UNIVERSITY OF GOTHENBURG
SCHOOL OF BUSINESS, ECONOMICS AND LAW

Master Degree Project in Finance

The Degree of Overconfidence

Examining finance and non-finance oriented business students

Sarah Finberg and Martina Hultberg

Supervisor: Martin Holmén
Master Degree Project No. 2014:90
Graduate School

Acknowledgements

Initially we would like to thank our supervisor, Martin Holmén at the School of Business, Economics and Law in Gothenburg, for the help and support regarding our thesis. Martin Holmén has been highly committed to our work, throughout the whole process, which we are grateful for.

We also want to acknowledge the teachers/professors Erik Hjalmarsson, Charles Nadeau, Per-Åke Andersson and Mattias Sundén. They were all helpful while we carried out our survey.

Finally we would like to dedicate a special thank you to each other, for a great cooperation during the entire process of the thesis.

Abstract

We examine the degree of overconfidence among finance and non-finance oriented business students, taking into account all the three overconfidence types; overprecision, overestimation and overplacement. We first investigate whether the degree of overconfidence among the business students increases when the education goes from being non-finance to finance oriented. Second, we test for possible self-selection effects. We find that only the degree of *Overestimation* increases among the business students; finance oriented students being more confident. The outcomes regarding *Overprecision* and *Overplacement* are not significant. Moreover, self-section does not seem to explain the outcome regarding *Overestimation* and there does not appear to be any self-selection effect on gender either, when comparing the finance oriented students to the non-finance oriented students.

Keywords: Overconfidence, Overprecision, Overestimation, Overplacement, Finance oriented, Business students

Table of Contents

1. Introduction

This thesis examines the degree of overconfidence among finance and non-finance oriented business students. We study the results from a survey, which measures the degree of overconfidence among undergraduate and graduate business students at the School of Business, Economics and Law in Gothenburg. The third year undergraduates and the graduates are finance oriented, while the first and second year undergraduates are non-finance oriented.

It appears that people in general display overconfidence regarding financial matters (see for example Barber & Odean, 2000; Malmendier & Tate, 2005). When Russo and Schoemaker (1992) measure overconfidence across different industries, they find a tendency of the degree of overconfidence to differ. They show that the security analysis industry, which is a finance oriented industry, displays a higher level of overconfidence compared to other non-finance oriented industries. The non-finance oriented industries include the advertising-, the data processing-, the petroleum- and the pharmaceutical industry, among others. Moreover, Estes and Hosseini (1988) find that the level of confidence increases with an academic degree in finance. The participants in their experiment are i) finance professionals, working as institutional investors or security analysts, ii) shareholders, and iii) general business persons. Finally, financial trading seems to be an occupation that usually displays overconfidence (Decovny, 2012).

Hence, finance oriented areas seem to display a higher degree of overconfidence compared to other areas. Thus, our research question is:
Does the degree of overconfidence among the business students increase, when the education goes from being non-finance to finance oriented?

We test if the degree of overconfidence among the third year undergraduates and graduates is higher than the degree of overconfidence among the first and second year undergraduates. If we receive an outcome where the third year undergraduates and graduates show a higher degree of overconfidence, another question arises. Perhaps this outcome is due to self-selection, i.e. that more overconfident people self-select into the finance oriented education. We investigate the possible effect of self-selection by examining the first and second year

undergraduates, where we test if the degree of overconfidence is higher among those who indicate that they will choose a Master of Science in Finance.

Furthermore, it has been found that specialization within a business area seems to erase gender differences in overconfidence (see for example Beckmann and Menkhoff, 2008). Hence, potential gender differences in overconfidence can be eliminated due to certain men and women having a tendency to self-select into a specific group. According to Hardies et al. (2013) the women who work within areas that are traditionally male dominated, such as finance (Thewlis, Miller and Neathey, 2004), might therefore be as confident as the men, due to self-selection. Hence, if it turns out that the finance oriented students show a higher degree of overconfidence compared to the non-finance oriented students, we test for a possible effect of self-selection on gender as well. We examine if the degree of gender difference in overconfidence is smaller among the third year undergraduates and the graduates, compared to the first and second year undergraduates.

The method for testing overconfidence in earlier literature is not always coherent. One strand of the literature studies overconfidence in the form of being better than average (see for example Svenson, 1981) while another strand of the literature examines overconfidence by looking at confidence intervals (see for example Hardies, Breesch and Branson, 2013). There is also a part of the literature that studies overconfidence by focusing on how people estimate their own results (see for example Dahlbom, Jakobsson, Jakobsson & Kotsadam, 2011).

Moore and Healy (2008) divide the term overconfidence into three different parts, taking earlier research into account. They state that these three types of overconfidence differ from each other, both from a conceptual as well as from an empirical point of view. Moore et al. (2008) label the three types of overconfidence overestimation, overplacement and overprecision. The first type of overconfidence means that you overestimate your level of control/capacity/performance. The second type of overconfidence, overplacement, incorporates you believing that you are better than everyone else; often by letting you compare your performance with the median or mean of everyone's performance. The third type of overconfidence, overprecision, means that you express a high certainty regarding the accuracy of your beliefs. This type of overconfidence is usually measured by asking people to provide confidence intervals to various questions, which have numerical answers.

Due to the findings of Moore et al. (2008), where they show that the three parts of overconfidence differ from each other, we examine all the parts of overconfidence. Hence, to see if the outcome we get is different, depending on which type of overconfidence we study.

Overconfidence among people might lead to faulty decisions, with bad consequences on outcomes (Russo et al., 1992). Barber et al. (2000) conclude that overconfidence leads to a high degree of trading among individual investors, which eventually results in lower rates of return. Overconfidence regarding financial matters is therefore not optimal, yet it exists. Decovny (2012) mentions that when financial firms are screening for new job candidates they need to improve their work in this area, due to the overconfidence found among these people. According to Abbes (2013), overconfidence is one of the factors that contributed to the major instability in the financial sector during 2008. Hence, if the students at the finance oriented education show a higher degree of overconfidence; the school system might want to make the students aware of the existence of overconfidence and what consequences overconfidence might have on (future) financial outcomes.

We find that only the degree of *Overestimation* among the business students increases when the education goes from being non-finance to finance oriented; finance oriented students being more confident. Moreover, the outcome regarding *Overestimation* does not seem to be explained by self-selection and we do not find any evidence of self-selection on gender either, when comparing the finance and non-finance oriented students. However, we do find an overall self-selection effect on gender, regarding *Overprecision*. Our results show that the women who self-select into business studies, seem to be significantly more overconfident than the men at the business track.

2. Defining overconfidence

There are a huge amount of psychological biases present among people, where overconfidence seems to be one of the more dominating ones, due to its consistency and powerfulness. This bias is also among the most widespread biases and it results in people overestimating their abilities, or alternatively, underestimating probable risks and difficulties regarding different tasks. In other words, overconfidence means that you believe that you are far better than you really are (Johnson and Fowler, 2011).

Investors tend to overestimate the probabilities regarding the states of the world where their chosen investments are shown to have higher returns. Though by expressing this kind of optimism regarding the probabilities one might make less optimal decisions, and consequently, experience an on average lower degree of utility ex post (Brunnermeier, Gollier and Parker, 2007). Hence, the consequences of overconfidence being present are errors in our decision-making and errors in our judgements. Therefore it has been argued this bias is responsible for many of the severe disasters in our history, such as the financial crisis in 2008, the climate change and also for some of the previous wars (Johnson et al., 2011).

Since overconfidence seems to be causing all these costly missteps it is a bit puzzling why this bias has evolved among people and why it is still maintained. One stated reason is that overconfidence, on average, can be beneficial, even though this bias sometimes leads to costly outcomes. The overconfidence enhances our ambition and it also increases the credibility when we are bluffing, which may have increased the historic net returns during conflicts. Moreover, if you experience conditions where there are both uncertainty and competition apparent, decisions that are unbiased might not be the optimal solution if you want to maximize benefits and minimize costs. Hence, even if economists tend to look at the human brain as rational, biases such as overconfidence might have been preferred by the natural selection process in certain areas, due to these biases being faster or more economically attractive (Johnson et al. 2011).

Johnson et al. (2011) find that when the uncertainty regarding a rival's abilities becomes larger, showing a higher degree of bias is an advantage. Hence, the overconfident part will express further confidence, while the underconfident part will express even less confidence. Furthermore, they show that when comparing correct beliefs to overconfidence, overconfidence is mostly found to be superior. By expressing overconfidence you can obtain an outcome that is all in your favour, an outcome that would not have been received if you

had been completely rational. Moreover, another factor that also increases this bias is when the costs of trying to get something are lower than the value you will receive if you succeed.

Johnson et al. (2011) conclude that due to their finding of an increased degree of overconfidence, when the level of uncertainty increases, one should expect a very large degree of over- or underconfidence when faced with contexts that are either weekly understood or not well known. A few examples of uncertain contexts the authors mention are new technologies, new leaders or enemies, or international and complex relations. Johnson et al. (2011) also conclude that even if the shown overconfidence might have been adaptive regarding previous states of our history, there is a high probability that the overconfidence that one expresses today will be within settings that are very risky and dangerous. Although, there might still be a few situations where showing overconfidence would be adaptive.

3. Previous findings on overconfidence

Since we examine the degree of overconfidence, we include the section Issues when trying to measure overconfidence. Moreover, the participants in our study are business students. Thereby we review earlier findings of overconfidence among students, where one has compared the degree of overconfidence between different student majors as well as within the business major. These findings are included in the section Overconfidence among students. Finally, since we also investigate gender differences, we include previous findings within this area, in the section Contradictory views regarding gender differences in overconfidence.

3.1 Issues when trying to measure overconfidence

Moore et al. (2008) state that the term overconfidence can be defined in three different ways, as overestimation, overplacement or overprecision. Earlier literature has failed in distinguishing these three types from each other, leading to problems regarding the methodology and to inconsistencies in the empirical outcomes.

The authors focus on three main problems from the previous literature. Firstly, the literature seems to confuse overprecision and overestimation with one another, which makes it impossible to observe the relative effects of the two. Secondly, there are a lot of cases in the literature where the outcomes show underconfidence instead of overconfidence, usually in the form of underplacement or underestimation. Findings of underprecision are not very usual. Thirdly, the results from earlier studies seem to be inconsistent regarding overplacement and overestimation. Tasks, which are easy, create underestimation while at the same time creating overplacement. The opposite is true regarding difficult tasks. Moore et al. (2008) show that the earlier literature, which has discovered overplacement, has been focusing on the easier tasks. These easier tasks might include how you get along with other people, or they might involve driving a car. Previous studies regarding overestimation have on the other hand been focusing on more difficult areas, for example by asking the participants demanding general knowledge questions.

