Which socio-demographic factors determine risk taking behaviour of investors?

An overview of the existing literature

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Abstract

Which socio-demographic factors influence the risk taking in investments? The literature considering the influence factors of investor risk tolerance is extensive, but also inconclusive. This makes it unclear which factors do and which do not influence the risk taking of investors. This survey will give an overview of all the relevant socio-demographic factors that influence investor risk taking. Data from different studies will be assembled to answer this question. The thesis shows that education and wealth are the most influential variables, followed by gender and age. The variables culture, race, occupation, religion and height have a minor impact on investor risk tolerance. The effect of marital status and dependents is unclear.

Keywords: risk taking, investment, socio-demographic factors

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1. Introduction

Risk profiling is a common measure of banks to measure the risk taking of clients. This risk profile gives the bank knowledge of the riskiness of investments an investor is likely to make. Risk profiles are important for banks, because different risk profiles ask for different types of investments. When the risk profile of an investor is known, the bank can decide how much it will invest in equities, bonds or stocks. A person's risk profile is dependent of three factors: the willingness to take risk; the ability to take risk; and the need to take risk (Finemetrica, 2016; Vanguard, 2016). The willingness to take risk (also called risk tolerance or risk attitude) is described by the level of risk taking a person is comfortable with (Finemetrica, 2016). The ability to take risk is measured through the level of financial risk a client can afford to take (Finemetrica, 2016). This is dependent of a client's investment horizon and level of wealth relative to liabilities (Vanguard, 2016). The need to take risk, or the risk required, is dependent of a person's goals. This is the risk which is needed to achieve these goals given his or her financial resources (Finemetrica, 2016). The need and ability to take risk are financial measures, which can be obtained by the personal financial situation of a client. The risk attitude on the other hand is a psychological measure and is often measured through questionnaires composed by banks. These questionnaires are constructed to determine the financial knowledge, comfort with risk, investment choice and emotions that arise from making the wrong decision, of the client (Vanguard, 2016). The combination of these questionnaires and the financial situation of a client determines the estimated risk profile of investors.

When looking at the literature on financial risk taking or risk attitudes, multiple demographic factors such as age, gender, culture and education seem to influence the risk taking of people (Dohmen et al., 2011; Grable, 2000). Current questionnaires developed to measure risk attitudes however, do not seem to be interested in these factors. This might be caused by the overflow of information on this topic, which makes it unclear which factors are important and which are not. While multiple scholars found socio-demographic impact factors that seem to influence risk taking in the investment domain. The results of these scholars often contradict, making the field fragmented and inconclusive. Authors all differ in the chosen factors of influence, which makes it difficult to compare them.

This thesis will therefore give an overview of the current theories on risk attitudes and attempts to determine the relevant socio-demographic factors that influence the risk attitude of investors. This overview will attempt to answer the following research question:

Which socio-demographic factors influence investor risk taking?

The focus of this thesis will be on investment risks, because this is the type of risk questionnaires try to measure. It is important to solely focus on investment risk, because a risk attitude in one domain does not imply the same risk attitude in another domain (Blais & Weber, 2006). Individuals show different degrees of risk taking and different perceptions of risk when they operate in different domains (Blais and Weber, 2006). This implies that the risk attitude regarding investments does not necessarily match the risk attitude in the recreational or social domain. A second distinction is made between financial risk and investment risk. Even though investment risk is correlated with risk taking in financial matters, there is a difference between both measures (Dohmen et al., 2011). Investment risk is a subsection of financial risk, where investment risk only covers investments, financial risk also concerns risk taking in everyday money matters. To make a clarifying overview, this thesis only considers literature on investment risk.

1.1 Risk preference and risk perception

Before making the overview, it is important to look more closely at risk tolerance. When considering risk tolerance, a distinction can be made between risk preference (or attitude) and risk perception. Risk preference is the willingness of someone to take risks. People with a higher risk preference take more risks because they are more attracted to risk (Weber and Milliman, 1997). When considering risk preference, people are aware of the risks they take and deliberately take more or less risks. The risk perception on the other hand is determined by the way a person perceives risk. How a person estimates the risk determines the amount of risk taking (Weber and Milliman, 1997). Both risk preference and risk perception determine someone's eventual risk taking, but in a different way. While people with a higher risk preference prefer more risks, people with a higher risk perception think they take less risks than they do. Entrepreneurs for example do not have a higher willingness to take risk, but perceive risks lower than other managers (Weber, 2009). When the difference in risk perception is factored out, entrepreneurs prefer options they perceive as moderate risks (Weber, 2009). Both the risk perception and risk preference influence the actual risk tolerance which is measured through the questionnaires. The socio-demographic variables used in this thesis often influence the risk preference as well as the risk perception.

1.2 Factors of influence

Multiple authors have investigated the effect of different variables on risk tolerance. To make a comprehensive overview, this thesis will consider all socio-demographic factors of influence measured by these authors. These factors of influence are: gender, age, wealth/income, education, occupation, race, culture, marital status, religion, dependents/family size and height. All these variables are mentioned by one or more authors and are believed to influence investor risk tolerance. There are already some popular opinions about these factors. (1) Men are considered more risk tolerant than women. (2) Older individuals invest in less risky assets than younger individuals. (3) Individuals with more financial resources are less risk averse than less wealthy individuals. (4) Individuals who have attained higher levels of education are more risk seeking. (5) professionally employed individuals are more risk tolerant than non-professionally employed individuals. (6) Whites tend to be more risk tolerant than non-whites. (7) Individualist cultures are associated with higher levels of risk taking. (8) Married people are more risk averse than single people. (9) Religious people, take less risks when investing than non-religious individuals. (10) Individuals with a smaller family size are more risk tolerant than individuals with bigger families. (11) Taller individuals, at last, are more risk taking than smaller individuals. This thesis will investigate whether the previous assumptions are indeed supported by the academic literature.

The rest of the thesis is organized as follows. Section 2 explains the used method. This section considers the classification of the articles and journals. Section 3 gives an overview of the existing literature, the different influence variables are extensively discussed in this section. The fourth section consists of the conclusion in which the different influence variables are reviewed. This section also discusses the implications for the questionnaire and suggests on further research.

2. Methodology

The purpose of this research is to construct an overview of the existing literature concerning the socio-demographic factors that influence investor risk taking. To make a comprehensive overview, different articles need to be compared. the following subsections will elaborate on the comparison of the papers.

2.1 Classification of articles

Per article the analysis starts with discovering whether the authors believe the impact factor affects investor risk tolerance or not. The second step is the identification of the effect, does the influence factor increase or decrease the risk tolerance? The articles are all listed in chronological order. This makes it possible to see whether the opinion about the effect of a variable is time dependent. The coefficients of the different effects are also important. Some variables have a bigger impact on risk tolerance than others. To compare the different coefficients, the papers that measured multiple impact factors are used. These papers are able to compare the strength of the different variables.

