Financial literacy’s effect on financial risk tolerance

- A quantitative study on whether financial literacy has an increasing or decreasing impact on financial risk tolerance

Authors: Carina Gustafsson
Lisa Omark

Supervisor: Jörgen Hellström
Abstract

As of today, our perception is that there has been an increased focus put on personal financial management, such as managing your own savings and retirement planning. By way of example, the Swedish pension system is a tool that has been implemented in order to incentivize Swedish citizens to manage their capital put aside for their retirement, as well for increasing financial risk tolerance and financial literacy. In fact, financial risk tolerance is a subject that has been extensively explored more or less globally, where predictors such as age, gender, marital status, education and wealth has been proved to affect financial risk tolerance. More importantly, financial literacy is one variable that has not been receiving enough attention in light of financial risk tolerance.

With this in mind, our objective is to investigate the relationship between financial risk tolerance and financial literacy. More specifically, how financial literacy affects financial risk tolerance. In addition, we aim shed light on underlying predictors of financial literacy, such as the distinction between how financial literacy derived from formal education and stock market experience affects financial risk tolerance. Therefore we will attempt to answer the following research question:

Do individuals differ in financial risk tolerance due to their level of financial literacy?

The theoretical point of reference of this study will have its central foundation in preceding studies on financial risk tolerance, however some established theories that will be used are risk aversion and overconfidence. With regards to the practical method of this study, this is a quantitative study, where we use an established questionnaire developed by Grable and Lytton (1999). The survey is distributed at Umeå University, where the aim is to obtain a sample containing both students with an economic and non-economic background.

Finally, the results of this study reveals that financial literacy, regardless of academic background, has an increasing effect on financial risk tolerance. In other words, an increase in financial literacy implies an increase in financial risk tolerance. In addition, we also find evidence that points to the fact that individuals that rely on their intuition rather than financial literacy when facing financial risks, are more inclined to display higher financial risk tolerance. Even more, our study exhibits evidence on the fact that having stock market experience, rather than having a formal economic background, showed an increased impact on financial risk tolerance.

Keywords: financial risk tolerance, financial literacy, risk-aversion
Acknowledgement

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# Table of Contents

## 1. INTRODUCTION

1.1 **Problem Background and Discussion**

1.2 **Research Question**

1.3 **Research Purpose**

1.4 **Research Gap**

1.5 **Theoretical and Practical Contribution**

1.6 **Delimitations**

## 2. SCIENTIFIC METHOD

2.1 **Pre-understanding**

2.2 **Methodological Assumptions**

2.2.1 **Ontology**

2.2.2 **Epistemology**

2.3 **Scientific Approach**

2.3.1 **Research Strategy**

2.4 **Criticism of Sources**

## 3. THEORETICAL FRAME OF REFERENCE

3.1 **Expected Utility Theory**

3.1.1 **Risk-averse vs. Risk-seeking Behaviour**

3.1.2 **Prospect Theory**

3.2 **Speculative Risk and Risk Control – A Financial Risk-taking Model**

3.3 **Understanding Financial Risk Tolerance**

3.4 **Financial Literacy**

3.4.1 **Self-perception of Financial Literacy**

3.4.2 **Overconfidence**

3.4.3 **Stock Market Experience**

3.5 **Mechanisms that Connects Financial Literacy to Financial Risk Tolerance**

3.6 **Demographic Variables**

3.6.1 **Gender**

3.6.2 **Age**

3.6.3 **Family Situation**

3.6.4 **Income**

3.6.5 **Education**

3.6.6 **Geographical Differences**

3.7 **Summary**

## 4. PRACTICAL METHOD

4.1 **Sampling Procedure**

4.2 **Questionnaire**

4.2.1 **Risk Dimensions**

4.2.2 **Scoring**

4.2.3 **Pilot Study**

4.3 **Data Collection**

4.3.1 **Response Losses**

4.4 **Data Analysis**

4.4.1 **Correlation Analysis and Multicollinearity Test**

4.4.2 **Multiple Linear Regression Analysis**

4.5 **Ethical Considerations and Access Gain**
### 5. EMPIRICAL FINDINGS

<table>
<thead>
<tr>
<th>Section</th>
<th>Title</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>5.1</td>
<td>Descriptive Statistics</td>
<td>32</td>
</tr>
<tr>
<td>5.1.1</td>
<td>Financial Risk Tolerance and Financial Literacy</td>
<td>32</td>
</tr>
<tr>
<td>5.2</td>
<td>Control Variables</td>
<td>35</td>
</tr>
<tr>
<td>5.3</td>
<td>Correlation Analysis</td>
<td>37</td>
</tr>
<tr>
<td>5.3.1</td>
<td>Correlation Between Financial Risk Tolerance and Independent Variables</td>
<td>38</td>
</tr>
<tr>
<td>5.3.2</td>
<td>Correlation Between Financial Literacy and Independent Variables</td>
<td>39</td>
</tr>
<tr>
<td>5.3.3</td>
<td>Multicollinearity Test</td>
<td>39</td>
</tr>
<tr>
<td>5.4</td>
<td>Multiple Linear Regression Analysis</td>
<td>40</td>
</tr>
<tr>
<td>5.4.1</td>
<td>Huber-White Robust Covariance Estimator</td>
<td>41</td>
</tr>
</tbody>
</table>

### 6. EMPIRICAL ANALYSIS

<table>
<thead>
<tr>
<th>Section</th>
<th>Title</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>6.1</td>
<td>Financial Risk Tolerance</td>
<td>43</td>
</tr>
<tr>
<td>6.2</td>
<td>Financial Literacy</td>
<td>43</td>
</tr>
<tr>
<td>6.2.1</td>
<td>Self-Perception of Financial Literacy</td>
<td>44</td>
</tr>
<tr>
<td>6.3</td>
<td>Financial Literacy’s Effect on Financial Risk Tolerance</td>
<td>45</td>
</tr>
<tr>
<td>6.3.1</td>
<td>Stock Market Experience</td>
<td>45</td>
</tr>
<tr>
<td>6.3.2</td>
<td>Reliance Factor When Facing Financial Risk</td>
<td>45</td>
</tr>
<tr>
<td>6.4</td>
<td>Demographical Variables</td>
<td>46</td>
</tr>
<tr>
<td>6.4.1</td>
<td>Gender</td>
<td>46</td>
</tr>
<tr>
<td>6.4.2</td>
<td>Age</td>
<td>46</td>
</tr>
<tr>
<td>6.4.3</td>
<td>Family Situation</td>
<td>47</td>
</tr>
<tr>
<td>6.4.4</td>
<td>Academic Background</td>
<td>47</td>
</tr>
<tr>
<td>6.4.5</td>
<td>Geographical Differences</td>
<td>47</td>
</tr>
</tbody>
</table>

### 7. DISCUSSION

<table>
<thead>
<tr>
<th>Section</th>
<th>Title</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>7.1</td>
<td>Financial Risk Tolerance</td>
<td>49</td>
</tr>
<tr>
<td>7.2</td>
<td>Financial Literacy</td>
<td>49</td>
</tr>
<tr>
<td>7.2.1</td>
<td>Self-Perception of Financial Literacy</td>
<td>50</td>
</tr>
<tr>
<td>7.3</td>
<td>Financial Literacy’s Effect on Financial Risk Tolerance</td>
<td>50</td>
</tr>
<tr>
<td>7.3.1</td>
<td>Stock Market Experience</td>
<td>51</td>
</tr>
<tr>
<td>7.3.2</td>
<td>Reliance Factor When Facing Financial Risk</td>
<td>52</td>
</tr>
<tr>
<td>7.4</td>
<td>Demographical Variables</td>
<td>52</td>
</tr>
<tr>
<td>7.4.1</td>
<td>Gender</td>
<td>52</td>
</tr>
<tr>
<td>7.4.2</td>
<td>Age</td>
<td>53</td>
</tr>
<tr>
<td>7.4.3</td>
<td>Family Situation</td>
<td>53</td>
</tr>
<tr>
<td>7.4.4</td>
<td>Academic Background</td>
<td>54</td>
</tr>
<tr>
<td>7.4.5</td>
<td>Geographical Differences</td>
<td>54</td>
</tr>
</tbody>
</table>

### 8. CONCLUSION

<table>
<thead>
<tr>
<th>Section</th>
<th>Title</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>8.1</td>
<td>Financial Literacy’s Effect on Financial Risk Tolerance</td>
<td>55</td>
</tr>
<tr>
<td>8.2</td>
<td>Theoretical and Practical Contribution</td>
<td>56</td>
</tr>
<tr>
<td>8.3</td>
<td>Societal Considerations</td>
<td>56</td>
</tr>
<tr>
<td>8.4</td>
<td>Future Research</td>
<td>56</td>
</tr>
</tbody>
</table>

### 9. TRUTH CRITERIA

<table>
<thead>
<tr>
<th>Section</th>
<th>Title</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>9.1</td>
<td>Reliability</td>
<td>58</td>
</tr>
<tr>
<td>9.2</td>
<td>Validity</td>
<td>58</td>
</tr>
</tbody>
</table>

### REFERENCE LIST

Page 60

### APPENDIX 1 - QUESTIONNAIRE

Page 65
LIST OF FIGURES

Figure 1. Risk-taking model 13
Figure 2. Risk-taking matrix 13
Figure 3. Categorisation scale 27
Figure 4. Number of correct answers on financial literacy test 34
Figure 5. Invested in stocks or funds 35
Figure 6. Reliance when facing financial risk 35
Figure 7. Gender distribution 36
Figure 8. Age distribution 36
Figure 9. Place of origin 37
Figure 10. Academic background 37

LIST OF TABLES

Table 1. Dimensions of risk assessed by each item 25
Table 2. Scoring 27
Table 3. Variable description 32
Table 4. Descriptive statistics 33
Table 5. Descriptive statistics for females 33
Table 6. Descriptive statistics for males 34
Table 7. Correlation analysis 38
Table 8. Multicollinearity test 40
Table 9. Multiple linear regression, Model 1 40
Table 10. Heteroscedasticity 41
Table 11. Multiple linear regression, Model 2 – Robust 41
1. Introduction

This chapter provides the reader with the rationales behind the topic selection, arranged as an introduction and a problem background derived from prior literature, and the current state of the topic. Thereafter, the reader will be presented to the research question and purpose of this study, which is afterwards followed by theoretical and practical contributions. Conclusively, the reader will be able to take part of potential delimitations, in order to allow the reader to create its own perspective of the outcome.

1.1 Problem background and discussion

It has become attractive in recent years to investigate the relationship between financial literacy, financial decision-making and financial risk tolerance, in particular among students and young participants (e.g. Beal & Delpachitra, 2003; Huzdik et al., 2014; Shahrabani, 2013; Sjöberg & Engelberg, 2009). As for Sweden, it is perhaps due to an increased interest in measuring attitudes towards retirement planning and savings behaviour (e.g. Almenberg & Säve-Söderbergh, 2011). Namely, the perception is that there has been an increase in focus put on today’s youth regarding retirement planning, savings behaviour and financial planning.

In fact, in the late 1990s, Sweden introduced a new reform that gave the Swedish citizens greater influence and responsibility for managing their retirement savings; it was marked as the reformed pension system (Sundén, 2008). That is to say, the Swedish citizens could through the new reformed pension system select for themselves how to manage and invest the capital set aside for their retirement. Notably, as of today occupational and public pensions are the main sources of income for individuals upon retirement (Sundén, 2008, p. 324). The Swedish citizens have the opportunity to select up to five different funds for their retirement savings, which can be changed at any time. For one thing, the Swedish government expected that the free selections of funds would allow the individuals to take on higher financial risks, however some argued that this could have large consequences for those with poor financial literacy (Sundén, 2008, p. 330). Above all, the design of the reformed pension system was intended to incentivize the Swedish citizens to increase financial literacy and tailor retirement savings based on their own risk preference, in order to obtain a higher rate of return in the capital market (Sundén, 2008, p. 327). In other words, create benefits for their future financial situation; hence contribute to society’s financial development.

However, while the perception of an increase in pressure on financial planning, there is a recent Swedish research by Almenberg and Widmark (2011, p. 27) on measuring Swedish citizens’ financial literacy. In fact, this research marks that Swedish citizens today exhibit low financial literacy, especially among young, women and those with low education. Notably, this data was derived from a survey conducted by the Financial Supervisory Authority in Sweden (Finansinspektionen) in 2010 (see Almenberg & Widmark, 2011). Altogether, what is interesting is whether low financial literacy, potentially associated with poor financial decision-making, is consistent with low financial risk tolerance or not.
To resume to financial risk tolerance, the term risk taking, its practical and theoretical usage, denotations and modifications appear in various practices, often followed by a number of affecting factors. However, independently, risk taking in the financial domain rarely has any affiliation with risk taking in another domain, such as in the social domain (Gärling et al., 2009, p. 3). Risk taking in prior studies has taken various expressions; some recognisable are risk assessment, risk aversion, risk attitude, risk propensity and lastly this study’s centre, financial risk tolerance. More importantly, it is inevitable to disregard the fact that risk tolerance in its many forms has been heavily explored already more or less globally. However, Cooper et al. (2014, p. 274) argues that despite the numerous studies performed on financial risk tolerance, there is a lack of cohesiveness when it comes to how to define and interpret financial risk tolerance.

Grable (2000, p. 625) defines financial risk tolerance as “the maximum amount of uncertainty that someone is willing to accept when making a financial decision, that reaches into almost every part of social and economic life”. Whereas, Gärling et al. (2009, p. 5) has contributed with another explanation for risk taking, “risk taking is an important component of financial decision making. It is mediated by risk perception, risk attitude, and risk propensity, and it is modified by sociodemographic, personality, and situational factors”.

Moreover, common denominators among preceding studies are the demographical variables that are used in order measure differences in financial risk tolerance. The general and significant perception among prior researchers is that factors such as gender, age, education, income, attitudes, marital status and financial literacy are statistically related to financial risk tolerance (Grable, 2000, p. 626; Gärling et al., 2009, p. 4; Cooper et al., 2014, p. 276; Hallahan et al., 2004, p. 60; Van de Venter et al., 2012, p. 797; Yao et al., 2011, p. 882). In addition, Grable (2000, p. 628) argues that a combination of the factors can explain variability in financial risk tolerance between groups of individuals with different demographical backgrounds, if one were to take into account that there are possible interactions among and between the variables. For instance, an interaction between and among education, financial literacy and gender may explain differences in financial risk tolerance.

There are reasons behind why many of the very recent research studies have used common potential predictors of financial risk tolerance, and one of them is the 20-item or 13-item multidimensional measurement instrument. Grable and Lytton (1999, p. 164) developed these instruments as a result of perceived lack of a valid and multidimensional method to measure financial risk tolerance. The 20-items index tests, at minimum, eight dimensions of risk (Grable & Lytton, 1999, p. 173), while the 13-items index, which is a portion of the 20-item index, measures financial risk tolerance on three risk factors (Grable & Lytton, 1999, p. 177). More importantly, no items, in neither the 20-items nor 13-items index, are sufficient enough to assess overall financial risk tolerance individually, it is determined that in order to assess an accurate measure, the items needs to be combined together (Grable & Lytton, 1999, p. 174).

With regards to prior studies, one variable that has been central in several of the recent studies, however shown to be associated with contradictory outcomes, is the age effect on financial risk tolerance. Yao et al. (2011, p. 883) concluded in their research that financial risk tolerance decreases with age, which indicates that high financial risk tolerance is associated with young individuals. In contrast, other authors such as Wang
and Hanna (1997, p. 30) discovered that older individuals are more risk tolerant than young individuals when it comes to financial decision-making. As for several of the other mentioned variables, previous authors suggest that females, regardless of marital status, are less risk tolerant than males (Yao et al., 2011, p. 885; Grable, 2000, p. 628).

Further on, one factor that is to become central in this paper is financial literacy, and its effect on financial risk tolerance. In fact, Yao et al. (2011, p. 885) suggests that there is a gap for future studies on the use of financial literacy and what effect it has on financial risk tolerance. Similarly, Ryaack (2011, p. 182) claims that the role of financial education and financial literacy in relation to financial risk tolerance is one approach that has not been receiving enough attention. However, there are some preceding authors that has proven that financial literacy and having a higher education (university diploma) are both correlated with increased financial risk tolerance (e.g. Grable 2000, p. 628; Hallahan et al., 2004, p. 74).

Besides this, there appears to be some earlier authors that have investigated the relationship between risk attitude and financial literacy using Swedish data, however more or less independently and not in relation to each other (e.g. Almenberg & Säve-Söderbergh, 2011; Almenberg & Widmark, 2011; Sjöberg & Engelberg, 2009). Sjöberg and Engelberg (2009, p. 37) for instance found that financial literate students displayed a more prominent positive attitude towards financial risk taking than non-financial literate students. However what prior researchers has to some extent failed to emphasise and analyse, is that one can in fact divide financial literacy into actual financial literacy, that is financial literacy obtained from education and financial literacy obtained from experience, for instance stock market experience.

Moreover, Yao et al. (2011, p. 886) argues that those with scarce financial experience and financial literacy can be expected to have a noticeable dissimilar perception of financial risks, compared to those who are active on the stock market or possess a higher level of financial literacy. This is an interesting aspect while considering the act of overconfidence alongside financial decision-making. According to Wood and Zaichkowsky (2004, p. 170), investing in stocks is a highly complex undertaking with low predictability. Overconfidence can therefore be deemed to thrive alongside investments with low predictability. However, it is unclear whether overconfidence is reinforced by intuition or literacy. With this in mind, it may be difficult to distinguish whether literacy or intuition weighs the most in financial decision-making, thus it becomes fascinating to explore which one of the mechanisms, literacy or intuition that is a predictor of an increase in financial risk tolerance.

With regards to overconfidence’s potential effect on financial risk tolerance, opens up a prospect to investigate self-perception of financial literacy. In other words, explore financial risk tolerance in light of over- and underestimation of financial literacy. That is to say, whether one’s self-perception of financial literacy can affect financial risk tolerance. For instance, a research conducted by Huzdik et al. (2014, p. 452), found that more than 59% of their respondents had a realistic perception of their own financial literacy, however 30% overrated their financial literacy, while merely 11% underrated their financial literacy. However, this study failed to confirm that the degree of financial risk tolerance would be influenced by the respondent’s self-perception of his or hers financial literacy (Huzik et al., 2014, p. 454).
With the above background on the subject in mind, one perspective that has been lacking is studies highlighting how dissimilarities in geographical background may affect financial risk tolerance. There are however a few to be found, which attempt to explain how culture and place of upbringing affect financial risk tolerance and financial development (e.g. Bonin et al., 2009; Guiso et al., 2004; Weber & Hsee, 1998). By way of example, Bonin et al. (2009, p. 1581) conducted a study comparing immigrants to natives in Germany, on how they contrasted in risk preferences, due to cultural differences. In fact, the authors did find evidence on the matter, and argued that immigrants were more risk-averse than natives (Bonin et al., 2009, p. 1585). To further illustrate, there was a similar study conducted in Italy, where researchers investigated whether social capital’s effect on financial development was shaped by place of upbringing and place of residence (Guiso et al., 2004). Given that geographical differences may affect financial risk tolerance, awakens an interest in conducting a cross-geographical on financial risk tolerance between the three provinces Norrland (north), Svealand (middle) and Götaland (south), in Sweden.