To deal with these issues and to offer a solution to them, Moore et al. (2008) develop a theoretical framework. In their theoretical framework they state that after you have completed a task there is often inadequate information regarding how you have performed. Though this imperfect information is even worse regarding how the others performed on the task. Thereby, if the task is easy, and the performance is high, you underestimate your performance. But at

the same time you underestimate the performance of the others further, leading to you believing that you are better compared to the others. Hence, you express underestimation, while at the same time experiencing overplacement. The opposite is stated to be true regarding difficult tasks.

The authors then test their theory. Their results show that their theory can help explain the negative correlation between overplacement and overestimation, which is found across tasks that go from being easy to being difficult. They also find that if you have more accurate beliefs, experiencing a higher precision, you will probably be expressing less overplacement as well as less overestimation.

To conclude, Moore et al. (2008) state that the three types of overconfidence differ from each other, both from a conceptual as well as from an empirical point of view. Hence, one has to distinguish between them and not treat them similarly.

3.2 Overconfidence among students

3.2.1 Different student majors

Kamas and Preston (2012) take all the three types of overconfidence into account in their study, though they choose to measure them in the form of confidence instead, looking at estimation, precision and placement. They choose to exclusively focus on overestimation and overplacement when measuring the overconfidence. Kamas et al. (2012) investigate if either gender differences in (over)confidence, personality traits, or risk aversion can help explain gender differences in the choice of entering competitive tournaments. Their study also examines if there are gender differences depending on which career path you have taken, represented by students' majors within business, the STEM fields (Science-, Technology-, Engineering-, and Math fields), and humanities and social sciences. Without accounting for any specific career path they conclude that the men are more overconfident in ex ante practices and less underconfident in ex post practices, regarding estimation. However, the differences are not significant. Regarding the relative placement they conclude that the men are significantly more overconfident than the women.

Kamas et al. (2012) then account for different career paths. Regarding overconfidence in estimation in ex ante practices, the men are more overconfident than the women in all three students' majors, where the men from the business school experience the highest overall

overestimation. Although none of these differences are significant. Regarding overconfidence in relative placement, a significant gender difference is only found among the humanities' and social sciences' majors. However, the men from the business school again display the highest overall overplacement.

3.2.2 The business major

Chira, Adams and Thornton (2008) observe that there are certain biases and heuristics between, and among, business college students. One of these biases is overconfidence and they measure this bias by asking the students six questions. The questions include the students' driving-, investment- and athletic ability, as well as their performance in job/school activities. The students also have to imagine failing a final test. Their study incorporates the framing effect; the participant´s decision will be influenced by the way a certain task is being presented to the individual.

From their study Chira et al. (2008) conclude that the business students overall are more overconfident regarding their own driving ability and their performance at school, though less overconfident considering their investment- and athletic ability. Furthermore, regarding the students' athletic ability relative to their peer age group, one of the underlying assumptions is that males perhaps have a tendency to view themselves slightly above average. Though, regarding all areas, no significant relationship among gender and overconfidence is displayed. Also, when comparing the results between undergraduates and graduates, they do not find any significant difference in overconfidence in any of the investigated areas.

3.3 Contradictory views regarding gender differences in overconfidence

There is a large amount of literature examining gender differences in overconfidence and its causes. Barber and Odean (2001) test for gender differences in overconfidence by comparing the amount of trading in stocks between men and women. They conclude that the men trade significantly more than the women, which in return implies a significant gender difference in overconfidence.

Moreover, Soll and Klayman (2004) find gender differences in overconfidence when looking at overconfidence in interval estimates, i.e. at overprecision, among judges. The judges are supposed to choose lower and upper bounds regarding their estimates on numerical questions. They should create intervals so that there is a certain given percentage chance that the true answers end up somewhere inside their intervals. Though their intervals are often too narrow,

displaying overconfidence. Bengtsson, Persson and Willenhag (2005) further confirm the existence of gender differences in overconfidence. They present evidence by examining the results from an exam at the Stockholm University, where the design of the exam makes it possible to measure the degree of overconfidence. On the exam there are four main questions, where you can get Fail (F), Pass (P) or Very Good (VG) on each question. To get a P on the exam, you need to get at least a P on each of the four main questions. Though, to be able to receive a VG on the exam, you first need to get a VG on each of the four main questions and then you also have to answer a fifth question, where you have to get a VG as well. Bengtsson et al. (2005) are able to confirm gender differences in overconfidence by finding that there are more male students answering the fifth question compared to female students. This result holds for both the students that were qualified to answer the fifth question, that is, those who could get a VG on the exam, as well as for the students that were unqualified to answer the fifth question.

Estes et al. (1988) also find significant gender differences when studying the confidence regarding an investment task. Their research subjects are given information about a hypothetical, but realistic, company, J. After reading all the information one shall decide how much to invest in the company, the amount ranging from 0-100000 dollars. When the decision on how much to invest is made the subjects shall also state on a scale of 0-10, where 10 means complete confidence, how confident they are regarding the correctness of their investment decision. Estes et al. (1988) conclude that gender explains most of the found difference in confidence regarding the investment decision, men being more overconfident.

However, the claim that women, on average, are less overconfident is not always verified considering managers and professionals (see for example Beckmann et al., 2008). Hence, average displayed differences do not imply systematic differences that persist in all various settings. Hardies et al. (2013) study the aspect that self-selection and socialization would influence the outcome on gender differences in overconfidence. More specifically, they compare gender differences in overconfidence between a group of auditors and groups of business- and non-business students. Their results provide no evidence of gender difference in overconfidence within the population of auditors; the women are as confident as the men when given the opportunity to self-select or socialize into this auditor's environment. However, gender differences in overconfidence are displayed among the two student groups, confirming the effect of self-selection and socialization.

The result of the review of Henrich, Heine and Norenzayan (2010) is in line with Hardies et al. (2013). Henrich et al. (2010) conclude that, as a potential outcome of self-selection, socialization and institutional appliances, psychological gender differences present among undergraduates may be absent within specialized subpopulations.

There are also results showing that due to the self-selection into male dominated areas, the women in these areas might be even more confident compared to the men. Nekby, Thoursie and Vahtrik (2008) study the Midnight Race (Midnattsloppet) in Sweden. Their study takes into account a sample of participants that ran the Midnight Race in both 2005 and 2006. In 2006 one made it possible for the participants to self-select into the starting groups, based on how good each participant thinks that he/she is. Thereby it is possible to study the degree of overconfidence. They measure the overconfidence in two different ways, initially by comparing the results from the race in 2006 with the start groups that the participants self-select into. If you self-select into a start group that is faster than your actual running result, you are considered to be overconfident. Nekby et al. (2008) test if the women are more prone than the men to self-select into these faster start groups. They then perform the same test again, though they now use the results from last year's race, that is, the results from 2005. Nekby et al. (2008) conclude that the women, when getting the opportunity to self-select into a male dominated environment, are significantly more overconfident than the men.

3. Research Design and Methodology

This section is divided into the following parts, Hypotheses, The Survey, Data, The Dependent Variables, The Independent Variables, Definition of Variables, and Regression Models.

3.1 Hypotheses

To answer our research question and test for possible self-selection effects, we form three hypotheses. We define the first and second year undergraduates as *Group 1*, and the third year undergraduates and graduates as *Group 2*.

Our first hypothesis tests if the students at the finance oriented education show a higher degree of overconfidence compared to the non-finance oriented students.
Hypothesis 1: *Group 2* displays a higher degree of overconfidence compared to *Group 1*

If the first hypothesis is true, we examine if there is any self-selection effect, more overconfident students self-selecting themselves into the finance oriented education. To test for this effect we formulate our second hypothesis:
Hypothesis 2: Those in *Group 1*, who indicate that they will choose a Master of Science in Finance, show a higher degree of overconfidence compared to the others in *Group 1*

Moreover, if the first hypothesis is true, we also examine if there is any self-selection effect on gender. To test for this effect we formulate our third hypothesis:
Hypothesis 3: The gender difference in overconfidence in *Group 2* is smaller than the gender difference in overconfidence in *Group 1*

3.2 The Survey

To test our hypotheses and to answer our research question we collect data through a survey, which contains three sections. The survey is inspired by the contents and findings from earlier studies, and can be found in Appendix 1.

In the first part of the survey we measure overprecision by asking 10 general knowledge questions with numerical answers. This procedure is in line with earlier literature; see Russo et al. (1992) or Hardies, Breesch and Branson (2012). The participants should provide 90 %

confidence intervals for their answers on each question, so that there is a 90 % chance that the true answer appears within their given upper- and lower bound.

In the second part of the survey we measure overestimation and overplacement by asking 10 multiple-choice questions. We use questions that are similar to those in part one and we ask 10 questions in this part as well. Each question has four alternatives, where the participants should choose the alternative they suppose is correct. However, in this part the four alternatives for each question are non-numerical. We believe that it is easier for the respondent to choose an alternative when being uncertain, if the alternatives are non-numerical. If the respondent sees only numbers there might be a higher probability of him/her to only pick one alternative without giving it much thought. This kind of questions differs from the questions used in a previous study by Kamas et al. (2012). Kamas et al. (2012) choose to measure overestimation and overplacement by asking their participants to perform various math tasks instead. Though, they do not measure overprecision in the same way as we do either and we want to be consistent regarding the questions in part and two of our survey.

After the multiple-choice questions there are two additional questions, which measure the overestimation and the overplacement. The first additional question measures overestimation by asking the participant how many correct answers he/she thinks that he/she will get regarding the multiple-choice. The second additional question measures overplacement by asking the participant how he/she ranks himself/herself compared to the rest of the participants in his/her class.

In the third part of the survey the participants are asked to provide information about e.g. their age, gender, and work experience. The answers to these questions are later used for the independent (control) variables in our regressions. This section differs slightly between the three undergraduate classes and the graduate class, which means that there are four versions of the survey. The first year undergraduates are asked whether they are analytically- or language oriented[1], as well as which Master Programme[2] they would select. Regarding the second year undergraduates, they are only asked which Master Programme they would

[1] If you are analytically oriented you focus more on analytical tools, such as statistics. If you are language oriented you focus more on your chosen language, as well as on international conditions and issues. (Göteborgs Universitet-Handelshögskolan, 2014) Translated from Swedish.

[2] You can choose the following Master Programmes: Accounting, Finance, Economics, Management, Marketing and Consumption, International Business and Trade, Knowledge-based Entrepreneurship, Innovation and Industrial Management and Logistics and Transport Management. (University of Gothenburg-School of Business Economics and Law, 2014)

choose. The third year undergraduates are asked if they are analytically oriented, language oriented, taking a stand-alone course[3] or if they are exchange students, as well as which Master Programme they would select. Finally, the graduates are asked if they are a taking a Master of Science in Finance, another Master, or if they are exchange students. The remaining general questions are similar for all participants, where the first question asks if the student is a first, second or third year undergraduate, or a graduate. Furthermore, we ask for the participant's gender, age, civil status, if the participant has a Swedish citizenship and whether the participant is raised in a capital/larger city or not. We also ask if the participant has studied at a university level, or has worked full-time, before attending his/her current studies at the School of Business, Economics and Law in Gothenburg.

