for women compared to men. Some argue this gap is explained by the fact that typically men participate in riskier (in terms of health) jobs[5], while women orientate towards lower risk jobs, and as the risk-return relationship dictates, higher risk is rewarded by higher return, thus the higher average male wage. Bergmann (1974) on the other hand suggests that the lower female wages are due to the large supply of women for a limited number of typically female-concentrated occupations, while

[1] Forbes, 2011. "20 jobs women are taking over". Retrieved from http://www.forbes.com/2011/03/07/women-surprising-jobs-forbes-woman-leadership-career_slide.html
[2] In numerous articles. For example, readers can see http://www.politifact.com/truth-o-meter/statements/2012/jun/21/barack-obama/barack-obama-ad-says-women-are-paid-77-cents-dolla/
[3] American Bureau of Statistics, 2016. Retrieved from http://www.bls.gov/opub/ted/2016/womens-earnings-83-percent-of-mens-but-vary-by-occupation.htm
[4] OECD, 2016. Gender Wage Gap. Retrieved from https://www.oecd.org/gender/data/genderwagegap.htm
[5] U.S. Department of Labor, Bureau of Labor Statistics, 2016. "Census of Fatal Occupational Injuries". Retrieved from http://www.bls.gov/iif/oshwc/cfoi/cftb0292.pdf

men have a larger number of occupations to choose from. Current initiatives, however, are encouraging females to enter typically male occupations, with statistics showing consistent, but slow increase[6]. Many employers have found benefit in gender diversity and are taking affirmative action programs to attract more female talents (Green et al, 2009). Not only occupations, but also increased inclusion in senior management, Norway for example, introduced a quota of 40% board representations of each gender (Bertrand et al, 2014; Ahern and Dittmar, 2012) with other nations following by mandatory quotas (Germany, France, Belgium, Iceland, Italy) or voluntary goals (Austria, Finland, the Netherlands, Spain, Sweden, the UK[7]). Would this suggest that women attracted by male-dominant occupations are more likely to be risk tolerant? This paper will try to answer this question.

Other studies have shown that gender differences disappear in professional environment (Masters and Meier, 1988; Johnson and Powell, 1994). Would it follow then that career choices are naturally driven to some extend by the individuals' masculinity (as characterized by more risk-taking, confidence and competitiveness) rather than biological sex? This study will try to contribute to the discussion.

In addition, the paper will add to studies of reported differences between self-assessed and observed financial risk taking, as in Brighetti and Lucarelli (2013). As these are predominantly found for women, and not men, they can lead to potential problems for the wealth accumulation of women. Firstly, because the difference between female self-assessment and actual behavior supposedly is an outcome of gender-based stereotypes of less risk taking on the part of females, to which stereotype women adhere (Booth and Nolen, 2002). As Eckel and Grossman (2002) suggest, this echoes in the perception of others towards women's higher risk aversion. The authors offer two potential economic issues arising from the wrong perception of others. One is that in employment negotiations, if women are perceived as less willing to risk the negotiations, they are likely to be offered lower initial wage and face more aggressive bargaining, resulting in lower negotiated salary. In addition, Johnson and Powell (1994) argue that women are less likely to be promoted because they are perceived to be less able of making risky decisions. Chauvin and Ash

[6] US Department of Labor, women's Bureau, 2008. "Quick Facts on Nontraditional Occupations for Women". Retrieved from: https://www.dol.gov/wb/factsheets/nontra2008.htm

[7] Wiersema and Mors, 2016. "What Board Directors Really Think of Gender Quotas?" Harvard Business Review. Retrieved from https://hbr.org/2016/11/what-board-directors-really-think-of-gender-quotas

(1994) find that female CEOs, perceived as more risk averse, are given higher percentage of fixed salaries as opposed to the more volatile performance-based compensation packages, resulting in overall less income for female than male CEOs. Similarly, investment advisors are more likely to offer low risk products to women, compared to men, resulting in lower returns. Grable and Lytton (1999) note the lack of adequate measure for individual risk aversion, instead they find that financial advisors use demographic characteristics, which increase the reliance on stereotypes for assessing financial risk taking. My study will compare empirical findings from two models using 1) self-assessed, and 2) observed financial risk taking, in order to conclude whether indeed women perceive themselves as more risk averse then they are.

Finally, this paper will contribute to the discussion of the individual, rather than household unit of financial decision-making. Using an individual characteristic, namely masculinity, as the main explanatory variable, I focus on the portfolio choices of individual investors, either single, or within a marriage[8]. Two contradicting theories suggest that either decision-making is done at the household level, or at the individual one. The first suggests that family participants engage in a cooperative model, where allocations are Pareto-efficient (Chiapotti and Donni, 2009) and decisions are made jointly by the spouses as following the egalitarian partnership roles (Webster, 1995); or on an autonomic basis, when both partners make an equal number of decision, but each decision is made individually by one or the other, and not jointly (Engel, Blackwell & Miniard, 1995). The second theory suggests non-unitary model of decision-making within households (Chiapotti and Donni, 2009) where each member has an individual utility function.

Distinguishing between the household and individual financial decision-making is especially important for this paper, since most of our data participants are married individuals. In addition, the fact that previous research has predominantly focused on the household unit of investment behavior, can explain why masculinity has been overlooked as a factor affecting risk aversion. In my analysis, I will distinguish between sub-samples of single versus married individuals, in order to capture influences that a spouse can have on their partner's financial decision making. Finally, this will extend the empirical evidence that gender differences are more pronounced for single individuals than people in partnerships (Jianakoplos and Bernasek, 1998).

[8] In this paper, being married and living with a partner are used interchangeably due to the nature of the research.

The rest of the paper is structured as follows: **Chapter 2** will discuss the concept of masculinity and its relevance for financial risk taking. The hypothesis are introduced. **Chapter 3** covers the methodology and data and presents descriptive statistics. **Chapter 4** presents the regression analysis and discusses the findings. **Chapter 5** presents limitations and suggestions for future research. **Chapter 6** concludes.

Chapter 2: Literature review on masculinity and hypothesis development

2.1. Masculinity and social influences on risk taking

Gender comes with not only biological differences but also cultural ones (Zingales, 2015). As Acker (1992) notes, gender is employed to emphasize the social and relational nature of differences between women and men, which are variable and subject to change, in contrast to unchanging physical differences in human reproduction, constituting the biological sexes.

I focus on the social meaning of gender as opposed to biological sex. The notion that risk taking is an "attribute of the masculine psychology" (Wilson and Daly, 1985) leads to the discussion of gender stereotypes. Masculinity is a personal characteristic that can be interpreted in the following ways. First, it depends on the physiological sex determined by the X and Y chromosomes (Therman, 1980). Then, expanding the typical gender profiles, cultural and sociological influences impact the development of a person's gender identity. It is established that certain personality traits are considered masculine or feminine, respectively (Bem, 1974). It is not that the masculine features are to be found in men, and feminine – in women only. Instead, most people possess features from both categories but to different extends. A particularly famous study, Bem's (1974) Sex-Role Inventory (BSRI), has offered a comprehensive list of characteristics to be considered masculine, feminine, or neutral. BSRI is a quantitative measure of masculinity and femininity that yields 4 gender-based, as opposed to sex-based categorizations. Based on this test, a person can possess either, neither or both of masculine and feminine desirable traits. Despite the fact that one can argue to what extend these are still valid (Palan et al, 1999), it is important to acknowledge their existence and the fact that a person's gender identity is rather a combination of masculine and feminine features, than it is solely a biological fact.

Expanding the debate from the 70s, more recent research has shown that the difference between men and women in terms of masculinity has decreased, with the main effect coming from increased masculinity scores for women, with no significant increase in femininity (Twenge, 1997). In this paper, I extend the research on the notion that nurture matters more than nature in risk attitude, and that masculinity is a trait found in both men and women (Meier-Pesti and Penz, 2008). I focus on the difference between biological sex and gender as a constructed identity. Previous empirical evidence to support this notion include findings that women in patriarchal societies are less competitive than men, while those in matrilineal societies are more competitive than men in the same societies, and as competitive as the men in the patriarchal societies (Gneezy et al, 2009). In addition, Dohmen et al (2006) finds that, among other factors, individuals with highly educated parents are more likely to take risks, another evidence in support of the nurture side of the debate. Booth and Nolen (2012) find that women are significantly less risk averse when they have studied in a female-only environment. They suggest this might be due to pressure on females to conform to gender stereotypes, where they are expected by the society to be more risk averse. In addition, Carr and Steele (2010) find that women who are reminded of their gender prior a game, perform significantly worse compared to a situation where gender is not mentioned prior a test.

On the other side of research, Sapienza et al (2009) studies the relationship between testosterone (the male hormone) and risk taking, and finds that while it is associated with higher risk preference, at the lower levels of the testosterone, there is no difference between risk aversion of men and women. Brighetti and Lucarelli (2013) find no physiological difference between men and women in actual risk attitude, while women in their sample show higher self-assessed risk aversion. All this suggests that while biological differences cannot be influenced from the outside, gender-identity based differences are shaped from the individuals' environment such as social expectations and upbringing.

In this paper, I follow the approach as in Meier-Pesti and Penz (2008) by introducing masculinity as a predictor of financial risk taking. The difference between the two approaches is that I use an observed rather than self-assessed proxy for masculinity. Since masculinity is a mixture of social and cultural traits and influences, this provides the opportunity to construct a masculinity measure in many ways. I use the individuals' career sector as a proxy for masculinity,

because career choice is a combination of factors, such as education and interests in a particular sphere. In the Methodology section, I construct the masculinity variable.

2.2. From perceived risk to financial risk taking

We distinguish between self-assessed risk attitude and actual financial risk taking. Byrnes et al. (1999), and later Nelson (2012) cover a substantive list of empirical research on gender differences and risk preferences as measured in various ways. Among others, these include gambling and lottery scenarios (e.g. Harris, Jenkins et al, 2006), self-assessed risk attitudes (e.g. Brighetti and Lucarelli, 2013), hypothetical investment allocation (e.g. Prast et al, 2014), and direct (e.g. Barber and Odean, 2001) versus indirect investment through pension funds (e.g. Arano et al, 2010). In this paper I focus my attention on two financial risk matters which can contribute to the literature on behavioral finance.