Altogether, the belief is that despite the large extent of preceding literature on financial risk tolerance and financial literacy, it appears that there are still contradictory results occurring in recent studies, thus continues to stay perceived as a current and an appealing subject to explore.

1.2 Research question

Derived from the problem background and discussion, this study will aim to answer the following research question:

*Do individuals differ in financial risk tolerance due to their level of financial literacy?*

1.3 Research purpose

The purpose of this study is to investigate whether financial literate individuals exhibit greater financial risk tolerance than non-financial literate individuals, due to financial literacy. That is to say, the aim is to measure whether an individual’s financial literacy has an increasing or decreasing effect on financial risk tolerance. In addition, an underlying objective, related to how to measure financial literacy, is to investigate how actual financial literacy (i.e. financial literacy derived from formal education) and financial literacy derived from experience, such as stock market experience affects financial risk tolerance.

1.4 Research gap

As mentioned, the topic financial risk tolerance has been studied extensively globally, although the main component that this paper will have in common with similar studies is the choice of using the 20-item measurement instrument by Grable and Lytton (1999).

The larger extent of studies related to financial risk tolerance and financial literacy have been conducted in the United States and Australia, including data collection on both
adults and students, separated and in comparison. Common knowledge is that there are cultural differences between nations, and culture is known to be a determinant for overall behaviour in various contexts, in this case financial risk tolerance. A highly known tool for culture differences is Hofstede’s cultural dimensions, and according to this tool, Sweden scores low on masculinity, which indicates that Sweden is a feminine society (The Hofstede Centre, 2015). However, the United States and Australia both scores high on masculinity, hence both are recognised as masculine societies. Masculine societies are driven by competition, achievement and success, whereas femininity is driven by opposite values, such as humility (The Hofstede Centre, 2015). This is where this paper may fill its first knowledge gap. The argument is that American and Australian individual’s financial behaviours are not sufficient enough to explain financial behaviour among Swedish citizens due to cultural differences.

Furthermore, the limitations of the preceding researches in Sweden lies with the fact that the papers lack comparisons among Swedes, such as differences in place of origin in Sweden, that is to say, detections of comparisons between Swedish provinces, Norrland, Svealand, and Götaland. Here is where this paper finds its second research gap, as one of the control variables will test how place of upbringing affect financial risk tolerance.

1.5 Theoretical and practical contribution

The theoretical contribution of this study will primarily consist of supplementary comprehension regarding how financial literacy, and to some extent other demographical variables affect financial risk tolerance. As mentioned, there are still contradictory results occurring in recent studies concerning affecting variables. Therefore, the contribution is to aid the interpretations of preceding results and theories, in order to further improve and contribute to a possible widely an accepted view of what determines and affects differences in financial risk tolerance.

As for practical contributions, this research can serve as a tool and insight for financial advisors in Sweden, in order to evaluate financial risk tolerance among Swedes. This can improve financial customer service and understanding of differences in risk preferences. In addition, although a bit more far fetched, this study can be of contribution to start-up companies that are interested in risk-seeking behaviour among their employees. Supporting this, Weber et al. (2002, p. 263) argues that in many situations, individuals are chosen on the foundation of their perceived risk attitudes, especially in start-up companies. Granted this, it is possible that the findings show that individuals with certain demographic characteristics that affect financial risk tolerance can be of interest to certain start-up companies.

1.6 Delimitations

Firstly, the data collection will be limited to students at Umeå University, which can limit the number of participants from different parts of Sweden, therefore the study will only consider and investigate geographical comparisons between the three provinces. The reason for dividing the participants into these provinces is due to the belief that smaller divisions would not contribute with sufficient data enough to make a comparison.
Secondly, this paper is aware of limitations concerning the demographics of the population, that is to say that students at Umeå University may not represent the population, thus lack in generalizability. That is to say, if gender or age of the sample does not reflect the population. More importantly, this has been taking into consideration while collecting the data and therefore adjusted to the extent that was possible within the timeframe of this study. In other words, even though this is considered a limitation, we have given our furthest to validate our sample in order to create generalisability to some extent.

Thirdly, connected to before mentioned limitation, there is a possibility that the data will fail to display an age effect due to the limitation of selecting students as a sample. The age difference among the participants might be too insignificant, hence fail to create or prove that age may have an effect on financial risk tolerance. Despite this, the belief is that it will harm the research more to exclude age as a variable, while age may be able to explain relationships that can contradict previous studies on other age groups.

Lastly, the survey that will contribute as the study’s main data collection source will be distributed in English, while the majority of the participants have Swedish as their native language. The criticism that can occur regards the fact that the participants might experience difficulties with understanding parts of the survey. In addition, some questions will test students’ financial literacy, and one might argue the student may be unfamiliar with the English terminologies and therefore misinterpret a question on the test. However, our opinion and reasoning behind the choice of using a survey in English, lies with the fact that we want to eliminate potential mistranslations and misinterpretations that thrives along translating original sources.
2. Scientific method

In the following chapter, the theoretical methodology will be presented and discussed. Initially, we will present our theoretical and practical pre-understandings and what perspective this study will display. Further, a discussion regarding the research philosophies, research approach and the research strategy will follow. Eventually, we will clarify what literature and data, as well as what kind of quality criteria that have been used.

2.1 Pre-understanding

According to Thurén (2007, p. 62) the way of perceiving the reality, both in the everyday life and the science, is determined by our pre-understanding. This term refers to the “[…] knowledge, insight and experience that researchers have about the lived experience of their own organization […]” which implies that the society and the upbringing of the researchers, and not only their senses, has shaped their attitudes and beliefs (Bryman & Bell, 2011, p. 414). Johansson-Lindfors (1993, p. 25) also argues that since researchers may have different backgrounds, education and practical experiences, it will influence the decisions that are made whilst doing a research. Thus, it is very important that the readers are provided with information regarding the researchers background, so they are able to understand the decision-making process.

Both researchers have studied the International Business Program with a specialisation in finance, at Umeå School of Business and Economics. Further, pre-knowledge relevant to this study has been derived primarily from courses taken on master’s level, consisting of subjects such as risk management, portfolio theory, valuation, investments and business statistics. This has in turn has provided a deeper understanding on how to analyse and interpret financially related theories in an academic purpose. In addition, both researchers have been on studies abroad, and can therefore be deemed to have a pre-intercultural understanding that may form views and create a broaden perspective on cultural and ethical matters. Altogether, the belief is that the researchers’ pre-understanding should not affect this study’s outcome in any substantial manner, due to this study’s scope, purpose, data collection and method of data analysis.

2.2 Methodological assumptions

To begin with, choosing a proper research philosophy is vital since the term relates to the nature of knowledge, as well as the development of knowledge, thus the base of this thesis (Saunders et al., 2012, p. 127). We believe that it is of great importance to clarify and state our approach regarding knowledge and research, in order for the reader to perceive our study accurately as well as to get a better understanding of the choices that we have made. The research philosophy consists out of two types: ontology and epistemology (Saunders et al., 2012, p. 129).

2.2.1 Ontology

The concept of ontology is concerned with the nature of social entities, and how individuals perceive the reality where earlier knowledge and experience have a large
impact (Bryman & Bell, 2011, p. 20; Johansson-Lindfors, 1993, p. 39). It also raises concerns about the reality, which enables researchers to ask questions about the assumptions and commitments held to a particular view. There are two different branches of ontology: objectivism and subjectivism or constructionism as it sometimes is referred to (Saunders et al., 2012, p. 131). The objectivistic approach focus on the belief that social entities exist in a reality external to social participants (Saunders et al., 2012, p. 131). In other words, objectivism implies that social entities, and the meaning of them, are independent of social actors (Bryman & Bell, 2011, p. 21).

In contrast to objectivism, subjectivism views the reality as being socially constructed, and the social actors dependent on the social reality. Thus, to understand what is happening, the details of a situation need to be studied (Bryman & Bell, 2011, p. 21). Because the purpose with this study is to identify the relationship between financial risk tolerance and financial literacy, we believe that an objectivistic position will be most suitable for our research. If a subjective approach would be applied, it would have been dependent on our view of reality, which we believe is not appropriate due to statistical methods being used to see correlations between different variables based on empirical findings close to reality.

2.2.2 Epistemology

Regarding the question of how the reality is supposed to be studied, epistemology is concerned with what is perceived as acceptable knowledge in a research (Saunders et al., 2012, p. 132). There are two main approaches that are discussed within the field of business administration: positivism and interpretivism (Bryman & Bell, 2011, pp. 15-20). Additionally, apart from these two main branches, there are also two smaller perspectives within epistemology: realism and axiology (Saunders et al., 2012, pp. 136-140). The first approach of epistemology, positivism, advocates that knowledge is acceptable when it can be studied with methods of natural sciences (Bryman & Bell, 2011, p. 15). According to Thurén (2007, pp. 16-17) the human only have two different sources of knowledge, what we can observe with our senses and what we can accept using logical reasoning. Consequently, we should not assume or speculate, rather critically review facts and only rely on evidences that can be ensured, and thereafter draw conclusions with statistical measurements (Thurén, 2007, p. 17).

In contrast to the positivism, there is the interpretivism, which highlights the importance of understanding the subjective meaning of social actions (Bryman & Bell, 2011, p. 17). That is, it stresses that there is a difference between conducting research amongst individuals and objects, for instance computers (Saunders et al., 2012, p. 137). Since this subject has been well researched, it has made it easier for us to find previous studies and theories. Thus, previous research will be used as a base to be able to test different correlations about risk tolerance on the Swedish market. To do this, we will use statistical methods and draw conclusions from them. Hence, our ambition is to be as objective as possible and not let our pre-understanding affect the results of the study. The interpretations will not be made on the social reality, and the chosen philosophical stance for this research is therefore directed towards positivism.
2.3 Scientific approach

There are two different methods of observing the relationship between theory and practice in the social science research field: the deductive- and inductive approach (Saunders et al., 2012, p. 143). The term induction implies that you as a researcher aim to first collect data to be able to explore a phenomenon and thereafter build a theory (Saunders et al., 2012, p. 145). Usually, this approach is suitable when a qualitative data collection is used (Saunders et al., 2012, p. 163).

According to Saunders et al. (2012, pp. 144-145) the deductive approach is suitable to use when the aim of the research is to test if there is a correlation between two variables using a quantitative research method. In this approach, you as a researcher will start with a theory, most likely derived from previous literature, and thereafter design a strategy to test the theory (Bryman & Bell, 2011, p. 13). Lastly, one of the main characteristics for this approach is the purpose of generalising the results received over a specific population, thus the sample must be of adequate size (Saunders et al., 2012, p. 146). Since the intention for this report is to use existing theories and test them empirically, the deductive approach is most suitable. We will first read relevant literature and process theories, which will be used as a base for the data collection made by a survey. Thereafter, we intend to do statistical tests to see if there are any correlations between the different variables. Lastly, conclusions will be derived from the results.

2.3.1 Research strategy

In research science there are two different methodologies: quantitative and qualitative (Bryman & Bell, 2011, p. 26). Generally, when a qualitative method is used, the researcher rather uses non-numeric data instead of numeric data (Saunders et al., 2012, p. 161). In other words, the emphasis when using a qualitative method is rather on words than on statistical results (Bryman & Bell, 2011, p. 27). The results using this method cannot be generalised since the collection methods often are restricted. This is because of the limited numbers of individuals that can be a part of the study due to the different methods used to collect data, for instance interviews etc. (Bryman & Bell, 2011, p. 408). In contrast, the quantitative method is most often used to collect numerical data (Saunders et al., 2012, p. 161). The researchers using this approach intend to generalise findings, such as correlations between different variables, using statistical measures (Bryman & Bell, 2011, pp. 163-164).

The quantitative method is according to us the most appropriate method to use in this research. We believe that this is the most suitable approach since the purpose in this paper is to identify relationships between variables using statistical analysis, which is consistent with the quantitative method. To do this study with a qualitative approach, with interviews for instance, would make it more difficult to see strong correlations between these variables due to the limited sample size.

Studies that have a purpose to see relationships between variables are often connected with an explanatory study, and will therefore be used in this report (Saunders et al., 2012, p. 172). There are many different research strategies, such as experiments, surveys, case studies etc. (Saunders et al., 2012, p. 173). The quantitative strategy in this report consists of a survey, with electronic self-complementary questionnaires.
According to Johansson-Lindfors (1993, p. 113) the advantages with a questionnaire are that it is cost efficient, that there is a larger sample size, and that interviewer effects are eliminated. There are many disadvantages with a questionnaire, for instance the respondents cannot get further explanations about the questions, as well as it cannot be certain that the right person has answered the questionnaire etc. (Bryman & Bell, 2011, p. 233). However, we believe that the advantages are predominating for the type of research that we aim to do.

2.4 Criticism of Sources

The literature sources available are generally divided into three categories: primary, secondary and tertiary sources (Saunders et al., 2012, p. 82). Primary sources are literature that occurs for the first time, such as reports, some government publications etc. (Saunders et al., 2012, p. 83). Secondary sources are literature that are built on primary sources, for instance books, articles and journals (Saunders et al., 2012, p. 83). The last source is tertiary literature, which is sources that are designed to help to find both primary and secondary sources, such as databases and indexes (Saunders et al., 2012, p. 83).

All of the literature in this report consists out of secondary literature. We have used both books and journals, which have been gathered from Umeå University Library and its databases. More importantly, most of the articles and journals used are believed to be of high academic standards, while it is shown that they have been scientifically examined through peer reviews. The databases that have been used are familiar databases within the subject, such as Emerald and Ebsco, where Business Source Premier also is included. Moreover, keywords used in the literature search were financial literacy, risk tolerance, risk perception, financial risk tolerance, financial decision-making, financial risk attitude, risk aversion, behavioural finance, overconfidence, and household finance.

In order to increase the reliability and quality of this report only original sources have been used, thus no secondary citations are used. However, some of our sources are inspired by other authors, hence these authors may have misinterpreted the original source, which in turn could decrease the credibility in this report. Furthermore, since no individual can be perceived as completely flawless, the authors in this report could also have misinterpreted or taken information out of context.

Moreover, since this topic has received increased attention the last 10-20 years, most of the articles and journals that have been used has been published quite recently. Several of them were published within the last 15 years, whereas some of them in the 1980’s and 1990’s. Most of the older articles that was found were not multidimensional, in other words measured simply one variable at a time, for instance wealth, which is excluded from this study. With this in mind, one might argue that this study has overlooked theories of older literature.

Conclusively, since the main data collection used in this research is derived from a questionnaire, our data is marked as primary. We believe that this increases credibility, while there is less room for data being taken out of context and adjusted for this research. One of the disadvantages with collecting our own data might be that individuals may judge the data as manipulated to suit the perceptions of this study’s outcome.
3. Theoretical frame of reference

This chapter provides the reader with a literature review and previous research that is contemplated to be relevant for this study. Subsequently, both will create this study’s theoretical frame of reference that will serve as an important foundation. The disposition will consist of current definitions of financial risk tolerance, presentations of previous used variables affecting financial risk tolerance. The reader will as well be presented to relevant risk theories and theoretical behaviour biases. The disposition of this chapter will be displayed as a funnel, in order to create a logical structure for the reader.

3.1 Expected Utility Theory

The conventional and well-established procedure to measure risk is by using the expected utility model. The formal theory of expected utility is the von Neumann-Morgenstern expected utility theorem. The central foundation of the theory is that individuals select the alternative that has the maximum expected utility (Frank, 2009, p. 180). In other words, according to von Neumann-Morgenstern’s theorem of behaviour in uncertain situations, individuals will show behaviour of choosing the option that maximizes their expected value of utility (Snyder & Nicholson, 2011, p. 194).

3.1.1 Risk-averse vs. Risk-seeking behaviour

Economists claim that individuals prefer to avoid risky situations, which display a shared view of people being classified as risk-averse (Snyder & Nicholson, 2011, p. 194). A risk-averse person is one that responds conservatively while facing risk (Dyer & Sarin, 1982, p. 882). Weber and Milliman (1997, p. 123) exemplifies this by arguing that the choice of selecting a definite amount of money over a lottery or gamble with equal expected value reveals an individual as risk-averse. In contrast, a person classified as a risk-seeker will choose the lottery over a guaranteed amount, given equal expected values (Weber & Milliman, 1997, p. 128). Apart from the behavioural classifications risk-averse and risk-seeking, a person can be described as risk neutral. A risk-neutral individual is indifferent about selecting a sure amount and a lottery (Perloff, 2012, p. 602). However, it is expected that a risk-neutral person will select the option with the highest expected value, in order to be able to maximize utility (Perloff, 2012, p. 605).

The expected utility theory will be of importance while considering and to some extent classifying the respondents’ behaviour in this research, however without using the model’s formal calculations. This since, the model only gives functions for three levels of risk behaviour, risk-averse, risk-neutral and risk-seeking, whereas this study will try to extend the classifications into five different categorisations. Therefore, there are no illustrations on how to measure expected utility in this chapter. Conclusively, one can argue that this study will simply use risk-aversion, risk-neutrality and risk-seeking as widely accepted terminologies derived from the expected utility model independently, however not as an instrument measuring financial risk tolerance.
3.1.2 Prospect theory

Kahneman and Tversky (1979) are the two researchers who have presented crucial critique towards the expected utility theory as a model of explaining decision-making under risk. They observed inconsistency with the central assumption that all reasonable people were to obey the axioms of the expected utility theory. The authors thereby decided upon developing an alternative model called the prospect theory. In line with the prospect theory, individuals are concerned about losses and gains, in other words, changes in wealth, rather than total wealth, which is in accordance with the expected utility model (Peroff, 2012, p. 620). In other words, the prospect theory considers values of changes in wealth rather than final states (Kahneman & Tversky, 1979, p. 277). In addition, the prospect theory marks that the individual make decisions from a current reference point and thereafter evaluate a gain or a loss on that foundation (Kahneman & Tversky, 1979, p. 274).

Similarly to the expected utility theory, the prospect theory is if importance in order to understand foundations of how to measure decision-making under risk. Though the prospect theory will be of less relevance, it fulfils the purpose of an alternative angle of explaining an irrational decision-making behaviour.

3.2 Speculative risk and risk control – a financial risk-taking model

Lampenius and Zickar (2005) made an attempt to develop and validate a model for financial risk taking, in order to make it possible to classify an individual’s risk-taking behaviour through two dimensions – speculative risk and risk control. The force that signifies an individual’s tendency towards risk-taking behaviour (or risk-seeking) is described as speculative risk, whereas an individual’s tendency towards a risk-averse behaviour is defined as risk control (Lampenius & Zickar, 2005, p. 131). In other words, the components are counterforces, and the framework is displayed as a continuum between an individual’s risk-seeking and risk-averse behaviour.