Moreover, to provide the participants an incentive to answer our survey, we randomly select a few participants from each class. These participants receive one cinema ticket each, at a value of 110 SEK.

3.3 Data

All data is collected through our survey, which is answered by four classes of business students at the School of Business, Economics and Law, in Gothenburg. There are a total of 174 student participants, where 56 are first year undergraduates, 66 are second year undergraduates, 35 are third year undergraduates, and 17 are graduates.

We collect data from undergraduates at the first, second and third year, who are taking courses at the Economic Programme (Ekonomprogrammet). At the first year there are both analytically- as well as language oriented students included, while there are only analytically oriented students included at the second year. The undergraduates from the third year are narrowed down to only include those at the Economics track (Nationalekonomisk inriktning). Furthermore, the students participating in the survey have chosen the financial economics track within the Economics track. Thus, these students have made an active choice to study Finance. We include both analytically and language oriented students, as well as exchange students and students taking a stand-alone course. Concerning the graduates we survey students that are studying finance courses within the Master of Science in Finance programme. The students included are either taking a Master of Science in Finance, a Master of Science in Economics, or they are exchange students.

[3] Taking a stand- alone course means that you choose to take only a certain course within a given programme.

We define the first and second year undergraduates as non-finance oriented, while the third year undergraduates and the graduates are defined as finance oriented. Therefore the undergraduates at the first and second year will be treated as one group, *Group 1*, and the undergraduates at the third year and the graduates will be treated as another group, *Group 2*.

3.4 The Dependent Variables

The dependent variable regarding our research question is overconfidence, although we investigate the three different parts of overconfidence one by one. Thereby we have three different dependent variables: *Overprecision, Overestimation* and *Overplacement*. Below follows a description of each of the dependent variables.

Overprecision

Regarding this variable we use the data collected from part one in our survey. The *Overprecision* for each participant is measured by dividing the number of times the participant's confidence intervals covered the correct answer by the total number of questions, which are 10. Thereby we get each participant's *HITRATE.* Since we ask our participants to provide 90 % confidence intervals, they should have a *HITRATE* of 0.9 (90 %), which means that their intervals should cover the correct answer in 9 out of 10 questions. This procedure is in line with Hardies et al. (2013). If their *HITRATE* is lower than 0.9 (90 %) this implies overconfidence, in the form of overprecision.

Overestimation

The data collected from the first additional question in part two in our survey is used regarding this variable. The *Overestimation* for each participant is measured by calculating the difference between the participant's estimated score on the multiple-choice questions, and his/her actually achieved score. The way of measuring the *Overestimation* is in line with Kamas et al. (2012). You can get a maximum of 10 scores and a minimum of 0 scores. A positive value implies overconfidence, in the form of overestimation.

We are aware of the fact that regarding all the observations where the participants get an actual score of 10, the participants cannot show any overconfidence. The opposite is true for all the observations where the participants get an actual score of 0; they cannot show any underconfidence. Thereby, to not get any skewed results because one group of participants

might receive more top- or bottom scores, we check our data. It turns out that no one has got 10 scores, and that only one participant has got 0 scores, where the shown overconfidence is low. Thereby we choose to include all our observations.

Overplacement

Regarding this variable we use the data received from the second additional question in part two in our survey. The *Overplacement* for each participant is measured by calculating the difference between the participant's actual rank on the multiple-choice questions, and the participant's estimated rank. This procedure is also in line with Kamas et al. (2012). The top rank is coded as 1 while the bottom rank is coded as 5. A positive value implies overconfidence, in the form of overplacement.

In Table 1 below is a summary of the outcomes on *Overprecision, Overestimation* and *Overplacement,* divided by education level.

Table 1: Results on *Overprecision, Overestimation* and *Overplacement* – across education level
A descriptive summary of the outcomes on the dependent variables, *Overprecision, Overestimation and Overplacement,* divided by education level. The four different education levels are first, second, and third year undergraduates, as well as graduates, where all participants are business students. Also included in the table are two groups, *Group 1* and *Group 2*. *Group 1* consists of first and second year undergraduates and *Group 2* consists of third year undergraduates and graduates. The variable *Overprecision* is defined as the optimal *HITRATE,* 0.9 (90 %), minus the participant's actual *HITRATE* on the confidence interval questions. The variable *Overestimation* in defined as the difference between the participant's estimated score and actually achieved score on the multiple-choice questions. The variable *Overplacement* is defined as the difference between the participant's actual rank and estimated rank on the multiple-choice questions, where the top rank is coded as 1 and the bottom rank is coded as 5. All values are stated in average values.

	No.	Overprecision	Overestimation	Overplacement
All	174	0.519	-0.402	-0.126
Group 1	122	0.507	-0.623	-0.221
Group 2	52	0.548	0.115	0.096
First year	56	0.454	-1	-0.232
Second year	66	0.552	-0.303	-0.212
Third year	35	0.563	0.029	0.057
Graduates	17	0.518	0.294	0.176

From Table 1 we observe that there are a total of 174 student participants, where 56 are first year undergraduates, 66 are second year undergraduates, 35 are third year undergraduates and 17 are graduates. We divide the four groups into *Group 1* and *Group 2*, where *Group 1* consists of the first and second year undergraduates and *Group 2* consists of the third year undergraduates and the graduates.

Regarding *Overprecision* the students are on average overconfident, at 51.9 percent. Thus, the participants have on average got an actual *HITRATE* that is 51.9 percentage points lower than

the optimal *HITRATE* at 90 percent. Regarding our two groups *Group 2* seems to be more overconfident compared to *Group 1*, 54.8 percent in contrast to 50.7 percent. The third year undergraduates are on average the most overconfident, while the first year undergraduates on average are the least overconfident, 56.3 percent compared to 45.4 percent.

If we then turn to *Overestimation* the students are on average underconfident[4], at -0.402 scores. Though, regarding our two groups, *Group 2* is overconfident at 0.115 scores, while *Group 1* is underconfident at -0.623 scores. Both first and second year undergraduates are underconfident, first year undergraduates being the most underconfident at -1 scores. The third year undergraduates and graduates on the other hand are overconfident, graduates being the most overconfident, at 0.294 scores.

Regarding *Overplacement* we again observe that the students on average are underconfident, at -0.126 rank values. Though, if we look at our two groups, *Group 2* is once more overconfident at 0.096 rank values, while *Group 1* is underconfident at -0.221 rank values. Both first and second year undergraduates are again underconfident, first year undergraduates being the most underconfident, -0.232 rank values. The third year undergraduates and graduates are overconfident, graduates being the most overconfident, at 0.176 rank values.

3.5 The Independent Variables

The data for these variables is collected from the third part of our survey. Below follows a description of each of the independent variables.

Group2

Group2 is the variable of interest, when testing our first hypothesis. *Group2* equalling one means you belong to *Group 2*, while *Group2* being zero means you belong to *Group 1*.

Undergraduate-Finance

We are interested in this variable when testing our second hypothesis. *Undergraduate-Finance* equalling one means you are an undergraduate who indicate that you will choose a Master of Science in Finance, zero if otherwise.

[4] Underconfidence is the opposite of overconfidence. This term is also divided into three parts: underprecision, underestimation and underplacement (Moore et al., 2008). The three types are measured in the same way as the overconfidence types, but the signs on the results are the opposite. Instead of being positive they are negative.

Gender

We include this variable to control for gender differences in overconfidence among the students. *Gender* equalling one means you are a man, zero if otherwise. Effects of gender differences are found in previous studies, where the men often are more overconfident than the women (see for example Kamas et al., 2012).

*Gender*Group2*

The variable of interest when answering our third and last hypothesis is *Gender*Group2*. This term is an interaction term, which measures the gender difference depending on if you belong to *Group 2* or *Group 1*. If *Gender*Group2* equals one you are a man and belong to *Group 2*, zero if otherwise.

Age

The variable *Age* is included since Bengtsson et al. (2005) find an age effect in their study when looking at gender differences in overconfidence among students. They conclude that the finding of gender differences in overconfidence is more pronounced among the younger students. Accordingly, we control for a possible age effect.

Civil Status

Civil Status is taken into account since Barber et. el (2001) find that gender differences in overconfidence among investors seem to be larger for single women and men. Since the difference in the portfolio turnover between single women and men is larger. This received outcome is due to the lack of influence that partners might have on each other. Therefore we control for the possible effect of being single or not.

Swedish Citizenship

Adams and Funk (2012) mention in their article that out of 115 different countries in the World Economic Forum's Global Gender Gap Index (GGGI) in 2006, Sweden was ranked as number one. The GGGI benchmarks countries gender gaps on political, economic, health- and education based criteria. Since Sweden is such an equal country when it comes to gender differences, we control for the effect of being Swedish or not. Gender differences in the mentioned areas above may affect the gender differences in overconfidence, which in return will affect the levels of overconfidence among men and women.

City raised in

City raised in is included since we want to control for the possible effect that the type of city one is raised in might have on the participant. We have not found any earlier literature regarding this variable.

Studied before

We include this variable since we want to control for a probable effect that earlier university studies might have on the participant. If one has studied before a greater knowledge base might be more likely, making the participant feel more confident about his/her answers. Though, we have not discovered any previous literature on this subject.

Worked before

Worked before is included to control for a possible effect that earlier work experience might have on the participant. If one has worked prior to the current education, maybe a superior knowledge base is more likely, making the participant feel more confident about his/her answers. However, we have not found any earlier literature on this topic.

In Table 2 is a descriptive summary on the outcomes regarding the independent control variables, across education level.

Table 2: Results on the independent control variables – across education level

Here is a descriptive summary of the independent control variables, *Gender, Age, Civil Status, Swedish Citizenship, City raised in, Studied before* and *Worked before*, divided by education level. The four different education levels are first, second, and third year undergraduates, as well as graduates, where all participants are business students. Also included in the table are two groups, *Group 1* and *Group 2*. *Group 1* consists of first and second year undergraduates and *Group 2* consists of third year undergraduates and graduates. Furthermore, the dummy variable *Group 1-Finance* is included. In the case where *Group 1-Finance* equals one you belong to *Group 1* and indicate that you will choose a Master of Science in Finance. All variables, except for *Age*, are denoted in percentage points. *Age* is denoted in average years. The variable *Studied before* is defined as whether the student has studied at a university level or not, before his/her current studies. Finally, the variable *Worked before* is defined as whether the student has had a full-time job or not, before his/her current studies.