2.2 Journal rankings

Journal rankings is one of the most common instruments to differentiate between the quality of journals. There are several organisations specialized in the ranking of journals. First, the VHB journal rating, which is a ranking of journals relevant to business research. Journals were evaluated by VHB members and received a ranking based on these evaluations (VHB, 2017). Journals are ranked from A+ ("outstanding and leading international academic business research journals") to D ("academic business research journals") (VHB, 2017). Journals that were not considered academic are labelled "not an academic journal" and journals that were given less than 25 evaluations are labelled "no ranking" (n.r.). The advantage of the VHB ranking is that it only covers business journals, and therefore specifies the field. The disadvantage however is that some journals are not ranked due to lack in evaluations. A second ranking instrument is used to increase the number of journals with a ranking. This second ranking instrument is the Journal Impact Factor. The Journal Impact Factor is accessible through Web of Science and measures the frequency with which an average article is cited (Clarivate Analytics, 2017). The annual journal impact factor is a ratio between citations and the citable articles published per year (Clarivate Analytics, 2017). The annual journal impact factor is based on the citations and citable articles published in the previous two years. Meaning the journal impact factor of 2016 concerns the citable items and citations of 2014 and 2015. To match the impact factor with the publication date of the article, the impact factor of the second

year following the publication is taken. Data of the impact factor go back to 1997, therefore journal that are written more than two years before 1997 are rated with the impact factor of 1997. The journal impact factor and the VHB journal ranking contribute to a better understanding on the influence of the used articles. Journal rankings however, do not necessarily indicate whether a certain paper is important or not. The times an article is cited corrects for this.

2.3 Citations

While journal rankings inform about the quality of the overall journal, the citation frequency per article gives insights on the actual influence of the article. There are different citation search engines of which Google Scholar, Scopus and Web of Science are the most important. The limitations of Scopus and Web of Science is that both search engines only search for papers. Citations of books or book chapters cannot be measured through these engines. The database of Google Scholar does not only include articles, but also books and book chapters. This makes the search engine more compatible for this research, in which some books are used to derive information from.

3. Results

The following section presents an overview of the existing literature. The literature is discussed per influence factor.

3.1 Gender

Table 3.1: Gender

Study	Effect (yes/no)	Assumed to be more risk tolerant	VHB Journal Ranking	Impact factor journal	Times cited
Baker and Haslem 1974	Yes	Men	B	0.407	77
Cohn et al. 1975	No		A+	2.173	435
Grable and Lytton 1998	Yes	Men	--	--	233
Jianakoplos and Bernasek 1998	Yes	Men	--	0.516	1437
Grable and Lytton 1999a	Yes	Men	--	--	103
Schubert et al. 1999	No		A+	1.630	722
Palmer 2003	No		--	1.634	115
Hallahan et al 2003	Yes	Men	--	--	89
Guiso and Paiella 2008	No		n.r.	1.703	616
Dohmen et al. 2011	Yes	Men	n.r.	3.356	1374
Charness and Gneezy 2012	Yes	Men	A	1.297	358
Weber et al. 2013	Yes	Men	A	2.012	85
Farrell 2014	Yes	Men	(book)	(book)	1
Nelson 2016	Yes	Men	--	1.476	21

One of the most common factors used for differentiation purposes is gender. The popular opinion among scholars is that women are more risk averse than men (Byrnes et al., 1999; Charness and Gneezy, 2012; Croson and Gneezy, 2009; Dohmen et al., 2011; Farrell, 2014; Grable and Lytton, 1998; Powell and Ansic, 1997). While gender is one of the influence factors used by Baker and Haslem in 1974, it was only extensively investigated in the 1990s. While in

1990 it was generally accepted that men are more risk seeking than women, there was no consensus among scholars regarding the effect of gender. Recent literature on the effect of gender on investment risk is more consentient and most scholars believe that gender influences the risk taking of investors. Charness and Gneezy (2012) for example found that "women make smaller investments in risky assets than do men" (p. 57). The reasoning behind this can be found in risk perception and risk attitude. Women often perceive a situation riskier than men do and are therefore inclined to take less risks (Dawson and Henly, 2015). Besides a difference in risk perception, there is also a difference in risk attitude (Dawson and Henly, 2015). Women prefer to invest more conservative than men. The combination of risk perception and the intention to take less risks makes women more risk averse than men (Byrnes et al., 1999; Dawson and Henly, 2015).

There are however, still authors who argue that gender does not influence investment risk taking (Cohn et al., 1975; Guiso and Paiella, 2008; Palmer, 2003; Schubert, 1999). Palmer (2003) for example found that there is a difference in risk taking present in the health domain, but not in the financial domain. Cohn et al. (1975) find no significant correlation between gender and risk tolerance, but argue that there is an interaction effect between gender and wealth. Cohn et al. (1975) argue that risk aversion is relatively decreasing with wealth and find that this effect is stronger for male than for female investors. this would imply that gender does influence investor risk tolerance after all. When looking at the literature on gender and risk tolerance the predominant opinion is that gender matters.

The strength of the correlation between gender and risk tolerance is less clear. Most authors argue that gender explains only a small part of the variance in risk tolerance. When comparing gender with other demographic factors, it is often argued to only have a minor impact on risk tolerance (Baker and Haslem, 1974; Grable and Lytton, 1999a; Hallahan et al, 2003; Jianakoplos and Bernasek, 1998). However, some authors found the opposite and argue that gender is one of the main explanatory powers among the demographic factors (Grable and Lytton, 1998; Weber et al., 2013). A third group of authors only look at the effects of gender without considering other factors (Charness and Gneezy, 2012; Nelson, 2016; Schubert et al., 1999). This might lead to biased results, because other factors of influence could affect this difference as well. The coefficients found in their research are therefore not used to compare gender to other factors of influence. It is assumed that gender explains a minor part of the variance in risk tolerance, because most authors support this argument.

3.2 Age

Table 3.2: Age

Study	Effect (yes/no)	Assumed to be more risk tolerant	VHB Journal Ranking	Impact factor journal	Times cited
Baker and Haslem 1974	Yes	Younger	B	0.407	77
Cohn et al. 1975	Yes	Older	A+	2.173	435
Riley and Chow 1992	Yes	Older (but <65)	B	0.671	474
Grable and Lytton 1998	No		--	--	233
Grable and Lytton 1999a	Yes	Older	--	--	103
Hallahan et al. 2003	Yes	At age 30 – 40	--	--	89
Jianakoplos and Bernasek, 2006	Yes	At age 22.5	n.r.	0.645	86
Guiso and Paiella 2008	No		n.r.	1.703	616
Dohmen et al. 2011	Yes	Younger	n.r.	3.356	1374
Weber et al. 2013	No		A	2.012	85
Farrell 2014	Yes	At age 30 – 40	(book)	(book)	1

Another demographic factor that is frequently argued to determine the risk attitude of investors is age. The general belief is that older investors have less time to recover from potential losses and therefore tend to make less risky investments (Grable and Lytton, 1998; Jianakoplos and Bernasek, 2006). Multiple authors found results in line with this argument. Some authors however found that older people make riskier investments than younger ones (Cohn et al., 1975; Grable and Lytton, 1999a; Riley and Chow, 1992). While other authors lack to find any significant relationship between age and investor risk taking (Grable and Lytton, 1998; Guiso and Paiella, 2008; Weber et al., 2013).