According to Lampenius and Zickar (2005, p. 131), their model illustrates an interaction between speculative risk and risk control, while the dimensions are influenced by preceding experience and literacy (see Figure 1). To illustrate the model’s work of interaction, an individual with beforehand high risk control and a modest level of speculative risk will, as this person is positively reinforced, increase its speculative risk and lower its risk control. The individual will be continuously reinforced providing it will yield high returns, thus engage in high-risk approaches. However when losses occur, the individual will lean towards re-evaluation of the dimensions’ interaction, causing the individual to lean towards a conservative approach – lower its speculative risk and increase its risk control (Lampenius & Zickar, 2005, p. 131).
In addition, contradictory to preceding literature which are pointing to the fact that the common people are risk-averse (e.g. Snyder & Nicholson, 2011, p. 194), this model suggests that some individuals’ risk-seeking behaviour, such as thrill, is more appealing than risk-averse behaviour, rather than the opposite (Lampenius & Zickar, 2005, p. 131). In summary, the creators of this model do as well mark that risk control decreases risk-seeking behaviour, while speculative risk increases risk-seeking behaviour (Lampenius & Zickar, 2005, p. 132).

Moreover, apart from being classified as a risk-seeker or risk-averter, this model allows for four additional classifications, illustrated in a matrix (see Figure 2) (Lampenius & Zickar, 2005, p. 131). The four classifications are divided into four quadrants. The individual's score, high or low, on the two dimensions determines the classification. This matrix, derived from the model, allows the individual to be identified as “Conservative Investor”, “Risk managing Investor”, “Speculator” or “Non-Investor” (Lampenius & Zickar, 2005, p. 131). In other words, the matrix displays the interaction between the two dimensions, speculative risk and risk control, through scores and sub-categorisations.
This will be of use for this study for inspiration regarding classifications of participants of this research. However, this study will attempt to classify into five categories, whereas one category will play a role of acting in between the categories of being more towards risk-seeking or risk-averse behaviour.

3.3 Understanding Financial Risk Tolerance

To begin, it is inevitable to neglect the fact that the subject risk tolerance, in various domains, such as financial, social and psychological, has been profoundly explored by preceding researchers more or less globally. Despite this, there are numerous authors arguing that there is a lack of consistency when it comes to how to widely define, interpret and measure financial risk tolerance (Cooper et al., 2014, p. 274).

One relatively common definition, of financial risk tolerance, which will also be the definition we use in this study, is the one stated by Grable (2000, p. 625), according to him financial risk tolerance is “the maximum amount of uncertainty that someone is willing to accept when making a financial decision, that reaches into almost every part of social and economic life”. In addition, Gärling et al. (2009, p. 3) argues that risk taking in one domain rarely has any affiliation with risk tolerance in another domain. In other words, risk taking in the financial domain is seldom associated with risk taking in the social domain.

Van de Venter et al. (2012, p. 794) distinguish risk into subjective risk and objective financial risk tolerance. The authors argue that subjective financial risk is defined as the risk that an individual prefers to accept, whereas objective financial risk can be defined as a risk that an individual is capable of taking. Whereas, Cooper et al. (2014, p. 274) believe that risk tolerance can be divided into four key elements – attitude, propensity, capacity and knowledge. However, the elements are to be evaluated individually and thereafter combined in order to create a complete risk profile.

Sitkin and Pablo (1992, p. 12) are additional authors that suggest that risk tolerance is characterised by risk preference, risk perception and risk propensity. The authors distinguish between the three by way of defining risk preference as a personality trait of being attracted to risk, whereas risk perception as an individual’s assessment of a situation-specific risk, and risk propensity as the objective likelihood of an individual taking or avoiding risk. On the foundation of Sitkin and Pablo’s (1992) definition of risk preference, Weber and Milliman (1997, p. 142) findings exhibit risk preference as a stable personality trait, which according to their study implies that risk preference can be explained as a constant variable across different domains.

However, this appears to be slightly contradictory to what was mentioned by Gärling et al. (2009) earlier in this chapter about risk taking being domain-specific and not constant across various domains. Moreover, a later research by Weber et al. (2002, p. 282), intended to measure risk attitude, did as well show results which supports the fact that risk attitude is domain-specific rather than a stable personality trait, although, it is important to distinguish the different elements of financial risk tolerance. Financial risk tolerance and risk taking are overall descriptions of a risk profile, whereas risk preference is as mentioned as an affecting element within the subject (Cooper, 2014, p. 274).
As clearly viewed, preceding literature tend to interchangeably use different elements, such as perception, preference, attitude and propensity in order to understand financial risk tolerance and risk tolerance in other domains. One might perceive the use of interchangeably terminologies as confusing and therefore misinterpret the definitions. As for the relevance of understanding financial risk tolerance for this study, the belief is that in order to fully understand how to measure financial risk tolerance, additional interpretations that affect the definition of financial risk tolerance are of great importance.

### 3.4 Financial literacy

According to Remund (2010, p. 284), “Financial literacy is a measure of the degree to which one understands key financial concepts and possesses the ability and confidence to manage personal finances through appropriate short-term decision-making and sound, long-range financial planning, while mindful of life events and changing economic conditions”.

Huhmann and McQuitty (2009, p. 273), creators of a conceptual model on consumer financial numeracy, argue that financial literacy is one of two components originated from financial numeracy. The other component is financial capacity. Slightly contradictory to Remund’s definition of financial literacy, Huhmann and McQuitty (2009, p. 289) describe financial capacity as the ability to understand and process financial information and statistics. While financial literacy is simply preceding knowledge about financial concepts, products and services and how these work. Although, the authors also argue that financial capacity is based on learning, whereas financial literacy is based on memory. To illustrate, an individual with poor financial numeracy is characterised by difficulties in comprehending financial concepts (financial capacity) and who lacks sufficient prior financial knowledge about concepts and products (financial literacy) (Huhmann & McQuitty, 2009, p. 272).

As for how to measure financial literacy, Fernandes et al. (2014, p. 1862) argues that from a conceptual standpoint, financial literacy insinuates skills, although preceding measures of financial literacy is dominated by measurements of objective knowledge. In other words, financial literacy is most viewed measured by knowledge tests where the respondents gets evaluated on the percentage correct answers on questions with one right answer – e.g. “Suppose the interest on your bank account is 1% and inflation is 2%. If you keep your money in the account for a year, how much will you be able to buy at the end of the year? (i) more; (ii) as much; (iii) less; (iv) do not know/Refuse to answer” (Almenberg & Säve-Söderbergh, 2011, p. 587).

As for the degree of financial literacy in Sweden, the Financial Supervisory Authority in Sweden (Finansinspektionen) conducted a survey in 2010, analysed by Almenberg and Widmark (2011), which was commissioned to measure Swedes’ financial literacy through simple calculations and financial concepts. On the foundation of this survey, Almenberg and Widmark (2011, p. 27) found that financial literacy among Swedes is low, especially among young, women (in contrast to men), and those who lack higher education.
Providing that financial literacy will be a central determinant of financial risk tolerance in our research, it is of value that prior characterisations and research on financial literacy are considered while constructing this paper’s theoretical standpoint. In particular when analysing the findings in a later stage of the research. Financial literacy in this paper will be treated as prior financial knowledge, more specifically how the respondents comprehend financial concepts and its tools.

3.4.1 Self-perception of financial literacy

Disney and Gathergood (2013, p. 2247) are two researchers who argue that individuals with poor financial literacy have awareness of their own lack of comprehending finance-related subjects. The authors also claim that due to their self-awareness of lacking financial understanding, they are usually less confident while facing financial risk. In addition, Huzdik et al. (2014, p. 452) attempted to measure self-perception of financial literacy among higher educational students in their research. Their findings revealed that the majority of the participants exhibited, more specifically 59%, had a realistic self-perception, whereas 30% overestimated and 11% underrated their financial literacy. In other words, one can argue that it is typical to have a realistic self-perception, however it is more common to overestimate rather than underestimate your own financial literacy.

This study will as prior research attempt to measure self-perception of financial literacy in comparison to actual objective financial knowledge, which mentioned before is based on financial knowledge tests. Thus, we will as well investigate whether self-perception of financial literacy affects financial risk tolerance or not.

3.4.2 Overconfidence

While the expected utility theory acts under the assumption that individuals are rational financial decision-makers, behavioural finance argues otherwise. In fact, several studies have concluded that individuals are not as rational as the aforementioned theory declares (e.g. Barber & Odean, 2001; Firat & Fettahoglu, 2011; Kahneman, 1994). According to Kahneman (1994, pp. 18-19), an individual who obey a set of formal rules is a rational person. Either way, Firat and Fettahoglu (2011, p. 154) imagine that individuals are signified as normal rather than rational. Further, it has been declared that behavioural finance is constructed on the foundation that individuals make choices based on insufficient information, thus restrict themselves from making decisions that accurately maximises their utility (Firat & Fettahoglu, 2011, p. 154). Above all, behavioural finance concentrates on the application of psychological principles that affects financial decision-making, in order to improve the process (Firat & Fettahoglu, 2011, p. 153).

One of the most recognised behavioural biases is overconfidence. People are expected to act with overconfidence while considering their own knowledge, capabilities and prospects for the future (Barber & Odean, 2001, p. 261).

Furthermore, research conducted within the psychological domain present findings that point to the fact that both men and women display overconfidence, although men are generally more inclined to exhibit it (e.g. Lundeberg et al., 1994). Similarly, Barber and
Odean (2001, p. 262) argue that this is connected to the fact that men exhibit higher level of stock market experience than women. Additionally, in Lundeberg et al.’s (1994, p. 115) research, students were found to exhibit the highest degree of overconfidence, in particular male students. The authors noted that male students showed overconfidence when they were incorrect to a larger extent than female students. Accordingly, male students exhibited a reluctance to admit if they did not know the correct answer, that is to say select the option of “do not know” in the questionnaire when they lacked correct reasoning, in contrast to female students who showed higher tendencies of admitting lack of correct reasoning (Lundeberg et al., 1994, p. 120).

In addition, Griffin and Tversky (1992, p. 430) predict that experts (i.e. financial literate and experienced on the stock market) display higher tendencies of overconfidence than inexperienced individuals (i.e. non-financial literate). Overall, overconfident people are excessively certain about their own judgements, hence fail to adequately consider judgements of others (Wood & Zaichkowsky, 2004, p. 171).

While this study will attempt to investigate self-perception and overconfidence, this will contribute as a potential bias that explains certain behaviour and choices while analysing the participants’ response behaviours. As overconfidence is one of the most documented behavioural biases we consider it to be an important theory in this study.

3.4.3 Stock market experience

According to both Frijns et al. (2014, p. 125) and Hilgert et al. (2003, p. 311), there is a positive correlation between stock market experience and financial literacy. Moreover, Frijns et al. (2014, p. 125) implies that an individual who has above average financial experience, also has greater financial literacy. The same author also suggests that individuals with greater financial experience are more willing to acquire further financial knowledge, either through financial educational programmes or self-education (Frijns et al., 2014, p. 125).

Subsequently, Yao et al. (2011, p. 886) do as well claim that the view of individual’s perception of financial risk may be influenced by the level of knowledge and experience an individual has with investments, and not only by a person’s level of education. To illustrate this, the authors imagine that an individual who has invested in stocks or similar activities for 20 years and holds a bachelor degree should have more knowledge about investing compared to an individual holding a Ph.D. degree in another field who only started investing a while ago.

Altogether, this is of importance as it can be seen that education is not the sole predictor that has to be taken into consideration when determining on how financial literate or how financial risk tolerant an individual is. It might be able to clarify certain findings when analysing and discussing the results of this study.

3.5 Mechanisms that connects financial literacy to financial risk tolerance

They way of revealing what mechanisms that connects financial literacy to financial risk tolerance has been demonstrated through abovementioned factors such as highest
level of education, stock market experience and overconfidence bias. Initially, when one is searching for prior studies on financial literacy or higher level of education in relation to financial risk tolerance, there are studies conducted in the United States and Australia that concludes the fact that individuals, regardless of age, with higher level of education, noticeable financial literacy or experience on the stock market are more inclined to take financial risks (e.g. Grable, 2000; Hallahan et al., 2004; Sjöberg & Engelberg, 2009).

Secondly, to resume to previously discussion regarding stock market experience, those with stock market experience are as well more inclined to face financial risks (van Rooij et al., 2011, p. 460). With regards to this, stock market experience is a subject of measuring financial risk tolerance. Lastly, Griffin and Tversky (1992, p. 426) marks that overconfidence is commonly visible to thrive alongside forecasts with low predictability, such as investing in stocks, where information is likely to be unpredictable and lacks feedback. As for overconfidence being commonly visible alongside stock investments, reveals that overconfidence may be an affecting factor on financial risk tolerance.

While it can be viewed that financial literacy itself is highly related to financial risk tolerance, it is of importance to shed light on mechanisms affecting this connection between the two subjects, such as the factors abovementioned.

3.6 Demographic variables

As formerly mentioned, many of the recent studies tend to use similar demographic variables in their investigation concerning factors affecting financial risk tolerance. In fact, most of the recent studies are based on preceding literature. The demographic variables mentioned below will serve as independent variables in the data analysis. That is to say, the demographical variables will not be measured and compared independently, solely control the outcome of measuring the relationship between financial risk tolerance and financial literacy. However, there are some variables that are of greater importance than others in this study, although of importance for the theoretical frame of reference, in order to obtain a complete understanding of how the variables affect financial risk tolerance and financial literacy. Apart from this, findings of preceding studies are to a large extent highlighted and presented in this section.

3.6.1 Gender

The topic of gender is not a new phenomenon. It has been studied extensively, where several authors have found gender differences. Borkowski and Ugras (1998, p. 1124), as well as Hagström and Gamberale (1995, pp. 486-488) argues that women are less materialistic than men and girls less than boys. It is also found that men are more likely to use money as an instrument to impress but also influence others, thus men place a higher value on money (Prince, 1993, p. 171). Bernasek and Shwiff (2001, p. 355) support the previous statement and express that women are more conservative than men, indicating that females are less likely to take on investment with a higher risk level.

As for the relationship between financial risk tolerance and gender, previous research, despite diverse approaches, has found that females are considerably less financial risk
tolerant compared to males (Cooper et al., 2014, p. 279; Faff et al., 2008, p. 21; Grable, 2000, p. 628; Grable & Lytton, 1998, p. 68; Hallahan et al., 2004, p. 67; Hawley & Fujii, 1993, p. 202; Jianakoplos & Bernasek, 1998, p. 629; Powell & Ansic, 1997, p. 622; Roszkowski & Grable, 2005, p. 188; Ryack, 2011, p. 191; Sjöberg & Engelberg, 2009, p. 40). One of the explanations for this difference in financial risk tolerance is based on the biological characteristics of the genders. Some studies have marked that women are biologically responsible for child bearing, thus a natural sense of security, which implies that women are more risk averse (Hallahan et al., 2004, p. 75). This is supported by Powell and Ansic (1997, p. 622) who argues that females has a higher desire for security than males, which in turn has a greater desire for returns. Providing that females are less risk tolerant, it is believed that they tend to use tactics that avoids the worst situation to be able to gain security (Powell & Ansic, 1997, p. 622).

3.6.2 Age

Notably, age has become a central variable in many recent studies. Some authors have not found age to have a significant effect on risk tolerance, which indicates that age is not a variable that affect how much risk you take (Grable & Lytton, 1998, p. 69; Haliassos & Bertaut, 1995, p. 1122; Hawley & Fujii, 1993, p. 199). Although others argue that younger individuals display a higher financial risk tolerance compared to older individuals (Grable & Lytton, 1998, p. 64; Yao et al., 2011, p. 883; Hallahan et al., 2004, p. 75). According to Yao et al. (2011, p. 885), as well as Grable and Lytton (1998, p. 64), risk means exposure to losses, which could indicate that older individuals are more reluctant to take risks since they have less time to recover from losses resulting from taking financial risks, implying that older individuals are less willing to take on financial risk.

In contrast, there are studies to be found with a significant nonlinear relation of age, which indicates that individuals financial risk tolerance decreases (or increases) to a certain point and then starts to increase (or decrease) (Faff et al., 2008, pp. 16, 21; Hallahan et al., 2004, p. 66). In fact, there exist literature stating that financial risk tolerance increases with age, indicating that older individuals are more risk tolerant than younger individuals (Grable, 2000, p. 628; Wang & Hanna, 1997, p. 30). In fact both Grable (2000, p. 628) and Wang and Hanna (1997, p. 30) claim that this could be explained due to younger individuals having insufficient capital or limited understanding of the subject. Altogether, the explanation for the contradictory results is not completely clear, but may be an effect of the differences in methodological choices, such as sampling procedure.

3.6.3 Family situation

Another potentially important variable that affects the preferred level of risk in financial decision-making is marital status. Several previous researchers have investigated this variable with contradicting results. Most of the studies have shown that single individuals tend to be more financial risk tolerant compared to married individuals (Faff et al., 2008, p. 16; Yao et al., 2011, p. 885; Hawley & Fujii, 1993, p. 202; Hallahan et al., 2004, p. 73; Grable & Joo, 2004, p. 82). According to Chaulk et al. (2003, p. 261) one of the reasons explaining why married individuals are less financial risk tolerant is
the fact that individuals change when they get married, as well as they introduce the possibility for future family events such as parenthood.

In contrast to previous stated research, Grable (2000, p. 628) argue the opposite and states that married individuals are more financial risk tolerant than single individuals. Nevertheless, some other authors have not been able to show any significant relationship between financial risk tolerance and marital status (Grable & Joo, 2004, p. 145; Haliassos & Bertaut, 1995, p. 1122; McInish, 1982, p. 132).

Further, it has been discovered that having children also is a factor that affects the level of willingness to take financial risk. According to Yao et al. (2011, p. 885) and Chaulk et al. (2003, pp. 272-273) individuals with children are more reluctant to take financial risk compared to individuals without children. This could also be explained by the biological factor, where individuals desire security and therefore become more risk averse (Chaulk et al., 2003, pp. 261-262).

### 3.6.4 Income

Initially, Bernheim et al. (2001, p. 854) could not find a relationship between financial risk tolerance and income or wealth. However, most previous studies have shown that individuals with a higher net worth or a high household income tend to be more financial risk tolerant, indicating that they are more willing to take financial risk (Grable et al., 2010, p. 145; Grable & Joo, 2004, p. 82; Hallahan et al., 2004, p. 67; Ryack, 2011, p. 191). Moreover, Grable (2000, p. 628) also agrees with the previous statement as well as he claims that professionals have a higher financial risk tolerance compared to those with a low income. Further on, Yao et al. (2011, p. 886) marks that it is reasonable for individuals with higher incomes and wealth to be more willing to pursue risky investments, since higher income households may be required to accumulate sufficient capital in order to maintain the desired lifestyle upon retirement.