	No.	Gender	Age	Civil Status	Swedish Citizenship	City raised in	Studied before	Worked before
		Man		*Single*	*Yes*	*Capital/Larger*	*Yes*	*Yes*
All	174	54.6	22.6	55.2	92.5	49.4	43.1	48.3
Group 1	122	54.1	21.9	59.8	93.4	50.8	35.2	43.4
Group 1-Finance	20	80.0	21.7	65.0	90.0	50.0	25.0	55.0
Group 2	52	55.8	24.1	44.2	90.4	46.2	61.5	59.6
First year	56	48.2	21.3	60.7	94.6	44.6	33.9	37.5
Second year	66	59.1	22.5	59.1	92.4	56.1	36.4	48.5
Third year	35	54.3	23.5	48.6	91.4	51.4	51.4	62.9
Graduates	17	58.8	25.4	35.3	88.2	35.3	82.4[5]	52.9

[5] By definition this rate should have been 100 percent, since to be able to attend your Master a Bachelor degree is required. Perhaps some of the graduate students view their Master studies as a part of earlier studies and thereby do not consider themselves to have studied before their current studies.

From Table 2 we see that there are a total of 174 business student participants, where 56 are first year undergraduates, 66 are second year undergraduates, 35 are third year undergraduates and 17 students are graduates. We then divide these four groups into two groups, *Group 1* and *Group 2*, where *Group 1* consists of the first and second year undergraduates and *Group 2* consists of the third year undergraduates and the graduates. If we look at *Group 1-Finance*, this group consists of 20 students and incorporates those in *Group 1* who indicate that they will select a Master of Science in Finance.

Looking at *Gender* we see that, apart from the first year undergraduates, there is a larger share of men in our sample. The largest share of men is found among the second year undergraduates, with 59.1 percent being men. If we look at our two groups, there is a slightly higher share of men in *Group 2*, compared to *Group 1*, 55.8 percent in contrast to 54.1 percent. Regarding *Group 1-Finance*, there is a much higher share of men in this group, at 80 percent.

In regards to the variable *Age* in our sample, the average age increases as the level of education increases. The opposite is true if we look at the variable *Civil Status*, where the share of students being single declines as the level of education increases. Regarding *Swedish Citizenship* the share of students having a Swedish citizenship declines as the level of education increases. There is no clear relationship between the level of education and *City raised in*, though *Studied before* is positively correlated with the education level. Finally, if we observe the variable *Worked before*, there does not seem to be any clear relationship between this variable and the education level.

If we examine the differences in the outcomes between *Group 2* and *Group 1*, taking into account all the control variables, we find that there are only significant differences regarding *Age, Civil Status, Studied before* and *Worked before*. The differences regarding *Age* and *Studied before* are significant at a 0.01 level, where the average age is the highest in *Group 2* at 24.1 years, compared to 21.9 years in *Group 1*. If we observe the variable *Studied before*, *Group 2* has the highest percentage share of students that have studied before at 61.5 percent, compared to 35.2 percent in *Group 1*. The differences regarding *Civil Status* and *Worked before* are significant at a 0.1 level. If we look at the variable *Civil Status*, 44.2 percent appears to be single in *Group 2*, compared to 59.8 percent in *Group 1*. Looking at the variable *Worked before* we can observe that 59. 6 percent has worked before in *Group 2* compared to

43.4 percent in *Group 1*. All outcomes are found in Table A1, in Appendix 2. Moreover, we also examine the correlations between the control variables. We observe that the correlations among most of these variables are relatively low. An exception are the correlations between *Age* and *Studied before*, and *Age and Worked before*, where the correlations are 0.369 respectively 0.459. The outcomes are found in Table A2 in Appendix 3.

3.6 Definition of variables

Table 3 summarizes the variables used in the empirical tests.

Table 3: Definition of variables

Variables	**Label**	**Definition**
Dependent variables:		
Overprecision	OPR	Difference between 0.9 (90%) and the participant's *HITRATE*. (Also independent variable)
Overestimation	OE	Difference between the participant's estimated score and actual score (Also independent variable)
Overplacement	OPL	Difference between the participant's actual rank and estimated rank (Also independent variable)
Finance	FINANCE	Dummy variable: 1 if the participant belongs to Group 2, or if the participant belongs to those who indicate that they will choose a Master of Science in Finance in Group 1, 0 if otherwise.
Independent variables:		
Group2	GROUP2	Dummy variable: 1 if the participant is a third year undergraduate or a graduate student, 0 if otherwise
Undergraduate-Finance	UNDGR_FIN	Dummy variable: 1 if the participant is an undergraduate student who indicate that he/she will choose a Master of Science in Finance, 0 if otherwise
Gender*Group2	GENDER_GROUP2	Dummy variable: Interaction-term. 1 if the participant is a man and a third year undergraduate or graduate student, 0 is otherwise
Gender	GENDER	Dummy variable: 1 if the participant is a man, 0 otherwise
Age	AGE	Nominal variable: Each participant's age
Civil Status	CIV_ST	Dummy variable: 1 if the participant is single, 0 if otherwise
Swedish Citizenship	SW_CIT	Dummy variable: 1 if the participant is Swedish, 0 if otherwise
City raised in	RAISED	Dummy variable: 1 if the participant is raised in a capital or large city, 0 if otherwise
Studied before	STUD_BEF	Dummy variable: 1 if the participant has studied at an university level before attending his/her current studies, 0 if otherwise
Worked before	WORK_BEF	Dummy variable: 1 if the participant has had a full-time job before attending his/her current studies, 0 if otherwise

3.7 Regression Models

We use OLS regressions and thereby assume a linear relationship among the variables we examine. Heteroskedasticity is taken into account, using robust standard errors (Stock and Watson, 2012). We further report adjusted R-square to account for the effect of a greater R-square, when including more independent variables into our regression models.

3.7.1 Hypothesis One

Our first hypothesis tests if *Group 2* shows a higher degree of overconfidence compared to *Group 1*. Thereby we can examine if the finance oriented students display a higher degree of overconfidence compared to the non-finance oriented students.

We estimate the following regression model:

$$\boldsymbol{Y_i = \alpha + \beta_1 GROUP2_i + \beta_2 GENDER_i + \beta_3 AGE_i + \beta_4 CIV\_ST_i + \beta_5 SW\_CIT_i + \beta_6 RAISED_i + \beta_7 STUD\_BEF_i + \beta_8 WORK\_BEF_i + \varepsilon_i}$$

Where $\boldsymbol{Y = OPR, OE\ or\ OPL}$[6] and $\boldsymbol{i = 1, 2, \dots, 174}$

If we find significant evidence supporting our first hypothesis we add additional variables to our basic regression model, in order to test our second and third hypothesis.

3.7.2 Hypothesis Two

In our second hypothesis we want to test if those in *Group 1*, who indicate that they will choose a Master of Science in Finance, show a higher degree of overconfidence compared to the others in *Group 1*. Thereby we can examine if there is any self-selection effect present, more overconfident students self-selecting into a finance oriented education. We add $\boldsymbol{UNDGR\_FIN_i}$ to our basic regression model and only focus on the undergraduates at the first and second year. Therefore we filter our data to only include observations where $\boldsymbol{GROUP2_i = 0}$. Hence, we have that $\boldsymbol{i = 1, 2, \dots, 122.}$

3.7.3 Hypothesis Three

Finally, our third hypothesis tests if the gender difference in overconfidence in *Group 2* is smaller than the gender difference in overconfidence in *Group 1*. Thereby we can examine if there is any self-selection effect on gender present as well. We add an interaction-term, $\boldsymbol{GENDER_i\_GROUP2_i}$ to our basic regression model. This variable compares the gender difference between the two groups. $\boldsymbol{GENDER_i\_GROUP2_i}$ equalling one means you are a man and belong to *Group 2*, zero if otherwise. We do not filter our data regarding this hypothesis and therefore we still have $\boldsymbol{i = 1, 2, \dots, 174.}$

[6] OPR means *Overprecision*, OE means *Overestimation* and OPL means *Overplacement.*

4. Empirical Results and Analysis

In this section we test our three hypotheses and answer our research question. We analyse the results by drawing parallels to previous literature.

4.1 Hypothesis One

We first test whether *Group 2* displays a higher degree of overconfidence compared to *Group 1*. *Group 2* is defined as third year undergraduates and graduates and *Group 1* is defined as first and second year undergraduates.

4.1.1 Outcomes on *Overprecision, Overestimation* and *Overplacement*

In Table 3 below[7], outcomes on *Overprecision, Overestimation* and *Overplacement*, regarding our two groups, are displayed.

Table 3: Results on *Overprecision, Overestimation* and *Overplacement* – average values
Average outcomes on *Overprecision, Overestimation* and *Overplacement*, in *Group 1* and *Group 2*. The variable *Overprecision* is defined as the optimal *HITRATE*, 0.9 (90 %), minus the participant's actual *HITRATE* on the confidence interval questions. The variable *Overestimation* in defined as the difference between the participant's estimated score and actually achieved score, on the multiple-choice questions. The variable *Overplacement* is defined as the difference between the participant's actual rank and estimated rank, on the multiple-choice questions, where the top rank is coded as 1 and the bottom rank is coded as 5. Values in parentheses are p-values.

	No.	Overprecision	Overestimation	Overplacement
Group 2	52	0.548***	0.115	0.096
		(0.000)	(0.612)	(0.616)
Group 1	122	0.507***	-0.623***	-0.221*
		(0.000)	(0.000)	(0.083)

*** Significantly different from zero at the 0.01 level, using a two-tailed t-test.
* Significantly different from zero at the 0.1 level, using a two-tailed t-test.

We first look at *Overprecision* in Table 3, which is measured as the difference between the optimal *HITRATE* at 0.9 (90 %) and each participant's actual *HITRATE*, on the confidence interval questions. Both groups are significantly overconfident. *Group 2* is 54.8 percent overconfident, and the value is significant at the 0.01 level. Also, *Group 1* is significantly overconfident at the 0.01 level, at 50.7 percent. These results are similar to the results from previous studies, where people often seem to provide too narrow confidence intervals and thereby display *HITRATES* that are lower than the optimal *HITRATE*. See for example Hardies et al. (2013), Russo et al. (1992) and Soll et al. (2004).

Next we turn to *Overestimation*, measured as the difference between each participant's estimated score and actual score, on the multiple-choice questions. The results display that

[7] We will investigate the differences between *Group 1* and *Group 2* in the regression analyses in sections 4.1.2-4.1.4 below.

Group 2 is overconfident while *Group 1* is underconfident. *Group 2* obtain a positive result at 0.115, meaning that on average the participants' estimated scores on the multiple-choice questions are 0.115 scores higher than their actually achieved scores. The opposite is true for *Group 1*, who displays a negative average value at -0.623 scores. However, the result of 0.115 is not significantly different from zero, while -0.623 is significant at the 0.01 level.