Among the authors who argue that older people make less risky investments, some argue that the relationship between risk taking and age is non-linear (Farrell, 2014; Hallahan et al., 2003; Jianakoplos and Bernasek, 2006). These authors argue that risk tolerance is a concave function of age, meaning that the risk tolerance first increases with age but decreases after a

certain age is reached. At which age the risk tolerance decreases is still debated. Jianakoplos and Bernasek (2006, p.996) found a quadratic relationship (concave) between age and risk tolerance with a peak at 22.5 years. This is inconsistent with Farrell (2014, p. 126) and Hallahan et al. (2003, p.495), who found a peak between age 30 and 40. When taking a closer look at the observed risk-age profile constructed by Jianakoplos and Bernasek (2006), the mean ratio of risky assets peaks between the age 30 and 54. This mean ratio of risky assets is different form the pure age effect, which is used to construct the age-risk profile. However the mean ratio of risky assets is a common measure of risk tolerance, therefore the mean ratio of risky assets will be used to measure the risk tolerance. This assumption also links the research of Jianakoplos and Bernasek (2006) to Farrell (2014) and Hallahan et al. (2003), all authors agree on a peak in risk tolerance around the age 30 to 40 or 30 to 50. Riley and Chow also investigate a turning point in the effect of age, but they use a different method than the previous authors. Riley and Chow (1992) include a variable which measures the risk taking after age 65. This variable turns out to be positive, meaning that the risk aversion increases after the age of 65 (Riley and Chow, 1992, p.37). The coefficient of the normal age variable has a negative coefficient. The combination of both variables shows that individuals become less risk averse when aging but become more risk averse when passing the age of 65. Riley and Chow assume that the risk tolerance reached a peak just before the age of 65, but do not measure this. It could therefore be possible that the risk tolerance peaks much earlier.

Most of the results from previous authors point towards a peak between the ages 30 to 40. Some authors argue that risk tolerance is a linear function of age instead of a concave one (Baker and Haslem, 1974; Dohmen et al., 2011). The linear function found by Baker and Haslem can be explained by the distribution of age. Baker and Haslem divided age into three categories, under 35, between 35 and 54 and over 54 (1974, p. 472). If the function is indeed concave and has the top at age 30 to 40. This would not be measured by Baker and Haslem, meaning the function could still be concave. Dohmen et al. (2011)do not test whether age has a linear or a quadratic effect on investor risk tolerance. They did find that age influences general risk taking linearly, but this is not tested for risk taking in financial matters. Dohmen et al. do not measure the influence of age on risk tolerance in the investment domain directly. They measure this via the influence of age on financial matters and the correlation between financial matters and risk taking in the investment domain (Dohmen et al., 2011, p. 539). This means that a concave function is possible, but not tested.

When looking at the strength of the age effect, it appears that age only marginally influences risk tolerance. While one could think this is due to the measurement scale, one year increase or decrease in age will presumably have a minor impact in the risk tolerance, this is not the case. Most articles transmit age into a categorical variable. A more suitable explanation for this small coefficient could be the concave function that characterizes age. When this is not measured, the coefficient of age could appear smaller than it is. When looking at the coefficient of age after 65, it shows a coefficient which is approximately fifteen times larger than the original age effect (Riley and Chow, p. 35). However, Hallahan et al. (2003) found the quadratic function of age to have a coefficient of only 0.0002, meaning the concave function does not necessarily increase the coefficient. It is therefore assumed that age only has a moderate impact on investor risk taking.

Hallahan et al. (2003) also found another interesting result, namely that the risk tolerance of men and women is differently affected by age. The risk tolerance of women decreases more rapidly with age than the risk tolerance of men (Hallahan et al., 2003). Jianakoplos and Bernasek (1998) also argue that the risk tolerance of men and women is differently affected by age. They show that single women become more risk seeking when approaching their forties, while single men become more risk averse when approaching this age (Jianakoplos and Bernasek, 1998, p. 629). When the forties are reached however, the risk aversion of both men and women stays around the same level, until the age of 65. After this age, the risk tolerance of both single men and women rapidly decreases (Jianakoplos and Bernasek, 1998, p. 629). The risk tolerance of married people stays stable during the entire age range and is around the same level as the risk tolerance of single men and women around 35 to 65 (Jianakoplos and Bernasek, 1998).

3.3 Wealth/Income

Table 3.3: Wealth/income

Study	Effect (yes/no)	Assumed to be more risk tolerant	VHB Journal Ranking	Impact factor journal	Times cited
Baker and Haslem 1974	No		B	0.407	77
Cohn et al. 1975	Yes	High	A+	2.173	435
Riley and Chow 1992	Yes	High	B	0.671	474
Jianakoplos and Bernasek 1998	Yes	High	--	0.516	1437
Grable and Lytton 1998	Yes	High	--	--	233
Grable and Lytton 1999a	Yes	High	--	--	103
Hallahan et al. 2003	Yes	High	--	--	89
Jianakoplos and Bernasek 2006	Yes	High	n.r.	0.645	86
Guiso and Paiella 2008	Yes	High	n.r.	1.703	616
Dohmen et al. 2011	Yes	High	n.r.	3.356	1374
Weber et al. 2013	No		A	2.012	85
Farrell 2014	Yes	High	(book)	(book)	1

Wealth or income is a third factor that might influence the amount of risk someone takes. Wealth and income differ in definition, wealthy people can have no income and people with high incomes are not necessarily wealthy. Wealth is often measured through assets, while income represents the annual income. On average, both variables are highly correlated and their effect is often measured in the same direction (Cohn et al., 1975). The variables are therefore combined in this research. The current literature regarding wealth and income argues that people with a higher income or who are more wealthy, invest more in risky assets. The reasoning behind this relies on common sense, people who are wealthier can invest in riskier assets, because a loss is less problematic. Meaning, wealth or income increases the risk taking of investors (Cohn et al., 1975; Dohmen et al., 2011; Farrell, 2014; Guiso and Paiella, 2008;

Grable and Lytton, 1998; Grable and Lytton, 1999a; Hallahan et al., 2003; Jianakoplos and Bernasek, 1998; Riley and Chow, 1992). Table 3.3 shows that all authors who argue that wealth influences risk tolerance agree about the direction of the effect.