Firstly, similar to Meier-Pesti and Penz (2008) and Kapteyn and Teppa (2002) I use a short questionnaire on financial risk taking. This is to formulate a risk measure while the individuals have specifically in mind decisions that will lead to maximization of their wealth and are associated with the financial risk-return relationship.

Research question: Does masculinity affect financial risk attitude?

H1: *Higher level of masculinity is associated with a lower level of risk aversion, regardless of biological sex.*

H2: *Masculinity mediates the influence of biological sex on risk aversion.*

Secondly, I use observed asset allocation decisions to measure risk attitude. Here, following previous empirical research, there are three main options to consider. One is using indirect investments through retirement savings, (e.g. Arano et al, 2010; Sunden and Surette, 1998). Using such approach contributes to the literature that policy makers can benefit from, for improving both institutional and product design for pension savings (Bodie and Prast, 2011). There are well documented behavioral biases adding to the irrationality of individual investors when it comes to pension plans. The main ones include the endowment effect, as in Samuelson and Zeckhauser (1988), which suggests that when choosing among alternatives, individuals tend to stick with the default option. In addition, individuals tend to allocate their retirements equally between the funds offered, and this effect becomes stronger with the increase in options offered

(Huberman and Jiuang, 2006). Generally, the more possibilities offered, the more people tend to choose the default option. It seems that these behavioral biases would be more pronounced for retirement allocations than for direct investments because participating in the stock market already assumes that a person has initiated actions to invest on her own. Thus, measuring risk preferences by direct investment will enable us to not have biased results from irrationality concerning retirement planning.

Within direct investments, risk preference could be measured similar to Christiansen et al. (2008) who uses stock holdings as the dependent, with a Probit model of whether individuals hold shares or not. I however, am interested to measure the proportion of risky assets in the whole portfolio. I believe this is a more interesting variable contributing to portfolio theory because empirical evidence (e.g. Goetzmann and Kumar, 2008) suggests that despite households increasing their investments in risky assets over the last decades, the majority of individual investors still do not fully diversify their portfolios, with the effect coming from under-allocation in equities.

Research question: Does masculinity affect asset allocation preferences?

H3: *Higher level of masculinity is associated with a higher allocation in risky assets, irrespective of gender.*

H4*: Masculinity mediates the influence of biological sex on the preference for riskier assets in the portfolio. .*

2.3. Comparing the risk assessments

It is important to compare our empirical results under the self-assessed risk attitude scenario and the observed financial behavior. Barasinska et al. (2009) notes that previous research suggests self-declared attitudes towards financial risk to be good predictors of actual behavior. On the other hand Brighetti and Lucarelli (2013) find that, while there is no statistical gender difference with observed response to situations of ambiguity, women consider themselves statistically more risk averse then men when self-evaluated by questionnaire.

Moreover, framing (Levin et al, 1998) is found to affect the outcomes of decision-making involving risk. While framing can be constructed in a number of way, especially important for the difference between women and men in risk taking, is the framing of risky choices. Tversky and Kahneman (1981) find that, with equivalent options given, but framed differently in terms of good

and bad outcomes, people display biased choices and prefer the safe option when the outcome is framed as positive, but the risky option when outcomes are framed as negative. Thus, framing could be another factor contributing to women being risk averse if they are the ones who respond stronger to framing influences.

Carr and Steele (2010) find that women show significantly higher risk aversion when pre-conditioned (or primed) for gender stereotypes (designed to be threatening to women), compared to both pre-conditioned men and women who have not been pre-conditioned. The stereotype-threat manipulation asks the experiment participants to complete tasks that measure their mathematical, logical and rational reasoning abilities and they are asked to indicate their gender prior to the tasks. In the case where there is no priming (participants are told that the tasks they would complete are puzzle-solving exercises, and they are asked to indicate their gender after completing the tasks), there is no significant difference in risk aversion between men and women.

In this paper I will look at whether what people self-assess as their risky preferences, is in line with their observed behavior. This leads to the sub-question of this paper:

Research question: Is there a difference in the findings when risk aversion is measured by self-assessed versus observed financial risk taking?

To answer the question, I will compare the results from the two set of models used on (1) risk aversion and (2) actual portfolio holdings in terms of statistical and economic significance. Most importantly, the focus is on whether masculinity impacts either, neither, or both, of the risk behavior measures.

Following Meier-Pesti and Penz' (2008) suggestion that masculine attributes, such as higher tendency to take risks, are also desirable for women (Taylor & Hall, 1982), women are starting to adopt these male traits. By comparing the outcomes from the two different risk taking measures I will try to find whether women's masculinity is indeed affecting their preferences for risky investments, but is irrelevant for their self-assessed risk tolerance, and they perceive themselves as more risk averse, as Brighetti and Lucarelli (2013) find.

Chapter 3. Methodology and data

3.1. Model Specification

Data

The data is collected through an internet survey among participants of the CentERpanel run by CentERdata at Tilburg University. The CentERpanel consists of about 2000 households and is representative of the Dutch population (Kapteyn and Teppa, 2002; Prast et al, 2014). Since 1993 annually economic data from survey participants is collected on economic and psychological determinants of the saving behavior of households. The data has been used for a number of studies on individual and household economic behavior, retirement planning and savings (e.g. Alessie et al, 2000; Kapteyn and Teppa, 2002). The data used in this paper was collected over the period April 2015 – October 2015. It consists of six questionnaires covering the topics of work, accommodation, income, health, assets and liabilities, economic and psychological concepts.

Methodology

In this study I investigate whether the masculinity of the sector in which individuals work (or have worked before retirement), can help in explaining their risk preferences. This can be a good measure for the purpose because, as previous research suggests, there is a correlation between risk aversion and testosterone levels which also links higher concentrations of testosterone to riskier career preferences, such as investment banking (Sapienza et al, 2009). I further investigate into this claim.

To investigate the relationship between the risk aversion of individuals and the industry in which they chose to work, I run two sets of regressions of the following model:

$$Risk\ Attitude_i = \beta_0 + \beta_1\ Masculinity_i + \beta_2\ \{Control\ variables\}_i + \varepsilon_i$$

Where:

Risk attitude is measured in two ways. This means there are two different sets of regressions I run.

1/ In the first one, risk attitude is measured as the average score obtained from 6 questions about the respondents' preferences in terms of different risk-related situations. The respondents could rank to what extend they agree with each of the 6 situations, on a scale from 1 /totally disagree/ to

7 /totally agree/. Then, the mean of the ranks given for the 6 questions is taken and this is the final risk score. The questions are as follow:

1. I think it is more important to have safe investments and guaranteed returns, than to take a risk to have a chance to get the highest possible returns.
2. I do not invest in shares, because I find this too risky.
3. If I think an investment will be profitable, I am prepared to borrow money to make this investment.
4. I want to be certain that my investments are safe.
5. If I want to improve my financial position, I should take financial risks.
6. I am prepared to take the risk to lose money, when there is also a chance to gain money.

Questions 1, 2 and 4 suggest that people who agree with the statements are more risk averse, since they prioritize the safe options. People who agree with questions 3, 5 and 6 are prepared to take financial risks, thus the scoring for these three questions is reversed to fit with the specification that higher score indicates higher risk aversion.

2/ The second way to measure risk attitude looks at the respondents' actual asset portfolio. The risk measure is calculated using the relative risk aversion index, RRA of the i-th investor, as defined by Hibbert et al (2013):

$$RRA_i = 1 - \frac{Risky\ Financial\ Assets_i}{Total\ Financial\ Assets_i}$$

The risky financial assets include stocks, mutual funds, put and call options and business equity as professional or self-employed. Total financial assets is the sum of the risky assets and the safe assets in the portfolio. The safe assets include employer-sponsored saving plans, cash in saving and deposit accounts, deposit books, saving certificates, single-premium annuity insurance policies, savings or endowment insurance policies, bonds and mortgage bonds.

Masculinity is measured as percentage of men working in a particular industry, as reported by the Centraal Bureau voor de Statistiek /CBS[9]/. The statistics are taken from the website CBS.nl for the

[9] The complete data on the employment by gender in all economic sectors can be found at http://statline.cbs.nl/Statweb/publication/?DM=SLEN&PA=82579ENG&D1=a&D2=a&D3=0&D4=a&D5=l&LA=EN&VW=T

year 2015 as this represents the most recent reliable data. The methodology to derive the explanatory variable is described under section **3.2. Masculinity** below.

Control variables: The CentERpanel data enables for a large number of additional explanatory variables to be used. In order to select the relevant factors, I researched academic works on the topic of gender and risk taking. I found that most previous literature have concluded on a certain set of variables which have a significant relationship with risk attitude. I found that the work of Hibbert et al (2013), studying the effect of education on risk taking, is a good reference and starting point for the selection of additional explanatory variables. In the section **Control variables** I explain the approach for choosing controls.

3.2. Masculinity

Sapienza et al (2009) suggest that higher testosterone levels can explain higher preferences for risky careers. On the other hand, higher testosterone levels are found to be correlated to lower risk aversion. In my analysis, I further investigate whether a preference for a more masculine career can help explain the risk attitude of individuals. I use the pension funds of nearly 2,000 participants in the PanelData survey as a proxy for their career sector choice. In the Netherlands, approximately 90% of the population participates in pension funds, with the main type being industry-wide funds (Federation of the Dutch pension funds, 2015), so this provides a good measure for the analysis.

To define the industries and the male concentration in each of them, I downloaded statistics from Statistics Netherlands (CBS.nl), for the employment in the Netherlands, filtered by gender. The bureau categorizes 10 main economic sectors with a number of sub-sectors. The 10 broad categories are as follow:

Agriculture, forestry and fishing	Financial institutions
Industry/Manufacturing/, energy	Renting, buying, selling real estate
Construction	Business services
Trade, transport, hotels, catering	Government and care
Information and communication	Culture, recreation, other services

After analyzing the data more carefully I split category Government and care into its two sub-sectors a) Government and education, and b) Health and social care. This is because the broad category has an average of 31% masculinity whereas separated Government and education has 48%

of men while Health and social care has a 19% masculinity, respectively. This represents a significant difference in percentages which could lead to biased results if left in one sector.