Finally we look at *Overplacement*, measured as the difference between each participant's actual rank and estimated rank, on the multiple-choice questions. The top rank is denoted as 1, while the bottom rank is denoted as 5. We again observe that *Group 2* is overconfident, while *Group 1* is underconfident. Though as before it is only the value in *Group 1*, at -0.221 rank values, that is significant at a 0.1 level.

Since the outcomes in Table 3 seem to display an underlying correlation between *Overestimation* and *Overplacement*, we check for the correlations among the three types of overconfidence. The outcomes are found in Table 4 below.

Table 4: Correlations between *Overprecision, Overestimation* and *Overplacement*

Correlations			
	Overprecision	Overestimation	Overplacement
Overprecision	1.0000		
Overestimation	-0.0393	1.0000	
Overplacement	0.0216	0.6472	1.0000

From Table 4 we see that there is a high correlation between *Overestimation* and *Overplacement*, at 0.6472. The other correlations are quite low, at -0.0393 and 0.0216. According to Moore et al. (2008) the three types of overconfidence differ from each other from an empirical point of view. Their findings can help explain the low correlation between overprecision and the two other types of overconfidence in our sample. Another explanation might be the fact that the *Overestimation* and *Overplacement* are measured from the same part of our survey, the multiple-choice questions. *Overprecision* on the other hand is measured from the confidence interval questions. Thus, our way of measuring the three different overconfidence types might affect the correlations among them.

In tables 5-7 below we report the results from our OLS regressions, with *Overprecision, Overestimation* and *Overplacement* as the dependent variables. We control for the variables that might influence the degree of overconfidence; *Gender, Age, Civil Status, Swedish*

Citizenship, City raised in, Studied before and *Worked before.* These variables are added one by one in order to control for their effects individually.

4.1.2 Results on *Overprecision*

Table 5: OLS regression – Comparing the degree of *Overprecision* between *Group 2* and *Group 1*
The dependent variable is *Overprecision.* Regarding the independent variables, all variables are dummy variables, except for *Age*, which is a nominal variable. The variable *Group2* is the variable of interest and *Group2* being one means that you belong to *Group 2*, while *Group2* being zero means that you belong to *Group 1*. We then control for *Gender, Age, Civil Status, Swedish Citizenship, City raised in, Studied before* and *Worked before*, adding one variable at a time. *Gender* equals one if you are a man, zero if otherwise. *Age* is the participant's age in years. *Civil Status* equals one if you are single, zero if otherwise. *Swedish Citizenship* equals one if you are Swedish, zero if otherwise. *City raised in* equals one if you are raised in a capital/larger city, zero if otherwise. *Studied before* means that you have studied at a university level before your current studies and the variable equals one if you have, zero if otherwise. *Worked before* means that you have had a full-time job before your current studies and the variable equals one if you have, zero if otherwise. Values in parentheses are p-values.

	Overprecision							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Group2	0.042	0.044	0.049	0.042	0.038	0.039	0.037	0.037
	(0.233)	(0.192)	(0.183)	(0.251)	(0.306)	(0.300)	(0.322)	(0.325)
Gender		-0.119***	-0.116***	-0.114***	-0.110***	-0.109***	-0.109***	-0.109***
		(0.000)	(0.000)	(0.000)	(0.001)	(0.001)	(0.001)	(0.001)
Age			-0.002	-0.003	-0.002	-0.002	-0.003	-0.004
			(0.745)	(0.730)	(0.751)	(0.780)	(0.729)	(0.694)
Civil Status				-0.045	-0.050	-0.048	-0.048	-0.048
				(0.146)	(0.116)	(0.131)	(0.128)	(0.136)
Swedish Citizenship					-0.088	-0.091	-0.089	-0.089
					(0.229)	(0.207)	(0.225)	(0.224)
City raised in						0.027	0.026	0.025
						(0.373)	(0.391)	(0.407)
Studied before							0.013	0.014
							(0.692)	(0.690)
Worked before								0.012
								(0.748)
Constant	0.507***	0.571***	0.621***	0.652***	0.731***	0.712***	0.720***	0.733***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Observations	174	174	174	174	174	174	174	174
Adj. R-square	0.0022	0.0743	0.0702	0.0759	0.0823	0.0810	0.0763	0.0713

***Significantly different from zero at the 0.01 level, using a two-tailed t-test.
Using robust standard errors to control for heteroskedasticity.

The dependent variable in Table 5 is *Overprecision.* We observe that the coefficient on the variable of interest, *Group2*, is positive but not significant at any conventional significance level[8], in any of the regressions. Thus, there does not seem to be any significant difference in the degree of *Overprecision* between *Group 2* and *Group 1*. However, the coefficient on *Gender* is significant at the 0.01 level. The coefficient is negative, ranging from -0.109 to -0.119. This outcome implies that if you are a man, all else equal, you show a significantly lower degree of *Overprecision.* Thus, if you are a man you appear to have a *HITRATE* that is 10.9-11.9 percentage points higher, which means that you are less overconfident. None of the coefficients on the other control variables are significant.

[8] The conventional significance level means the 0.1, the 0.05 or the 0.01 level.

4.1.3 Results on *Overestimation*

Table 6: OLS regression – Comparing the degree of overestimation between *Group 2* and *Group 1*
The dependent variable is *Overestimation*. Regarding the independent variables, all variables are dummy variables, except for *Age*, which is a nominal variable. The variable *Group2* is the variable of interest and *Group2* being one means that you belong to *Group 2*, while *Group2* being zero means that you belong to *Group 1*. We then control for *Gender, Age, Civil status, Swedish Citizenship, City raised in, Studied before* and *Worked before*, adding one variable at a time. *Gender* equals one if you are a man, zero if otherwise. *Age* is the participant's age in years. *Civil Status* equals one if you are single, zero if otherwise. *Swedish Citizenship* equals one if you are Swedish, zero if otherwise. *City raised in* equals one if you are raised in a capital/larger city, zero if otherwise. *Studied before* means that you have studied at a university level before your current studies and the variable equals one if you have, zero if otherwise. *Worked before* means that you have had a full-time job before your current studies and the variable equals one if you have, zero if otherwise. Values in parentheses are p-values.

	Overestimation							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Group2	0.738***	0.734***	0.698**	0.655**	0.682**	0.684**	0.712**	0.709**
	(0.010)	(0.010)	(0.016)	(0.023)	(0.018)	(0.018)	(0.019)	(0.021)
Gender		0.250	0.229	0.242	0.212	0.214	0.214	0.202
		(0.365)	(0.431)	(0.406)	(0.465)	(0.462)	(0.462)	(0.492)
Age			0.017	0.016	0.014	0.015	0.023	0.011
			(0.620)	(0.651)	(0.681)	(0.665)	(0.503)	(0.748)
Civil Status				-0.296	-0.265	-0.261	-0.256	-0.244
				(0.262)	(0.315)	(0.326)	(0.336)	(0.363)
Swedish Citizenship					0.626	0.618	0.582	0.572
					(0.236)	(0.244)	(0.276)	(0.286)
City raised in						0.069	0.084	0.071
						(0.803)	(0.767)	(0.802)
Studied before							-0.176	-0.173
							(0.563)	(0.571)
Worked before								0.187
								(0.531)
Constant	-0.623***	-0.758***	-1.120	-0.918	-1.475*	-1.522*	-1.625*	-1.425
	(0.000)	(0.001)	(0.143)	(0.225)	(0.094)	(0.087)	(0.073)	(0.102)
Observations	174	174	174	174	174	174	174	174
Adj. R-square	0.0284	0.0274	0.0226	0.0233	0.0256	0.0201	0.0162	0.0123

***Significantly different from zero at the 0.01 level, using a two-tailed t-test.
**Significantly different from zero at the 0.05 level, using a two-tailed t-test.
*Significantly different from zero at the 0.1 level, using a two-tailed t-test.
Using robust standard errors to control for heteroskedasticity.

In Table 6 the dependent variable is *Overestimation*. We observe that the variable of interest, *Group2*, is significant at the 0.01 level in regression 1-2 and significant at the 0.05 level in regression 3-8. The coefficient is positive which implies that if you belong to *Group 2*, all else equal, you show a significantly higher degree of *Overestimation*. Though the outcome on *Overestimation* in Table 3 displays that *Group 1* is significantly underconfident while *Group 2* does not seem to be neither underconfident nor overconfident. Also, the negative constant terms in regressions 2-8, in Table 6, are larger than the positive coefficients on *Group2. Group* 2 can thereby only be stated to be more confident compared to *Group 1,* and not more overconfident, regarding *Overestimation.*

The magnitude of the estimated coefficient ranges from 0.655 in regression 4 to 0.738 in regression 1. This result implies that if you belong to *Group 2*, all else equal, you tend to be

on average 0.655-0.738 scores more confident. None of the coefficients on the other control variables included are significant.

This outcome seems to be in line with the results from previous literature, finance oriented areas displaying a higher degree of confidence relative to other areas (see for example Russo et al. 1992). Hence, the level of confidence among the participants increases along with an academic study within the field of finance (Estes et al., 1988).

4.1.4 Results on *Overplacement*

Table 7: OLS regression – Comparing the degree of overplacement between *Group 2* and *Group 1*
The dependent variable is *Overplacement*. Regarding the independent variables, all variables are dummy variables except for age, which is a nominal variable. The variable *Group2* is the variable of interest and *Group2* being one means that you belong to *Group 2*, while *Group2* being zero means that you belong to *Group 1*. We then control for *Gender, Age, Civil Status, Swedish Citizenship, City raised in, Studied before* and *Worked before*, adding one variable at a time. *Gender* equals one if you are a man, zero if otherwise. *Age* is the participant's age in years. *Civil Status* equals one if you are single, zero if otherwise. *Swedish Citizenship* equals one if you are Swedish, zero if otherwise. *City raised in* equals one if you are raised in a capital/larger city, zero if otherwise. *Studied before* means that you have studied at a university level before your current studies and the variable equals one if you have, zero if otherwise. *Worked before* means that you have had a full-time job before your current studies and the variable equals one if you have, zero if otherwise. Values in parentheses are p-values.