While there is consensus about the overall direction of the effect, some authors argue that income or wealth does not linearly influence investor risk taking. Hallahan et al. (2003) and Guiso and Paiella (2008), found a concave effect instead of a linear one. Hallahan et al. argue that risk tolerance increases with wealth, but when income exceeds $200 000, the risk tolerance decreases (2003, p. 499). This could imply that the very wealthy of society are more concerned protecting their wealth rather than increasing it. Guiso and Paiella, argue that risk tolerance is and increasing and concave function of financial assets plus household income. However, instead of the decrease found by Hallahan et al. (2003), Guiso and Paiella argue that the risk tolerance stagnates after a certain income is reached. Riley and Chow (1992) argue the other way around, they found that the risk tolerance further increases after a certain wealth level is reached. All three articles show a different influence of wealth or income on risk tolerance. The difference found by the previous authors could be caused by the usage of different measurement units. Hallahan et al. (2003) consider solely income, while Riley and Chow (1992) only consider wealth and Guiso and Paiela (2008) combine income and wealth. This could mean that risk tolerance decreases after a certain level of wealth is reached, but increases when a relatively similar amount of income is reached. Both effects counterpart each other, which could lead to the stagnating effect found by Guiso and Paiella. Besides these three articles, all other authors argue that wealth or income linearly affect risk tolerance.

Jianakoplos and Bernasek (1998) also argue in favour of a linear correlation between wealth and investor risk tolerance. They do however also argue that this correlation is influenced by gender. Where increasing wealth leads to an increase in risk tolerance for both men and women, the risk tolerance of men increases more steep than for women (Jianakoplos and Bernasek, 1998). Meaning that there is indeed a linear relationship, but the actual coefficient differs between men and women.

When looking at the coefficient of wealth, the results are very mixed. Some authors argue that wealth or income is one of the main variables of interest (Cohn et al., 1975; Grable and Lytton, 1999a; Guiso and Paiella, 2008; Hallahan et al., 2003) They argue that wealth has a greater explanatory power than variables like gender, age or marital status. Other authors argue that variables like age and gender influence risk tolerance more than wealth (Dohmen et al., 2011; Farrell, 2014; Jianakoplos and Bernasek, 1998; Riley and Chow, 1992). The

discrepancy between different authors could be caused by differences in measurement units and respondents. Wealth or income probably has a similar influence on investor risk tolerance as gender and age.

Besides a difference in the assumed coefficient of wealth, some authors believe that there is no relationship at all between wealth and risk tolerance (Baker and Haslem, 1974; Weber et al., 2013). Weber et al. (2013) tested the influence of multiple demographic factors on risk tolerance and found that only gender and number of dependents matter. This contradicts with most authors, who found a significant influence of multiple variables. Why Weber et al. do not observe an influence is unclear. Baker and Haslem (1974) found that income does influence the expected dividend yield, but that it does not influence the risk tolerance variables. They acknowledge that this result is not consistent with results from other studies, but there is no additional explanation given for the lack of this effect. Only two of the articles argue that wealth or income does not matter, compared to ten articles that argue wealth or income matters. It is therefore assumed that wealth or income significantly influences risk tolerance.

3.4 Education

Table 3.4: Education

Study	Effect (yes/no)	Assumed to be more risk tolerant	VHB Journal Ranking	Impact factor journal	Times cited
Baker and Haslem 1974	Yes	Higher	B	0.407	77
Cohn et al. 1975	No		A+	2.173	435
Riley and Chow 1992	Yes	Higher	B	0.671	474
Grable and Lytton 1998	Yes	Higher	--	--	233
Grable and Lytton 1999a	Yes	Higher	--	--	103
Hallahan et al. 2003	No		--	--	89
Guiso and Paiella 2008	Yes	Higher	n.r.	1.703	616
Dohmen et al. 2011	Yes	Higher	n.r.	3.356	1374
Farrell 2014	Yes	Higher	(book)	(book)	1
Parental education					
Dohmen et al. 2011	Yes	Educated parents	n.r.	3.356	1374

Another factor that seems to influence investor risk tolerance is education. The general belief concerning education, is that people who obtained higher levels of education take more investment risks (Baker and Haslem, 1974; Dohmen et al., 2011; Farrell, 2014; Grable and Lytton, 1998; Guiso and Paiella, 2008; Riley and Chow, 1992). Individuals who are higher educated are better able to assess risks and benefits carefully and are exposed to more investment options (Grable and Lytton, 1998; Riley and Chow, 1992). This implies that education increases the understanding of risks inherent to investments and therefore increases the level of risk tolerance. Most authors indeed found that a higher educational level leads to increased risk tolerance (Baker and Haslem, 1974; Dohmen et al., 2011; Farrell, 2014; Grable and Lytton, 1998; Guiso and Paiella, 2008; Riley and Chow, 1992).

The effect of education is argued to be linear. Multiple authors consider education as the most influential variable to risk tolerance (Grable and Lytton, 19998; Grable and Lytton 1999a, Riley and Chow, 1992). These authors all measure the level of education, making the variable an interval variable. When looking at the authors who argue education has moderate impact on risk tolerance it is noticeable that all used a different type of measurement. Instead of using the level of education, these authors measured education by the dichotomous variable educational degree (Dohmen et al., 2011; Farrell, 2014; Guiso and Paiella, 2008). Dohmen et al. use the *Abitur*, an exam that is a prerequisite for attending university (2011, p. 529). Guiso and Paiella measure education by the junior high school diploma, which is considered a rather basic diploma (2008, p. 1132). Farrell measures education through different dichotomous variables, from associate degree to doctorate (2014, p. 128). The difference in level of measurement could be an explanation for the difference in coefficients measured. The actual level of education is more precise and might therefore be a better predictor of risk tolerance. Especially the coefficient of education measured by Guiso and Paiella is small compared to other authors. This could easily be explained when considering that a junior high school diploma is a low threshold. It would therefore only have a minor impact on the understanding of risks inherent to investments and only moderately influence the risk tolerance.

Dohmen et al. (2011) also investigate the effect of parental education. They do this through measuring whether the parents of the respondent passed their *Abitur* or not. The results show that only the educational level of the father influences the risk tolerance. Children of fathers who passed the *Abitur* exam are more risk tolerant than children of fathers who did not pass the exam. The educational level of the mother had no influence on the risk tolerance. The effect of parents level of education on the risk tolerance of investors is only measured by Dohmen et al. Further research might answer whether the parental education indeed influences the risk tolerance of investors.

Besides the difference in coefficients, all authors of the previous three subsections argue that education matters. There are however also authors who conclude that education does not influence risk tolerance (Cohn et al., 1974; Hallahan et al., 2003). Cohn et al. (1975) measure education by years of education and are the only authors applying this measurement scale. This might explain the lack of findings in their research. While years of education is a good proxy for educational level, it is less accurate than educational level. An increase in the years of education attained does not necessarily cause an increase in the educational level. Besides these

two articles arguing against an effect, most literature points towards a correlation between education and risk tolerance.