### 3.6.5 Education

To begin with, educational effects have as well been tested to a large extent by previous research, in particular higher education (university diploma). According to several authors, individuals with a higher level of education are more financial risk tolerant compared to individuals with a lower level of attained education (Grable, 2000, p. 628; Grable & Joo, 2004, p. 82; Grable & Lytton, 1998, p. 68; Hallahan et al., 2004, p. 67; Ryack, 2011, p. 191; Sages & Grable, 2010, p. 59; Sjöberg & Engelberg, 2009, p. 37; Yao et al., 2011, p. 885). Furthermore, there are some differences in how prior studies have differentiated between specific education levels. For instance, Hallahan et al. (2004, pp. 66-67) stated that at least a trade or diploma level of education was essential before a significant increase in financial risk tolerance could be observed.

### 3.6.6 Geographical differences

There is a study to be found by Guiso et al. (2004) where the objective was to identify how the effect of social capital on financial development differed in various areas of Italy. Social capital can be explained as the advantages, opportunities and resources
derived from social ties and belonging to a community (Guiso et al., 2004, p. 528). In fact, the same authors believe that social capital is intermediated by level of trust and that both in collaboration generated an effect of economic propensity (Guiso et al., 2004, p. 527).

Moreover, Guiso et al. (2004, p. 528) managed to separately detect effects of both the environment the participant’s residence in today and where they grew up, and what they managed to withdraw was that even though most of the level social capital was explained by their place of residence, there was still a fraction of social capital explained by their place of birth. That is to say, even though a person moves from their place of birth and develop social capital at their place of residence, they will still display fractions of social capital prevailing in the area where they were born. Further on, Guiso et al. (2004, p. 536) display findings of geographical differences between the North and South of Italy. That is to say, North of Italy had tendencies of a high level of social capital in the North, whereas the South exhibited a low level social capital.

Above all, Guiso et al. (2004, p. 540) found that, when investigated proportion of wealth invested in stock, that the social capital of where one grew up has a strong positive effect on stock market experience and financial wealth. As mentioned before, stock market experience is associated with higher financial literacy, and engaging on the stock market is a form of facing financial risk.

3.7 Summary

In summary, the main focus of this study will be the concepts of financial risk tolerance and financial literacy. In fact, the study will aim to explain the relationship between financial risk tolerance and financial literacy, as well investigate the mechanisms that connect the two concepts. The expected utility theorem will merely serve as a foundation to the denotations of risk-aversion, risk-neutral and risk-seeking behaviour, however not as a theory in focus. Moving forward, the demographical variables mentioned is to be denoted as control variables, with the purpose of increasing validity of the study while they have proven to show affects from previous studies, hence the main focus is to detect the affects of financial literacy. Therefore the reader should not expect an extended analysis or discussion regarding the control variables. Further, the expectations of the outcome, derived from previous literature, is that financial literacy will have an increasing effect on financial risk tolerance and that mechanisms such as overconfidence and stock market experience will serve as underlying mechanisms for an increased financial risk tolerance. Additionally, for the control variables, we expect gender, education and geographical background to affect the level of financial risk tolerance, namely that males and individuals with a higher education in business and economics will have an increasing impact.
4. Practical method

In the section of practical method, we will aim to increase the readers understanding of how this study has been performed and structured. First we will present how the study has been conducted, in terms of sampling procedure, the construction of questionnaire, data collection and how the data analysis was performed. Thereafter, ethical considerations and access gain will follow. Altogether, the reader will be able to get an overview of the data of this study and its usage.

4.1 Sampling procedure

When collecting primary data with a quantitative method, there are two different sampling techniques, probability and non-probability sampling (Bryman & Bell, 2011, p. 176). The main difference between the two methods is that you as a researcher are able to generalise results if the probability technique is used (Bryman & Bell, 2011, p. 176). A non-probability sampling implies that the sample has not been chosen by a random selection, in other words, it indicates that not all individuals have the same probability to be selected (Saunders et al., 2012, p. 262). In contrast to the non-probability sampling technique, the probability method is based on an entirely random sampling, thus the probability for all individuals are exactly the same (Bryman & Bell, 2011, p. 176). However, precise probability sampling can be difficult to achieve completely, while databases and member’s lists are often incomplete or inaccurate, as well out of date (Saunders et al., 2012, p. 263). This could be considered a disadvantage with probability sampling, thus it is of great importance to ensure that the sampling frame is complete and accurate.

To begin with, the population of this study is expected to be the young highly educated individuals. When we entered the selection procedure, we primarily selected a probability sampling technique, more specifically, using a cluster sampling technique. The cluster sampling technique implies that you group individuals in order to divide the population prior the sampling process (Bryman & Bell, 2011, p. 278). In this particular study, we created clusters of academic backgrounds. Unfortunately as a result of access and time limits, we were not able to obtain a complete member’s list of the population. Therefore, in order to maintain a partly probability sampling, we decided to contact various program coordinators and requesting them to supply the survey to the students within their faculty. The belief is that this sampling technique is in accordance with this study’s purpose of comparing the cluster of non-financial literate individuals against financial literate individuals, in order to compare actual financial literacy to financial literacy obtained from experience.

In addition, it was decided to use convenience sampling as a secondary sampling technique, which is a non-probability sampling, this in order to obtain a higher response rate. Convenience sampling is a form of haphazard sampling, which implies that the selection of a sample is based on availability (Saunders et al., 2012, p. 291). The survey was distributed through academic background-based groups on Facebook, as it is considered to be productive, efficient and easily available. However of importance, the survey was again clustered and segregated into academic backgrounds.
Further, students at Umeå University in Sweden represent the population of this study’s data. As of 2015, there are 30,254 individuals enrolled at bachelor- or master’s level, whereas the majority are women, more precisely 61% (Umeå University, 2015). The population consist of individuals with various academic backgrounds: both business and non-business related educations. Moreover, in order to obtain the highest accuracy of the population, one would need to access a sample that is representative for the population as a whole. This would require access to all students within all existing faculties in order to guarantee participation from various academic backgrounds.

Altogether, despite abovementioned hinders, the belief is that both sampling techniques has provided us with data that is sufficiently similar to the chosen population, thus provided us with an outcome that can be generalised to some extent, and therefore we have confidence in our obtained sample.

### 4.2 Questionnaire

One of the most commonly used data collection technique within the survey strategy is the questionnaire (Saunders et al., 2012, p. 417). Since each respondent is provided with the exactly the same questions, it is an efficient way to collect data from a larger sample (Saunders et al., 2012, p. 417). However, the response rate, the reliability and validity of the data that you collect will be affected by the questionnaire design (Saunders et al., 2012, p. 419).

Further, Bodie et al. (2011, p. 284) notes that behavioural biases are fundamentally affected by how information or questions are framed, for instance in a risk versus return situation. That is to say, decisions are influenced by how options are framed. To illustrate, an individual may accept an option or bet when it is framed in a sense in terms of the risk surrounding possible losses, whereas possibly reject the same bet when it is framed in a sense in terms of the risk surrounding prospective gains (Bodie et al., 2011, p. 384). As this study will distribute a survey containing certain questions that tests financial risk tolerance and financial literacy, it can be deemed that these questions might have been framed initially. Thus, it is of importance to shed light on framing as a potential bias, while the survey will serve as this study’s main source of data collection.

In order to be able to measure financial risk tolerance in a proper manner, we decided to use an existing measure developed by Grable and Lytton (1999) as a basis for our questionnaire. The 20-item scale as the first measure is called was first derived from 100 assessment items, which originally were selected from previous academic and trade publications (Grable & Lytton, 1999, p. 168). Items not related to financial risk tolerance, such as preferences for general risk seeking etc., were eliminated to make sure that subtle differences in financial risk tolerance were represented (Grable & Lytton, 1999, p. 168). Thereafter Grable and Lytton (1999) narrowed down the 20 items until only 13 items was left and decided to call it the 13-item scale. The biggest difference between these two scales is that the 20-item scale analyses eight different dimensions, whilst the 13-item scale evaluates the financial risk tolerance using only three dimensions (Grable & Lytton, 1999, p. 174, 177). The scales has been tested various times by the developers, as well as by other authors, and has proven to be a good indicator to see how financial risk tolerant an individual is. Therefore, we thought it was suitable to use this as a base for our study.
According to Saunders et al. (2012, p. 238), it is very important that a respondent is provided with all necessary information, as well as an individual has decided to participate in the research completely by his or her own free will. The same authors also emphasises that you as a researcher need to provide clear assurances about confidentiality when both collecting and processing the data (Saunders et al., 2012, p. 223). To be able to fulfil our duty to the respondents, we included a description providing instructions, as well as relevant information about the study, in the beginning of the questionnaire. In order to ensure that all respondents would be able to understand all information, the letter was well structured and had a simplified language. The purpose with it was to increase the respondents’ trust in our research as well as to increase the number of respondents.

The questionnaire was divided into three different parts: demographic variables, financial literacy and risk scenarios, making it more organised and easy to follow. The first section in the questionnaire consisted of 17 different questions regarding the respondents’ background and attitudes towards financial risk taking, as well as questions about an individual’s self-perception. Further, in the second section we included three questions about financial literacy, which were based on the research of van Rooij et al. (2011). These questions tested an individual’s actual financial literacy with questions concerning numeracy, inflation and money illusion, which we could compare to an individuals self-perception about their financial knowledge.

Finally, in the third and last section, we asked ten questions regarding different risk scenarios. As previously mentioned, these questions were based on the 20-item scale constructed by Grable and Lytton (1999). However, we only included ten out of the 20 items, as well as we modified the questions to some extent so they would suit our research better. Since we are including more demographic variables and questions concerning attitudes towards financial risk tolerance compared to previous research, as well as financial literacy questions, we believe that our study is sufficient enough to investigate the financial risk tolerance of an individual.

Other changes that we conducted were to increase the number of alternatives for each risk scenario question. In the scale that Grable and Lytton (1999) developed, most questions had either three or four alternatives. We found that the number of alternatives was limited, making it more difficult to see the differences in financial risk preference. Thus, we decided to increase the number of alternatives to five. Additionally, we chose to use the Swedish krona as our currency instead of the U.S. dollar that was used in the original questionnaire. Since the majority of our respondents are living in Sweden and uses the Swedish krona on daily bases, we believe that the usage of another currency would have confused the respondents and biased the outcome.

The final questionnaire, which can be found in Appendix 1, consisted of 27 different questions, where the majority of the questions are closed questions. These questions provide alternatives from which the respondents were forced to choose between (Saunders et al., 2012, p. 432). Advantages with this type of questions are that it often takes less time, as well as it is easier to compare answers between different respondents. Since we decided to use an existing questionnaire, most of the questions were designed with multiple-choices. Predetermined alternatives were required so relationships between the different variables would be simpler to detect. Using open-ended questions would not have been suitable since follow-up questions might have been needed.
However, we made two exceptions. We decided to let the respondents’ fill in what program they were enrolled in and what semester they were studying on due to the numerous of different alternatives of academic background.

Although the majority of the respondents were Swedish and have Swedish as their mother tongue, we decided to have the questionnaire in English. As mentioned previously, the questionnaire was based on the questions made by Grable and Lytton (1999), with the original questions stated in English, thus we chose to use English in order to avoid mistranslations to Swedish. Furthermore, it is deemed that individuals studying at university level should be familiar with the English language, and therefore this should not bias the outcome.

### 4.2.1 Risk dimensions

The questions in the 20-item scale developed by Grable and Lytton (1999) are supposed to measure eight different dimensions, which will be presented below. Individually, no item is sufficient enough to assess financial risk tolerance, however when the items are combined together it could provide an accurate method of an individuals financial risk tolerance. The eight dimensions are also shown in Table 1, where we have summarised which questions representing what risk dimension.

<table>
<thead>
<tr>
<th>Item</th>
<th>Guaranteed vs. probable gambles</th>
<th>General risk choice</th>
<th>Choice between sure loss and sure gain</th>
<th>Risk as experience and knowledge</th>
<th>Risk as a level of comfort</th>
<th>Speculative risk</th>
<th>Prospect theory</th>
<th>Investment risk</th>
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<tbody>
<tr>
<td>Item 14</td>
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<td>Item 17</td>
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<td>Item 22</td>
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<td>Item 24</td>
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<td>Item 25</td>
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<td>Item 26</td>
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</table>

The dimension “Guaranteed vs. Probable Gambles” investigates questions where the respondents have the option to choose between a guaranteed safe alternative and a gamble. If an individual selects a guaranteed safe option in comparison to an alternative including gamble, that individual is more risk averse. For instance, in question 21, individuals who choses 5000 SEK in cash is more risk averse than individuals choosing an alternative with 50% chance to win 25 000 SEK. “General risk choice”, or “General
risk taking propensity” as it is also called, is the second dimension in our questionnaire, which can only be measured by item 26 in our study. This question indicates that an individual who decides to borrow money from friends and family to qualify for a bigger mortgage is more financial risk tolerant than an individual deciding to buy an affordable house with a comfortable monthly payment.

Question 22 in our questionnaire measures the “Choice between sure loss and sure gain”, which implies that individuals with a high financial risk tolerance are more likely to feel satisfaction when they make a profit having incomplete information. Thus, to be able to measure this dimension, item 22 requires respondents to choose an alternative without all necessary information. An individual who chooses to answer question 14, 16, 17 and 27 with either answer alternative (d) or (e) should, on average, have a higher financial risk tolerance than others. These questions regard the dimension “Risk as experience and knowledge”, which requires expertise or knowledge to some degree to be able to answer the item.

Furthermore, questions concerning the dimension “Risk as a level of comfort” are items 14, 16, 17, 23, 25, 26 and 27. These questions are highly related to the expertise and knowledge of an individual since they reflect on how comfortable an individual is when investing, as well as they assess how an individual’s attitude toward financial risk tolerance is. According to Carducci and Wong (1998, pp. 357-358) some individuals are more willing to take risks due to their heritage. For instance, some individuals might be inheritably comfortable to invest in stocks or funds compared to hard assets, such as real estate.

As the name implies for the fourth dimension “Speculative risk”, individuals who have a higher tendency to speculate are generally more financial risk tolerant compared to others. Items 21, 22, and 24 forces respondents to choose between a safe alternative and an alternative where he or she has to speculate on the degree of return that is offered by that situation. If the safer alternatives are being chosen, it indicates that an individual are more risk-averse. When considering the dimension “Prospect theory” and item 23, it is stated that an individual with high financial risk tolerance would choose an alternative including chance. Finally, item 16 regards the dimension of “Investment risk”, which combines the attributes of knowledge and temperament in the valuation of financial risk tolerance. If an individual rather chooses an investment with little variance, he or she is considered to be more risk averse.

4.2.2 Scoring

Being able to measure an individuals financial risk tolerance, each item has been given a weight with a range from one to five (see Table 2). We have decided to perform a similar scoring technique as Grable and Lytton (1999, p. 168), where a higher weight indicates that it is a more risky choice, whereas a lower score indicates that it is a less risky choice. The maximum score that an individual can get is 50, which implies that a person has a very high financial risk tolerance. In contrast, the score that indicates that an individual is risk averse is 10, which is the lowest score a respondent can get.
Table 2. Scoring (Grable & Lytton, 1999, p. 172)

<table>
<thead>
<tr>
<th>Item</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
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<tbody>
<tr>
<td>Item 14</td>
<td>1</td>
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<td>3</td>
<td>4</td>
<td>5</td>
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<td>Item 16</td>
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<tr>
<td>Item 17</td>
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<td>Item 21</td>
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<td>Item 22</td>
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<td>Item 23</td>
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<tr>
<td>Item 25</td>
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<tr>
<td>Item 26</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
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<tr>
<td>Item 27</td>
<td>1</td>
<td>2</td>
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<td>5</td>
</tr>
</tbody>
</table>

Furthermore, to be able to know how financial risk tolerant an individual is, we have created a scale which divides all respondents into five different risk categories: (1) “A real risk avoider”, (2) “Cautious”, (3) “Somewhere in between”, (4) “Willing to take risks after completing adequate research” and (5) “A real gambler” (see Figure 3).

![Figure 3. Categorisation scale](image)

4.2.3 Pilot study

The purpose of performing a pilot study is to improve and refine the questionnaire so that respondents are not faced with any problems answering the questions (Saunders et al., 2012, p. 451). Thus, to avoid misunderstandings when collecting the data, as well as to see if the questions were comprehensive, we decided to perform a pilot study with ten different students from various academic backgrounds with different English skills. During the time the respondents were answering the questions, we were able to observe them, thus they were able to ask questions about the questionnaire at any time. When the respondents had completed the pilot-questionnaire, they were asked to give constructive criticism about the questions, in order for us to be given the opportunity to improve the survey.

Altogether, almost all respondents participated in the pilot-questionnaire had trouble understanding two different questions, thus we decided to eliminate those questions. More importantly, our belief was that the elimination of these questions would not affect the results, since other questions available tested an equivalent risk dimension. Furthermore, the English terms in the questionnaire were deemed to be comprehensible;
however, a few individuals with low experience with English financial terms had some difficulties. Hence, we decided to include a Swedish translation for a few words in order to eliminate risks of misinterpretations. Conclusively, additional changes made were not of major proportions, thus a further discussion will not be of relevance.

4.3 Data collection

Self-completed questionnaires distributed electronically using the Internet is one of the most common methods when doing a survey, due to the limited costs and the larger sample size available (Bryman & Bell, 2011, pp. 232-233; Johansson-Lindfors, 1993, p. 113). Electronic distribution of a questionnaire is also timesaving due to the automatic recording of the data in the survey program (Ejlertsson, 2014, p. 10). In other words, the data does not need to be entered manually into a statistical program, which will save the researchers a large amount of time. If the distribution of the questionnaire had been done by paper, the costs would have increased. More time would also have been required to be able to collect a sufficient amount of answers, as well as it would have taken a great deal of time to insert the answers manually. Furthermore, since the respondents were able to choose where and when to complete the questionnaire, we believe that it has increased the credibility of the respondents’ answers. Thus, we are confident in our choice to use an electronic based questionnaire.

In order to collect data, the tool Google Docs Survey was used. However, as mentioned in the sampling procedure, the distribution of the survey was conducted both via program coordinators and Facebook, as the belief was that one distribution channel was not sufficient enough. Further, the questionnaire was open for 27 days, from 25th of February until 23rd of March. Compared to larger surveys, this can be perceived as a short period of time. Although at this time, the response rate had decreased as well as enough answers to complete adequate statistical tests were received. The belief was that the response rate would not increase, thus the decision to close the questionnaire was made.