	Overplacement							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Group2	0.317	0.312	0.321	0.291	0.290	0.292	0.292	0.285
	(0.167)	(0.171)	(0.174)	(0.216)	(0.216)	(0.214)	(0.218)	(0.234)
Gender		0.344	0.349	0.359	0.360	0.363	0.363	0.340
		(0.108)	(0.117)	(0.109)	(0.107)	(0.102)	(0.104)	(0.127)
Age			-0.005	-0.006	-0.006	-0.005	-0.005	-0.029
			(0.879)	(0.850)	(0.853)	(0.875)	(0.878)	(0.387)
Civil Status				-0.206	-0.208	-0.203	-0.203	-0.179
				(0.331)	(0.332)	(0.346)	(0.346)	(0.408)
Swedish Citizenship					-0.036	-0.045	-0.045	-0.063
					(0.926)	(0.906)	(0.990)	(0.874)
City raised in						0.081	0.081	0.056
						(0.704)	(0.708)	(0.796)
Studied before							0.003	0.009
							(0.990)	(0.970)
Worked before								0.367
								(0.142)
Constant	-0.221*	-0.407**	-0.310	-0.169	-0.137	-0.192	-0.191	0.202
	(0.083)	(0.022)	(0.630)	(0.793)	(0.851)	(0.797)	(0.800)	(0.794)
Observations	174	174	174	174	174	174	174	174
Adj. R-square[9]	0.0051	0.0146	0.0089	0.0085	0.0026	-0.0025	-0.0085	-0.0005

**Significantly different from zero at the 0.05 level, using a two-tailed t-test.
*Significantly different from zero at the 0.1 level, using a two-tailed t-test.
Using robust standard errors to control for heteroskedasticity.

In Table 7 the dependent variable is *Overplacement*. We can observe that the coefficient on *Group2* is positive, but not significant in any of the regressions. Thus, there does not seem to

[9] It appears that the adjusted R-square values are negative in regression 6-8. The adjusted R-square decreases when one includes new independent variables into the regression, which improves the model by less than what can be expected by chance. Also, if the actual R-square is close to zero, which it is in this case, the adjusted R-square can be slightly negative. Hence, including the control variables after gender seem to improve our model by less than what we can expect from chance, leading to a decrease in the adjusted R-square, making it negative when we include *City raised in*.

be any significant difference in the degree of *Overplacement* between *Group 2* and *Group 1*. None of the coefficients on the other control variables included are significant either.

4.1.5 Results regarding Hypothesis One

We find that including our control variables does not alter the overall outcome on the coefficient on *Group2* from regression 1, in any of the cases. This result is true regarding all the three overconfidence types. A significant difference between *Group 2* and *Group 1* is thereby only found regarding *Overestimation*, where *Group 2* displays a higher degree of *Overestimation* and is stated as more confident.

We can therefore reject the null hypothesis regarding *Overestimation* but we cannot reject the null hypothesis regarding *Overprecision* and *Overplacement*. This result is somewhat surprising since *Overplacement* appears to be correlated with *Overestimation* (see Table 4) and *Group 1* is significantly underconfident regarding both *Overestimation* and *Overplacement* (see Table 3).

The different outcomes we get on *Overprecision*, *Overestimation* and *Overplacement* are consistent with Moore et al. (2008). They argue that one has to distinguish between the three types of overconfidence since they differ from each other, both from a conceptual, as well as from an empirical, point of view. One cannot look at them as one and the same; i.e. one has to treat them as three different parts of the term overconfidence.

4.1.6 Other results

An interesting result is the coefficient on *Gender* being significant and negative in Table 5, since men generally are found to be more overconfident than women (Barber et al., 2001; Bengtsson et al., 2005). However, Nekby et al. (2008) show an opposite outcome when women have the possibility to self-select into male dominated environments. These findings might be an explanation for our result regarding *Overprecision*. Since business is regarded to be a male dominated area, the female students who choose to focus on business in their education might be more overconfident than the men at the business education, due to this self-selection effect on gender.

Apart from the outcome on *Gender* in Table 5, regarding *Overprecision*, all our control variables appear insignificant. We expected some of them to be significant, due to the results from earlier literature. However, the participants we study can be considered to come from

quite a homogeneous group of individuals. Everyone is studying at the same university, where the age and origin of the students are quite similar. Thereby the effect of adding the chosen control variables to our regressions might not be very strong, explaining the insignificance.[10]

Since we find a significantly higher degree of *Overestimation* among those in *Group 2*, we only test hypothesis two and three on *Overestimation*.

4.2 Hypothesis Two

We test if those in *Group 1*, who indicate that they will select a Master of Science in Finance, show a higher degree of *Overestimation* compared to the others in *Group 1*. Thereby we examine if there is any self-selection effect, more confident students self-selecting themselves into a finance oriented education.

The outcomes on *Overestimation* between those indicating that they will choose a Master of Science in Finance and those indicating that they will select another Master; are found in Table 8 below.[11]

Table 8: Results on *Overestimation* – Self-selection effect
Average values on *Overestimation*, regarding those in *Group 1* who indicate that they will choose a Master of Science in Finance, and those who indicate that they will choose another Master. The variable *Overestimation* in defined as the difference between the participant's estimated score and actually achieved score on the multiple-choice questions. Values in parentheses are p-values.

	No.	Overestimation
Indicating a Master of Science in Finance	20	-0.300
		(0.562)
Indicating another Master	102	-0.686***
		(0.000)

***Significantly different from zero at the 0.01 level, using a two-tailed t-test.

If we look at Table 8 both groups appear underconfident. However, the 20 students indicating that they will choose a Master of Science in Finance in *Group 1* appear less underconfident. Thereby they seem to be more confident in *Group 1*. Although it is only the outcome regarding those indicating that they will choose another Master, at -0.686 scores, which is significantly different from zero, at a 0.01 level.

[10] The intercept values from our OLS regressions are significant regarding all the overconfidence types, though at different magnitudes. Regarding *Overprecision* the intercepts are positive and significant implying an underlying overconfidence among the participants. If we look at the constant terms regarding *Overestimation*, they are negative and sometimes significant implying an underlying underconfidence. Finally, if we observe *Overplacement* the constants are also negative, and in a few cases significant, inferring an underlying underconfidence.
[11] We will investigate the difference between those indicating that they will choose a Master of Science in Finance and those indicating that they will select another Master, in the regression analysis further down.

In Table 9 below we report the results from our OLS regression, with *Overestimation* as the dependent variable. We control for the variables that might influence the degree of overconfidence; *Gender, Age, Civil Status, Swedish Citizenship, City raised in, Studied before* and *Worked before.* These variables are added one by one in order to control for their effects individually.

Table 9: OLS regression on *Overestimation* – Self-selection effect
The dependent variable is *Overestimation*. Regarding the independent variables all variables are dummy variables except for *Age*, which is a nominal variable. The data is here filtered and only includes students from *Group 1*. The variable *Undergraduate Finance* is the variable of interest. *Undergraduate Finance* being one means that you are among those in *Group 1* who indicate that you will choose a Master of Science in Finance, while Undergraduate Finance being zero means that you are among those in *Group 1* who indicate that you will choose another Master. We then control for *Gender, Age, Civil Status, Swedish Citizenship, City raised in, Studied before* and *Worked before*, adding one variable at a time. *Gender* equals one if you are a man, zero if otherwise. *Age* is the participant's age in years. *Civil Status* equals one if you are single, zero if otherwise. *Swedish Citizenship* equals one if you are Swedish, zero if otherwise. *City raised in* equals one if you are raised in a capital/larger city, zero if otherwise. *Studied before* means that you have studied at a university level before your current studies and the variable equals one if you have, zero if otherwise. *Worked before* means that you have had a full-time job before your current studies and the variable equals one if you have, zero if otherwise. Values in parentheses are p-values.

	Overestimation							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Undergraduate Finance	0.386	0.331	0.378	0.412	0.456	0.455	0.405	0.331
	(0.468)	(0.538)	(0.476)	(0.428)	(0.388)	(0.391)	(0.450)	(0.535)
Gender		0.178	0.083	0.080	0.072	0.072	0.079	0.044
		(0.598)	(0.823)	0.829)	(0.846)	(0.845)	(0.830)	(0.906)
Age			0.049	0.052	0.046	0.046	0.068	0.038
			(0.224)	0.196)	(0.262)	(0.263)	(0.106)	(0.335)
Civil Status				-0.525	-0.478	-0.478	-0.453	-0.447
				0.102)	(0.134)	(0.136)	(0.160)	(0.165)
Swedish Citizenship					1.115*	1.115*	1.023	1.017
					(0.075)	(0.076)	(0.114)	(0.118)
City raised in						-0.029	0.000	-0.031
						(0.930)	(0.999)	(0.929)
Studied before							-0.415	-0.446
							(0.274)	(0.238)
Worked before								0.499
								(0.186)
Constant	-0.686***	-0.774***	-1.813**	-1.566*	-2.498***	-2.482**	-2.763***	-2.257**
	(0.000)	(0.002)	(0.040)	(0.067)	(0.010)	(0.011)	(0.007)	(0.019)
Observations	122	122	122	122	122	122	122	122
Adj. R-square	-0.0025	-0.0087	-0.0096	0.0011	0.0147	0.0062	0.0073	0.0.0128

***Significantly different from zero at the 0.01 level, using a two-tailed t-test.
**Significantly different from zero at the 0.05 level, using a two-tailed t-test.
*Significantly different from zero at the 0.1 level, using a two-tailed t-test.
Using robust standard errors to control for heteroskedasticity.

The dependent variable in Table 9 is *Overestimation.* We see that the coefficient on the variable of interest, *Undergraduate Finance*, is positive in all of the regressions, though not significant. Hence, there does not seem to be any significant difference in the degree if *Overestimation* between the students indicating that they will choose a Master of Science in Finance and the remaining students in *Group 1*. Therefore we cannot reject the null hypothesis of no difference in the degree of *Overestimation* between the students who indicate that they will choose a Master of Science in Finance and the others in *Group 1*. Thus, self-

selection does not seem to be the explanation for the students at the finance oriented education to be more confident than the students at the non-finance oriented education, regarding *Overestimation*.

However, the coefficient on *Swedish Citizenship* is significant at the 0.1 level in regression 5-6, at 1.115 scores. The coefficient is positive which implies that if you belong to *Group 1* and have a Swedish citizenship, all else equal, you are 1.115 scores more confident compared to the remaining *Group 1.* Though out of the 122 students in *Group 1*, 114 of them have a Swedish citizenship. Hence, the majority in this group are Swedish, which might exert an effect on the results. Thus, we should be careful when interpreting the significance regarding *Swedish Citizenship*. None of the coefficients on the other control variables included are significant.[12]

4.3 Hypothesis Three

Regarding our third hypothesis, we are supposed to test if the gender difference in overconfidence in *Group 2* is smaller than the gender difference in overconfidence in *Group 1.* This test is made to be able to examine if there is any self-selection effect on gender among our students. Though, from the previous results received on *Gender*, regarding *Overestimation* in Table 6, we find no evidence of gender differences in our sample. The coefficient on *Gender* is insignificant in all regressions. This outcome infers no significant deviation in the gender difference in confidence between *Group 2* and *Group 1*. Testing our third hypothesis is therefore not necessary.