3.5 Occupation

Table 3.5: Occupation

Study	Effect (yes/no)	Assumed to be more risk tolerant	VHB Journal Ranking	Impact factor journal	Times cited
Baker and Haslem 1974	No	Not given	B	0.407	77
Cohn et al. 1975	Yes		A+	2.173	435
Grable and Lytton 1998	Yes	Professional	--	--	233
Grable and Lytton 1999a	Yes	Professional	--	--	103

Occupation is another variable that might influence the willingness to take risks. Grable and Lytton argue that individuals who are professionally employed are more likely to have higher levels of investor risk tolerance (1998, 1999a). The literature on occupation is less extensive than the literature on the previous influence factors. This makes it harder to evaluate the effect of occupation on risk tolerance. Besides Grable and Lytton, Baker and Haslem and Cohn et al. also investigate the influence of occupation. Cohn et al. (1975) initially did not find a significant correlation between occupational level and risk tolerance. However, when considering a different analysis which corrects for possible interaction effects, occupation does seem to influence risk tolerance. Cohn et al. (1975) do not specify on the direction of the effect. Contrary to Coh et al and Grable and Lytton, Baker and Haslem found no significant correlation between occupation and risk tolerance. Baker and Haslem (1974) tested the effect of occupation in a single regression but found no significant correlation between the occupational level and investor risk tolerance.

The coefficient of the effect is only given by Grable and Lytton. In 1998 Grable and Lytton found that occupation only has a minor influence on risk tolerance. In their article of 1999 however, occupation is considered one of the main explanatory variables for risk

tolerance. Cohn et al. (1975) do not investigate the coefficient or direction of the effect, but their analysis does show that occupation is only of minor importance. When looking at the results in chronological order it reveals that the more recent articles report an influence of occupation, while the more dated article does not. The article of Cohn et al. found no correlation between occupation and investor risk tolerance in the first place, but did find an effect when correcting for interacting variables. The research of Baker and Haslem however, concerned a single regression and is therefore not influenced by interacting variables. Still, it could be possible that improved research conditions and tools might be an explanation for the change in findings. New research concerning the effect of occupation on investor risk tolerance might provide a solution.

3.6 Race

Table 3.6: Race

Study	Effect (yes/no)	Assumed to be more risk tolerant	VHB Journal Ranking	Impact factor journal	Times cited
Grable and Lytton 1998	Yes	Whites	--	--	233
Palmer 2003	No		--	1.634	115
Jianakoplos and Bernasek 2006	Yes	Whites	n.r.	0.645	86
Brown 2007	Yes	Whites	--	--	26
Farrell 2014	Yes	Whites	(book)	(book)	1

When going back to physical characteristics, race is often argued to influence investor risk tolerance. It is important here to first make a distinction between race and culture. People with the same culture could have a different race and the other way around. When comparing risk tolerance in the investment domain based on race, most authors categorize race into whites, African Americans (or blacks) and Hispanics. When distinguishing individuals based on culture, people from different countries are compared.

The most common example of race influencing risk taking, is the 'white male effect', which presumes that white males are the most eager to take risks (Finucane et al., 2000). The 'white male effect' is commonly used to explain differences in risk taking in health issues. When applying this to economical, and especially investment issues, the effect is disputed. Palmer (2003) for example found no evidence that white males perceive risks lower than any

other subgroup. Palmer (2003) argues that no ethnic subgroup deviates from other subgroups, meaning that race does not influence the risk attitude. Farrell (2014) however, also investigates the white male effect and finds that white males are the most risk seeking investors. His results also show that African American women are the most risk averse subgroup. For African Americans, the race effect appears to be stronger than the gender effect, meaning that African American males are more risk averse than white females. Hispanic women are more risk averse than white women and African American men, but more risk seeking than African American females. These results are inconsistent with the results of Jianakoplos and Bernasek (1998). They found that single black women are more risk seeking than single white women. Single black men and black married couples are indeed more risk averse than white couples or whites males, but when looking at single females the effect is reversed (Jianakoplos and Bernasek, 1998). Single black women are not only more risk taking than single white women, they also hold more risky assets than single black men or black couples. Jianakoplos and Bernasek argue that this is due to the different role black and white women have in the financial decisions of households. African American females are more often involved in the financial decision making and are therefore more involved in investing, which could lead to a more risk tolerant attitude (Jianakoplos and Bernasek, 1998). While African Americans are overall more risk averse than whites, it is unclear whether African American females are more risk seeking or risk averse than white females.

Farrell (2014) also investigated whether the Hispanic race influences the risk attitude. The variable for Hispanic men was unfortunately not significant, which makes it impossible to compare Hispanic men with other races. Other authors did find the variable 'Hispanic' to have a significant impact on risk tolerance (Brown, 2007; Grable and Lytton, 1998). The results of Grable and Lytton imply that African Americans are more risk averse than Hispanics and that Hispanics are more risk averse than whites. Brown (2007) finds the opposite, she argues that Hispanics are more risk averse than blacks. Both articles show that whites are the most risk tolerant group, which is in accordance with the results from Farrell. The 'white male' stereotype therefore seems to hold. White males are the most risk tolerant subgroup. Whether whiter are followed by blacks or Hispanics remains however unclear.

The difference in race is often argued to be caused by a difference in class or education. Farrell (2014) for example argues that it is not race itself that matters, but that the racial differences point to cultural issues, such as financial knowledge and education. More educated and wealthy people have indeed shown to be more risk tolerant. To correct for this, Brown

(2007) measures the proportion of risky assets by educational level and income. This analysis shows that even when corrected for income or education, whites are the most risk tolerant group. When looking at college educated individuals, 85% of the whites own risky assets, compared to 50% of the blacks and 40% of the Hispanics (Brown, 2007, p. 401). For the least educated subgroup, this difference is smaller, 35% of the whites own risky assets compared to 10% of the blacks and Hispanics (Brown, 2007, p. 401). Implying that an increase in education causes a more rapidly increase in risky assets among whites than among blacks or Hispanics (Brown, 2007). The difference in risk tolerance is smaller when the results are corrected for income. Among the highest income group, 56% of the whites are considered risk seeking, compared to 26% of the blacks and 21% of the Hispanics. Still, the results show that even when corrected for income or education, whites are the most risk tolerant group.

Compared to other influence factors, race does not have a major impact on risk tolerance. Besides the results of Farrell, that shows similar coefficients of race and gender, most results suggest a smaller impact. Grable and Lytton (1998) as well as Jianakoplos and Bernasek (2006) find that race is one of the least important influence variables. Brown (2007) only investigates the effect of race and does not apply a multiple regression which makes it impossible to compare the impact of race with other influence factors.

