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Gender differences in over- and underconfidence

An experimental study

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Abstract

In this paper we examine the connection between gender and confidence level, studying the estimation of one's own abilities as well as placement in respect to others. We test whether the previously studied overconfidence of males also corresponds to a higher, simultaneous degree of underconfidence, as estimation and placement are negatively correlated depending on task difficulty. Using an experimental approach on Swedish upper-secondary school students, we find men to underplace themselves less than women on difficult tasks. In contrast to our expectations, we find no difference in confidence between men and women on easy tasks, nor do they differ in their estimation on difficult tasks. Rather than finding evidence for men being simultaneously more over- and underconfident than women, we find the differences in confidence between men and women to be smaller than previously believed.

Key words: Overconfidence, underconfidence; overestimation, overplacement, gender differences
JEL classification: C91, D03, J16

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We now know it doesn't.

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1. Introduction

Over- and underconfidence have large effects for the decisions made by economic actors, and can help explain as diverse phenomena as bubbles resulting from excessive risk-taking on the financial markets, how decisions are made on managerial levels and what determines the choice of professional position. The financial sector is employing essentially more men than women (Kumar 2010) and the labour market has a vast majority of men in executive positions (Sabic 2016). At the same time men are unemployed to a higher degree than women (Statistiska Centralbyrån 2014; Bureau of Labor Statistics 2016). These phenomena lead to the question being raised whether there is a difference in over- and underconfidence between men and women and if such a difference could be a reason for the uneven gender distribution in the labour market, but also what implications such possible differences could have. This paper explores the phenomena through an experimental approach on upper secondary school students in Sweden.

Previous research has found gender differences in confidence level to have large implications for how financial decisions are made. Overconfidence has been linked to overly risky behaviour in the financial markets (Croson & Gneezy 2009), as well as corporate overinvestment and the subsequent destruction of shareholder value (Malmendier & Tate 2005). As men are overrepresented as both C-suite executives and financial analysts (Kumar 2010; Sabic 2016), gender differences in overconfidence can potentially amplify these phenomena and reduce the efficiency of the capital markets. The confidence differences between men and women have also been found to have an effect on the outcomes of the labour market. Men have, due to overconfidence, been found to be overrepresented in high risk jobs and more prone to initiate wage negotiation (Croson & Gneezy 2009). As high-risk jobs have higher mean earnings (Azmat & Petrongolo 2014), this difference in confidence between men and women could, together with higher frequency of negotiation, likely explain part of the gender wage gap (Weichselbaumer & Winter-Ebmer 2005).

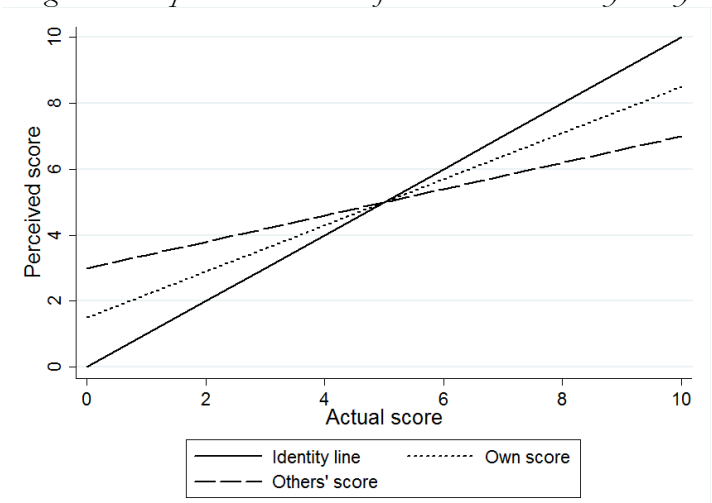
Research has found three distinct types of overconfidence - overestimation, overplacement and overprecision. Overestimation is generally present on difficult tasks, and arises when a person believes her performance on a task was better than it actually was. Overplacement is the tendency of people to believe that they are better, compared to the average or to peers, than they actually are. Overplacement is more common on easy tasks. The third part to overconfidence, overprecision, will not be studied further in this paper.[1] The literature has also found people to be

[1] Overprecision captures the tendency of people being overly precise in their estimates (Moore & Healy 2008). For example, when asked the question "How long is the Nile?", people on average give too narrow confidence intervals.

prone to underconfidence, taking the shape of underestimation and underplacement. Underestimation is found on easier tasks (Fu et al. 2005), while underplacement is present on difficult tasks (Windschitl, Kruger & Nus Simms 2003). Combining the findings, the research points towards simultaneous overplacement and underestimation on easy tasks and overestimation and underplacement on difficult tasks. Overestimation and overplacement will be explained in detail in Section 3.