I also combined the sectors Financial institutions and Business services due to their similar nature of services and gender concentration. Then I calculated the 'masculinity' of an industry as follows. If all people employed in a particular industry equal 100%, I divide the number of men employed by the total number of industry participants to find the percentage of masculinity. A summary of the results can be found in Table 1. The last column gives the masculinity measure.

The table indicates that there are 4 male-dominated sectors, namely Agriculture (68%), Industry and Energy, excl. construction (78%), Construction (90%), and Information and communication (75%). There are two female-dominated sectors: Health and Social care (19%) and Culture, recreation and other (38%). Finally, there are 4 relatively neutral industries: Trade, transport, hotels and catering (58%), Financial institutions and business services (53%), Real estate (55%), and Government and education (48%).

Table 1. Employment by gender and economic sector, as reported by CBS.nl for the year 2015.
The table displays employment data by gender in the Netherlands for the year 2015. The numbers are in thousands of people. The last two columns show the percentage of the respective gender over the total population of the particular industry. The last column gives the masculinity measure to be used in the regression analysis.

Industry sector	Women x 1 000	Men x 1 000	Both x 1 000	% Women	% Men
Agriculture, forestry and fishing	61	131	192	32%	68%
Industry (no construction), energy	182	652	834	22%	78%
Construction	47	410	457	10%	90%
Trade, transport, hotels, catering	924	1.260	2.184	42%	58%
Information and communication	67	200	267	25%	75%
Financial institutions, Business services	950	1.068	2.018	47%	53%
Renting, buying, selling real estate	33	41	74	45%	55%
Government and education	527	482	1.009	52%	48%
Health and social work activities	1.123	262	1.385	81%	19%
Culture, recreation, other services	230	141	371	62%	38%
Grand Total	**4.144**	**4.647**	**8.791**	**47%**	**53%**

There are 52 pension funds per CentERpanel database. In addition, there is an option to include another fund in case it is not listed in the 52 options. I only included individuals who have answered 'Yes' to the question "Do you participate in a pension fund **through your current employer** (past employer if the person is retired)?". After responding 'Yes' to this question people were asked to select their pension fund from the 52 options given, or input the fund's name in case

it was not present. There was an option 'I don't know the name of my pension fund', and in case this was selected, the respondent was removed from the sample.

I defined each fund's main sector from its official website. It can be distinguish between two types of funds, one is industry-wide and second, company-specific. From the 52 pension funds, for example Pensionfonds Bouw (Construction) is an industry-wide fund for all employed and self-employed workers in the construction sector. This information is obtained under section 'Scope of the pension fund' at their webpage[10]. For company-specific funds, for example, on the webpage of ING's pension fund it is found that employees who have worked for ING in the Netherlands have built up a pension through Pensionfonds ING[11]. Going the official page of ING Netherlands, the main sector of operation is found (usually under section "About us") and it falls into the category of financial services[12]. A list of all the pension funds in the database and their industry classification can be found in Appendix 1.

Not all respondents participated in a pension fund and not all filled out all the data. In addition, 97 respondents who have reported to participate in a pension fund but have never had a paid job, were removed from the sample. For such individuals the pension fund does not serve as a career choice proxy. This reduced the amount of observations to 1,096, around 50% of the initial number of respondents who filled out information about their pensions. Table 2 shows summary statistics of the respondents in the CentERpanel data by their employment in the 10 industries.

The Masculinity percentage next to the industry name is the main explanatory variable in my regression analysis. The CentERpanel data shows that the largest amount of the population is working (or has worked) in the Government and education sector, followed by Health and social work activities. In terms of gender differences, the CentERpanel respondents fit well into the CBS statistics by showing that the amount of women working in Health and care is over 1.5 the amount of men. The largest percentage of the men in the sample population (33%) come from the Government sector, followed by 20% in Industry and energy, and 19% in Financial and business services. 43% of women come from the Health and care sector, followed by 30% from Government

[10] The information is obtained from BPF Bouw webpage at https://www.bpfbouw.nl/over-bpfbouw/organisatie/ . Direct link to the scope of the participants in the fund can be found at: https://www.bpfbouw.nl/images/pensioenreglement-bouwnijverheid-01-01-2015_tcm198-181966.pdf

[11] The information is obtained from https://www.pensioenfondsing.nl/en/

[12] Obtained from https://www.ing.nl/de-ing/over-de-ing/index.html

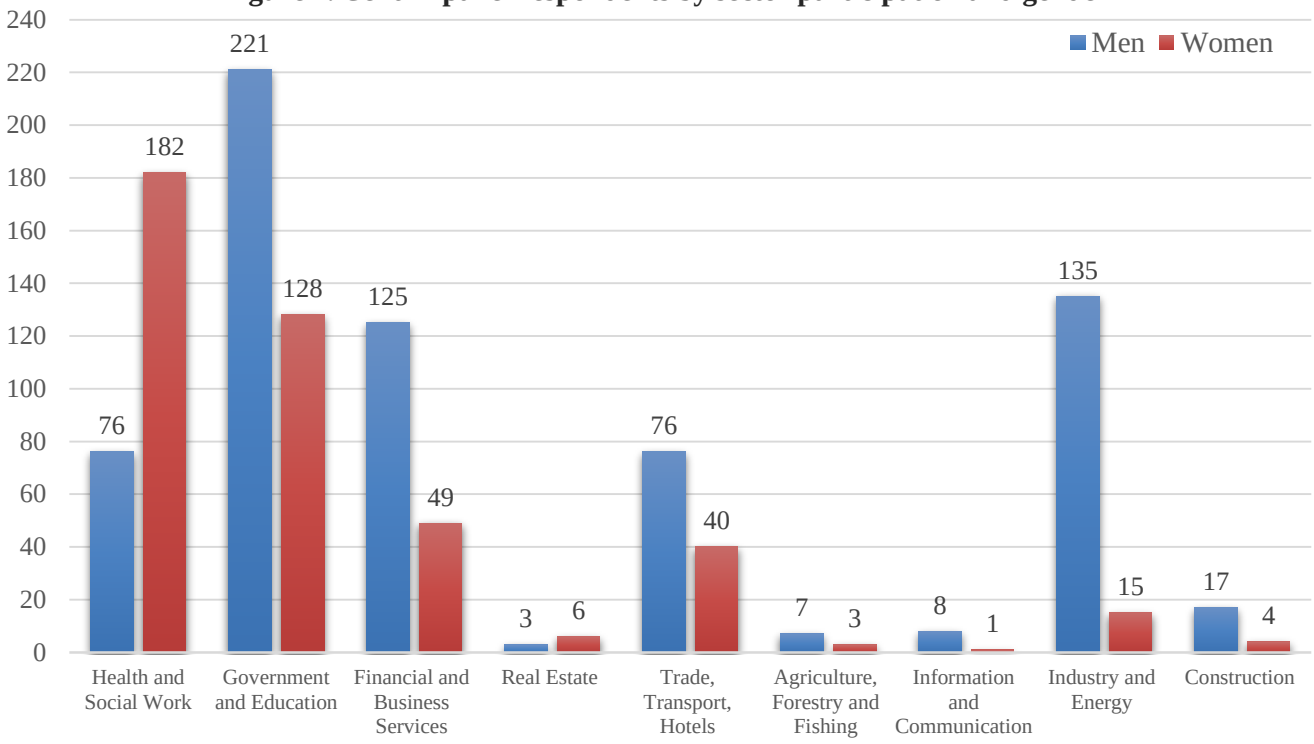
and education, and thirdly, 11% from Finance and business. The Real Estate and IT and communications sectors are represented by the lowest number of people, only 9 people for each sector. There are no individuals in the sample who come from the culture and recreation sector. Figure 2 presents a graphical view of the industry participation of the CentERpanel respondents. There are 8 times more men than women in the highly masculine sector of Industry and energy, whereas 71% of participants from the health and social sector are women. The financial and business services sector is represented by 72% men, which is higher than the 53% average male participation in the Netherlands. Government and education also contain more men than the country average, with 63% in our data, compared to 48% country-average for the sector. There are only 21 participant in Construction, the most masculine sector of the Netherlands, and 81% of them are men. Figure 2 displays clearly that there is no sector with an equal proportion of men and women. All sectors, except for Health and social care, and Real Estate, predominantly consist of male participants, which is also due to the fact that our population consists of more men than women, namely 61% of men compared to 39% of women.

Table 2. Respondents' industry participation according to gender and pension fund

Displayed are summary statistics of the respondents from the CentERpanel data presented by industry participation and gender. The column Masculinity gives the respective male concentration of each industry. Columns 2 and 4 give the percentage of individuals in the respective industry compared to the total amount of men or women respectively in all economic sectors.

		(1)	(2)	(3)	(4)	(5)
Industry	**Masculinity**	**Men**	**In %**	**Women**	**In %**	**Total**
Health and social work activities	19%	76	11%	182	43%	258
Government and education	48%	221	33%	128	30%	349
Financial institutions, Business services	53%	125	19%	49	11%	174
Renting, buying, selling real estate	55%	3	0%	6	1%	9
Trade, transport, hotels, catering	58%	76	11%	40	9%	116
Agriculture, forestry and fishing	68%	7	1%	3	1%	10
Information and communication	75%	8	1%	1	0%	9
Industry (no construction), energy	78%	135	20%	15	4%	150
Construction	90%	17	3%	4	1%	21
Total		**668**	**100%**	**428**	**100%**	**1.096**

Figure 2. CentERpanel respondents by sector participation and gender



In addition to the masculinity variable, I added an interception variable between the masculinity and if the respondent is female, Female*Masculinity, where I use 1 for women (0 for men) multiplied by the respective ratio of men in a particular industry. This enables me to measure whether masculinity has a different effect on women, compared to men. The expectation is that if masculinity affects both genders in the same way, Female*Masculinity will be statistically not significant and thus, masculinity effect will not differ between men and women.