According to Ejlertsson (2014, p. 25) there are many advantages having a large sample. Using a larger sample will most likely generate more accurate data as well as it will decrease the effects of errors (Ejlertsson, 2014, p. 25). Hence, 2442 individuals were requested to participate in this study, which represents 8,1% of the total amount of students at bachelor- or master level. In the end, we received 210 answers that we were able to use, excluding the response loss. Our opinion is that the sample is sufficient enough for conducting regression analyses. In fact, Hair et al. (2006, p. 197) argues that a sample of 50 individuals is enough to execute multiple regression analyses, whilst a simple regression analysis only requires 20 participants.

4.3.1 Response losses

Generally, when online linkages are used as the distribution method, the expected response rate of losses is usually large, which can be explained by several different reasons (Ejlertsson, 2014, p. 10). The same author argues that it is difficult to control the distribution process; for instance, e-mails can end up as junk mail, as well as respondents can feel a general disinterest towards the subject and consequently ignore the e-mail (Ejlertsson, 2014, p. 10).
Both Ejlertsson (2014, p. 26) and Saunders et al. (2012, p. 267), suggest that two different losses of data will occur when doing a study. When respondents do not participate in the study due to different reasons, external losses occur (Ejlertsson, 2014, p. 26). In contrast to external losses there are internal losses, which occur when a participant have for some reason missed one or more question in the questionnaire (Ejlertsson, 2014, p. 26). If an internal loss has occurred, the results will be affected negatively, thus it is crucial to eliminate answers from respondents where a question has been missed (Ejlertsson, 2014, p. 26).

In total, we received 225 answers. However, as previously mentioned, in the end we could only use 210 answers. 15 of the respondents’ answers had to be eliminated due to insufficient answers. A few of the answers had to be excluded because exchange students performed them. Since the response rate was very low, the belief was that it could not generate sufficient data and thus, it were not adequate enough to do further investigations. Furthermore, to decrease the response loss and increase the motivation of the respondents we included a letter with all necessary information needed, as well as we sent out a reminder with our questionnaire.

4.4 Data analysis

As abovementioned, the data was gathered electronically using the tool Google Docs Survey. This tool provided a prepared and structured excel file in order to further analyse and categorise the collected answers. The collected data was then inserted into the statistical program Stata. The reason behind using Stata was mainly founded in the researchers’ prior experience with the software, and was believed to suit this study’s view of analysis procedure.

The gathered data was initially categorical data, including both descriptive and data that could be placed in rank order (Saunders et al., 2012, p. 475). However, due to the processing procedure, the gathered categorical data was transferred into numerical data. To illustrate, the demographical data was placed into sets of numerical descriptive data, while data gathered on financial literacy, financial risk tolerance (derived from risk scenario questions) and financial literacy perceptions was transferred into numerical scores. Seeing that we in the end process numerical data, we will display our results and analyses using bar charts, pie charts and tabulations, in order to provide the reader with a graphical view of the results.

4.4.1 Correlation analysis and Multicollinearity test

Initially, in order to mark in which way two variables of the collected data was related and to what extent and strength the relationship was, without making distinctions between the dependent variable and independent variables, we performed a correlation analysis (Saunders et al., 2012, p. 521). The correlation (r) assess the strength of association between two variables, and takes forms of a number between -1 and +1, where -1 is explained as a perfect negative correlation, and +1 as a perfect positive correlation, while 0 indicates no correlation (Moore et al., 2011, p. 95). However of importance is that correlation should not be acknowledged as a complete description of variables’ relationships.
To further validate our model, we performed a multicollinearity test. This allowed us to detect if any of the variables were highly correlated and thereby caused instabilities in the regression analysis, thus become imprecise (Moore et al., 2011, p. 610). The statistical software Stata allowed us to calculate a Variance Inflation Factor (VIF) for each independent variable in the model, in order to detect multicollinearity.

Subsequently, our data analysis do as well consist of descriptive statistics, where the demographics of the respondents are presented including minimum and maximum values of the responses, as well as mean and standard deviation. This will create an overall image of the sample’s characteristics, such as gender and age distribution, hence as well give the reader an opportunity to create a perspective of the results as a subject of the gathered data.

### 4.4.2 Multiple linear regression analysis

Followed by the correlation analysis and multicollinearity test, we performed a multiple linear regression analysis, where the dependent variable is a linear function of the explanatory variables (Moore et al., 2011, pp. 590-591);

$$y_i = \beta_0 + \beta_1 x_{i1} + \beta_2 x_{i2} + \cdots + \beta_p x_{ip} + \epsilon_i$$

Where:
- $y_i$ is the dependent variable (i.e. Total Risk Score).
- $x_i$ are the independent variables (i.e. Demographic variables and Financial literacy).
- $\beta_0$ is the parameter of the model which display the mean value for the dependent variable ($y_i$), when the independent variable(s)($x_i$) is zero.
- $\beta_1$ is the parameter that represents the slope, i.e. display the change is the dependent variable ($y_i$) when the independent variable ($x_i$) increases with one unit.
- $\epsilon_i$ represents the deviations, it is independent and normally distributed with mean 0 and standard deviation $\sigma$.

Further, a multiple linear regression analysis is performed to detect a relationship between the dependent variable and the independent variables, in order to explain if and how one and other affect each other when measured in relation (Saunders et al., 2012, p. 512). In concise, the multiple linear regression analysis exhibits statistical significance testing (p-value) of each independent variable (i.e. demographic variable), R-squared ($R^2$) which explains how well the collected data derived from the survey fits into the regression model, and the F-test allows for explanation whether the overall model is statistical significant or not. In this study, we have decided to initially mark all p-values as significant both when $p < 0.05$ (i.e. 95% confidence level) and $p < 0.01$ (i.e. 99% confidence level). Further illustrations will be presented in the following chapter.

### 4.5 Ethical considerations and access gain

Saunders et al. (2012, p. 208) marks that a correct manner of success is succeeded through carefully consider data access and possible ethical concerns of the study. By way of example, it is crucial to pay careful attention to the process of data access, data collection and literature usage that involve ethical considerations. This study has gained
access to data through the form internet-mediated access, using questionnaires and secondary sources, such as preceding literature (Saunders et al., 2012, p. 210).

Moreover, one of the principal issues associated with gaining access to our data concerns physical access. It is noted that physical access refers to difficulties with engaging individuals to participate in the data collection (Saunders et al., 2012, p. 210). An individual may feel that the study is a lack of value to oneself, that the topic is sensible or have doubt concerning the author’s competence, thus lack credibility, and based on that reject participation (Saunders et al., 2012, p. 210). As described, physical access may certainly have affected this study’s access gain while the distributed questionnaire was entirely voluntarily and the respondent had the option to withdraw from the survey at any time.

As aforementioned, the individual was given a description of conditions concerning the questionnaire before participating (see Appendix 1), in order to highlight that participating was solely of free will. In addition, the individual was assured that the questionnaire was harmless for the participant and that the data collection was only to be presented in the aggregate, thus secure the participant’s anonymity and confidentiality (Saunders et al., 2012, pp. 231-232). More importantly, anonymity is of importance to guarantee if a participant was to perceive the topic as sensitive or harmful in any context.

As for modifying the questions included in the survey, the primary aim has been to assure no leading questions that might bias the participant’s perception or behaviour, hence this study’s outcome. Above all, there is an understanding that the formulations of our questions do affect the respondent’s interpretations and perceptions. In other words, it would be highly unethical to disregard the survey design’s impact on the respondents. Although some questions has been marked as mandatory in order to avoid response losses, there are questions where to define gender and marital status that were not marked as mandatory, seeing that it can be perceived as invasion of privacy or sensitive from an ethical point of view (Bryman & Bell, 2011, p. 136). To further assure our ethical understanding, we appended a description beneath the gender question, which informed the respondent that it was acceptable to skip the question without requiring further explanation from the respondent.

Altogether, it is our role as researchers to hold responsibility for all participants and outcomes of this study. Our ethical aim has been to act with consent to social norms of the environment, that is to say act with appropriateness towards the participants and to whom this study may concern.
5. Empirical findings

This chapter provides the reader with the findings of the data collection derived from the conducted survey. Initially, the reader will be presented to the descriptive statistics of this study. That is to say the results found on the two main variables, financial risk tolerance and financial literacy. Followed by the respondent demographics, where the results on the control variables will be displayed. In the end, we will present the correlation and regression analyses on the gathered data will be presented, this in order to prove the statistical outcome of the collected data alongside with interpretations.

5.1 Descriptive statistics

Initially, in order to better comprehend the following models and tables displaying the results, a variable description is demonstrated in Table 3. To emphasise, the variables has been transferred into both calculated scores and dummy variables in the statistical model, therefore it is of importance to understand the underlying denotations.

Table 3. Variable description

<table>
<thead>
<tr>
<th>Variable</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total risk score</td>
<td>The respondents risk score 10 (low) - 50 (high)</td>
</tr>
<tr>
<td>Gender</td>
<td>If female 1, if male 0</td>
</tr>
<tr>
<td>Age</td>
<td>Age range &lt;20, 20-25, 26-30, 31-36, &gt;36</td>
</tr>
<tr>
<td>Partnership</td>
<td>If they were in a partnership 1, if not 0</td>
</tr>
<tr>
<td>Children</td>
<td>If they had children 1, if not 0</td>
</tr>
<tr>
<td>Academic background</td>
<td>If they had economic background 1, if not 0</td>
</tr>
<tr>
<td>Job</td>
<td>If they had a job 1, if not 0</td>
</tr>
<tr>
<td>Literacy Perception</td>
<td>Perception of financial literacy, rank 0 (low) – 3 (high)</td>
</tr>
<tr>
<td>Stocks or funds</td>
<td>If they had invested in stocks or funds 1, if not 0</td>
</tr>
<tr>
<td>Financial literacy score</td>
<td>Number of correct answers on the financial literacy test, 1-4</td>
</tr>
<tr>
<td>Norrland</td>
<td>Geographical place of origin, Norrland in relation to Svealand</td>
</tr>
<tr>
<td>Götaland</td>
<td>Geographical place of origin, Götaland in relation to Svealand</td>
</tr>
<tr>
<td>Intuition</td>
<td>Reliance when facing financial risk, intuition in relation to literacy</td>
</tr>
<tr>
<td>Do not know</td>
<td>Reliance when facing financial risk, do not know in relation to literacy</td>
</tr>
</tbody>
</table>

To begin with, we will initially present the findings that represents the respondents’ total risk score (i.e. financial risk tolerance), financial literacy score and the participants’ own perception of their financial literacy, which was also scored. Thereafter present the findings on items regarding stock market experience and reliance when facing financial risks.

5.1.1 Financial risk tolerance and financial literacy

The total risk score was, as described in section 4.2.2, measured by scoring through selected items included in the survey, where all 210 participants could obtain a score of minimum 10 and maximum 50. As Table 4 below displays, the mean total risk score among the participants were 24.96, with a standard deviation of 5.77, where standard deviation describes the spread of data values around the mean (Saunders et al., 2012, p.
The participant with the lowest total risk score obtained a score of 12 and the participant with the highest total risk score obtained a score of 45. As for the participants’ score on the financial literacy items, where only the correct answer gave a score, the participants could obtain a score between 0-3. The mean value of correct answers was found to correspond to 2.50 with a standard deviation of 0.78. Which indicates that the average participant obtained a fairly high score, based on the facts that below 1.5 correct answers would correspond to a low score.

### Table 4. Descriptive statistics

<table>
<thead>
<tr>
<th>Variable</th>
<th>N</th>
<th>Mean</th>
<th>Std. Dev.</th>
<th>Min</th>
<th>Max</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Risk Score</td>
<td>210</td>
<td>24.96</td>
<td>5.77</td>
<td>12</td>
<td>45</td>
</tr>
<tr>
<td>Financial Literacy Score</td>
<td>210</td>
<td>2.50</td>
<td>0.78</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>Financial Literacy Perception</td>
<td>210</td>
<td>3.33</td>
<td>0.96</td>
<td>1</td>
<td>5</td>
</tr>
</tbody>
</table>

Subsequently, the participants were given the prospect to rate his or her own perception of their financial literacy. In other words, rate them from having a low to high perception of their financial literacy. The participant was able to give oneself a rating between 1-5, where 1 corresponds to very low financial literacy and 5 corresponds to very high financial literacy, compared to the average student at Umeå University. To illustrate, the alternatives the participants could choose from was “Very low” (1), “Lower” (2), “Equal” (3), “Higher” (4) and “Very high” (5) (see Appendix 1, item 10). As Table 4 displays, the average rate a participant gave oneself on financial literacy was 3.33, which indicates that they average participant rated oneself having higher financial literacy than the average student at Umeå University.

Alternatively, while Table 4 displays the descriptive statistics for the total sample, Table 5 displays the descriptive statistics of equivalent variables on solely female respondents. For one thing, the mean of total risk score is 23.14 with a standard deviation of 4.92, whereas minimum score is 12 and maximum score is 38. In fact, the results on females’ financial literacy score shows that the mean value of correct answers corresponds to 2.03 correct answers on the financial literacy test, which is slightly lower than what the mean score displays on the total sample. In addition, the results on females’ perception of their financial literacy correspond to 3.34, which as be viewed as equivalent to what the mean on the total sample corresponded to.

### Table 5. Descriptive statistics of females

<table>
<thead>
<tr>
<th>Variable</th>
<th>N</th>
<th>Mean</th>
<th>Std. Dev.</th>
<th>Min</th>
<th>Max</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Risk Score</td>
<td>123</td>
<td>23.14</td>
<td>4.92</td>
<td>12</td>
<td>38</td>
</tr>
<tr>
<td>Financial Literacy Score</td>
<td>123</td>
<td>2.03</td>
<td>0.84</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>Financial Literacy Perception</td>
<td>123</td>
<td>3.34</td>
<td>0.91</td>
<td>1</td>
<td>5</td>
</tr>
</tbody>
</table>

As for the results of male respondents on the three descriptive variables (see Table 6), one can detect a feeble difference, where the males' mean value on all three variables are all higher compared to the results on the female’s descriptive statistics. That is to say, males display a higher mean value on total risk score, financial literacy score and self-perception of financial literacy, which implies that males are displayed with having both higher financial risk tolerance and financial literacy.
Table 6. Descriptive statistics of males

<table>
<thead>
<tr>
<th>Variable</th>
<th>N</th>
<th>Mean</th>
<th>Std. Dev.</th>
<th>Min</th>
<th>Max</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Risk Score</td>
<td>87</td>
<td>27.53</td>
<td>5.94</td>
<td>15</td>
<td>45</td>
</tr>
<tr>
<td>Financial Literacy Score</td>
<td>87</td>
<td>2.71</td>
<td>0.63</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>Financial Literacy Perception</td>
<td>87</td>
<td>3.75</td>
<td>0.88</td>
<td>1</td>
<td>5</td>
</tr>
</tbody>
</table>

Notably, the results on specifically how many correct answers each respondent obtained, both as a total sample and divided into gender, can be seen in Figure 4. With regards to gender differences, only one male answered incorrectly on all financial literacy items, while there were four female respondents who answered incorrectly on all financial literacy items. Thus, supports the prior detected differences in mean values of the financial literacy score, between males and females. Moreover, the total number of female respondents corresponded to 123 and 67 of these answered correctly on all financial literacy items, which signifies that 54.5% of the females had all correct answers. Whereas, the total number of male respondents corresponded to 87, where 69 of them answered correctly on all items, which indicates that 79.3% of all male respondents obtained all correct answers. Altogether, male respondents were more successful on the financial literacy test; hence male respondents display higher financial literacy than female respondents, regardless of academic background.

Figure 4. Number of correct answers on the financial literacy test

With regards to stock market experience, the survey included an item testing if the respondents had ever invested in either stock or funds. In Figure 5, it can be viewed that the majority corresponding to 57.1%, of the respondents, had stock market experience, whereas 42.9% of the respondents had not. In fact, this item is of particular importance in order to further discuss financial literacy obtained through education and financial literacy obtained through stock market experience.
Further the respondents were given the option to reflect upon what they relied on when they were facing financial risks (see Figure 6). Notably, 63.3% of the respondents answered that they rely on their financial literacy, whereas 18.1% of the respondents were unsure or did not know what they relied on when they were facing risk. The option of “Do not know” was mainly included in order to give the individuals who lacked stock market experience an alternative, since it cannot be deemed that all participants perceive that they have ever faced financial risks, thus less capable of knowing what they rely on. Finally, 18.6% of the respondents marked that they relied on intuition, in other words their gut instinct, when they were facing financial risks and making investment decisions. More importantly, the rational behind this item is that it should not be deemed that an individual with actual high financial literacy or with self-perceived high financial literacy should rely on its financial literacy.

5.2 Control variables

In order to investigate the relationship between financial literacy and individuals financial risk tolerance, independent variables (i.e. control variables) had to be inserted into the statistical model. If these variables were to be excluded, the risk of making inadequate conclusions about the relationship between financial risk tolerance and the independent variables would have increased (Saunders et al., 2012, p. 174).
The initial control variable included was the respondents’ gender. As can be seen in Figure 7, 58.6% of the respondents was women, and 41.4% were males, which is a fair representation of the population at Umeå University (Umeå University, 2015). In other words, the percentage of females and males in this sample corresponds to the actual population.

![Gender distribution](image)

**Figure 7. Gender distribution**

In Figure 8, we display the age distribution of the sample. In concise, 67.6% of the respondents were between 20 to 25 years of age, while merely 10.4% of the sample stated that they were 31 years of age. Altogether, 89.5% of the total sample is 30 years of age or younger, thus this sample can be regarded as the young generation today, and to some extent in accordance with the age distribution of the selected population.

![Age distribution](image)

**Figure 8. Age distribution**

The distribution of the respondents’ place of origin is presented in Figure 9. Most of the respondents, specifically 51.0%, originated from Norrland. The distribution between Svealand and Götaland were rather equivalent. In addition, since Umeå University is situated in Norrland, the results can be deemed to be fairly realistic.
To make it possible for us to determine if an individual had an economic or non-economic academic background, the respondents were asked to provide us with the program they were enrolled in at Umeå University. To be able to divide all programs into economic or non-economic, we went through each program’s course syllabus in order to determine if they had been given the opportunity to obtain financial literacy through their education. To illustrate, an economic background included courses in business, economics and finance. In the end, the distribution of the two different categories was almost equal, which can be viewed in Figure 10.