In the paper *The Trouble With Overconfidence,* Moore and Healy (2008) provide a theory that explains when and why people are simultaneously over- and underconfident. After completing a task, people have imperfect information about their own performance, and because of this they regress their own scores and believe them to be closer to middle than they actually are. If the actual score is high, they believe it to be lower than it actually is, and if the actual score is low, they believe it is higher than it actually is. As such, people underestimate on easy tasks and overestimate on difficult tasks. However, as people have even worse information about other participants, they regress others' scores even more and believe these results to be even closer to the middle than their own. On easy tasks they will hence believe others' scores to be lower than their own, and will therefore on average overplace. Conversely, on difficult tasks, they will believe others' scores to be higher than their own, and therefore on average underplace. This theory (Moore & Healy 2008) is the foundation of our study and we have chosen to refer to it as the Moore and Healy theory throughout this paper. Graphically, the relationship between overestimation and overplacement and score is shown in Figure 1.

Figure 1: Graphical illustration of the Moore and Healy theory



There exists a large literature on gender differences in confidence. Generally, men have been found both to overplace and overestimate more than women do (Bengtsson, Persson & Willenhag 2004; Healy & Pate, 2007; Jakobsson, Levin & Kotsadam 2013). If gender differences in confidence level

follow the Moore and Healy theory, men's higher overconfidence should result in more simultaneous underconfidence. Together, this would mean that men are worse than women at judging their own performance. Men being simultaneously more over- and underconfident than women could help explain why men have higher wages and are overrepresented in executive positions, at the same time as they face higher unemployment and commit suicide to a higher degree than women (Canetto & Sakinofsky 1998).

To our knowledge, no study has investigated gender differences in simultaneous over- and underconfidence. To be able to investigate over- and underconfidence in the same subjects, we use an experimental approach to investigate these differences on Swedish adolescents in upper secondary school. By giving them two trivia quizzes, one easy and one difficult, we control the difficulty of the task in order to induce simultaneous over- and underconfidence.

On an aggregate level, our results are in line with Moore and Healy's theory. We find the subjects to underestimate and overplace on easy tasks, as well as overestimate and underplace on difficult tasks. In contrast to our predictions, we do not find evidence for men being simultaneously more over- and underconfident. We find men to underplace less than women on the difficult task, but we find no differences between how men and women underestimate and overplace on the easy task and how they overestimate on the difficult task. The results speak against previous research that suggests men to be more confident than women, as well as our prediction of men being more extreme in their over- and underconfidence. In fact, the difference between men's and women's confidence levels might not be as large as previously believed.

This paper will be outlined as follows: Section 2 covers our research question and hypotheses, while Section 3 covers previous research on confidence and the differences that have been found between men and women with regards to it. Section 4 explains our method, including our experimental design, our dependent and independent variables, as well as our experimental procedure. In Section 5 we cover the empirical results from our experiment. In Section 6 we discuss the implications of our results and the limits of our study. Section 7 serves as our conclusion and Section 8 as our summary.

2. Research question

While a connection between gender and overconfidence is fairly well-established, this paper will aim at looking closer at the mechanisms behind it. As over- and underconfidence are simultaneously present, and men are more overconfident than women, this raises the question whether men are also more underconfident than women or if they simply have a higher confidence level overall. If men regress their own and other's scores more than women do, this would not only lead to men being more overconfident than women, they should at the same time also be more underconfident. From this prediction follows our research question:

Are men simultaneously more over- and underconfident than women?

With simultaneous overestimation and underplacement being prevalent on difficult tasks and simultaneous underestimation and overplacement being more common on easy tasks, the nature of over- and underconfidence is dependent on task difficulty. To test both cases, this paper will look into overplacement and overestimation on both easy and difficult tasks to see if gender differences in confidence level are consistent with the Moore and Healy theory. From this follows the four alternative hypotheses inherent to our research question:

$H1_1$: Men underestimate more than women on tasks perceived as easy

$H1_2$: Men overplace more than women on tasks perceived as easy

$H1_3$: Men overestimate more than women on tasks perceived as difficult

$H1_4$: Men underplace more than women on tasks perceived as difficult

These alternative hypotheses will be tested against the null-hypotheses that there are no gender differences. Previous studies on the connection between confidence and gender have mostly studied overestimation and overplacement, while much less has been done on the connection between gender and underestimation and underplacement, respectively. By having different difficulties in the tasks we assign to the participants, we simultaneously test both over- and underconfidence. To our knowledge, no studies have tested gender differences in confidence level in this way.