3.3. Control variables

For the selection of additional explanatory variables, I turn to relevant academic research on the topic of gender differences in risk taking. Hibbert et al. (2013) uses the individual's age, level of education, marital status, household income level, unsecured debt level and the number of children under 18 in the household. I find that Jianakoplos and Bernasek (1998) use similar factors in their research on the gender difference in risk aversion. For my analysis, I follow this selection due to its relevance. All these factors have been found to be significantly correlated with risk aversion so they are important controls. In addition, I add a dummy variable Decision-maker to control for whether the individual is the main person who takes the financial decision in the

household. This will control for the people in a partnership or marriage whose financial decisions are influenced by their partner for example, as found by Meier et al (1999).

I add a dummy variable for when the individual is the main wage earner in the household. Following the relative resource contribution theory (Blood and Wolfe, 1960), it is expected that the dominance in financial decisions within married couples, is partly explained from the amount of money that the household members contribute to the family budget (Meier et al, 1999). Including the main wage earner factor is important because men and women can differ in their risky behaviors when they are the main wage earners. For example, a single woman who has to provide for her children may avoid investments in risky assets because she fears the loss more compared to a married woman with income, who is not the main wage earner in the family.

I add a variable measuring the self-assessed financial literacy of the respondents in addition to their level of education, because a university diploma does not guarantee that the individual is financially literate, and financial literacy has been found to be significantly associated with higher investments in stocks (Hibbert et al., 2013).

One factor associated with the investment behavior within households, is the importance to distinguish between the household unit of investment and the intra-household members. As previously mentioned, empirical research has found that individuals in the household have preferences different from each other (Chiappori and Donni, 2009). This makes it possible to study individual behavior within households, as our sample consists of mainly couples (80% of the sample), rather than single individuals (20%, respectively). On the other hand, gender differences are found to decrease when living in partnerships due to higher degree of interaction between the spouses (Jianakoplos & Bernasek, 1998). Therefore, a dummy variable indicating if the respondent is living with a partner, is included in the analysis.

3.4. Descriptive Statistics

The breakdown of the respondents by gender and all control variables are shown in Table 3, and summary statistics are presented in Table 4. Note that there were individuals with no assets, so for variables related to the RRA variable, these were removed from the population (193 observations dropped). From Tables 3 and 4 we see that the average age of men in the population is 60 years, as opposed to 53 years for women. As expected, women have on average a higher risk score than men, 5.41 as opposed to 5.08. Since the risk score has a minimum of 1 and maximum

of 7, it is clear that both genders in the sample are significantly risk averse. It is already noticeable that men have on average larger amounts invested in both risky and safe assets. However, the difference is more pronounced for the risky assets, where on average men have invested 1.5 times the amount for women. For the safe assets, the amount is one time larger. The difference in individual income (39,314 Euros for men, compared to 26,561 Euros for women) can help explain the overall smaller investments that women have made compared to men, but it does not explain the more prominent risky investments gap. It is important to note that income includes not only salary, but bonuses, scholarships for students, pensions and benefits. In terms of the respondents' current financial situation, both genders fall on average in the category where debts and expenses are manageable, with men being slightly closer to having the ability to save some money.

Over half of individuals for both genders have indicated they are the main decision makers in the household, with higher score of 6 percentage points for male respondents (73%) compared to female ones (67%). There is a significant difference between the two genders in terms of the main wage provider in the family, 92% of men compared to only 43% of women. These results fit well with the fact that in terms of personal income, men earn double the income of women. Moreover, over half of both men and women have no children in the household, but the percentage is higher for men by 11 percentage points. Above 80% of both genders have no unsecured debt, and we can see that the average debt amount is low with 6,644 Euros for men and only 2,449 Euros for women. The low numbers can be due to the fact that for households the most common and large form of debt is the mortgage, which is excluded from this category. In terms of financial literacy, it is clear that both men and women consider themselves not very financially literate. The number is lower for women, with only 25% considering themselves as literate, compared to 37% of men. The difference can be to some extend due to generally, women being less confident in their knowledge than men, or due to more men in the population being the main financial decision makers in the family.

Figure 3 displays the average risk aversion score of men and women by age. For every age group women have slightly higher risk score, as expected. Generally, men below 50 years old have mean scores between 4.60 and 5.00, after which it increases gradually to 5.22. For women, the lowest risk score is 5.00 at ages before 30, the highest between the ages of 60 and 70 (5.57). In Figure 4 the average masculinity levels for each age group are presented. Generally, the mean is

in the lower spectrum because of the majority of people (55% of the whole population) participating in the non-profit sectors of government and education, health and social care. As expected, the masculinity levels of men are significantly higher than these for women, in all age groups. For all ages the sectors where male respondents have chosen to work have a masculinity level of at least 50%. For women, no average is above 42%. Interestingly, women above 70 years old have the highest masculinity from all female participants. By looking at the data, this fact is explain by 45% of women above the age of 70 participating in the government and education sector.

Table 3. Summary statistics of the control variables by gender

Explanatory variables used in the empirical research by gender. All variables are dissected into categories.

	Male		Female	
Age group				
18-29	10	1%	18	4%
30-39	67	10%	82	19%
40-49	95	14%	91	21%
50-59	109	16%	75	18%
60-69	170	25%	100	23%
over 70	217	32%	62	14%
Education				
Primary education	12	2%	10	2%
VMBO	148	22%	92	21%
HAVO / VWO	61	9%	38	9%
MBO	166	25%	110	26%
HBO	178	27%	130	30%
WO	103	15%	48	11%
Gross Personal Income				
Below 25,000 Euros	112	17%	173	40%
25,000 - 50,000 Euros	331	50%	180	42%
50,000 - 75,000 Euros	136	20%	28	7%
75,000 - 100,000 Euros	32	5%	3	1%
100,000 - 150,000 Euros	7	1%	2	0%
150,000 Euros and above	50	7%	42	10%
Net income of the household				
Less than 10,000 Euro	15	2%	5	1%
between 10,000 and 14,000 Euro	29	5%	28	7%
between 14,000 and 22,000 Euro	86	14%	61	16%
between 22,000 and 40,000 Euro	314	51%	179	47%
between 40,000 and 75,000 Euro	156	25%	106	28%
75,000 Euro or more	16	3%	5	1%
Current financial situation of the household				
Debts are present	10	2%	3	1%
Need to draw upon savings	71	11%	61	15%
Manageable	146	22%	94	22%
Some money is saved	359	55%	218	52%
A lot of money can be saved	71	11%	44	10%

	Male		Female	
Unsecured Debt /Individual level/				
No Debt	456	82%	278	81%
Less than 25,000 euros	81	14%	58	17%
25,000 - 99,999 euros	15	3%	7	2%
100,000 – 249,999 euros	6	1%	1	0%
250,000 or more	1	0%	0	0%
Financially literate				
Yes	204	36%	88	26%
No	355	64%	256	74%
Decision-maker				
No	183	27%	140	33%
Yes	485	73%	288	67%
Main wage earner				
No	55	8%	246	57%
Yes	613	92%	182	43%
Partner present in the household				
No	105	16%	116	27%
Yes	563	84%	313	73%
Number of children in the household				
None	462	69%	248	58%
One	65	10%	66	15%
Two	100	15%	84	20%
Three or more	41	6%	30	7%

Table 4. Summary statistics of the main variables

The table presents the mean and number of observations of the main variables in the regression analysis by gender. In addition, notional amounts of the risky and safe investments are presented. The Education variable ranges from 1 to 5, in increasing order of scientific level as listed in Table 3. Net household income follows the categories in Table 3 and ranges from 1 to 6. Gross personal income is in notional amount. Decision-maker is a dummy variable, which takes the value of one when the individual makes the majority of financial decision in the household, and zero otherwise. Main wage earner is a dummy variable taking the value of one when the person is the main income provider in the household, and zero otherwise, Partner is a dummy variable which takes the value of 1 when the individual is married or lives with a partner in the household. Financial literacy is a dummy variable with 1 = highly literate, and 0 = no or low literacy.

	Male		Female		General	
VARIABLES	N	mean	N	mean	N	mean
Risk score	668	5.080	428	5.412	1,096	5.220
Risky investments, in Euros	599	12,357	344	4,955	903	9,537
Safe investments, in Euros	599	46,377	344	23,625	903	37,710
RRA	599	0.889	344	0.952	903	0.913
Masculinity	668	0.545	428	0.390	1,096	0.484
Age	668	60.40	428	52.91	1,096	57.47
Education	668	3.987	428	3.939	1,096	3.968
Net household income category	639	3.531	405	3.286	1,044	3.436
Gross personal income	668	39,314	428	26,561	1,096	34,334
Decision-maker	668	0.726	428	0.673	1,096	0.705
Main wage earner	668	0.918	428	0.425	1,096	0.725
Partner	668	0.843	428	0.729	1,096	0.798
Number of children in the household	668	0.581	428	0.757	1,096	0.650
Unsecured debt	559	6,644	344	2,449	903	5,107
Financial literacy	668	0.364	428	0.252	1,096	0.320

Figure 3. Average risk score by ages and gender

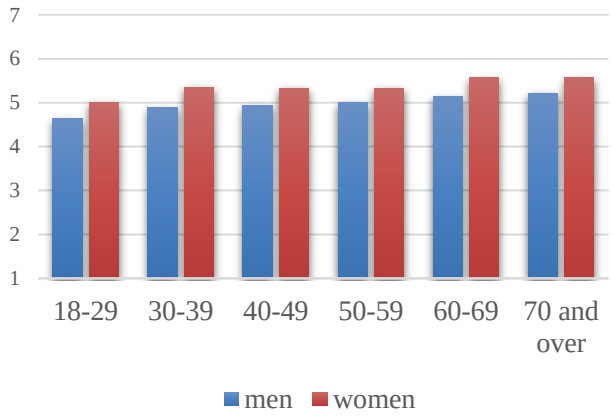


Figure 4. Average masculinity by age and gender

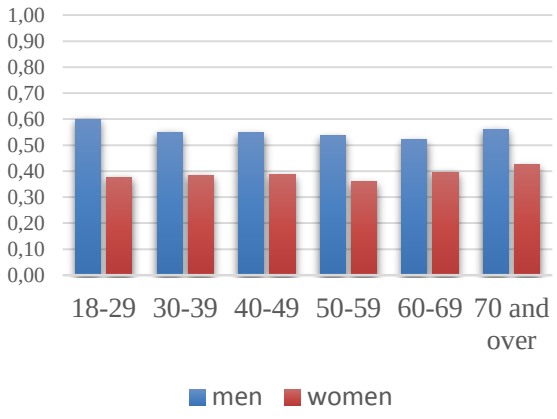


Table 5. Summary statistics of the financial assets held by respondents

The table displays details about the financial assets held by the CentERpanel respondents as segregated by gender. The number of people who hold the respective asset class, the percentage of all men or women, and the average notional value for each asset class as at 2014 year-end are displayed. The average values are calculated only for individuals whose asset value held exceeds zero.