5.3 Correlation analysis

The performed correlation analysis seen in Table 7, measures the strength of the relationship between both the dependent and independent variables, two at a time. As before mentioned, the correlation can take a value between -1 and +1, where -1 is a negative correlation, which means that the relationship is negative, where an increase in one variable is a definite decrease in the other variable, and vice versa. As for when the correlation value is +1, the relationship is positive, where an increase or decrease in one variable indicates the same directional change for the other variable. By way of example, if one variable increases, the other variable increases as well. Additionally, when two variables do not show any correlation, it takes the value 0.
Table 7. Correlation analysis

<table>
<thead>
<tr>
<th></th>
<th>(1)</th>
<th>(2)</th>
<th>(3)</th>
<th>(4)</th>
<th>(5)</th>
<th>(6)</th>
<th>(7)</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1) Total Risk Score</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(2) Gender</td>
<td>-.0375**</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(3) Age</td>
<td>.0257</td>
<td>.1263</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(4) Norrland</td>
<td>.0770</td>
<td>.0644</td>
<td>-.0812</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(5) Götaland</td>
<td>-.1029</td>
<td>.0151</td>
<td>.0106</td>
<td>-.5323**</td>
<td>1.00</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(6) Partnership</td>
<td>-.0549</td>
<td>.0594</td>
<td>.2126**</td>
<td>.0746</td>
<td>-.0667</td>
<td>1.00</td>
<td></td>
</tr>
<tr>
<td>(7) Children</td>
<td>-.0181</td>
<td>.0894</td>
<td>.6155**</td>
<td>-.0967</td>
<td>.1042</td>
<td>.1428*</td>
<td>1.00</td>
</tr>
<tr>
<td>(8) Academic background</td>
<td>.2885**</td>
<td>-.3706**</td>
<td>-.1209</td>
<td>.2200**</td>
<td>-.2240**</td>
<td>-.0918</td>
<td>-.1660*</td>
</tr>
<tr>
<td>(9) Job</td>
<td>.1027</td>
<td>.0111</td>
<td>.0709</td>
<td>.1512*</td>
<td>-.1516*</td>
<td>.1231</td>
<td>.0536</td>
</tr>
<tr>
<td>(10) Literacy perception</td>
<td>.5131**</td>
<td>-.3659**</td>
<td>-.1381*</td>
<td>.0975</td>
<td>-.0698</td>
<td>-.0011</td>
<td>-.1383</td>
</tr>
<tr>
<td>(11) Stocks or funds</td>
<td>.4396**</td>
<td>-.2205**</td>
<td>.1057</td>
<td>-.0220</td>
<td>.0067</td>
<td>-.0055</td>
<td>.1296</td>
</tr>
<tr>
<td>(12) Intuition</td>
<td>.1864**</td>
<td>-.0707</td>
<td>.0031</td>
<td>-.0213</td>
<td>-.0405</td>
<td>-.1119</td>
<td>-.0176</td>
</tr>
<tr>
<td>(13) Do not know</td>
<td>-.1898**</td>
<td>.1442*</td>
<td>.1675*</td>
<td>-.1327</td>
<td>.1163</td>
<td>-.0246</td>
<td>.0644</td>
</tr>
<tr>
<td>(14) Financial literacy score</td>
<td>.3286**</td>
<td>-.2356**</td>
<td>-.1723*</td>
<td>.0860</td>
<td>-.0641</td>
<td>-.0919</td>
<td>-.1328</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>(8)</th>
<th>(9)</th>
<th>(10)</th>
<th>(11)</th>
<th>(12)</th>
<th>(13)</th>
<th>(14)</th>
</tr>
</thead>
<tbody>
<tr>
<td>(8) Academic background</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(9) Job</td>
<td>.0792</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(10) Literacy perception</td>
<td>.3647**</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(11) Stocks or funds</td>
<td>.2751**</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(12) Intuition</td>
<td>.1775**</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(13) Do not know</td>
<td>-.1554*</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(14) Financial literacy score</td>
<td>.3559**</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

** Correlation is significant at \( \alpha, 0.01 \) (i.e. 99% confidence level)
* Correlation is significant at \( \alpha, 0.05 \) (i.e. 95% confidence level)

5.3.1 Correlation between financial risk tolerance and independent variables

Total risk score represents the dependent variable, while remaining variables are labelled as independent variables (see Table 7). The total risk score has a significant correlation with gender, academic background, financial literacy perception, having invested in stocks or funds (i.e. stock market experience), reliance on when facing risk (“intuition” and “do not know” in Table 7) and the financial literacy score. Further, gender was one variable that is viewed to have a significant negative correlation with total risk score with a value of -.0375, in other words, as male corresponded to the dummy variable 0, total risk score increases if it is a male respondent.

The other mentioned significant variables have been found to have a positive correlation, which indicates that as total risk score increases, these variables increase as well, such as ever invested in stocks or funds with a correlation of .4396, academic background with a correlation of .2885, and financial literacy perception with a correlation of .5131. That is to say, having stock market experience, having an economic background and an increase in self-perception of financial literacy is correlated with an increase in financial risk tolerance. However of greater importance is the correlation between the financial literacy score and the total risk score, which displays a positive correlation with a value of .3559. This value is considered to be a moderate positive correlation, and indicates that when total risk score increases (decreases) – financial literacy score increases (decreases).
5.3.2 Correlation between financial literacy and independent variables

As for what the correlation analysis shows on the strength of association between financial literacy score and other independent variables, there are occurrences of both negative and positive correlations. In fact, similar to the negative correlation between total risk score and gender, the correlation between financial literacy score and gender do as well exhibit a significant weak negative correlation of -.2356, which can explain that if the respondent is a male, financial literacy score tends to increase.

Further, the significant positive correlations that occur to be associated with the financial literacy score are academic background and financial literacy perception. To illustrate, as financial literacy score increases (decreases), self-perception of financial literacy increases (decreases). In other words, an increase in financial literacy score is positively correlated with a higher financial literacy perception, compared to the average participant. Conclusively, the positive correlation between the financial literacy score and academic background indicates that the financial literacy score increases with an economic background, compared to a non-economic background.

As for the obtained financial literacy score’s correlation with stock market experience (stocks or funds), there is a significant correlation, however the correlation value is weak and is therefore not sufficient enough to determine whether it is a positive or negative correlation.

5.3.3 Multicollinearity test

To further validate the collected data, we performed a multicollinearity test using a VIF-test (see Table 8). As before mentioned, this tests to which extent two or more independent variables are correlated with each other (Saunders et al., 2012, p. 667). VIF’s rule of thumb marks that those values greater than 10 are indicators of high multicollinearity, and should be further investigated for exclusion from a further statistical test, as the linear regression model (Moore et al., 2011, p. 610). As seen, there is little indication of multicollinearity among our independent variables, and can therefore be deemed to not cause any instabilities in the following multiple linear regression analysis.
Table 8. Multicollinearity test

<table>
<thead>
<tr>
<th>Variable</th>
<th>VIF</th>
<th>1/VIF</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>1.76</td>
<td>.568822</td>
</tr>
<tr>
<td>Children</td>
<td>1.69</td>
<td>.591075</td>
</tr>
<tr>
<td>Academic background</td>
<td>1.53</td>
<td>.655324</td>
</tr>
<tr>
<td>Norrland</td>
<td>1.50</td>
<td>.666587</td>
</tr>
<tr>
<td>Götaland</td>
<td>1.46</td>
<td>.686622</td>
</tr>
<tr>
<td>Literacy perception</td>
<td>1.45</td>
<td>.687901</td>
</tr>
<tr>
<td>Financial literacy score</td>
<td>1.38</td>
<td>.722436</td>
</tr>
<tr>
<td>Gender</td>
<td>1.31</td>
<td>.763994</td>
</tr>
<tr>
<td>Stocks or funds</td>
<td>1.27</td>
<td>.790134</td>
</tr>
<tr>
<td>Do not know</td>
<td>1.24</td>
<td>.804327</td>
</tr>
<tr>
<td>Intuition</td>
<td>1.14</td>
<td>.880324</td>
</tr>
<tr>
<td>Partnership</td>
<td>1.11</td>
<td>.901867</td>
</tr>
<tr>
<td>Job</td>
<td>1.06</td>
<td>.944729</td>
</tr>
<tr>
<td>Mean VIF</td>
<td>1.38</td>
<td></td>
</tr>
</tbody>
</table>

5.4 Multiple linear regression analysis

In addition to the correlation- and multicollinearity tests that were performed, we performed a multiple linear regression analysis. This was done in order to detect if there is a relationship between total risk score, and the independent variables.

In Table 9 you are able to see the results of the multiple linear regression analysis. According to the result of the F-test, with a score of 11.11, the model is significant at a 99% confidence level. Further, the R-squared gives a result of .4243, which suggests that 42.43% of the variation in the total risk score is explained by the independent variables. Overall, the results indicate that this model is satisfactory with a rather strong relationship between the dependent- and independent variables.

Table 9. Multiple Linear Regression, Model 1

<table>
<thead>
<tr>
<th>Model</th>
<th>N</th>
<th>F</th>
<th>R-squared</th>
<th>Adj R-squared</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>210</td>
<td>11.11</td>
<td>0.4243</td>
<td>0.3861</td>
</tr>
<tr>
<td>Total risk score</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gender</td>
<td>-2.2705</td>
<td>.7249</td>
<td>-3.13**</td>
<td>0.002</td>
</tr>
<tr>
<td>Age</td>
<td>8279</td>
<td>.4824</td>
<td>1.72</td>
<td>0.088</td>
</tr>
<tr>
<td>Partnership</td>
<td>-6488</td>
<td>.6610</td>
<td>-.98</td>
<td>0.328</td>
</tr>
<tr>
<td>Children</td>
<td>-7508</td>
<td>1.2761</td>
<td>-.59</td>
<td>0.557</td>
</tr>
<tr>
<td>Academic background</td>
<td>-7764</td>
<td>.7717</td>
<td>-1.01</td>
<td>0.316</td>
</tr>
<tr>
<td>Job</td>
<td>7944</td>
<td>.6597</td>
<td>1.20</td>
<td>0.230</td>
</tr>
<tr>
<td>Literacy perception</td>
<td>1.8951</td>
<td>.3912</td>
<td>4.84**</td>
<td>0.000</td>
</tr>
<tr>
<td>Stocks or funds</td>
<td>2.9651</td>
<td>.7096</td>
<td>4.18**</td>
<td>0.000</td>
</tr>
<tr>
<td>Financial literacy score</td>
<td>1.0326</td>
<td>.4732</td>
<td>2.18*</td>
<td>0.030</td>
</tr>
<tr>
<td>Norrland</td>
<td>.4862</td>
<td>.7648</td>
<td>.64</td>
<td>0.526</td>
</tr>
<tr>
<td>Götaland</td>
<td>-6403</td>
<td>.9180</td>
<td>-.70</td>
<td>0.486</td>
</tr>
<tr>
<td>Intuition</td>
<td>1.9042</td>
<td>.8555</td>
<td>2.23*</td>
<td>0.027</td>
</tr>
<tr>
<td>Do not know</td>
<td>-3.3869</td>
<td>.9041</td>
<td>-.43</td>
<td>0.669</td>
</tr>
</tbody>
</table>

**. Correlation is significant at α, 0.01 (i.e. 99% confidence level)
* . Correlation is significant at α, 0.05 (i.e. 95% confidence level)
However, to be sure that our model is valid and that the dependent and independent variables did not have unequal variances, we performed a heteroscedasticity test. If a model has heteroscedasticity, the standard errors are theoretically incorrect and hence the t-values as well as the model in general. In Table 10, it can be seen that the null-hypotheses for this test was a constant variance, implying that the model would have homoscedasticity if we were not able to reject the null-hypothesis. With the results of the Chi-square test, we are able to reject the null-hypotheses and state that the model has heteroscedasticity.

Table 10. Heteroscedasticity

<table>
<thead>
<tr>
<th>Chi2</th>
<th>Prob &gt; chi2</th>
</tr>
</thead>
<tbody>
<tr>
<td>6.55</td>
<td>0.0105</td>
</tr>
</tbody>
</table>

5.4.1 Huber-White robust covariance estimator

Since the result showed that our initial model displayed heteroscedasticity, the decision to use the Huber-White robust covariance estimator was made, which is a common test to manage with heteroscedasticity (White, 1980). The new findings from the robust covariance estimator, which the conclusions will be derived from, can be viewed in Table 11.

When comparing the results from the two different tests, it can be seen that the findings are rather equivalent. The F-test in Table 9 presented a score of 11.11, whereas the F-test in the Robust-model showed a decreased score of 10.50. Nonetheless, the difference was minor and the model is still significant at a 99% confidence level. Furthermore, the R-squared test of the new model showed exactly the same result as in the first test, indicating that 42.43% of the model can be explained. Thus, the findings are in line with the results in Table 9, implying that relationship between the dependent- and the independent variables are fairly strong, as well as the model can be seen as acceptable.

Table 11. Multiple Linear Regression, Model 2 - Robust

<table>
<thead>
<tr>
<th>Model</th>
<th>N</th>
<th>F</th>
<th>R-squared</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 - ROBUST</td>
<td>210</td>
<td>10.50</td>
<td>0.4243</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Total risk score</th>
<th>Coeff.</th>
<th>Std. Error</th>
<th>t</th>
<th>P &gt; t</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td>-2.2705</td>
<td>.7191</td>
<td>-3.16**</td>
<td>0.002</td>
</tr>
<tr>
<td>Age</td>
<td>.8279</td>
<td>.5872</td>
<td>1.41</td>
<td>0.160</td>
</tr>
<tr>
<td>Partnership</td>
<td>-.6488</td>
<td>.6429</td>
<td>-1.01</td>
<td>0.314</td>
</tr>
<tr>
<td>Children</td>
<td>-.7508</td>
<td>1.5362</td>
<td>-.49</td>
<td>0.626</td>
</tr>
<tr>
<td>Academic background</td>
<td>-.7764</td>
<td>.6982</td>
<td>-1.11</td>
<td>0.268</td>
</tr>
<tr>
<td>Job</td>
<td>.7944</td>
<td>.6778</td>
<td>1.17</td>
<td>0.243</td>
</tr>
<tr>
<td>Literacy perception</td>
<td>1.8951</td>
<td>.4102</td>
<td>4.62**</td>
<td>0.000</td>
</tr>
<tr>
<td>Stocks or funds</td>
<td>2.9651</td>
<td>.6330</td>
<td>4.68**</td>
<td>0.000</td>
</tr>
<tr>
<td>Financial literacy score</td>
<td>1.0326</td>
<td>.4739</td>
<td>2.18*</td>
<td>0.030</td>
</tr>
<tr>
<td>Norrland</td>
<td>.4862</td>
<td>.8263</td>
<td>.59</td>
<td>0.526</td>
</tr>
<tr>
<td>Götaland</td>
<td>-.6403</td>
<td>.8963</td>
<td>-0.71</td>
<td>0.486</td>
</tr>
<tr>
<td>Intuition</td>
<td>1.9042</td>
<td>.9222</td>
<td>2.06*</td>
<td>0.027</td>
</tr>
<tr>
<td>Do not know</td>
<td>-.3869</td>
<td>.8811</td>
<td>-.44</td>
<td>0.669</td>
</tr>
</tbody>
</table>

**. Correlation is significant at α, 0.01 (i.e. 99% confidence level)

*. Correlation is significant at α, 0.05 (i.e. 95% confidence level)
Moreover, the multiple linear regression analysis shows that the t-test for the variable gender is significant at 0.01. It suggests that females are less willing to take financial risk compared to males. Another variable that were significant at a 0.01 level was literacy perception. This variable refers to how an individual rates his- or hers financial literacy compared to the average at Umeå University. In this study, the results indicates that the higher an individual rates his or hers financial literacy, the more risk they are willing to take. The findings also show that the variable stocks or funds were significant at 0.01. An individual who has invested in either stocks or funds (i.e. having stock market experience) exhibit higher financial risk tolerance compared to those who lacks stock market experience.

Furthermore, the variable financial literacy score, where the financial knowledge of the respondents was tested, was also statistical significant at a 0.05 level (i.e. 95% confidence level). That is to say, individuals who are more financial literate are more financial risk tolerant. We are as well able mark that the variable intuition is significant at a 0.05 level, which implies that that an individual who rely more on their intuition (i.e. gut instinct), in relation to individuals relying on their literacy, are more inclined to face financial risks. Additionally, age is significant at a 0.1 level (i.e. 90% confidence level), suggesting that financial risk tolerance increases with age.

Further on, a few variables included in the test were not significant, indicating that there is not a relationship between financial risk tolerance and these variables. In other words, we are not able to determine if being in a partnership, having children, an economic background, a job alongside studies, or if the place of origin of affects an individual’s financial risk tolerance. However, since all of these variables were simply control variables the results does not directly affect this study’s purpose.
6. Empirical Analysis

This chapter will be a continuation of the findings chapter, where the reader will be presented to the analysis of the empirical findings. In the analysis, we will reflect upon our results in the light of the theoretical frame of reference and prior literature. The reader will be given a deeper understanding on how and if our findings have any reflections in prior literature. Conclusively, we will present the analysis in a similar configuration as the theoretical framework in order to create a logical structure. That is to say, initiate with analysing financial risk tolerance, financial literacy, and the demographic variables.

6.1 Financial risk tolerance

With regards to the findings on the individuals’ financial risk tolerance, the total risk score determines an individual’s level of financial risk tolerance in this study, and the levels of financial risk tolerance are divided into five categorisations. The individuals’ are either classified as "A risk avoider", "Cautious", "Somewhere in between", "Willing to take risk after completing adequate research" and "A real gambler". Similarly to what Snyder and Nicholson (2011, p. 194) claimed, that individuals in general prefer to avoid risk and can therefore be labelled as risk-avers, our research revealed fairly supporting results.

As an illustration, the mean of the total risk score among all respondents, with a possible minimum score of 10 and maximum score of 50, was 24.96, which is equivalent to an individual who classifies as a “Cautious” individual and feel less comfortable when facing financial risks (see Figure 3). Besides, this is a score that can be estimated as risk-aversion while it is below 30, which is the value in between minimum and maximum possible total risk score. In other words, our findings reveal that our study to some extent supports the fact that the average individual is risk averse and acts conservatively when facing financial risk (Dyer & Sarin, 1982, p. 882).

6.2 Financial literacy

On the subject of the obtained financial literacy score, Huhmann and McQuitty (2009, p. 289) marked, financial literacy is based on memory and financial capacity is explained as the ability to comprehend and process financial information, our results on the respondents financial literacy score was based on a test which included both memory and understanding financial concepts. The financial concepts used were interest rate, illusion of money and inflation.

Further, our survey only included three items on financial literacy (see Appendix 1, items 18-20), which served to measure the respondents’ financial knowledge. However, mean values on the matter revealed that the respondents answered correct on 2.5/3 items on the financial literacy test, hence the results is an indication that the average respondent shows high financial literacy, although solely based on these three items. With this in mind, Almenberg and Widmark’s (2011, p. 27) conclusion that Swedish individuals, let alone young individuals, exhibit low financial literacy could not be supported in our findings. Although this can be explained by the fact that Almenberg and Widmark’s sample and financial literacy test was more extensive. For one thing,
the correlation analysis revealed that individuals with an economic background might be more inclined to answer correct on the financial literacy items than those with a non-economic background.