3. Previous research

As previously mentioned, research has found overconfidence to take three different forms, with this paper focusing on two; overestimation and overplacement. We will in this Section further elaborate on the current state of knowledge regarding over- and underconfidence and how gender affects.

The first form of overconfidence, overestimation, is present in difficult tasks defined by Moore and Healy (2008) as "the overestimation of one's actual ability, performance, level of control, or chance of success" (p. 502). For example: if a student after an exam believes she scored 90% correct, while in reality she only scored 75% correct, the student has overestimated her exam result. While people generally tend to overestimate their abilities, the research has found that men generally do so more than women. Bengtsson et al. (2004) found when studying students in an introductory economics class that men were more inclined to answer an extra question on an exam that only would count if points from the regular questions were high enough, a result consistent with men overestimating their exam score more than women do. Furthermore, Jakobsson et al. (2013) showed that when asked to predict their grade on an upcoming social science test, a gender-neutral subject, both boys and girls aged 15-16 in El Salvador overestimated their performance, but boys did so more than girls.

The study of Jakobsson et al. (2013) also looked at overestimation in a mathematics test. Mathematics is generally labelled as a masculine task, and as a result boys overestimated their performance, while girls underestimated theirs. This strengthens the notion that men are more overconfident than women, but makes it clear that overconfidence might not always be prevalent and that task content has great influence. The same pattern was found in a study conducted in Sweden on 14-year old upper secondary school students by Dahlbom et al. (2011), in which men overestimated their performance and females underestimated their performance on a mathematics test. Also Beyer (1990) shows that men and women differ in confidence level depending on task topic and whether it is considered gender neutral or not. It is worth noting that overestimation can be prevalent in many other situations than on tests and exams, they are a good method commonly used for measuring confidence levels.

The second type of overconfidence, overplacement, is defined as "when people believe themselves to be better than others" (Moore & Healy 2008, p. 502) and is generally found on easy tasks. This is also called the better-than-average effect and is famously found by Svenson (1981) when he showed that 92.7% American thought their driving skills to be better than the median. Researching

the connection between overplacement and gender, Healy and Pate (2007) found women to accurately place themselves when doing a mathematics test and running a fictional lemonade stand. Men, on the other hand, believed they would be above the median in 74% of the cases, while they were only above the median 58% of the time.

Although it is not as well-studied, research has also found evidence of underplacement and underestimation. Underplacement has been found by Moore and Cain (2007) to be common on difficult tasks, such as on hard trivia quizzes on topics such as the indigenous vegetation of the Amazon or the history of Mesopotamia (Windschitl et al. 2003). Underestimation, on the other hand, has been found when the task is easier or when the participant is skilled on the task at hand (Fischhoff, Slovic & Lichtenstein 1977; Griffin & Tversky 1992). It has also been found when the task is so difficult that the participant does not reach a "minimal threshold of knowledge" (Kruger & Dunning 1999, p. 1132), such as when asked to translate Slovenian proverbs. In these cases, the participants become so convinced of their inability that they underestimate themselves.

When combining the conclusions from these different studies, the outcome is seemingly very counter-intuitive as they point towards over- and underconfidence being present at the same time. When tasks are easy, subjects tend to underestimate their performance but overplace themselves compared to peers. Conversely, when tasks are difficult, subjects tend to overestimate their performance, but also underplace their performance compared to others. Moore and Healy (2008) unify this in their paper *The Trouble With Overconfidence*. They point out that while people, post-task, have imperfect information about their own performance, they have even worse information regarding the performance of others. As a result, they will regress their own scores, but regress the scores of others even more. When a task is easy and scores are high, participants will believe that they have a lower score than they actually do, but they will believe that others performed worse than they did. Conversely, when a task is very difficult and points are low, participants believe to have scored higher than they actually did, but worse than others. This leads to the pattern of simultaneous underestimation and overplacement on easy tasks and overestimation and underplacement on difficult tasks, as graphically given in Figure 1. This regression of scores is the basic mechanism that explains the apparently inconsistent phenomena of simultaneous over- and underconfidence. This can explain why people are overestimating the risk of being killed in such an unlikely event as a terrorist attack, yet believe they are at less risk of being killed than others (Lerner et al. 2003).