	Men			Women		
Categories	**N**	**% of all men**	**Average asset value in Euros**	**N**	**% of all women**	**Average asset value in Euros**
Safe assets						
Savings & deposit accounts	529	95%	32.919	329	96%	20.533
Bonds	19	3%	30.076	3	1%	53.500
Other safe assets	151	27%	42.683	79	14%	13.458
Risky Assets						
Mutual funds	109	19%	43.991	28	8%	51.464
Stock/Equity	75	13%	28.752	16	3%	17.526
Options	5	1%	1.928	1	0%	500

Table 5 displays the investments of men and women in the different asset classes. In general, both men and women invested mostly in savings and deposit accounts (frequency (f) = 529 for men and f = 329 for women, which represent over 95% of all respondents). We see that larger percentage of the male population invested in assets in general, compared to women. When we look at the average notional amounts of assets, men have on average higher holdings in savings and deposit accounts (32,919 euros compared to 20,533 euros for women), which can be explained by the generally higher income we saw in Table 4 for men compared to women and men more often being the main wage earner in the household. The second most preferred asset for both genders was 'other safe assets', which includes employer-sponsored savings plans (f = 29 for men and 18 for women); deposit books (16 men and 9 women); single-premium annuity insurance policies (83 men and 37 women); and savings or endowment insurance policies (56 men and 26 women). The last two make up the most of other safe investments with around 15% of men and 11% of women investing in single-premium annuities, and 10% and 8% respectively holding endowment annuities.

Interestingly, slightly more men hold risky assets (f = 189) than bonds and other safe assets (f = 170). For women the opposite is true, with more investment in bonds and other safe assets (f = 82) compared to risky assets (f = 45). Another interesting observation is that despite the small number of women investing in bonds, the average notional value of bonds for the three women that have invested, is higher than the average value that men hold (53,500 euros for women

compared to 30,076 euros for men). Secondly, the average female amount in mutual funds of 51,464 euros is higher than the average value for men of 43,991 euros.

On the other hand, we see that men both in frequency and in average value, hold substantially more in stock (f = 75 as opposed to 16 for women, and 28,752 euros compared to 17,526 euros for women). This could be due to women in general being more risk averse or having more investment in mutual stocks where they can leave the direct decision of stock selection to the experts. One other possible explanation is the fact that individual investors have preference for familiar stocks (Huberman, 2001), and tend to allocate large part of their stock portfolio to professionally close stocks (Doskeland and Hvide, 2011) in the same industry as their employer. If we look at the industries where our respondents work, the non-profit sectors of government and health are represented by 251 of women compared to 252 men (the numbers are smaller than the ones in table 2, due to some individuals from table 2 not having assets), even though the total number of male investors in the sample exceeds the number of their female counterparties (559 men and 344 women). A significant 73% of female respondents are working in a non-profit sector compared to 45% of male investors in the data. Therefore, higher proportion of men have expertise in the for-profit sectors, compared to women. For a simple comparison, 14 out of the 25 company securities in the AEX index operate in the highly-masculine sectors of Industrial production, and IT and communications, and 4 others in the financial services[13]. Looking at our data, 40% of our male population work in these sectors, compared to only 15% of women. Despite the fact that we don't have information about the equities that the respondents hold, generally a large proportion of wealth is held in domestic securities with little international diversification (French and Poterba, 1991).

Chapter 4. Regression analysis

4.1. Influence of masculinity on the risk aversion and portfolio allocation

I run two sets of multivariate Tobit regressions, one with the risk score as the dependent variable (to test *Hypothesis 1 and 2*), the second with the RRA measure (*Hypothesis 3 and 4*). I use a Tobit model because both variables are left and right censored. The risk score is left and right

[13] AEX composition with company sectors can be downloaded under the section 'Documentation: AEX-Index Factsheet' from https://www.euronext.com/en/products/indices/NL0000000107-XAMS/market-information

censored at 1 and 7 respectively, since the average score obtained from the psychological questionnaire cannot be lower than 1 and higher than 7. For the second set of regressions, the RRA is left and right censored at zero and 1, respectively, where zero being investment in risky assets only, and 1 being investing only in the safe asset. To confirm that Tobit is the most appropriate model, I researched academic literature on household asset allocation, and indeed I find that it is the most used model when measuring risky assets as a proportion of total assets (Hochguertel et al, 1997; Poterba and Samwick, 1997; Hibbert et al, 2013).

Note that some control variables are slightly different from the ones presented in the descriptive statistics. I use the logarithm of personal income instead of the notional amount due to its non-linearity with the dependents. For example, an income increase from 50,000 Euros to 75,000 Euros (50% increase) can lead to an increase in the proportion an individual allocates to risky assets, but the same 50% increase from 200,000 Euros to 300,000 Euros will probably lead to a smaller effect in the asset allocations, because even before the change the income was high enough for the individual to afford risky investments. Furthermore, the natural logarithm form will enable to measure the effect of a percentage change in income on the dependents. In addition to the age variable, I add age squared/1000 as in Hochguertel et al. (1997), because age has a non-linear relationship with investments, suggesting that after a certain age, the effect on the dependent is smaller.

Table 6 summarizes the results from regressing the risk score of individuals on the masculinity and other factors. Model 1 uses the initially derived masculinity measure, whereas Model 2 uses a dummy for the masculinity taking the value of 1 for industries with a masculinity of 50% or higher; and 0 for lower than 50%. Model 5 is only for single participants with no spouse or partner, and Model 6 is for participants living with a partner.

Models 1 and 2 show that masculinity has a significant and negative effect on the risk aversion, from which we can concluded that *H1* cannot be rejected. With both measures, increase in masculinity is associated with decrease in risk aversion, even with the control variables included. The interception between gender and masculinity is also statistically significant and suggests that working in a masculine industry increases the risk score when the respondent is female. A possible interpretation for this is that women have been found to be willing to take more risks when they are in single-sex female environments (Booth et al., 2014), and thus women in working

environments in highly masculine industries are more likely to adhere to the gender stereotypes of women being more risk averse.

It is important now to include gender as additional explanatory variable. It could be that the effect from masculinity is a substitute for the gender factor, and omitting gender in the model would lead to an endogeneity issue. Looking at Specification 3 in Table 6, where gender and all control factors are regressed, excluding masculinity, this might be the case. Gender is significantly and positively correlated with risk aversion, suggesting that women as expected have stated higher risk aversion from the questionnaire. In addition, the other two significant factors – age and education – also hold for Model 3. It seems that gender absorbs the effect from financial literacy, which we found in the first specification. In case we had a OLS regression, it would be possible to compare the goodness of fit, as measured by R^2 between Models 1 and 3, which would give us idea of whether gender or masculinity explains more in the variation in the risk scores. For Tobit models, the Pseudo R^2 is just a reworking of the model chi-squared and does not explain the proportion of variability of the outcome of the model, as the OLS R^2 does. It is generally advised to approach the Pseudo R^2 with caution and not to rely on its value of comparison of alternative models[14].

To test *H2,* we run a regression including both gender and masculinity. The expectation is that either the gender effect will be absorbed by masculinity, as the real cause for higher risk aversion, or that its economic significance will be decreased by masculinity. *H2* is tested in Specification 4. It is clear that the effect of masculinity is absorbed by the gender, and thus we reject the hypothesis. This concludes that it is gender, and not masculinity, that impacts the risk aversion of people, and as expected women have on average higher risk aversion than men.

In terms of the control variables, education is always significant (except for Specification 6), with increase in one level of education associated with on average 0.4 unit decrease in risk aversion. In addition, as expected, gender has a significantly stronger effect for single individuals than married ones, in economic terms. For example, being a single woman lead to 0.894 unit increase in risk aversion, as opposed to 0.520 for married women.

[14] IDRE UCLA (2011). FAQ: What are pseudo R-squares? Retrieved from http://www.ats.ucla.edu/stat/mult_pkg/faq/general/Psuedo_RSquareds.htm

Table 6. Tobit regression on the risk score

The table provides the Tobit regression analysis of individual risk score, relative to industry masculinity and the set of control variables. The models in specifications (1) and (2) differ in the main explanatory variable for industry masculinity. Column 1 includes the masculinity as explained under the methodology section above. Column 2 includes a dummy variable for the industry where 0 represent feminine industries with a ratio below 0.5, and 1 are masculine industries above 0.5. All models except (3) include the interception variable Female*Masculinity. Model (3) only include the control variables. The variables decision-maker and main wage earner in Specification 5 are omitted due to their value being 1 for all single respondents. Robust standard errors are provided in parenthesis. *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.