Subsequently, Almenberg and Widmark (2011, p. 27) presented findings that indicated low financial literacy among women, which our results showed tendencies of. Our findings show that the average female answered correct on 2.03/3 items, while the average male answered correct on 2.71/3 items (see Table 5 & 6), which can be an indicator that our findings to some extent can support above authors' evidence. Besides, when analysing females and males in comparison, our findings shows that fewer males had all incorrect answers or had chosen to respond “do not know” than the female respondents. In fact, a larger number of males answered correct on all financial literacy items, thus are more financially literate than females according to our findings. Conclusively, what Lundeberg et al. (1994, p. 120) claimed about males being more inclined to avoid selecting the option “do not know” when having insufficient knowledge about a question could not be supported in our findings and will therefore not be analysed further.

Overall, van Rooij et al. (2012, p. 466) claims that those individuals with high financial literacy have larger chances of obtaining greater household wealth, while they perform better on the stock market in terms of positive returns.

6.2.1 Self-perception of financial literacy

As for the data collected on self-perception of ones financial literacy, and the participant’s actual financial literacy, measured by the financial literacy score, the findings revealed that the average respondent had a realistic view of their financial literacy. Nevertheless, Disney and Gathergood (2013, p. 2247) claims that individuals with low financial literacy shows awareness of its lacking knowledge in the financial area, hence more inclined to avoid financial risks and feel less comfortable when facing risk. Supporting this, our correlation analysis displays that there is a positive correlation between self-perception of financial literacy and financial literacy score (see Table 7), which may indicate that when the respondent’s self-perception increases (decreases), the respondent’s score on the financial literacy test increase (decreases), thus a realistic view. In addition, our findings are as well in accordance with Huzdik et al.’s (2014, p. 452) results where the findings on a youth population, similar to sample, show that the participants had a realistic perception of their financial literacy.

Granted this, our findings could not detect any major indications of overconfidence among males or females. However, males’ average self-perception was higher than females’ average self-perception, although males had a higher average financial literacy score than females, thus is not a sufficient indication of overconfidence (see Table 5 & 6). We can therefore not support prior research, which display evidence on overconfidence among males or females with our collected data (e.g. Lunderberg et al., 1994; Barber & Odean, 2001).
6.3 Financial literacy’s effect on financial risk tolerance

To begin with, Yao et al. (2011, p. 886) marks that those who lack financial experience and have poor financial literacy can be considered to have a different perception of financial risks, whereas those who have financial experience and possess relatively high financial literacy. Further, Huhmann and McQuitty (2009, p. 272) argue that those with poor financial literacy will have more difficulties with understanding financial concepts, which in this study can affect both the financial literacy score and the total risk score. Supporting this, the performed multiple linear regression analysis reveals that higher financial literacy is an indicator of higher total risk score, hence lower financial literacy is an indicator of lower total risk score.

6.3.1 Stock market experience

Both Frijns et al. (2014, p. 125) and Hilgert et al. (2003, p. 311) argue that there is a strong relationship between stock market experience and financial literacy, however our results could not find any significance evidence on this matter. In fact, instead of a positive correlation between financial literacy and stock market experience, our results displayed a positive correlation between stock market experience and total risk score. The correlation analysis showed that the score on the financial literacy test and if the participant had ever invested in stocks or funds had a significant weak positive correlation, thus not strong enough to support above authors' claim on the relationship. However, the multiple linear regression analysis showed that having invested in stocks or funds was significant with total risk score, which indicates that those individuals having invested in stocks or funds obtained a higher total risk score.

Furthermore, Frijns et al. (2014, p. 125) also suggested that individuals with financial experience are more willing to learn about investment compared to individuals with less financial knowledge, indicating that they will become more financial literate. However, we are not able to support this statement in this study.

6.3.2 Reliance factor when facing financial risk

Further, as the findings revealed in Figure 6, the majority of the participants marked that when facing financial risk, they relied on prior literacy. What was not specified in this item was what kind of knowledge the respondent had in mind while selecting this option. Our intention was to seek out if they used prior financial literacy, for instance using stock valuation models or calculated volatility. Since the respondents could not provide this specification, we can only assume whether they relied on intuition or not. With this in mind, those who were relying on intuition was significant in the multiple linear regression analysis, revealing that in comparison to literacy, the more one relied on intuition, the higher total risk score (i.e. financial risk tolerance) one obtained. Providing that intuition has an increasing impact on financial risk tolerance, we can expect intuition to act as a driving force.

However, prior literature on how intuition affects financial risk tolerance is scarce. In fact, preceding studies have to a large extent put focus on overconfidence as a behavioural bias, as in overrating risk tolerance, rather than intuition when facing financial risks. With regards to this, our findings on reliance when facing risk can be
claimed as a fairly undiscovered predictor to discuss further in light of financial risk tolerance.

6.4 Demographical variables

The demographic variables that will be analysed are those shown to be significant or of interest to this study in the multiple linear regression analysis, where total risk score was the dependent variable and the demographical variables were independent variables. As mentioned previously, the independent variables are of high importance to this study. Since several of them have been used in prior literature, it will give a good indication of the validation of the model and the results received.

6.4.1 Gender

As previous researchers, we came to the same conclusion about gender differences within the topic of financial risk taking: females are more risk averse than males ((Cooper et al., 2014, p. 279; Faff et al., 2008, p. 21; Grable, 2000, p. 628; Grable & Lytton, 1998, p. 68; Hallahan et al, 2004, p. 67; Hawley & Fujii, 1993, p. 202; Jianakoplos & Bernasek, 1998, p. 629; Powell & Ansic, 1997, p. 622; Roszkowski & Grable, 2005, p. 188; Ryack, 2011, p. 191; Sjöberg & Engelberg, 2009, p. 40). According to our scale of financial risk tolerance (Figure 3), the male respondents in our sample received a total risk score mean of 27.53, placing them into the category “Somewhere in between”, indicating that they are risk neutral. Females on the other hand, were placed in the category “Cautious” due to their total risk score mean of 23.14. Since the females in the sample received a fairly low mean score, we are able to state that they are more risk-averse than male respondents.

Both Hallahan et al. (2004, p. 75) and Powell and Ansic (1997, p. 622) reason that women crave a higher sense of security and are therefore less willing to take on financial risk. Furthermore, some other authors also argue that females are more conservative and not especially materialistic, whereas males are more likely to place a higher value on money (Bernasek & Shwiff, 2001, p. 355; Borkowski & Ugras, 1998, p. 1124; Hagström & Gamberale, 1995, pp. 486-488; Prince, 1993, p. 171). However, the results in this study are not able to support this theory. Further investigation is needed.

6.4.2 Age

Age is one of the variables that previous researchers have received various results about. The result received in this study is consistent with the results of Grable (2000, p. 628) and Wang and Hanna (1997, p. 30): older individuals are more willing to take financial risk. A reason to this according to both Grable (2000, p. 628) and Wang and Hanna (1997, p. 30) is that younger individuals might have insufficient capital to be able to invest in either stocks or funds. We tried to support this statement when we requested the respondents to inform us if they had a job alongside their studies. However, the data received was not statistical significant. Thus, we cannot support their statement.
Furthermore, as can be seen in part 5.1 (see Figure 8), 89.5% of the sample was either 30 years of age or younger. Only 5.2% of the respondents stated that they were 36 years or age or older. Hence, we are able to conclude that this sample is rather young and that the result for this study can be skewed to some extent. Additionally, the differences of the samples have to be taken into consideration as well. The sample of this study consists of only students at Umeå University, whereas the samples of Grable (2000) and Wang and Hanna (1997) cover all ages to a larger extent.

6.4.3 Family situation

Another variable that has received contradicting results is partnership. The most common conclusion is that married individuals are less financial risk tolerant compared to single individuals (Faff et al., 2008, p. 16; Grable & Joo, 2004, p. 82; Hallahan et al., 2004, p. 73; Hawley & Fujii, 1993, p. 202; Yao et al., 2011, p. 885). Caulk et al. (2003, p. 261) argues that individuals change when they get married and therefore become further risk-averse. Though, in line with the results of McInisch (1982, p. 132), Haliassos and Bertaut (1995, p. 1122), as well as Grable et al. (2004, p. 145), we were not able to present results indicating that there is a statistical significant relationship between marital status and financial risk tolerance. Therefore, the statement of Chaulk et al. (2003) cannot be supported.

Moreover, both Yao et al. (2011, p. 885) and Chaulk et al. (2003, pp. 272-273) argue that married individuals with children are far more risk-averse. Due to the fact that no statistical significant results were found in either of the questions, this statement does not correspond to the findings in this study.

6.4.4 Academic Background

Prior studies have to a large extent examined the relationship between a higher level of education and financial risk tolerance, with consistent results, showing that individuals with a higher degree are more financial risk tolerant in comparison with individuals with a lower level of education (Grable, 2000, p. 628; 68; Grable & Joo, 2004, p. 82; Grable & Lytton, 1998, p. Hallahan et al., 2004, p. 67; Ryack, 2011, p. 191; Sages & Grable, 2010, p. 59; Sjöberg & Engelberg, 2009, p. 37; Yao et al., 2011, p. 885). However, in this study the type of academic background, especially economic versus non-economic background, has been tested. As stated in part 5.4, we were not able to find a statistical significant relationship between the academic background and financial risk tolerance.

6.4.5 Geographical differences

While Guiso et al. (2004) detected geographical differences when investigating whether place of birth or place of residence had an impact on financial development and social capital, our findings did not find any significant geographical differences. According to the performed multiple linear regression analysis, place of origin could not be regarded as significant when testing against total risk score. In other words, our findings lack support of geographical origin’s affect on financial risk tolerance. Neither could our
findings detect any significant correlations between geographical place of origin and score on the financial literacy test.
7. Discussion

In this chapter, we will discuss and interpret the results and the previous analysis chapter. The aim is to create a bridge between what was found in the collected data, the analysis derived from prior literature and our own reflection on the matter. The reader will be able to follow a similar structure to what has been presented in the analysis chapter in order to deepen the understanding. We will initiate by discussion the main concepts of this study, financial risk tolerance and financial literacy. Thereafter follow with a discussion on the demographic variables.

7.1 Financial risk tolerance

With regards to what was analysed about total risk score and level of financial risk tolerance, the average participant was shown to be “Cautious” according to our risk categories regardless of gender, which is as well in accordance with the general view of prior literature stating that individuals are risk-averse (e.g. Dyer & Sarin, 1982; Snyder & Nicholson, 2011). Altogether, what was expected was as well in accordance with this, mostly due to the participants’ demographics, which will be discussed further on. By way of example, our belief is that factors such as gender, age, experience and the fact that all participants were students had various impacts on the outcome that explains why our findings display a risk-averse population. Nonetheless, even though we did not include wealth as an independent variable, we asked whether the participant had a job alongside their studies, level of income might have been an additional determinant. However, our belief was that our sample would not vary in case of wealth or income while all participants were students, thus is expected to have similar income.

Not only can it be seen that individuals in general are risk-averse but also implications of a risk-averse society can be discussed further. For one thing, without incentives to increase financial risk tolerance in order to reinforce risk-seeking behaviour, a risk-averse society may face low financial development, thus lower household wealth. Besides, one can contemplate that in the long run, implications of risk aversion among individuals can cause disruptions on the financial market. Provided those consequences, we regard financial risk tolerance to remain a subject that is to be investigated continuously due to the interchangeable risk perceptions mediated by changes in the financial market.

7.2 Financial literacy

With regards to the extent of the financial literacy test, there are little implications that can be derived from financial literacy itself, without comparing it to financial risk tolerance. For one thing, the financial literacy test included three items on interest rate, illusion of money and inflation, hence it was not expected that the respondent was given the full opportunity to display his or hers financial literacy. While our findings could not find any evidence on the matter that Swedish individuals show low financial literacy as in Almenberg and Widmark (2011), we believe it might be affected by the difference in scope. In order to be able to some extent compare our findings to abovementioned authors’ claim, we would have had to extend our financial literacy test. More importantly, we can argue that our findings cannot support findings on Swedish
individuals having low financial literacy, however we are not able to disregard or disprove those findings either.

To further extend the discussion on household wealth and financial development, we regard financial literacy to be as central as financial risk tolerance in light of household wealth and financial development. The expectations is that financial literacy is deemed to be crucial in the long run, in order to reinforce household wealth and financial development. In addition, our belief is as well that financial literacy thrives alongside an interest in financial development and high returns. That is to say, individuals with a desired increase in household wealth and financial development are far more incentivized to increase financial literacy. Therefore, poor financial literacy among citizens should be considered a threat for society’s financial literacy. Even more, large differences in financial literacy can create a financial gap between citizens with poor financial literacy and financial literate individuals, which may create implications for society’s financial situation. Altogether, our suggestion is to constantly incentivise future generations to increase financial literacy and stimulate interest in financial development among all individuals regardless of anticipated financial risk preferences.

### 7.2.1 Self-perception of financial literacy

As for self-perception of financial literacy, the respondents were inclined to have a fairly realistic view of their financial literacy as their perception was slightly higher than average and their financial literacy score was higher than 50\% correct answers. We believe that it becomes simpler to relate to your financial literacy based on your known experience. For instance, one may expect that a respondent who answered that they have never invested in stocks or funds, had a non-economic background and was not confident when completing the financial literacy test, would have a view of low financial literacy of themselves, and vice versa. Nonetheless, if the respondents would have displayed a non-realistic view of their financial literacy, for instance overestimation, we could have labelled it as overconfidence bias.

The implications of having a realistic view of your financial literacy can be deemed to be both negative and positive. By way of example, a negative implication is that individuals with poor financial literacy, and are aware of this, may avoid facing financial risks due to difficulties in understanding financial possibilities and consequences, hence fail to seize opportunities to increase household wealth. In contrast, one can argue that a positive implication may be that those with poor financial literacy, and are aware of this, are less inclined to make financial mistakes.

### 7.3 Financial literacy’s effect on financial risk tolerance

As discussed in the introduction of this study, Swedish individuals are more inclined to face financial risk today, while there is a larger pressure put on the society when it comes to managing personal savings and retirement. By way of example, Sundén (2008, p. 327) stated that the new reform system was intended to serve as an incentive for the Swedish citizens to increase financial literacy and financial risk tolerance by providing them with the opportunity to financially managing their savings and retirement themselves. Our belief is that this pressure put on financially managing your own savings and retirement may have affected the level of financial risk tolerance and
financial literacy among our participants, and thereby have affected this study's outcome. That is to say, explain the fact that our findings shows that the participants exhibit fairly high financial literacy, even though Almenberg and Widmark (2011) suggests the opposite.

Subsequently, the subjects that have been discussed as dimensions affecting financial literacy and financial risk tolerance independently are stock market experience, reliance when facing financial risks and self-perception (i.e. confidence in financial literacy). In fact, all of these abovementioned dimensions can be discussed both in light of financial literacy and financial risk tolerance, in other words the dimensions shows tendencies of interaction among and between each other. For instance, stock market experience has been viewed both in this study and prior studies to affect both financial risk tolerance and financial literacy in relation and independently.

Furthermore, to some extent discuss the mechanisms that connects implications of financial literacy to implications if financial risk tolerance, one can shed light on what consequences level of financial literacy has on financial risk tolerance. As already discussed throughout both financial literacy and financial risk tolerance independently, household wealth and financial development are both affected by financial literacy and financial risk tolerance. More importantly, the relationship between financial literacy and financial risk tolerance affects both household wealth and financial development. One can even argue that these four elements create implications among and between each other, and are subjects to reinforcement in order to strengthen one and other. Altogether, the implications of this study are not only to shed light on financial literacy’s effect on financial risk tolerance, but also implications of household wealth and financial development.

7.3.1 Stock market experience

In our opinion, it was expected that stock market experience (i.e. having invested in stocks or funds) would be a significant predictor of an increase in financial risk tolerance. That is to say, the respondents who had prior experience in invested in stocks or funds had a higher total risk score. Moreover, we identify having invested in stocks or funds before as having faced financial risk before, thus it is deemed that those who have invested in stocks or funds are more risk tolerant, at least to some extent. In contrast, those who avoid stock or fund market participation are therefore more disposed to low financial risk tolerance.

To resume to the importance of considering implications of a risk-averse society, stock market participation is as well a factor to consider while regarding consequences of household wealth and financial development. In order to remain financial development and increase household wealth, stock market participation is a major contributing part. By way of example, a risk-averse individual who abstain from obtaining stock market experience has thereby lower chances of increasing household wealth (i.e. gain positive returns), and contribute to financial development. Altogether, our opinion is that stock market experience is of high relevance for all individuals, regardless of risk preferences; in order to contribute to increased household wealth and financial developments. That is to say, we would mark that society should increase focus on how to incentivize individuals to engage on the stock market in order to increase society’s financial development.
7.3.2 Reliance factor when facing financial risk

To begin with, it seems like individuals who display higher financial risk tolerance are the same individuals that rely on intuition when facing financial risks. Our own anticipation was that relying on intuition when facing financial risks thrived along poor financial literacy, while reliance on knowledge when facing financial risks thrived along high financial literacy, although based on our findings, there was not a strong enough correlation between intuition and financial literacy for this to be concluded.

With regards to this, consequences that occurs with these results concerns subjects of what drives financial risk tolerance and if it is sustainable to rely on gut instinct rather than knowledge. That is to say, even though intuition increases financial risk tolerance, thus increase likelihood of having stock market experience, it may not be sustainable for increased household wealth and financial development in the long run, hence a negative implication. Prior literature may claim that stock market experience imply increased household wealth, but fail to investigate whether success on the stock market is due to reliance on knowledge or intuition, and what predictors which matter for the long run. Our belief is that intuition may create household wealth through engaging in the stock market in the short run, whereas in the long run, knowledge is more reliable for financial development when facing financial risks on the stock market.

7.4 Demographic variables

In the following section, the demographic variables that are either significant or of interest to this research will be discussed. This section will follow the structure of the analysis.

7.4.1 Gender

The findings in this study about gender differences within the topic of financial risk tolerance were expected. As previous research already had established, females are less willing to take financial risk compared to males. Since we have not been able to find a single prior study stating the opposite, or that there is no difference, it would have been alarming if our findings had a different conclusion.

In line with what both Hallahan et al. (2004, p. 75) and Powell and Ansic (1997, p. 622) argued for, we believe that the biological factor, that females require a higher sense of security, are one of the explanations to why women are more risk averse. Further, as Borkowski and Ugras (1998, p. 1124), Hagström and Gamberale (1995, pp. 486-488), Prince (1993, p. 171), as well as Bernasek and Shwiff (2001, p. 355) stated, we believe that another reason that could explain this difference in financial risk tolerance is that males are more materialistic compared to females, and are therefore more financial risk tolerant.

Regarding the total risk scores attained in this study, we can conclude that females attained a lower mean total risk score compared to males as expected. Hence, the
conclusion is that the financial risk tolerance was rather low in general. Since 58.6% of the respondents were women who attained a lower score, we believe that this could be one of the reasons to why the mean total risk score was considered to be low.