While Moore and Healy (2008) found simultaneous over- and underconfidence in their study, the empirical evidence is mixed. Chevalier et al. (2009) found both overplacement and overestimation

on the same tasks. Asking undergraduates to judge their own absolute and relative performance on a literacy and a mathematics test, they found both men and women to overestimate their actual scores on both tasks, while overplacing themselves in literacy and underplacing themselves in numeracy. For literacy, this contradicts the Moore and Healy theory. Furthermore, Chevalier et al. (2009) found men to both overplace and overestimate their performance more than women did.

4. Method

In Section 4, we discuss the method used to test our research question. Subsection 4.1 specifies the experimental design, while Subsection 4.2 introduces our dependent variables. Subsection 4.3 explains our independent variables and the regression model used to test our hypotheses, and in Subsection 4.4 we explain the experimental procedure.

4.1 Experimental design

In order to investigate the simultaneous over- and underconfidence among men and women, we have chosen an experimental approach. While an experiment has the drawback of not being in a natural environment, it allows us to control the difficulty of the task. Further it allows us to accurately measure the over- and underconfidence of the participants, both compared to their own and to other participants' performances. These criteria for our method could only be met by using an experimental method.

The experiment was carried out by giving upper secondary school students, in class, a three-part survey.[2] The cover page of the survey contained information about the experiment and instructions for the survey. The cover page was written with great concern to avoid framing and stereotype threat. The latter could otherwise result in women performing worse as a consequence of being aware of the general stereotype of women as being less confident than men (Steele & Aronson 1995). Thus we did not specifically point out that we were interested in gender differences.

The first section of the survey consisted of one easy and one difficult ten-question trivia quiz, below referred to as the easy task and difficult task. There were two versions of the first section, one with the easy task first and one with the difficult task first, to ensure any effects from the ordering of the tasks were minimised in our results. The trivia questions in both tasks were written by us to ensure the questions were sufficiently easy and difficult to observe a difference in task difficulty. The second section asked questions about what the participants' believed about their

[2] See Appendix for the original and a translated version of the survey.

own and other participants' performance. They were first asked how many correct answers, zero through ten, they believed they had scored on the first and second task, and also what decile they believed their score to be in. They were then, on the next page, asked what they believed the average score of each task to be. There are two reasons for asking for both what deciles the participants believed themselves to be in and what they believed the average score of each task to be. Firstly, it allows us to construct two measures of overplacement, which will be discussed in Subsection 4.2. This reduces our dependency on any one measurement of overplacement. Secondly, and perhaps most importantly, it obscures the objective of the experiment to the participant. If simply asked "What do you believe your score was?" and "What do you believe the average score to be?", it would for many be obvious that we were studying overconfidence. As this could potentially affect their self-assessment, obscuring the objective of the experiment allows for more honest answers. In the third section of the survey, questions about their gender, age, school, programme, year of study and parents' educational background were asked. The time to complete the survey was set to 15 minutes.

Previous studies on gender and confidence have found the gender coding of the task to have large effects on the subjects' over - and underconfidence (Dahlbom et al. 2010; Jakobsson et al. 2013). Girls were more underconfident on tasks coded as masculine, such as math, than they were on tasks coded neutral, such as social sciences. For this reason, our trivia quizzes included a large variety of questions on different topics.

4.2 Dependent variables

We define one measure of overestimation and two measures of overplacement from the participants' a) actual score b) estimated score c) estimated average score and d) believed decile placement.

Overestimation:

Following Moore and Healy (2008), we define the overestimation of participant *i* as the difference between the *i*'s estimated score and the actual score on each task:

$$Overestimation = E[X_i] - x_i$$

where x_i is participant *i*'s number of correct answers and $E[X_i]$ her estimated number of correct answers.

Overplacement:

From our survey, we can define two measures for overplacement. The first measure, in this paper referred to as score overplacement, follows Moore and Healy (2008) and is designed to take into account not only if the participant believes she is better than the average, but also if the participant actually is better than the average or not. The score overplacement for participant *i* therefore is:

$$Score\ overplacement = (E[X_i] - E[\bar{Y}]) - (x_i - \bar{y})$$

where $E[\bar{Y}]$ is participant *i*'s estimation of the average score on the task and $\bar{y}$ is the actual average score on the task.

We have designed our second measure of overplacement, referred to as decile overplacement, in order to be less dependent on Moore and Healy's (2008) measure. It measures the difference between the decile the participant believed her score to be in and the actual decile she was in. The decile overplacement for participant *i* therefore is:

$$Decile\ overplacement = E[R_i] - r_i$$

where r_i is the score decile the participant *i* was in and $E[R_i]$ her estimated score decile.