	All	All	All	All	Single	Married
VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)
Masculinity:						
Masculinity of industry	-0.388**			0.0981	0.463	0.0691
	(0.171)			(0.236)	(0.712)	(0.251)
Female*Masculinity	0.765***	0.735***		-0.228	-0.424	-0.247
	(0.165)	(0.164)		(0.350)	(0.920)	(0.382)
Dummy masculinity		-0.168**				
		(0.0672)				
Controls:						
Gender			0.474***	0.579***	0.894*	0.520**
			(0.0829)	(0.185)	(0.479)	(0.210)
Age	0.0123	0.0123	0.0124	0.0124	0.0259	0.00721
	(0.0158)	(0.0157)	(0.0157)	(0.0157)	(0.0280)	(0.0189)
Age squared/1000	-0.0396	-0.0459	-0.0360	-0.0364	-0.163	0.00778
	(0.139)	(0.138)	(0.138)	(0.138)	(0.244)	(0.166)
Education	-0.0453*	-0.0518**	-0.0424*	-0.0421*	-0.135**	-0.0246
	(0.0250)	(0.0255)	(0.0247)	(0.0250)	(0.0567)	(0.0279)
Partner	0.0970	0.0907	0.144	0.145		
	(0.0944)	(0.0936)	(0.0955)	(0.0958)		
Decision maker	-0.107	-0.107	-0.105	-0.104		-0.0850
	(0.0754)	(0.0753)	(0.0750)	(0.0750)		(0.0766)
Main wage earner	0.0767	0.0597	0.144	0.142		0.116
	(0.0921)	(0.0901)	(0.0941)	(0.0942)		(0.105)
Children	0.00425	0.00419	0.00141	0.000313	0.0207	-0.00317
	(0.0379)	(0.0378)	(0.0378)	(0.0379)	(0.133)	(0.0409)
Log Personal income	-0.00326	-0.00328	-0.00161	-0.00112	0.0289	-0.00743
	(0.0112)	(0.0111)	(0.0110)	(0.0111)	(0.0317)	(0.0116)
Financial literacy	-0.133*	-0.129*	-0.115	-0.112	-0.143	-0.115
	(0.0740)	(0.0740)	(0.0741)	(0.0742)	(0.177)	(0.0819)
Constant	4.940***	4.891***	4.546***	4.482***	3.999***	4.810***
	(0.477)	(0.469)	(0.465)	(0.498)	(0.990)	(0.590)
Observations	1,096	1,096	1,096	1,096	221	875
Prob>F	<0.0001	<0.0001	<0.0001	<0.0001	0.0002	0.0001
Pseudo-R_sq	0.0155	0.0159	0.0183	0.0184	0.0430	0.0141

On to the regressions of the asset allocation ratio, RRA, Table 7 presents similar results. In the first two specifications masculinity is significantly and negatively correlated with RRA variable. In model one for example, a 1% increase in masculinity would lead to 0.422% more allocated to the risky assets in the portfolio. Thus, for example a person working in business services (53% masculinity) is expected to allocate around 5*0.422% = 2% more of his wealth to shares instead of bonds, compared to a person from the education sector (48% masculinity). Again, being a woman in a masculine industry on average decreases the risky allocation. Interestingly, living with a partner leads to a higher allocation to the safe assets while older higher-educated respondents who are financially literate and are the main decision-takers in the household are the ones who allocate the most to the risky assets. We see that the age effect decreases with time, as the coefficient of age squared is significant and positive. Being the main wage earner in the household, the personal income, number of children and the amount of unsecured debt all seem not to influence significantly the asset allocation choices.

The most interesting finding is that while for the whole sample gender seems to absorb the effect of masculinity, in specification 5 we see that masculinity is statistically significant and negative, while gender is no longer significant. This is interesting because previous empirical findings suggest that gender differences are more pronounced for single, rather than married people (Jianakoplos and Bernasek, 1998). Thus, my findings show that indeed gender is not an important factor for married investors, but for singles, masculinity explains more in the variation than gender does. A possible explanation could be that, since masculinity is characterized by competitiveness and ambitiousness (Bem, 1974), masculine individuals postpone marriage in order to focus on their careers. In addition, being more self-reliant, single people with higher masculinity manage their savings and investments from earlier on, compared to married ones.

We can also claim that previous findings of gender effect are actually due to the gender characteristic of masculinity, rather than biological sex. The findings prove to be in accordance with both *H3 and H4*, concluding that higher level of masculinity is associated with higher allocation to risky assets, irrespective of sex, and masculinity mediates the influence of biological sex on allocation between risky and safe assets, despite the latter being true only for single investors. This justifies the use of separate regressions for single and married individuals.

Table 7. Tobit regression on the relative risk aversion, RRA

The table displays the results from the multivariate Tobit regressions on the RRA variable, measuring the asset allocation of individuals. The variable log unsecured debt is the natural logarithm of the respondent's unsecured debt amount. The models in specifications (1) and (2) differ in the main explanatory variable for industry masculinity. Column 1 includes the masculinity as explained under the methodology section above. Column 2 includes a dummy variable for the industry where 0 represent feminine industries with a ratio below 0.5, and 1 are masculine industries above 0.5. All models except (3) include the interception variable Female*Masculinity. Model (3) only include the control variables. The variables decision-maker and main wage earner in Specification 5 are omitted due to their value being 1 for all single respondents. Robust standard errors are provided in parenthesis. *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.

VARIABLES	All (1)	All (2)	All (3)	All (4)	Single (5)	Married (6)
Masculinity:						
Masculinity of industry	-0.422**			-0.126	-1.134*	0.0573
	(0.188)			(0.230)	(0.657)	(0.238)
Female*Masculinity	0.634***	0.602***		-0.116	-0.328	0.0604
	(0.206)	(0.208)		(0.420)	(0.934)	(0.480)
Dummy masculinity		-0.166**				
		(0.0683)				
Controls:						
Gender			0.395***	0.422**	0.492	0.284
			(0.0974)	(0.210)	(0.465)	(0.248)
Age	-0.0424**	-0.0440**	-0.0399**	-0.0409**	-0.0380	-0.0417**
	(0.0174)	(0.0172)	(0.0171)	(0.0173)	(0.0326)	(0.0205)
Age squared/1000	0.279*	0.287*	0.260*	0.268*	0.269	0.264
	(0.148)	(0.146)	(0.146)	(0.148)	(0.278)	(0.174)
Education	-0.150***	-0.157***	-0.145***	-0.148***	-0.224***	-0.129***
	(0.0258)	(0.0267)	(0.0256)	(0.0256)	(0.0565)	(0.0279)
Partner	0.152*	0.149*	0.183**	0.182**		
	(0.0889)	(0.0889)	(0.0909)	(0.0904)		
Decision maker	-0.171**	-0.168*	-0.171**	-0.169**		-0.150*
	(0.0858)	(0.0860)	(0.0857)	(0.0857)		(0.0828)
Main wage earner	0.0815	0.0611	0.132	0.131		0.0854
	(0.106)	(0.103)	(0.109)	(0.109)		(0.121)
Children	-0.0259	-0.0262	-0.0280	-0.0292	0.254	-0.0469
	(0.0395)	(0.0394)	(0.0394)	(0.0396)	(0.194)	(0.0398)
Log Personal Income	-0.0187	-0.0186	-0.0176	-0.0170	-0.0212	-0.0163
	(0.0155)	(0.0157)	(0.0154)	(0.0155)	(0.0486)	(0.0157)
Financial literacy	-0.139**	-0.135**	-0.125*	-0.122*	-0.113	-0.131*
	(0.0660)	(0.0664)	(0.0663)	(0.0654)	(0.163)	(0.0706)
Log Unsecured Debt	0.00510	0.00554	0.00677	0.00603	0.0156	0.00345
	(0.0103)	(0.0103)	(0.0104)	(0.0104)	(0.0258)	(0.0111)
Constant	3.980***	3.960***	3.538***	3.645***	4.336***	3.726***
	(0.587)	(0.570)	(0.563)	(0.595)	(1.210)	(0.693)
Observations	903	903	903	903	199	704
Prob>F	<0.0001	<0.0001	<0.0001	<0.0001	0.0001	<0.0001
Pseudo-R_sq	0.0959	0.0965	0.0994	0.1002	0.1504	0.0932

From the other factors, decision makers in the household allocate more to risky assets. This might be because a person who takes the majority of financial decision accumulates more financial knowledge to enable investments in risky assets. On the other hand, it can be that a person who actively engages in investment decisions will be up to date with the financial world, and will likely also be the one contributing most to deciding on financial matters in the family. In addition, being financially is significantly and negatively correlated, with the exception for single investors where literacy has no statistically significant effect.

4.2. Endogeneity

Currently the regression analysis found that masculinity does not affect the risk score of individuals, but is a significant factor for the allocation of risky assets of single investors, and not married ones. For single individuals gender is irrelevant based on the model. In order to confirm the findings, it must hold that there is no other possible factor affecting both the dependent and independent variables to change. It is difficult to predict other factors for the choice of industry to work in, as it could be mostly personal interests in the sphere. While the reasons to choose a particular industry over another cannot be observed from the data, there are other factors that might affect the outcomes and are observable. One is that in the middle range of industry masculinity are participants in the financial sector. It could be that our findings are biased due to this. In addition, the results could be driven from individuals who hold a financial position, thus the higher financial expertise is the factor associated with higher proportion allocated to risky assets, and it just happens that there are more such individuals in the more masculine industries.

To reject such possibility, I run a Tobit regression on the RRA variable and include two addition measures for financial positions: one is a dummy variable, called ‘financial job’, taking the value of 1 for individuals who work in the financial industry; the second is a constructed variable between the variable for self-assessed financial knowledge and masculinity, which has the lowest value for low financial knowledge and low masculinity individuals, and highest for the most financially knowledgeable in the most masculine industries. In case masculinity is still significant after the inclusion of these two factors, we can rule out the possibility of financial jobs being the main factor for investing in risky assets, as opposed to masculinity. In addition, I add a variable ‘Urban’ to control for individuals living in urban areas, as this can be another factor

contributing to both availability of jobs, and specific sectors such as financials mainly located in urban areas, and to larger investments in risky assets.

The findings in Table 8 confirm that our previous results are not biased in terms of masculinity being influenced by holding a financial position. We see that with including both measures of financial jobs, masculinity still impacts the asset allocation of single investors, and having a job in finance is irrelevant. On the other hand, for married individuals both measures for financial position are significantly and negatively correlated with preference for safe assets. In addition, living in an urban area is not significantly associated with higher allocation to risky assets, suggesting that we can rule out the possibility of both choice of career sector and investment in risky assets to be influenced by individuals living in an urban area.

4.3. Within gender comparison

There are studies that do not find statistical significance in portfolio holdings between male and female investors after controlling for common demographic factors such as income, age and education (Feng and Seasholes, 2008). Instead, differences that occur within each gender are found greater than between the genders (Hamacher, 2001). In this analysis I regress the masculinity and control variables within each gender sub-group to further analyze the factors affecting risk aversion and asset allocation for each gender. The combined Female*Masculinity variable is omitted because it is already reflected by the fact that each regression is for one gender only.