7.4.2 Age

Considering the variable age, we were, as well as Grable (2000, p. 628) and Wang and Hanna (1997, p. 30), able to conclude that younger individuals are more risk averse compared to older individuals. In line with above authors, we believe that one explanation could be that younger individuals might have less capital, and are therefore less willing, or unable, to do investments or to take on financial risk. As mentioned in part 6.4.2, we tried to support this statement with another question. However, no relationship were found between total risk score and having a job alongside the studies, thus, we are not able to determine if having more capital would increase an individuals financial risk tolerance. A reason to why we were not able to find a relationship between those two variables could be that all respondents are students, and therefore might have very little capital in the first place to do investments with. Consequently, an extra income might instead be spent on other items necessary in the daily life.

Even though we are not able to generalise these findings to the whole population in Sweden, due to the fact that it was significant at only 0.1, we believe that it could explain the behaviour of a young sample. Some authors have found nonlinear relations of age, implying that the financial risk tolerance of an individual can decrease (increase) to a certain point, and thereafter start to increase (decrease) (Faff et al., 2008, pp. 16, 21; Hallahan et al., 2004, p. 66). Since most individuals within our sample were 30 years old or younger, we believe that our result could explain one part of an individuals’ financial risk tolerance curve. To be certain of this, further investigation is needed.

Additionally, since this sample is rather young, it might be another reason to why the mean total risk score was low. As mentioned above, younger individuals might be reluctant to invest due to low income or insufficient capital.

7.4.3 Family situation

Similarly to three preceding researchers, McInisch (1982, p. 132), Haliassos and Bertaut (1995, p. 1122) and Grable and Joo (2004, p. 145), we were not able to find a significant relationship between financial risk tolerance and marital status. Although, our result was insignificant, it was expected. One of the reasons for our result could be the rather young sample that we obtained. We believe that young individuals seldom have shared economy at this stage of their life, and therefore accounts as “singles” in this context, making it more difficult to see if there is a relationship between total risk score and marital status.

Furthermore, the main explanation to why we could not find a relationship between total risk score and children is probably that very few respondents declared that they had children. According to us, this was something that we had expected due to the fact that our sample consisted out of students, thus rather young individuals.
7.4.4 Academic Background

One of the variables that we did not expect to be insignificant was the one of academic background. Our hope was that an individual’s financial risk tolerance would have increased when an individual had an economic background. This implies that there is not a gap between economic and non-economic students financial risk tolerance. One of the explanations to this finding could be that many respondents who have a non-economic background might be interested in investment, and therefore shows more willingness to take financial risk.

Since we were able to find a strong relationship between total risk score and individuals who has invested in either stocks or funds, we can conclude that experience of investing will increase an individuals financial risk tolerance. An explanation for this could be that individuals who invest are more interested in the subject and therefore shows a higher financial risk tolerance. Further, this could imply that experience could be more important than having an academic background with a focus on finance or economics.

7.4.5 Geographical differences

We believe that one reason for our results to not show evidence of any geographical differences may be due to the fact that the other characteristics of the respondents was fairly alike, such as age and the fact that the individuals participating were students. In other words, the demographics of the respondents did not vary extensively, hence may have eliminated the effect of geographical differences. The other reason that may have affected the insignificance could be the scope, that is to say that we did not prove to have a large enough spread among the three provinces Norrland, Svealand and Götaland. In fact, one can argue that a broader range of the other demographical characteristics of the respondents could have affected this outcome. Altogether, we cannot conclude whether it may have an affect or not on financial risk tolerance, merely that our data was not sufficient enough.
8. Conclusion

In the conclusion chapter, we will initiate with answering our stated research question, and if we achieved to accomplish to meet our objectives. In addition, we will discuss how our study’s outcome can contribute to the theoretical and practical field of the subject, based on the findings. In the end, we will gather suggestions for future research concerning the subject in order to raise awareness of possible further investigations.

8.1 Financial literacy’s effect on financial risk tolerance

To begin with, we will attempt to answer our research question that is formulated as;

Do individuals differ in financial risk tolerance due to their level of financial literacy?

While the purpose of this study was to investigate whether financial literacy has an increasing or decreasing effect on financial risk tolerance. That is to say, we aim to find evidence on whether having above average financial literacy implied greater financial risk tolerance for an individual, or not. Secondly, we wanted to explore predictors of financial literacy. If the source of financial literacy was reinforced by actual financial literacy, that is formal financial knowledge derived from financial education programs, or financial literacy derived from prior experience (i.e. stock market experience).

Derived from our findings from the questionnaire, we can conclude that individuals do differ in financial risk tolerance due to their level of financial literacy. In fact, our results indicates that when an individual's financial literacy increase – his or hers financial risk tolerance increase, hence financial literacy has an increasing impact on financial risk tolerance.

With regards to the underlying purpose, we can conclude that those individuals exhibiting higher financial risk tolerance are more likely to have gained financial literacy through stock market experience, which affects their financial risk tolerance, rather than financial literacy obtained from an academic background in business and economics. In other words, regardless of academic background, a further financial literacy through prior stock market experience and/or obtained score on the financial literacy test has an increasing effect on financial risk tolerance.

To further illustrate, level of financial literacy in this study was not based on academic background, rather on which score the individual obtained on the financial literacy test. Besides, academic background and total risk score (i.e. financial risk tolerance) did not show a significant relationship. That is to say, our findings could not detect an adequate relationship between these two variables, thus we cannot assume that those with an economic background exhibit greater financial risk tolerance.

In addition, we attempted to detect tendencies of overconfidence among the participants. That is to say, if individuals exhibited greater risk tolerance due to preceding financial knowledge or intuition, or if those with poor financial literacy exhibited greater financial risk tolerance due to factors such as overconfidence. By way of contrast, we could not find evidence on overconfidence among those with poor financial literacy; they acted realistic in the light of their risk-taking behaviour. Neither
could we find tendencies of overconfidence among those individuals displaying a higher level of financial literacy. In fact, the majority marked that they relied on literacy when facing risk.

However, of interest, was that even though the majority relied on preceding literacy when facing financial risks, our findings showed that relying on intuition rather than literacy explained an increasing impact on financial risk tolerance. In other words, according to our findings, intuition rather than literacy can be regarded as a driving force for an increased financial risk tolerance.

Altogether, even though financial literacy showed to have an increasing impact on financial risk tolerance, the results suggest that the average individual is risk-averse, or according to our own risk categories, they can be labelled as “Cautious” individuals.

8.2 Theoretical and practical contribution

With regards to the findings of this study, we expect to theoretically contribute with further insight on financial literacy’s effect on financial risk tolerance. Further, our findings contribute with the fact that stock market experience and reliance on intuition when facing financial risks are predictors of financial risk tolerance and financial literacy. In addition, we will to some extent contribute with supporting results to existing contradictory results, in other words, strengthen already existing evidence in order to further reinforce predictors of financial risk tolerance.

On the subject of the practical contribution, we will not as we initially prospected, contribute with practical insight to financial advisors in Sweden regarding how geographical differences might affect financial risk tolerance. Either way, financial advisors may still view our study as a helpful tool for measuring financial risk tolerance, and what is expected of the average individual when facing financial risks.

8.3 Societal considerations

The societal implications of this study concern the discussion regarding the impacts financial risk tolerance and financial literacy has on society’s financial development and household wealth. The findings of this study can affect the view on how to incentivize individuals’ need for increasing their financial risk tolerance when they are provided with an insight on how their personal financial risk tolerance affect their household wealth. Moving forward, the implications of having a “Cautious” (i.e. risk-averse) population might in the long run affect directions of the society’s financial development and household wealth. By way of example, a risk-averse population might disregard opportunities of facing financial risks that can increase household wealth, due to their low level of financial risk tolerance, hence affect society’s financial development. Thus, it is crucial to emphasise the societal implications of individuals having a low financial risk tolerance, which was the results of this study.

8.4 Future research

Derived from this study’s outcome of financial literacy’s effect on financial risk tolerance, and disproved results on geographical differences in Sweden, we suggest both
further extensive research on financial literacy’s effect on financial risk tolerance and geographical differences in the light of financial risk tolerance. By way of example, a longitudinal research that can measure predictors of financial risk tolerance over a longer period of time, in order to possibly detect changes over time in age, gender, financial literacy and stock market experience.

Moreover, as for further research on geographical differences, namely for the reason that we did not filled the research gap of detecting geographical differences, we suggest both a further extensive research on place of origin’s affect on financial risk tolerance in Sweden since our study failed to detect any differences. That is to say, an investigation that included a greater sample, containing a larger variety of individuals from different provinces. However, as well of interest is a cross-cultural research in order to further investigate if cultural background may affect financial risk tolerance, and financial literacy’s effect on financial risk tolerance. Subsequently, we suggest further investigations similar to ours, which shed light on how the relationship between financial risk tolerance and financial literacy affects household wealth and financial development in the long run. That is to say, detect which predictors that need to be reinforced in order to achieve maintainable financial developments and household wealth.

Conclusively, our belief is that financial risk tolerance will remain an attractive subject to investigate while the predictor’s of the subject tends to be perceived as interchangeable depending on period of time, age generation and society’s financial situation.
9. **Truth Criteria**

In this last chapter, we will display the concepts reliability and validity of this study. In other words, the truth criteria will serve as foundation to this study’s credibility to the reader.

9.1 **Reliability**

According to Ejlertsson (2014, p. 111), the reliability should reflect the credibility of a questionnaire. In other words, reliability refers to whether the findings in a study could be replicated on another occasion or by another researcher if the same data collection methods and analytical techniques were used (Saunders et al., 2012, p. 192). If a question has high reliability, the random error should be small (Ejlertsson, 2014, p. 107).

One of the threats to reliability is participation error, implying that there are different times at the day where the answers that you receive could be biased, such as just before a lunch- or coffee break (Saunders et al., 2012, p. 192). Because of the fact that we sent our questionnaire out by e-mail we were able to avoid this issue. The respondents could answer the questionnaire at their chosen time and place without any pressure or time limit, which increases the reliability. However, since the respondents could answer the questionnaire at any time given, some might not have answered it truthfully. The questionnaire is rather complex, requiring the respondents to be concentrated, which some respondents might not have been. Hence, this could have created bias to some extent. Further, the threat of researcher bias was also eliminated due to the fact that we were not present when the respondents answered the questionnaire. Hence, we were not able to influence the respondents with our opinion.

Furthermore, this study is based on prior research, thus it is in practice replicable. A thorough assessment of each step performed in a study is necessary in order for a study to be replicable. Hence, to increase the ability to replicate this study, clarity in each step of the process has been strived for. However, when considering our sample, it would be difficult to replicate, due to the fact that our sample was not completely random.

9.2 **Validity**

Even though reliability is important when it concerns the topic of research quality, it is not sufficient enough by itself to ensure that a research has good quality, thus to ensure the quality of the research various forms of validity has been identified (Saunders et al., 2012, p. 193). The concept of validity when using a questionnaire refers to the questions ability to measure what it intents to measure (Ejlertsson, 2014, p. 107). The questionnaire has high validity if it has no or a very small amount of systematic errors (Ejlertsson, 2014, p. 107). In the field of business administration there are two main types of validity: internal and external (Ejlertsson, 2014, p. 109).

Internal validity can be established when a relationship between two different variables can be proven statistically (Saunders et al., 2012, p. 193). To put it in another way, internal validity concerns the measurement technique and the questionnaires ability to measure what it aim to be measured (Saunders et al., 2012, p. 429). To increase the
validity of this study, a pilot study was performed where ten random individuals were asked to test the questions to be able to see if the questions made sense and what could be improved. Further, since the questionnaire was based on an existing measure developed by Grable and Lytton (1999), which has been proven to be a successful technique and used by several different authors, the validity could be seen as high in this study. Due to the fact that the questionnaire already had been tested several times by different authors, we did not think that it was necessary to perform a validity test, for instance a Cronbach’s alpha test. Even though this could have increased the validity even further, it was decided that previous researcher’s validity tests would be enough for this study.

In contrast to internal validity, external validity refers to how generalised the findings of the research are (Saunders et al., 2012, p. 194). Due to the fact that we used two different types of sampling methods, whereas one was non-random sampling indicating that the results cannot be generalised, we are able to conclude that our research generalisability is rather low (Bryman & Bell, 2011, p. 195). Thus, it cannot be generalised to the whole population or to individuals in Sweden in general. Though, since some of the findings in this study were in line with prior studies, we are able to state that we are able to generalise them to some extent.
Reference list


Appendix 1 – questionnaire

Hi!
You are invited to participate in our survey that will serve as a foundation of our Degree Project in Business Administration. This study will investigate if and how financial literacy affects financial risk tolerance. To get a better understanding of your risk tolerance, this questionnaire will be based on how you perceive risk taking and will therefore NOT require any calculations.

It will take approximately 10 minutes to complete the questionnaire. Your participation in this study is completely voluntary. There are no foreseeable risks associated with this project. However, if you feel uncomfortable answering any questions, you can withdraw from the survey at any point.

It is very important for us to learn your opinions. Your survey responses will be strictly confidential and data from this research will be reported only in the aggregate. Your information will be coded and will remain confidential. Thank you very much for your time and support.

Sincerely,
Carina Gustafsson & Lisa Omark

1. Gender
   If you do not want to answer, move on to the next question
   a. Male
   b. Female

2. Age
   a. <20
   b. 20-25
   c. 26-30
   d. 31-35
   e. >36

3. Are you a foreign exchange student?
   a. Yes
   b. No

4. If you are from Sweden, which part of the country do you come from?
   a. Norrland (North)
   b. Svealand (Middle)
   c. Götaland (South)

5. Marital status
   a. Single
   b. Relationship
   c. Married

6. Do you have any children?
   a. Yes
   b. No
7. What program are you enrolled in?

______________________________________________________

8. Which semester are you currently studying on?

______________________________________________________

9. Do you have a job alongside your studies? (Summer job does not apply)
   a. Yes  
   b. No

10. How do you perceive your knowledge about finance compared to the average student at Umeå University?
    a. Very low
    b. Slightly lower
    c. Equal
    d. Slightly higher
    e. Very high

11. Have you ever invested in stocks or funds?
    a. Yes  
    b. No

12. If yes in the previous question, when you considering buying or selling stock how much do you take stock valuation models into account in your decision-making?
    If no in the previous question, move on to question 13
    a. Not at all
    b. Rarely
    c. Sometimes
    d. Often
    e. Always

13. If no in question 11, Investing in stocks is something I have not done since it is too risky:
    If yes in question 11, move on to the next question

   Strongly disagree  1  2  3  4  5  Strongly agree

14. My perception of myself is that I am
    a. A real risk avoider
    b. Cautious
    c. Somewhere in between
    d. Willing to take risks after completing adequate research
    e. A real gambler

15. When you are facing risk, what do you rely on?
    a. Knowledge
    b. Confidence
    c. Do not know
16. How comfortable are you with investing in stocks or funds?
   a. Not comfortable at all
   b. Less comfortable
   c. Somewhere in between
   d. Comfortable
   e. Very comfortable

17. When you think of the word “risk”, which of the following words comes to mind first?
   a. Loss
   b. Uncertainty
   c. Indifferent
   d. Opportunity
   e. Thrill

18. Suppose you had 10 000 SEK in a savings account and the interest rate (ränta) is 2% per year and you never withdraw money or interest payments. After 5 years, how much would you have on this account in total?
   No calculation is needed
   a. More than 10 000 SEK
   b. Exactly 10 000 SEK
   c. Less than 10 000 SEK
   d. Do not know

19. Imagine that the interest rate (ränta) on your savings account was 1% per year and inflation was 2% per year. After 1 year, how much would you be able to buy with the money in this account?
   No calculation is needed
   a. More than today
   b. Exactly the same
   c. Less than today
   d. Do not know

20. Suppose that in the year 2014, your income has doubled and prices of all goods have doubled too. How much will you be able to buy with your income in 2014?
   No calculation is needed
   a. More than today
   b. Exactly the same
   c. Less than today
   d. Do not know

21. You are on a TV game show and can choose one of the following alternatives. Which alternative would you take?
   a. 5000 SEK in cash
   b. 75 % chance to win 12 500 SEK
   c. 50 % chance to win 25 000 SEK
   d. 25 % chance to win 50 000 SEK
   e. 5 % chance to win 500 000 SEK
22. Which of the following investment alternatives would you prefer? The probability for a profit and a loss is the same in all alternatives.

   a. Best case scenario: a profit of 1400 SEK & Worst-case scenario: a profit/loss of 0 SEK
   b. Best case scenario: a profit of 5600 SEK & Worst-case scenario: a loss of 1400 SEK
   c. Best case scenario: a profit of 18 200 SEK & Worst-case scenario: a loss of 5600 SEK
   d. Best case scenario: a profit of 36 400 SEK & Worst-case scenario: a loss of 18 200 SEK
   e. Best case scenario: a profit of 72 800 SEK & Worst-case scenario: a loss of 36 400 SEK

23. Assume that you have 150 000 SEK to invest. Which of the following investment alternatives look most attractive to you?

   a. 80% in a low-risk, 15% in an average-risk & 5% in a high-risk investment
   b. 60% in a low-risk, 20% in an average-risk & 20% in a high-risk investment
   c. 40% in a low-risk, 30% in an average-risk & 30% in a high-risk investment
   d. 20% in a low-risk, 45% in an average-risk & 35% in a high-risk investment
   e. 10% in a low-risk, 40% in an average-risk & 50% in a high-risk investment

24. Your trusted friend, an experienced geologist, is putting together a group of investors to fund an exploratory gold mining venture. The venture could pay back 50 to 100 times the investment if successful. If the mine is a bust, the entire investment is worthless. The probability of success is only 20%. If you had the money, how much would you invest?

   a. Nothing
   b. One month’s salary
   c. Two month’s salary
   d. Three month’s salary
   e. Six month’s salary

25. You have just finished saving for an “once-in-a-lifetime” vacation. Three weeks before you plan to leave, you lose your job. What would you do?

   a. Cancel the vacation
   b. Take a much more modest vacation
   c. Go as scheduled, do some job hunting while gone
   d. Go as scheduled and live in the present, the job hunting can wait until you return home
   e. You extend the vacation since this might be your last chance to go first-class

26. Assume you are going to buy a home in the next few weeks. Your strategy would probably be:

   a. To buy the cheapest house on the market with low monthly payments
   b. To buy an affordable house where you can make monthly payments comfortably
   c. To stretch a bit financially to buy the house you really want
   d. To buy the most expensive house you can qualify for
   e. To borrow money from friends or relatives so you can qualify for a bigger mortgage
27. Assume that you are applying for a mortgage (lån). Interest rates (räntan) have been coming down over the past few months. There’s the possibility that this trend will continue. But some economists are predicting rates to increase. You have the option of locking in your mortgage interest rate or letting it float. If you lock in, you will get the current rate, even if interest rates go up. If the rates go down, you’ll have to settle for the higher locked in rate. You plan to live in the house for at least three years. What would you do?
   a. Definitely lock in the interest rate
   b. Probably lock in the interest rate
   c. Let the interest float for a short period of time and then lock it in
   d. Probably let the interest float
   e. Definitely let the interest float