3.7 Culture

Table 3.7: Culture

Study	Effect (yes/no)	Assumed to be more risk tolerant	VHB Journal Ranking	Impact factor journal	Times cited
Weber and Hsee 1998	Yes	Chinese	A+	1.011	803
Fan, Xiao and Xu 1998	Yes	Chinese	(book)	(book)	11
Hsee and Weber 1999	Yes	Chinese	B	1.511	501
Fan and Xiao 2006	Yes	Chinese	--	--	47

When focussing on culture, the first thing to notice is the consensus among scholars investigating the effect. The common opinion among these authors is that culture matters when looking at the risk taking of investors (Fan and Xiao, 2006; Fan et al., 1998; Hsee and Weber,

1999; Weber and Hsee, 1998). Several authors used China and America as case-studies when comparing different cultures. The reason for this is the big difference in the culture of both countries. Where China is a hierarchical and collectivist country, America is characterized by a market environment and individualism. In hierarchical societies decision-making is based on standard procedures and individuals are therefore assumed to be more risk averse (Fan and Xiao, 2006). The individualistic market structure on the other hand has a greater focus on exploring opportunities which causes uncertainties and encourages risk-taking (Fan and Xiao, 2006). When looking at the case of China and America, this would imply that Chinese investors are more risk averse than American investors.

However, when looking at research where the actual influence of culture on risk taking in the investment domain is measured, Chinese respondents are less risk averse than American respondents (Weber and Hsee, 1998). Weber and Hsee (1998) explain their argument with the cushion hypothesis. This hypothesis predicts that in social-collectivist countries, such as China, family or other group members will help you if a catastrophic event takes place. In individualist countries, like America, this social safety net is absent and a person is expected to personally bear all the consequences of a risky decision (Weber and Hsee, 1998). This safety net makes Chinese respondents perceive risks less severe, which makes them more risk tolerant (Weber and Hsee, 1998). Weber and Hsee (1998) also investigated Poland and Germany. They expect both countries to score between China and America, because the countries are characterized by less individualism than the US, but more individualism than China. The results confirm their hypothesis, Poland and Germany score somewhere between China an America when looking at investment risk-taking.

The research of Weber and Hsee is however only limited to students. This affects the generalizability and poses the question whether this effect applies with different respondents. To solve for this, Fan and Xiao (2006) use a non-student sample. With this non-student sample, Fan and Xiao derive at the same conclusion as Weber and Hsee and find that Chinese are more willing to take substantial risks in the investment domain.

It is difficult to measure the impact of culture on risk tolerance, because the authors writing about culture do not include other demographic variables. This makes a comparison between different variables impossible. Hsee and Weber (1999) and Weber and Hsee (1998) also acknowledge this and argue that differences in risk tolerance between different cultures could also be caused by other factors. Both authors argue that the cushion hypothesis does exist and that culture influences risk tolerance, but they also acknowledge that the actual influence

is probably small. Research concerning culture as well as other variables in a multiple regression is suggested to estimate the actual effect of culture.

3.8 Marital Status

Table 3.8: Marital status

Study	Effect (yes/no)	Assumed to be more risk tolerant	VHB Journal Ranking	Impact factor journal	Times cited
Baker and Haslem 1974	No		B	0.407	77
Cohn et al. 1975	Yes	Single	A+	2.173	435
Grable and Lytton 1998	Yes	Married (compared to divorced)	--	--	233
Jianakoplos and Bernasek 1998	Yes	Married (compared to single women)	--	0.516	1437
Grable and Lytton 1999a	No		--	--	103
Hallahan et al. 2003	No		--	--	89
Jianakoplos and Bernasek 2006	Yes	Married (compared to single women)	n.r.	0.645	86
Dohmen et al. 2011	Yes	Single	n.r.	3.356	1374
Weber et al. 2013	No		A	2.012	85
Roussanov and Savor 2014	Yes	Single	A+	2.822	31

Marital status has also been postulated to influence the risk attitude of investors. The effect of marital status is often debated. One view asserts that single people take more risks than married people, because they have less responsibilities (Grable and Lytton, 1998; Hallahan et al., 2003). Married individuals are also believed to be more sensitive to social risk, defined by the loss of esteem in the eyes of colleagues and peers which causes a lower risk tolerance (Grable and Lytton, 1998). The other view suggests that married people take more risks, because of the greater capacity to absorb undesirable outcomes (Hallahan et al., 2003). In line with this argument, some scholars find that married people indeed take more risks (Grable and Lytton, 1998; Jianakoplos and Bernasek, 1998; Jianakoplos and Bernasek, 2006). While other authors find that singles are more risk seeking (Cohn et al., 1975; Dohment et al., 2011; Roussanov and Savor, 2014). Roussanov and Savor did not only find that singles are more risk

seeking, but also found that age interacts with this effect. They first implemented age in the equation to make sure the marital effect is not a disguised age effect. Older individuals are assumed to be less risk tolerant and also more often married. However their results show that this is not the case. When looking at the interaction effect, Roussanov and Savor find that the impact of marital status on investment risk is less important for older individuals. Cohn et al. (1975) also argue that there is an interaction effect between marriage and another variable. In this case, the interaction effect is between marital status and wealth. While risk aversion decreases with wealth, this effect is more pronounced for married couples than for single individuals (Cohn et al., 1975). Meaning that risk tolerance increases more rapidly with wealth for married couples than for singles.

Jianakoplos and Bernasek (2006) do not solely distinguish between married and unmarried individuals, but consider married couples, single men and single women. They expect single women to be more risk averse than married people and single men to be more risk seeking than married people (Jianakoplos and Bernasek, 2006). Besides measuring the observed risk aversion, Jianakoplos anf Bernasek also observed stated risk aversion and found that men verbally indicate that they are more risk taking. However, when looking at observed risk taking, there is no difference between the risk attitude of single men and married couples. When diverging between single women and married couples, there is a difference in the observed risk attitude. Single females take significantly less risks in financial matters than married couples (Jianakoplos and Bernasek, 2006). This effect is also found by Jianakoplos and Bernasek in 1998, while single men and married couples show comparable risk attitudes, single women are significantly more risk averse. The research of Jianakoplos and Bernasek (1998; 2006) does not measure on the individual level, but on the household level. Meaning that the person of interest is the household head. This could affect the results because the sex of the household head is not given and sex is assumed to influence the risk tolerance. This implies that the difference in risk taking between married couples and single women could also be a difference between men and women. Jianakoplos and Bernasek are not the only authors that argue married couples take more risks than single. Grable and Lytton (1998) also assume that married people are more risk tolerant. When looking more closely at the results however, this distinction is only visible between married couples and divorced individuals. The coefficient for never married individuals is not significant. Meaning that neither of the authors found a significant distinction between married couples and unmarried individuals.

When looking at the coefficient of marital status, most authors find that marriage has a moderate or even minor influence on risk tolerance. While the research of Cohn et al. (1975) for example finds a coefficient of 3.34, the coefficient found by Dohmen et al. (2011) is just 0.166. Most authors however, argue that the influence of marital status on risk tolerance is small.

While previous authors argue that marriage influences the risk tolerance of investors, other authors fail to identify any relationship between marriage and investor risk tolerance (Baker and Haslem, 1974; Grable and Lytton, 1999a; Hallahan et al., 2003; Weber et al., 2013). This makes the literature on marital status even more fragmented. It is therefore difficult to draw conclusions based on the current literature. There is no consensus about either the direction or the presence of the effect. This research does, however suggest that single individuals are more risk prone than married couples. The research suggesting married couples are more risk tolerant contains more flaws and cannot accurately distinguish between married couples and single individuals.