Thus, the effect of self-selection on gender differences that Hardies et al. (2013) find when they compare auditors with business and non-business students, does not seem to be applicable to a comparison between only students, assuming the finance-oriented students to be more specialized in one area.

[12] The intercept values are significant in all regressions, ranging from -0.686 scores in regression 1 to -2.763 scores in regression 7. The negative outcome implies that there is an underlying overall underconfidence among the students in *Group 1*, not being explained by any of our included variables.

5. Conclusion and Discussion

Finance related occupations seem to display a higher degree of overconfidence compared to other occupations (see for example Russo et al., 1992). We therefore examine whether the degree of overconfidence among the business students increases when the education goes from being non-finance to finance oriented. Three types of overconfidence are taken into account: overprecision, overestimation and overplacement. We conclude that only the degree of *Overestimation* among the business students increases when the education goes from being non-finance to finance oriented; finance oriented students being more confident. Moreover, self-selection does not seem to explain the significant increase in *Overestimation* among the finance oriented students.

We also test for self-selection on gender, regarding *Overestimation*, and find that it is absent when comparing our two student groups. Although we do find that the women seem to be more overconfident than the men, at an overall level, regarding *Overprecision.* We thereby conclude that there seems to be a self-selection effect on gender, regarding the choice of studying business. The women at the business studies appear to be more overconfident than the men when getting the opportunity to self-select into this male dominated area.

In accordance with earlier literature we find occurrences of both overconfidence, as well as of underconfidence, among our participants (see e.g. Moore et al., 2008). However, Benoît and Dubra (2011) argue that a majority of earlier results on overconfidence, as well as on underconfidence, show an apparent misconfidence and not a true one. They focus on overplacement, being better than average, or being better than the median. According to Benoît et al. (2011) rational people can display both overconfidence and underconfidence, by using the information they have in an optimal way. The shown misconfidence is thereby only apparent, not true. To be able to show that people are truly overconfident, or underconfident, more specific information is needed. Regarding overplacement and underplacement, one should preferably have information on the proportion of the participants who consider themselves above each decile in the studied sample. One should not focus on being above the average or the median. Another component needed is the strength of the participants' beliefs, regarding their overconfidence or underconfidence.

The authors conclude that, at a nonconcrete level, people whom are rational should show overplacement as well as underplacement, when only focusing on the better than the average/median measures. Benoît et al. (2011) also mention that their analysis on over- and

underplacement to some extent is applicable to over- and underestimation, although the analysis is not appropriate to use on over- and underprecision.

Merkle and Weber (2011) take the criticism of Benoît et.al (2011) into account. They develop a new experimental design to be able to differentiate between the explanations for the better than average effect, which are (true) overconfidence and rational information processing (apparent overconfidence). The authors conclude that people show overconfidence that is inconsistent with the explanation given by the rational information processing and this overconfidence is thus inconsistent with apparent overconfidence. True overconfidence seems to be the key driver of the degree of overconfidence they find. The apparent overconfidence, in general, essentially represents true overconfidence. Hence, the criticism of Benoît et al. (2011) does not seem to be valid from an empirical point of view.

Thus, the underplacement that we find in our sample can most likely be stated to be true underconfidence. Regarding the other two types, no criticism has been stated directly towards these. Thereby we assume our results regarding these types to indicate true over- and underconfidence as well.

Furthermore, the significant outcome we find regarding *Overestimation* is from a statistical point of view. However, the finding that the finance oriented students on average are 0.655-0.738 scores more confident does not result in any economic significance per se. Although, since *Overestimation* means overestimating ones control/capacity/performance, the displayed increase in confidence regarding this type will probably have some economic implications. For example by considering the finance oriented students' (future) actions and decision-making in society. Hence, we argue that this outcome is both statistically, as well as economically, significant.

Another interesting aspect is whether the overconfident students in our sample performed better or worse, compared to the rest of the students, on the confidence interval- and multiple-choice questions. Regarding the results on the confidence interval questions and *Overprecision,* it is not possible to draw any conclusions here. Since we assume an optimal *HITRATE* of 90 % the correlation between the participants' *HITRATES* and *Overprecision* will always be -1. Though we can draw some conclusions regarding the multiple-choice questions and the two other types, *Overestimation* and *Overplacement*.

The correlation between the participants' actual score results[13] and *Overestimation* is negative, at -0.54. This outcome implies that if you show a higher degree of *Overestimation,* you will have worse results on the multiple-choice questions and vice versa. Furthermore, the average result for the students who are overconfident, regarding *Overestimation,* is 3.78 scores. This result is lower compared to the average result found among the rest of the students, at 5.40 scores.

The correlation between the participants' actual rank values[14] and *Overplacement* is positive, at 0.65. This outcome implies that if you show a higher degree of *Overplacement,* you will have a higher rank value[15] on the multiple-choice questions and vice versa. Moreover, the average rank for the students who show overconfidence in the form of *Overplacement* is 4.18 rank values. This result is higher than the average rank found among the rest of the students, at 2.93 rank values.

Thereby the overconfident students seem to perform worse on the multiple-choice questions, which is a distressing finding. Believing that you are better than you really are, and at the same time actually being worse than the rest, is not optimal.

It would be interesting to further investigate if the found difference in the degree of *Overestimation* between non-finance and finance oriented students is due to the education itself, since we find no evidence of self-selection in our study. To examine the education effect one should preferably follow the same students as they move from a non-finance to a finance oriented education. Hence, one should use panel data and not cross-sectional data as we do.

Moreover, we find a high correlation between *Overestimation* and *Overplacement*. This result might be due to the fact that we measure *Overestimation* and *Overplacement* from the same part of our survey, the multiple-choice questions. *Overprecision* on the other hand is measured from the confidence-interval part of the survey. Therefore a suggestion for further research would be to actually measure all the three types of overconfidence from the same

[13] We exclude all observations where the participant got an actual result of 10 scores, since in this case you can only belong to the non-overconfident students (the underconfident or the neutral students). Thereby all observations with 10 scores will automatically increase the average among the non-overconfident students. 0 observations are excluded, since none of our participants got 10 scores on the multiple-choice questions.
[14] We exclude all observations where the participant got an actual rank value of 1, since in this case you can only belong to the non-overconfident students (the underconfident or the neutral students). Thereby all observations with a rank value of 1 will automatically decrease the average among the non-overconfident students. 33 observations are excluded.
[15] A higher rank value means that you are worse, compared to the rest of your class. 1=top rank while 5=bottom rank.

underlying data, which would probably give more coherent results. This concurrent way of measuring all three types would be in line with Moore et al. (2008).

Earlier studies that have focused on business students have either compared the business major to other student majors, or they have compared undergraduate and graduate business students to each other (see Kamas et al., 2012; Chira et al., 2008). These earlier studies have not drawn any parallels to finance related areas.

We choose to compare finance oriented business students to non-finance oriented business students. One can thereby draw parallels between the business studies and finance oriented areas outside the school system. Our main contribution to research is therefore finding that the finance oriented business students are more confident regarding *Overestimation*. This finding means that the finance oriented students estimate their level of control/capacity/performance to be higher compared to the non-finance oriented students. Since the finance oriented students are most likely to take part in future financial decisions and outcomes, where (over)confidence is found to have had a negative impact (see Decovny, 2012; Abbes, 2013), it is not optimal for these students to be more confident regarding *Overestimation* and at the same time not be aware of it.

Thus, the school system should maybe begin to inform students about the term (over)confidence and what consequences shown (over)confidence might have on financial decisions and outcomes. Though one should probably not try to cure the shown (over)confidence completely, since being (over)confident might in some cases be advantageous; for example in uncertain and competitive environments (Johnson et al., 2011).

Hence, a good start would be to make the business students, and more specifically the finance oriented business students, aware of the term (over)confidence and its implications on finance oriented areas.

References:

Scientific articles:

Abbes, M. (2013). Does Overconfidence Bias Explain Volatility During the Global Financial Crisis? *Transition Studies Review, 19*(3), 291-312

Adams, R., & Funk, P. (2012). Beyond the glass ceiling: Does gender matter? *Management Science, 58*(2), 219-235

Barber, B. M., & Odean, T. (2000). Trading Is Hazardous to Your Wealth: The Common Stock Investment Performance of Individual Investors. *The Journal of Finance, 55*(2), 773-806

Barber, B. M., & Odean, T. (2001). Boys will be boys: Gender, overconfidence and common stock investment. *The Quarterly Journal of Economics, 116*(1), 261-292

Beckmann, D., & Menkhoff, L. (2008). Will Women be Women? Analysing the Gender Difference among Financial Experts. *Kyklos, 61*(3), 364-384

Bengtsson, C., Persson, M., & Willenhag, P. (2005). Gender and overconfidence. *Economics Letters, 86*(2), 199-203

Benoît, J. P., & Dubra, J. (2011). Apparent Overconfidence. *Econometrica, 79*(5), 1591-1625

Brunnermeier, M. K., Gollier, C., & Parker, J. A. (2007). Beliefs in the Utility function – Optimal Beliefs, Asset Prices, and the Preference for Skewed Returns, *AEA Papers and Proceedings, 97*(2)

Chira, I., Adams, M., & Thornton, B. (2008). Behavioral Bias Within The Decision Making Process. *Journal of Business & Economics Research, 6*(8), 11-19

Dahlbom, L., Jakobsson, A., Jakobsson, N., & Kotsadam, A. (2011). Gender and overconfidence: are girls really overconfident? *Applied Economics Letters, 18*(4), 325-327

Estes, R., & Hosseini, J. (1988). The gender gap on wall street: An empirical analysis of confidence in investment decision making. *Journal of Psychology: Interdisciplinary and Applied, 122*(6), 577-590

Hardies, K., Breesch, D., & Branson, J. (2012). Male and female ausitors' overconfidence. *Managerial Auditing Journal, 27*(1), 105-118

Hardies, K., Breesch, D., & Branson, J. (2013). Gender differences in overconfidence and risk taking: Do self-selection and socialization matter? *Economics Letters, 118*(3), 442-444

Henrich, J., Heine, S. J., & Norenzayan, A. (2010). The weirdest people in the world? *Behavioral and Brain Sciences, 33*(2-3), 61-83

Johnson, D. D. P., & Fowler, J. H. (2011). The evolution of overconfidence. *Nature, 477*, 317-320

Kamas, L., & Preston A. (2012). The importance of being confident; gender, career choice, and willingness to compete. *Journal of Economic Behaviour & Organization, 83*(1), 82-97

Malmendier, U., & Tate, G. (2005). CEO Overconfidence and Corporate Investment. *The Journal of Finance, 60*(6), 2661-2700

Merkle, C., & Weber, M. (2011). True overconfidence: The inability of rational information processing to account for apparent overconfidence. *Organizational Behavior and Human Decision Processes, 116*(2), 262-271

Moore, D. A., & Healy, P. J. (2008). The trouble with overconfidence. *Psychological Review, 115*(2), 502-517

Nekby, L., Thoursie, P. S., & Vahtrik, L. (2008). Gender and self-selection into a competitive environment: Are woman more overconfident than men? *Economics Letters, 100*(3), 405-407.