The results from the regressions of both risk score and asset allocation are presented in Table 9. Clearly, for the risk score (specifications 1 – 4) the factors have little statistical significance in explaining the variation for both men and women, with only the level of education affecting the risk aversion for men. A possible explanation is that for self-assessed risk aversion, gender is the main explanatory variable, and thus once accounted for it, other factors do not contribute greatly to the variation is risk scores.

We focus on the results from the regressions of the asset allocation variable RRA in specifications 5 - 8. Most importantly, masculinity is a significant factor for single male and female investors, and not significant for investors living with a partner. Thus, the finding holds both for genders, suggesting that higher masculinity as captured by the career choice of individuals is

associated with higher allocation in risky assets, and this is valid for both men and women. Its effect is negative and stronger for women than men, as observed by the coefficients.

Table 8. Regression on the asset allocation on masculinity, financial job and the control variables

The table presents results from the Tobit regression on the RRA variable, and differs from Table 7 in that two measures of financial jobs are added. 'Financial Job' is a dummy variable being 1 for respondents with a job in the financial sector, 0 otherwise. 'Financial*Masculinity' is a constructed variable between financial knowledge and masculinity, and serves as a proxy of whether individuals in a respective industry have a financial position. When the latter variable is included, the financial literacy factor is excluded to prevent collinearity. Urban is a variable taking the value of 1 when the respondent lives in an area with very high degree of urbanization, and 0 otherwise. Robust standard errors are provided in parenthesis. *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)
VARIABLES	All	All	Single	Single	Married	Married
Masculinity of industry	-0.140	-0.0494	-1.131*	-1.140*	0.0443	0.169
	(0.235)	(0.234)	(0.638)	(0.648)	(0.246)	(0.246)
Female*Masculinity	-0.0511	-0.129	-0.363	-0.313	0.132	0.0467
	(0.431)	(0.419)	(0.912)	(0.927)	(0.497)	(0.476)
Gender	0.376*	0.430**	0.511	0.484	0.222	0.290
	(0.215)	(0.210)	(0.453)	(0.460)	(0.253)	(0.246)
Age	-0.0447***	-0.0413**	-0.0353	-0.0366	-0.0476**	-0.0416**
	(0.0171)	(0.0173)	(0.0331)	(0.0332)	(0.0198)	(0.0205)
Age squared/1000	0.296**	0.270*	0.251	0.256	0.311*	0.263
	(0.145)	(0.148)	(0.282)	(0.283)	(0.168)	(0.174)
Education	-0.149***	-0.149***	-0.223***	-0.227***	-0.130***	-0.129***
	(0.0257)	(0.0257)	(0.0564)	(0.0569)	(0.0280)	(0.0280)
Partner	0.182**	0.184**				
	(0.0921)	(0.0915)				
Decision maker	-0.161*	-0.169**			-0.138*	-0.146*
	(0.0866)	(0.0856)			(0.0835)	(0.0825)
Main wage earner	0.126	0.130			0.0737	0.0828
	(0.110)	(0.109)			(0.121)	(0.122)
Children	-0.0333	-0.0293	0.260	0.247	-0.0500	-0.0456
	(0.0398)	(0.0397)	(0.197)	(0.194)	(0.0398)	(0.0397)
Log personal income	-0.0157	-0.0172	-0.0211	-0.0206	-0.0147	-0.0166
	(0.0155)	(0.0155)	(0.0491)	(0.0491)	(0.0155)	(0.0156)
Financial literacy	-0.111*		-0.119		-0.116	
	(0.0657)		(0.159)		(0.0710)	
Financial job	-0.141*		0.103		-0.194**	
	(0.0843)		(0.215)		(0.0888)	
Financial*Masculinity		-0.0792**		-0.0406		-0.0957**
		(0.0379)		(0.101)		(0.0408)
Urban	-0.0119	-0.00408	-0.0462	-0.0675	0.0150	0.0143
	(0.0957)	(0.0954)	(0.161)	(0.162)	(0.120)	(0.119)
Log unsecured debt	0.00611	0.00582	0.0148	0.0160	0.00301	0.00286
	(0.0104)	(0.0104)	(0.0255)	(0.0260)	(0.0110)	(0.0111)
Constant	3.790***	3.625***	4.231***	4.318***	3.940***	3.683***
	(0.587)	(0.594)	(1.228)	(1.224)	(0.673)	(0.691)
Observations	903	903	199	199	704	704
Prob>F	<0.0001	<0.0001	0.0003	0.0002	<0.0001	<0.0001
Pseudo R^2	0.1029	0.1010	0.1553	0.1536	0.0993	0.0959

Age impacts the asset allocation of married female investors only, and has a negative relationship with safe assets allocation, but as predicted the relationship is not linear, as the squared age term is positive and significant, suggesting that after a certain age women decrease their proportion in shares. This could be due to the expected lower cash flows in the future, when women are closer to retirement. As for the fact that age seems no to impact single women, this could be due to single women managing their wealth from an earlier age, and being in a highly masculine industry contributing more than the age to their investment decisions.

The personal income impacts the asset allocation of men, both single and married, and the higher income, the more men allocate to risky assets. An explanation could be that once individuals accumulate some savings, they tend to keep them in a savings or deposit account, as the default and easiest option, as most people automatically receive a savings account in addition to their current accounts. It seems that once men have guaranteed savings, they can afford to include risky assets in their portfolio, as they have enough guaranteed funds to allow higher risk on top.

4.4. Risk aversion and investment behavior comparison

To answer the last question of whether there are differences in the empirical results when risk aversion is measured as self-assessed versus observed behavior, I compare the findings from my analysis.

It is evident from the regression analysis, that masculinity does not impact the self-assessed risk aversion of individuals, after accounted for gender and other control variables, as Table 6, Specifications 4-6 show. It seems that women consider themselves more risk averse than men when it comes to financial matters. When we look at the actual asset portfolios of individuals, women also allocate less to risky assets compared to men, when looking at the whole sample (Table 7, Specification 4). Masculinity shows irrelevant for the asset allocation decisions of people in partnerships. However, for single investors, this does not hold, and it is masculinity that impacts the asset allocation decisions, as opposed to gender (Table 7, Specification 5). This holds even after controlling for a job in finance and explains also the variation in investing in between the men- and women-only samples (Tables 8, 9). From these findings, we can conclude that based on the model, we find different outcomes of masculinity impact on the risk attitude, when risk is measured as self-assessed versus actual behavior.

Table 9. Tobit regressions of the risk score and RRA segregated by gender and marital status

The table displays the results from the multivariate Tobit regressions on the risk score, within each gender sub-sample. Specifications 1-4 presents the results on the risk score, specifications 5-8, on the asset allocation variable RRA, respectively. For single individuals the variables decision-maker and main wage earner are omitted due to collinearity. In specification 7, also number of children is omitted due to collinearity. Robust standard errors are provided in parenthesis. *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.

	Risk Score				**RRA**			
	Men		**Women**		**Men**		**Women**	
	Single	Married	Single	Married	Single	Married	Single	Married
VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Masculinity	0.342	0.00934	-0.187	-0.0711	-1.229*	0.0766	-1.837**	0.0659
	(0.731)	(0.251)	(0.558)	(0.295)	(0.619)	(0.226)	(0.738)	(0.489)
Age	0.0482	0.00284	0.00161	0.0250	-0.0601	-0.0180	0.00301	-0.128***
	(0.0411)	(0.0256)	(0.0411)	(0.0356)	(0.0394)	(0.0223)	(0.0580)	(0.0460)
Age squared/1000	-0.357	0.0409	0.0720	-0.141	0.462	0.0733	-0.187	0.998**
	(0.343)	(0.215)	(0.365)	(0.351)	(0.326)	(0.190)	(0.501)	(0.415)
Education	-0.136*	-0.0621*	-0.111	0.0667	-0.202***	-0.103***	-0.273*	-0.242***
	(0.0786)	(0.0335)	(0.0865)	(0.0527)	(0.0602)	(0.0282)	(0.142)	(0.0842)
log personal income	0.00537	0.00306	0.0543	-0.0260	-0.115*	-0.0427**	0.0324	0.0493
	(0.0469)	(0.0136)	(0.0458)	(0.0198)	(0.0665)	(0.0181)	(0.0528)	(0.0326)
Financial literacy	-0.385	-0.149	0.0718	0.00945	-0.255	-0.114	0.307	-0.274
	(0.294)	(0.0966)	(0.224)	(0.157)	(0.195)	(0.0755)	(0.329)	(0.190)
Children	0.140	-0.0185	0.0216	0.00535	-0.246*	-0.0687		0.0683
	(0.255)	(0.0568)	(0.152)	(0.0638)	(0.128)	(0.0459)		(0.0846)
Decision maker		-0.0804		-0.0938		-0.131		-0.186
		(0.0980)		(0.125)		(0.0921)		(0.209)
Main wage earner		0.226		-0.00398		0.0913		0.114
		(0.162)		(0.147)		(0.158)		(0.224)
log unsecured debt					-0.0122	0.000171		0.00492
					(0.0308)	(0.0119)		(0.0297)
Constant	3.757**	4.947***	5.148***	4.602***	5.901***	3.142***	4.062**	6.430***
	(1.435)	(0.802)	(1.197)	(0.942)	(1.529)	(0.755)	(1.907)	(1.491)
Observations	105	563	116	312	94	465	105	239
Prob>F	0.1040	0.0070	0.2144	0.4386	0.0003	0.0002	0.0478	0.0891
Pseudo-R_sq	0.0250	0.0128	0.0263	0.0084	0.1518	0.0663	0.1238	0.1333

This finding is important as it introduces doubt into previous empirical research on the gender gap in risk preferences, as measured by self-assessed rather than observed behavior. It is also important for the real-life perceptions of others towards women being less willing to take risky decisions and less likely to hold stock.

The expectation of this paper was to find whether the gender gap in risk aversion and investment decisions could be mitigated by the introduction of a new variable – masculinity – as measured by how masculine the career sector of a person is. I found that masculinity, while significant together with other background characteristics, is not a relevant factor for risk aversion when gender is added to the model. In terms of actual investment behavior, I find that masculinity affects the asset allocation choices of single investors, and not the ones of people in a partnership. In addition, when masculinity is significant gender is no longer a relevant factor. This holds for both men and women. Thus, based on the data and model in this paper, masculinity does not affect risk attitude, and masculinity affects financial behavior only when the individual is single. Finally, based on this, we can say there is a difference in outcomes when risk attitude is measured by self-assessed versus observed risk taking.