3.9 Religion

Table 3.9: Religion

Study	Effect (yes/no)	Assumed to be more risk tolerant	VHB Journal Ranking	Impact factor journal	Times cited
Hilary and Hui 2009	Yes	Non-religious	A+	3.725	467
Dohmen et al. 2011	Yes	Non-religious	n.r.	3.356	1374

A less often researched factor is religion, this factor is only recently argued to influence the risk tolerance of investors. When looking at religion, a distinction can be made between religiosity and religious affiliation. Religious affiliation concerns the difference between different religions, while religiosity concerns the difference between religious and non-religious individuals. This research investigates whether religiosity influences investor risk tolerance. There are two contradicting views on the effect of religiosity on risk tolerance. First, Mansour and Jlassi (2014) argue that religious people are often considered to have higher trust levels, which could lead to a lower risk perception. Mansour and Jlassie however also acknowledge that religious people are often more risk averse, meaning that they are less willing to take risks.

This risk aversion could be caused by the fear of uncertainty that characterizes religious people. Hilary and Hui (2003) argue that risk-averse individuals try to reduce the amount of anxiety in their lives through religion. Religious people are also found to be more anxious and anxiety leads people to more risk averse behaviour (Hilary and Hui, 2003). Noussair et al. (2013) also argue that religious individuals are more risk averse than non-religious individuals. In line with Hilary and Hui they argue this correlation is not driven by religious beliefs themselves, but by the social aspects of church membership (Noussair et al., 2013). According to Noussiar et al. (2013), religious people are either affected by the risk aversion of other church members, or risk averse people are attracted to religious organizations, which supports the argumentation of Hilary and Hui.

When considering risk aversion in the investment domain, both Hilary and Hui (2003) and Dohmen et al. (2011) find that religious investors are less risk tolerant than non-religious investors. Whether religious aspects affect risk aversion or risk averse individuals are attracted to church is unclear. When looking at the size of the coefficient, religion only seems to explain a minor part of the risk tolerance. Domhen et al. (2011) found that non-religious individuals are slightly more risk tolerant than religious individuals. Compared to other influence variables, religion only explains a minor part of the variance in risk aversion. The effect of religiosity on risk tolerance needs to be further researched. With only two authors acknowledging this effect, the support in the existing literature is small. Whether people become more risk averse through church or are already risk averse and therefore drawn to church is another topic for further research.

3.10 Dependents/Family Size

Table 3.10: Dependents/Family size

Study	Effect (yes/no)	Assumed to be more risk tolerant	VHB Journal Ranking	Impact factor journal	Times cited
Cohn et al. 1975	Yes	Less	A+	2.173	435
Jianakoplos and Bernasek 1998	Yes	More (for men and married couples) Less (for women)	--	0.516	1437
Hallahan et al. 2003	No		--	--	89
Jianakoplos and Bernasek 2006	No		n.r.	0.645	86
Weber et al. 2013	Yes	More	A	2.012	85

The number of dependents or size of the family is another demographic factor that is sometimes considered to influence investor risk taking. Most scholars argue that individuals with less dependents or a smaller family size are more risk taking than individuals with bigger families (Cohn et al., 1974, Hallahan et al., 2003; Jianakoplos and Bernasek, 2006). This is caused by the increased responsibilities that come with increased family size. However, there is lack of consensus about the direction and existence of this effect. Cohn et al. (1975, p.617) find that people with no other dependents invest more in risky assets than people with one or more dependents. The results of Cohn et al. are however influenced by two things. First, Cohn et al. only distinguish between family size = 1 and family size > 1. This means that the effect could also be caused by difference between single and married people. Secondly, family size only matters for the lower wealth group. Cohn et al. distinguish between higher and lower wealth and find that in the lower wealth sample family size matters. In the higher wealth sample however, family size has no influence. Jianakoplos and Bernasek (1998) argue that an increase in the amount of children leads to increased risk aversion. However, this effect only holds for single women. For single men and married couples, the opposite is true, risk aversion decreases with an increase in the amount of children. Weber et al. (2013) also find that investors with more dependents are significantly more risk tolerant (Weber, 2013, p. 870).

When looking at the strength of the effect, Cohn et al. show that in the lower wealth group 59% of the investments is invested in risky assets if the family size is 1. When the family size is bigger than 1, only 38% of the investments are invested in risky assets. The effect however only appears in the lower wealth sample, which means that family size only influences this part of the sample. The results of Dohmen et al. shows that dependents is one of the only significant explaining demographic variables for risk tolerance. The size of the effect can only be compared to gender, because this is the only other significant variable. Compared to gender, the number of dependents only has a minor influence on the risk tolerance. This could also be caused by the different levels of measurement, where gender in a nominal variable an therefore only distinguishes between men and women, number of dependents is a ratio variable. However the coefficient of dependents is still approximately six times smaller than gender. When looking at both articles, the effect of dependents seems to be rather small compared to other socio-demographic variables.

Besides these two conflicting statements, other authors who investigate the influence of dependents on investor risk tolerance find no correlation at all (Hallahan et al., 2003;

Jianakoplos and Bernasek, 2006). The literature on dependents can therefore only argued to be fragmented. This fragmentation might possibly be caused by the difference between single men, single women and married couples. More research is recommended in order to discover whether this is indeed the case.

3.11 Height

Table 3.11: Height

Study	Effect (yes/no)	Assumed to be more risk tolerant	VHB Journal Ranking	Impact factor journal	Times cited
Dohmen et al. 2011	Yes	Taller	n.r.	3.356	1374

The last factor that is believed to influence investor risk tolerance, is height. Taller individuals are inclined to be more risk taking than smaller ones (Dohmen et al., 2011) According to Persico et al. (2004) this effect is not caused by the actual height when applying for a job. The effect is caused by the increased self-esteem that is created by height. People who were taller in their teens are characterized by a higher self-esteem and more confidence (Perisco et al., 2004). Perisco et al. (2004), however only measure the impact of height on salary. Dohmen et al. (2011) are the only authors that measure the influence of height on risk tolerance and argue that the higher self-esteem, as described by Persico et al., leads to an increase in the risk tolerance of taller individuals.

The coefficient of the height effect is rather small. This could be explained by the measurement scale, which is height in centimetres. However, even when considering this scale, the effect is small compared to other influence variables. Further research is needed to determine whether height actually affects investment risk taking.

3.12 Overview of the demographic variables

Table 3.12 presents and overview of the effect of the demographic variables on investment risk tolerance. The table summarizes the previous chapters and provides the direction of the effect per factor. The table also gives an overview of the support this effect has in the existing

literature. While this thesis was able to derive a direction of the effect for most variables, this was unfortunately impossible for the variable dependents.