Russo, J. E., & Schoemaker, P. J. H. (1992). Managing Overconfidence. *Sloan Management Review, 33*(2), 7-18

Soll, J. B., & Klayman, J. (2004). Overconfidence in Interval Estimates. *Journal of Experimental Psychology, 30*(2), 299-314

Svenson, O. (1981). Are we all less risky and more skilful than our fellow drivers? *Acta Psychologica, 47*(2), 143-148

Thewlis, M., Miller, L. and Neathey, F. (2004). Advancing women in the workplace: statistical analysis. *Working Paper Series No. 12.* EOC. Manchester, Equal Opportunities Commission

Literature:

Stock, J. H., & Watson, M. M. (2012). *Introduction to Econometrics.* Essex: Pearson.

Electronic resources:

Decovny, S. (2012, March/April). The Financial Psycopath Next Door. *CFA Magazine, 23*(2). Last accessed 2014-03-25 from: http://www.cfapubs.org/doi/pdf/10.2469/cfm.v23.n2.20

Göteborgs Universitet-Handelshögskolan. (2014). *Välkommen till Handelshögskolans Ekonomprogram!* Last accessed 2014-03-11 from: http://www.fek.handels.gu.se/utbildning/ekonomprogrammet

University of Gothenburg-School of Business, Economics and Law. (2014). *Programmes 2014.* Last accessed 2014-03-11 from: http://www.handels.gu.se/english/education/master/graduate-school/msc-programmes/programmes-2014/

Appendix 1: The Survey

a) Part 1 of the survey

Part 1: Confidence Interval Questions

Here we would like you to provide a 90 % confidence interval for each of the following 10 questions. That is, you should create an interval so that there is a 90 % chance that the true answer lies between your lower- and upper bound.

Number	Question:	Lower bound (min. value)	Upper bound (max. value)
1	Which year was Nelson Mandela born?		
2	How high is the Eiffel Tower in Paris, France, in *meters*?		
3	How many teeth does a tiger have?		
4	How high is Mount Everest, in *meters*?		
5	How long is the Nile River, in *kilometres*?		
6	How old was William Shakespeare when he died?		
7	What is the equatorial diameter of the Earth, in *kilometres*?		
8	What is the maximum limit of characters allowed in each tweet on Twitter?		
9	What is the weight of an empty Boeing 747, in *tons*?		
10	What is the air distance between London and Sydney, in *kilometres*?		

b) Part 2 of the survey

Part 2: Multiple Choice Questions

Choose what you think is the right answer (A, B, C or D) and write the letter in the "Answer" column.

Number	Question & Alternatives	Answer:
1	Which is the deepest lake in the world? A) Lake Vostok B) Lake Malawi C) Lake Baikal D) Lake Tanganyika	
2	What is the abbreviation for Mercury in the periodic table? A) Hg B) Mg C) Pb D) Mt	
3	What colours do the flag of the Republic of Seychelles have? A) Blue, yellow and red B) Blue, yellow and white C) Blue, yellow, red and green D) Blue, yellow, red, white and green	
4	What is the capital in Venezuela, South America? A) Caracas B) Sucre C) Lima D) Quito	
5	The Greek ancient god Zeus is the child of: A) Minos and Amalthea B) Cronus and Rhea C) Athena and Apollo D) Hermes and Gaia	
6	Where in the world can you find today's highest building? A) New York B) Shanghai C) Taipei D) Dubai	
7	What does the abbreviation OECD stand for? A) Organisational and Environmental Co-operation and Development B) Organisational and Economic Co-operation and Development C) Organisation for Economic Co-operation and Development D) Organisation for Environmental Co-operation and Development	
8	Which person is *not* one of the founders of Facebook? A) Chris Hughes B) Mark Zuckerberg C) Eduardo Saverin D) Cameron Winklevoss	
9	How were the founders of McDonald's, Richard and Maurice McDonald, related? A) Cousins B) Husband and wife C) Brother and sister D) Brothers	
10	Which nut is one of the ingredients in Italian pesto? A) Cashew-nut B) Pine-nut C) Walnut D) Almond	

Questions regarding the Multiple Choice, Part 2:

How many correct answers do you think you will get regarding the Multiple Choice? _____
How would you rank yourself compared to rest of your class, regarding your result on the Multiple Choice? Among the top 20 % Among the top 40 % In the middle Among the bottom 40 % Among the bottom 20 %

c) Part 3 of the survey – First year undergraduate business students

Part 3: General Questions

You are: An undergraduate student – 2nd semester An undergraduate student – 4th semester An undergraduate student – 6th semester A graduate student
You are: Analytically-oriented Language-oriented
Gender: Man Woman
Age: _____
Civil status: Single In a relationship
Swedish citizenship: Yes No
You were raised in a: Capital city or larger city Other
Have you studied at a University level before you attended your current studies here at Handelshögskolan in Gothenburg? Yes No
Have you had a full-time job before you attended your current studies here at Handelshögskolan in Gothenburg? Yes No

If you had to choose a Master Programme today, which one would you choose?

- Accounting (ACC)
- Finance (FIN)
- Economics (ECO)
- Management (MAN)
- Marketing and Consumption (MAC)
- International Business and Trade (IBT)
- Knowledge-based Entrepreneurship (KBE)
- Innovation and Industrial Management (IIM)
- Logistics and Transport Management (LTM)
- I will not take any Master

d) Part 3 of the survey – Second year undergraduate business students

Part 3: General Questions

You are: An undergraduate student – 2nd semester An undergraduate student – 4th semester An undergraduate student – 6th semester A graduate student
Gender: Man Woman
Age: _____
Civil status: Single In a relationship
Swedish citizenship: Yes No
You were raised in a: Capital city or larger city Other
Have you studied at a University level before you attended your current studies here at Handelshögskolan in Gothenburg? Yes No
Have you had a full-time job before you attended your current studies here at Handelshögskolan in Gothenburg? Yes No

If you had to choose a Master Programme today, which one would you choose? Accounting (ACC) Finance (FIN) Economics (ECO) Management (MAN) Marketing and Consumption (MAC) International Business and Trade (IBT) Knowledge-based Entrepreneurship (KBE) Innovation and Industrial Management (IIM) Logistics and Transport Management (LTM) I will not take any Master

e) Part 3 of the survey – Third year undergraduate business students

Part 3: General Questions

You are:
- An undergraduate student – 2nd semester
- An undergraduate student – 4th semester
- An undergraduate student – 6th semester
- A graduate student

You are:
- Analytically-oriented
- Language-oriented
- Exchange student
- Taking a stand-alone course

Gender:
- Man
- Woman

Age: _____

Civil status:
- Single
- In a relationship

Swedish citizenship:
- Yes
- No

You were raised in a:
- Capital city or larger city
- Other

Have you studied at a University level before you attended your current studies here at Handelshögskolan in Gothenburg?
- Yes
- No

Have you had a full-time job before you attended your current studies here at Handelshögskolan in Gothenburg?
- Yes
- No

If you had to choose a Master Programme today, which one would you choose?
- Accounting (ACC)
- Finance (FIN)
- Economics (ECO)
- Management (MAN)
- Marketing and Consumption (MAC)
- International Business and Trade (IBT)
- Knowledge-based Entrepreneurship (KBE)
- Innovation and Industrial Management (IIM)
- Logistics and Transport Management (LTM)
- I will not take any Master

f) Part 3 of the survey – Graduate business students

Part 3: General Questions

You are: An undergraduate student – 2nd semester An undergraduate student – 4th semester An undergraduate student – 6th semester A graduate student
Gender: Man Woman
Age: _____
Civil status: Single In a relationship
Swedish citizenship: Yes No
You were raised in a: Capital city or larger city Other
Have you studied *business/finance* at a University level before you attended your current studies here at Handelshögskolan in Gothenburg? Yes No
Have you had a full-time job within *business/finance* before you attended your current studies here at Handelshögskolan in Gothenburg? Yes No

You are: A Finance Master programme student Other Master programme student An Exchange student

Appendix 2: Outcomes on the control variables – differences between *Group 2* and *Group 1*

Table A1: Results on independent control variables – average values

Average values on the independent control variables and the difference between average values on the independent control variables, in *Group 1* and *Group 2*. The control variables are G*ender, Age, Civil Status, Swedish Citizenship, Raised, Studied before* and *Worked before.* All variables are dummy variables, except for *Age*. *Gender* equals one if you are a man, zero if otherwise. *Age* is the participant's age in years. *Civil Status* equals one if you are single, zero if otherwise. *Swedish Citizenship* equals one if you are Swedish, zero if otherwise. *City raised in* equals one if you are raised in a capital/larger city, zero if otherwise. *Studied before* means that you have studied at a university level before your current studies, and the variable equals one if you have, zero if otherwise. *Worked before* means that you have had a full-time job before your current studies, and the variable equals one if you have, zero if otherwise. All the values are interpreted in percentage points, except for *Age*, where the values are in average years. Values in parentheses are p-values.

	Group 2	Group 1	Difference
No.	52	122	-
Gender	55.8	54.1	1.7
			(0.841)
Age	24.1	21.9	2.2***
			(0.001)
Civil Status	44.2	59.8	-15.6*
			(0.059)
Swedish Citizenship	90.4	93.4	-3.0
			(0.485)
Raised	46.2	50.8	-4.6
			(0.576)
Studied Before	61.5	35.2	26.3***
			(0.001)
Worked Before	59.6	43.4	16.2*
			(0.051)

*** Significantly different from zero at the 0.01 level, using a two-tailed t-test.

* Significantly different from zero at the 0.1 level, using a two-tailed t-test.

Appendix 3: Correlations among the control variables

Table A2: Correlations between the control variables

The correlations between the control variables: *Gender*, *Age*, *Civil Status*, *Swedish Citizenship*, *City raised in*, *Studied before* and *Worked before.*

	Correlations						
	Gender	Age	Civil Status	Swedish Citizenship	City raised in	Studied before	Worked before
Gender	1						
Age	0.1828	1					
Civil Status	0.0368	-0.0650	1				
Swedish Citizenship	0.0921	0.0295	-0.0803	1			
City raised in	-0.0451	-0.0785	-0.0566	0.0623	1		
Studied before	0.0478	0.3690	-0.0089	-0.1058	0.0448	1	
Worked before	0.1418	0.4587	-0.1005	0.0558	0.0341	0.1578	1