Chapter 5. Limitations

Several limitations and suggestions for further research stem from my analysis. A threat for the validity of my findings is that it is difficult to account for changes in preferences in a cross-sectional analysis, and it is more appropriate to use a panel data approach (Betermier et al, 2012). This is because cross-sectional data is limited in a number of ways, and in relevance to my analysis, it could be that a person has recently changed his or her career sector, and has not yet rebalanced the portfolio weights. Particularly relevant problem for the outcome of this paper is that there is another possibly contradicting theory in terms of labor and the proportion invested in risky assets in the portfolio. Betermier et al (2012) find that individuals who change industry rebalance their portfolios, which is in line with the expectation in my analysis. The authors explain the rebalancing effect by the labor income risk theory which suggests that individual investors hedge their income risk by a "counter position" in their portfolio. More specifically, when an individual moves to a job or sector with a higher volatility of wages, they should reduce their holding in shares in order to decrease the volatility of the investment portfolio. This effect is important for our model to hold,

however it suggests that hedging income risk has the opposite effect compared to the effect from industry masculinity. This is especially true for our least masculine industries which make part of the government sector, where jobs are more secure than in for-profit sectors. However, it does not hold that the highly masculine industries are the most volatile in terms of salaries. In fact, as Betermier et al (2012) state, the lowest volatile industry in terms of wages is recycling metal waste, which in our analysis falls into the general sector of Industry and energy[15], which is highly masculine (68% as measured in our analysis). What all this implies is, that our findings might show weaker due to omitting income labor risk as explanatory variable.

Another limitation is that our main explanatory variable, masculinity, is too broad to account for within industry characteristics. There are several possible problems for the variable's validity. Firstly, as stated earlier, it could be that for an individual who allocates more to the risky asset, the driving factor is that he or she has a financial position, and it coincides that the person also works in a highly masculine industry. On the other hand, as Betermier et al (2012) find, individuals rebalance their positions when changing jobs, as a hedging device for labor risk. This lead to complicated outcomes, as for example a person working at a higher level in a financial institution has a relatively neutral career in terms of masculinity (suggests a 50/50 allocation between safe and risky assets), has high financial expertise and is familiar with financial products (suggests higher allocation to risky assets), but his salary is exposed to higher volatility (suggests a lower allocation to risky assets). Clearly, my analysis is limited in comparing which one of these, among other factors, is the driving force for investment decisions.

A suggestion to solve this puzzle, is to use the CentERpanel data in a panel data analysis, where one can observe how individual financial decision-making changes over time. Betermier et al (2012) suggest that more risk tolerant individuals choose to work in a riskier industry, which is in line with my method, but this is only the starting allocation, that changes with wage volatility observed over time. For future research, I suggest employing a panel data analysis, and including wage volatility and position within the company as additional variables.

Expanding the suggestion on the use of a panel data, there are also some limitations. Most importantly, 34% of the respondents in the CentERpanel are retired, meaning no change in industry

[15] Refer to footnote 9.

will occur for them. I suggest that for following research, the working or studying part of the population is taken over a period of time. Betermier et al (2012) use a 3-year period in their analysis, where change in jobs happens in the second year and the individual has another year to change their portfolio weights.

In addition, there is the possibility of reverse causality. Sapienza et al. (2009) suggest that risk aversion is a factor influencing career choices, and thus, my method is wrong in assuming that career choice influences risk aversion. However, my method finds no significant relationship between risk tolerance and masculinity. It is hard to understand how people's risk aversion changes. I would suggest that it changes simultaneously with changes in career preferences, as evidence suggest that gender differences in risk aversion disappear in professional environment (Masters and Meier, 1988; Johnson and Powell, 1994). The question still remains: do individuals become less risk averse after working in a particular role, or are less risk averse people more likely to choose this career as a consequence? Furthermore, previous findings are mostly based on managerial roles, rather than lower levels of employees, thus higher the financial expertise on the part of managers may be the cause of lower risk aversion and more investment in risky assets. One possible suggestion for resolving the issue in future research is by asking respondents to the panel data to complete the risk attitude questionnaire before and after they change careers. Then it would be evident whether there is a change in risk scores, and in what direction, due to the change in career. The rest of the control variables should also be included, so the researcher can capture potential effects from other factors.

Finally, considering cross-country and cultural differences, it could be that the findings from this paper would not hold for other countries. Although the CentERpanel data has over 5,000 respondents, after removing participants with uncomplete data, my final sample consisted of around 1,000 individuals. Moreover, the statistically significant results on single individuals cover 199 observations. Thus, the statistical validity of the test might be argued. It is advisable that future research consider datasets from different countries. For example, comprehensive surveys are provided for the US population (The Survey of Consumer Finances, as used in e.g. Jianakoplos and Bernasek, 1998; Hibbert et al, 2013); Swedish population (as in Betermier et al, 2012; Massa and Simonov, 2006); or Danish (Christiansen et al, 2008). Of course data is not limited to these

countries only, and future researchers can also explore other countries, especially the ones with distinct cultural differences or ones with emerging markets (e.g. Feng and Seasholes, 2008).

Chapter 6. Conclusion

In this paper, I investigate whether masculinity contributes to explain the gender gap in risk aversion and investments. I use the industry sector where people work, as a proxy to measure masculinity. I find that masculinity has no effect on self-assessed financial risk taking, where gender is the main contributing factor to stated risk aversion, with women being more risk averse than men. I find, however, that for observed financial risk taking, namely proportion allocated to risky assets in the portfolios, higher masculinity is associated with higher allocation to the risky assets for single individuals. The finding holds for both single men and women. In addition, for single individuals, gender is no longer significant when masculinity is accounted for, suggesting that previous findings that gender differences are greater for singles, might have overlooked an important factor, leading to incomplete models.

For married investors, or ones living with a partner, I find that gender does not affect their asset allocation decisions, which supports previous findings. My results contribute on the debate of whether household or individual decision-making should be the primary focus of research on the allocation of wealth within individual investors. It seems that the decisions that people make once they move in with a partner differ from their preferences when being single. My findings suggest that single individuals are either more sensitive to the masculinity of their working sector, or that masculinity is a strong individualistic characteristic determining people's financial risk taking, but once there is a spouse in the household, the partners seem to work in a joint decision-making process where the financial expertise matters more than both masculinity and gender.

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Appendix 1

	Pension fund	Industry
1	ABP	O-P Government and education
2	PGGM & Pensioenfonds Zorg en Welzijn	Q Health and social care
3	Metaal en Techniek (metal and engineering)	B-E Industry (no construction), energy
4	Bouwnijverheid (construction)	F Construction
5	Detailhandel (retail)	G-I Trade, transport, hotels, catering
6	Schoonmaak- en Glazenwassersbedrijf ((window) cleaning)	K Financial institutions, M-N Business services
7	Bedrijfstakpensioenfonds voor langdurige uitzendkrachten (Stiplu)& (StiPP) .	K Financial institutions, M-N Business services
8	Beroepsvervoer over de Weg (transport people)	G-I Trade, transport, hotels, catering
9	Horecabedrijf (catering)	G-I Trade, transport, hotels, catering
10	Metalektro (PME) (metal and electricity)	B-E Industry (no construction), energy
11	Beroepsgoederenvervoer over de Weg en de Verhuur van Mobiele Kranen	G-I Trade, transport, hotels, catering
12	Werk en Reintegratie (work and reintegration)	Q Health and social care
13	Landbouw (agriculture)	A Agriculture, forestry and fishing
14	Levensmiddelen (food)	G-I Trade, transport, hotels, catering
15	Flexsecurity	K Financial institutions, M-N Business services
16	Rabobankorganisatie (Rabobank)	K Financial institutions, M-N Business services
17	TNT Postbezorgers (postal)	G-I Trade, transport, hotels, catering
18	Grafische bedrijven (graphical companies)	K Financial institutions, M-N Business services
19	Schilders-, Afwerkings- en Glaszetbedrijf (painter, finishing, and glass companies)	K Financial institutions, M-N Business services
20	Wonen (housing)	L Renting, buying, selling real estate
21	ING	K Financial institutions, M-N Business services
22	Bakkersbedrijven	G-I Trade, transport, hotels, catering
23	Woningcorporaties	L Renting, buying, selling real estate
24	Spoorwegpensioenfonds	G-I Trade, transport, hotels, catering
25	Philips	B-E Industry (no construction), energy
26	AHOLD	G-I Trade, transport, hotels, catering
27	VENDEX KBB	G-I Trade, transport, hotels, catering
28	ABN AMRO	K Financial institutions, M-N Business services
29	Apotheken	Q Health and social care
30	UWV	Q Health and social care
31	KPN	J Information and communication
32	Meubelindustrie en Meubileringsbedrijven	B-E Industry (no construction), energy
33	Achmea Personeel	K Financial institutions, M-N Business services
34	APF	B-E Industry (no construction), energy
35	Architectenbureaus	K Financial institutions, M-N Business services
36	DSM Nederland	B-E Industry (no construction), energy
37	Fysiotherapeuten	Q Health and social care
38	Heineken	B-E Industry (no construction), energy
39	Hoogovens	B-E Industry (no construction), energy
40	Huisartsen	Q Health and social care
41	IBM Nederland	J Information and communication
42	KLM	G-I Trade, transport, hotels, catering
43	Koopvaardij	G-I Trade, transport, hotels, catering
44	Media PNO	J Information and communication
45	Medische Specialisten	Q Health and social care
46	Openbaar Vervoer (public transport)	G-I Trade, transport, hotels, catering
47	Progress Unilever	B-E Industry (no construction), energy
48	Protector	B-E Industry (no construction), energy
49	Shell	B-E Industry (no construction), energy
50	SNS Reaal Groep	K Financial institutions, M-N Business services
51	TNO	K Financial institutions, M-N Business services
52	Zorgverzekeraars	Q Health and social care