Table 3.12: Overview

Influence factor	**Assumed to be more risk tolerant**	**Strength of the effect**	**Level of support in the literature**
Gender	Men	Moderate	High
Age	Middle age	Moderate	High
Wealth/Income	High	Moderate	High
Education	Higher	Strong	High
Occupation	Professional	Small	Moderate
Race	Whites	Small	Moderate
Culture	Chinese	Small	Moderate
Marital status	Singles	Small	Small
Religion	Non-religious	Small	Small
Dependents	*Diffuse*	Small	*Diffuse*
Height	Taller	Small	Small

The direction of the effects given in table 3.12 is generally in accordance with the expectations beforehand. Two variables that draw attention are culture and age. For age it appears that the effect is concave and people reach their most risk tolerant behaviour between the age of thirty and forty. For culture, it appears that Chinese are more risk tolerant than Americans. While it is often assumed that Americans are the most risk tolerant group. The other variables match their expectations.

3.13 Overall effect

Besides the strength per impact factor, the effect of all demographic impact variables matters. Some authors only estimated the effect of one specific variable or used simple regression. Other authors, however, did measure the effect of multiple variables. Multiple articles of these authors measure the overall effect as well. The following section will analyse these articles and attempt to determine the variance in risk tolerance that is explained through socio-demographic variables. First, a distinction should be made between different methods of measurement. Most authors look at the explained variance, measured through the R-squared. Some authors though,

used different regression and therefore a different measure for explained variance. Jianakoplos and Bernasek (1998) and Farrell (2014) both use a Tobit regression, which requires a pseudo R-squared. The values of this pseudo R-squared cannot be compared to the values of the 'normal' R-squared. Farrell (2014) even found a R-squared of 1.164, a value that is impossible to obtain when using the 'normal' R-squared. The pseudo R-squared values found by Jianakoplos and Bernasek (1998) are 0.248 (for single women), 0.312 (for single men) and 0.228 (for married couples). These values are closer to the values found when using the 'normal' R-squared (see Table 3.13), but the different measures used to obtain this values makes it impossible to compare them. Table 3.13 shows the explained variance found by the authors that use the 'nomral' R-squared.

Table 3.13

Article	**Explained variance**
Grable and Lytton 1998	20%
Grable and Lytton 1999a	22%
Hallahan et al. 2003	21%
Guiso and Paiella 2008	13%

When looking at the table, it appears that the explained variance varies per article. Most articles argue that the used variables explain approximately 20% of the variance in investor risk tolerance. The explained variance found by Guiso and Paiella however, is rather small compared to the explained variance found by the other authors. This could be caused by the different selection in samples between Guiso and Paiella and the other authors. Guiso and Paiella only selected risk averse individuals and measured the influence of demographic variables on the risk taking behaviour of these individuals. The other authors, on the other hand, used a random sample in which risk averse as well as risk seeking individuals are represented. A second reason for this difference could be the lack of significance of the coefficients used by Guiso and Paiella. Only three of the eight variables turned out to have a significant effect on investor risk tolerance. The results of the other three articles all showed more coefficients with a significant impact.

Table 3.13 shows that the explained variance found by different authors is approximately twenty percent. These authors all measured a maximum of eight influence factors. Of these influence factors, three to seven turned out to influence the investor risk

tolerance. This thesis on the other hand considers eleven influence factors. The factors: religion, culture and height were not implemented in any of these articles, but are present in this thesis. These factors also turned out to significantly influence risk tolerance, even though the variables should be analysed to a further extent to draw more reliable conclusions. It could therefore be possible that an analysis including all eleven variables would end up with a higher explained variance. Until this research is computed, the explained variance is estimated around twenty percent. Meaning that approximately eighty percent of the variance in investor risk tolerance is still unexplained when estimating the variance based on socio-demographic variables.

4. Conclusion and Discussion

Based on the relationships shown in the results and summarized in Table 3.12, it is possible to better understand how investor risk tolerance is influenced by different demographic factors. The research question: "*Which socio-demographic factors influence investor risk taking?"* is however difficult to answer. The theoretical overview shows that the effect of some factors are not as simple as suggested in the introduction. Many variables interact with each other, making the actual effect difficult to measure. Education is found to be the most influential variables. Wealth/income, age and gender follow, and are argued to have a moderate impact on investor risk tolerance. The remaining influence factors only have a minor impact on risk tolerance. For religion, culture and height, the effect is presumed to be small, but none of these influence factors are compared to other factors. It is therefore possible that the actual strength of the effect differs when comparing the factors with the other variables.

The question now arises whether socio-demographic variables should be included in questionnaires developed by banks. When looking at the risk profile of investors, there are three factors of importance: the willingness to take risks, the ability to take risks and the need to take risks. Of these three sections, socio-demographic factors only influence the willingness to take risks. The ability and need to take risks are determined through different measures. When concentrating on willingness to take risks, approximately twenty percent of the variance is explained by socio-demographic factors. The influence of socio-demographic on the eventual risk profile is therefore not even twenty percent, but more likely one third of twenty percent (around seven percent). It appears that socio-demographic factors only explain a minor part of the risk profile. Based on the influence socio-demographic factors have on the eventual risk profile, it is perhaps not necessary to include questions about the socio-demographic background of investors.

Besides the minor impact of the variables, a more ethical question is of relevance. How appropriate is it to ask someone's gender, age, culture or ethnicity? Especially the latter two questions might be considered rather inappropriate. Investors might refuse to answer these questions or perhaps find another bank where this information is not required. Another problem regarding socioeconomic variables is the fact that certain groups are overall more risk seeking or risk averse, but this does not necessarily mean that the questioned individual acts in coherence with this group. Men for example are considered more risk tolerant than women, but there are obviously also women that are more risk tolerant than the average man. One could therefore wonder what the use is of a socio-demographic distinction.

There are however, also plenty of arguments in favour of adding questions about certain socio-demographic characteristics. First, the questionnaires used by banks have the purpose to determine the willingness to take risks. Socio-demographic variables explain twenty percent of the variance in this willingness to take risks. Further research might discover that even more than twenty percent of the risk tolerance is explained by socio-demographic factors. It might not be clever to leave out variables that are able to further understand someone's risk attitude. Second, there is a difference between actual risk tolerance and stated risk tolerance. Jianakoplos and Bernasek (2006) for example found that men verbally indicate that they are more risk tolerant but when measuring actual investments, this turned out not to be true. The discrepancy between stated risk tolerance and actual risk tolerance could be decreased by implementing questions about socio-demographic characteristics. Third, the socio-demographic characteristics will be used in combination with the answers to other questions determining the risk tolerance. A mayor discrepancy between the socio-demographic characteristics and questions concerning the risk attitude would lead to further investigation to determine the actual risk profile. Both types of questions could be used to complement each other and make a more comprehensive profile. This would benefit the investor as well as the bank.

To solve this question further research is the first step. Research implementing more demographic variables might come closer to the actual variance in risk tolerance that is explained by socio-demographic variables. This overview is an attempt to make the field more structured and to identify the most important factors of influence and succeeded in this attempt.

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