It is from these three measures we will examine the over- and underconfidence among men and women in Swedish upper secondary schools.

4.3 Independent variables and the regression model

The independent variable of interest in our study is gender. The control variables are based on where the subjects go to school, which programme they attend and what educational level their parents' have, as well as the subjects' age.[3] The variable for where subjects go to schools aims at controlling for ambition, motivation and to some extent intelligence, as upper secondary schools accept students depending on their grades from primary school. It also helps controlling for geographical factors and, to some extent, social background. The programme of study serves as a

[3] Due to multicollinearity, some control variables have been collapsed as follows: The variable *Sthlm* includes all students at Norra Real, Enskilda Gymnasiet, Kungsholmens Gymnasium and Östra Real as they are all schools in central Stockholm and schools with very strict admission criteria (Gymnasieantagningen Gävle Kommun 2015; Gymnasieantagningen Stockholms Län 2013, 2014, 2015). Students studying social sciences or economics have been grouped into the variable *SS*, and participants with a strong educational background, defined as parents with a university or PhD degree, have all been grouped into the variable *Uni*. While some collinearity remains between the variables *SS* and *Age*, this does not have an effect on the outcome of our results. For correlation tables of the original and new variables, see Appendix.

proxy for varied interests and a difference in what school subjects one prefers and learn more about. As social background and educational support from home could possibly have large effects on a person's confidence level, we control for this using the proxy of parents' educational background. Lastly, we control for age because maturity as well as age might play part in the level of confidence.

From the control questions in our survey, we get the data for our independent variable and control variables. In our OLS regression, all control variables, except age, are coded as dummy variables. As a result, our regression model looks as follows:

$$Y = \beta_0 + \beta_1 x_{Man} + \beta_2 x_{Sthlm} + \beta_3 x_{SS} + \beta_4 x_{Uni} + \beta_5 x_{Age}$$

Where:

- *Y* is the dependent variable, in our case *Overestimation, Score overplacement* and *Decile overplacement*.
- *Man* is our main independent variable. It is a dummy variable taking the value one if the participant is male.
- *Sthlm* is a dummy variable taking the value one if the participant is a student at a school in central of Stockholm.
- *SS* is a dummy variable taking the value one if the participant studies social sciences.
- *Uni* is a dummy variable taking the value one if the participant's parents have a degree from university.
- *Age* is a variable of the participant's age.

4.4 Experimental procedure

As our subjects went to Swedish schools, the experiment was carried out in Swedish. We chose studying upper-secondary school students in order to easily obtain a larger sample than otherwise would have been possible, and to avoid the self-selection into a specialised university or profession. Our choice of subjects also allows for the controlled environment a class room provides. The obvious drawback from this choice is that the subjects are fairly young.

We executed the experiment on five schools and eight classes during two weeks in March 2016. Before handing out the survey to the participants, they were each given a unique number with our contact details for identification.[4] This way we could ensure the anonymity of all participants to both us and the participants' teachers. When the experiment was finished we contacted all teachers

[4] See Appendix for the original and a translated version of the identification sheet.

and told them whether they had the number of a winner in their class. The teachers could then tell their class which numbers the winners had, who could then contact us to collect their prizes. Hence, we only gained knowledge about the identity of winners who collected their prizes.

After handing out the numbers, we introduced ourselves and gave instructions for the experiment. These instructions were the same as those which were given in writing. We ensured the participants of their anonymity and informed them that their participation was optional and could be ended at any given time by not answering any further questions. We told the students that they were given points based on how many correct answers they received on each task combined with how well they estimated their performance. They were further told that their points could win them a prize.

After the instructions were given and any questions regarding the survey had been answered, we handed out the survey. Participants were given 15 minutes to complete it, and if everyone was finished before the time was up we collected the surveys early, after asking whether anyone wanted more time. Only one class needed the whole 15 minutes. When the participants had completed the survey we again asked if they had any question and thanked them for taking their time to complete the survey.

The participants were given points based on their score and how well they judged their own performance. As an incentive for the participants, the person with the most points won 500 SEK, and the five following participants won a cinema ticket. A participant, *i* gained 1 point for each correct answer, and $10 - |E[X_i] - x_i|$ points for her ability to guess her own score. For her judgment of relative performance there were two scoring rules. First, participant *i* gained $10 - |E[R_i] - r_i|$ points for her ability to guess her score decile. Secondly, she gained $10 - |(E[X_i] - E[\bar{Y}]) - (x_i - \bar{y})|$ points for her ability to place herself compared to the average. With this scoring rule, the maximum number of points on each task was 30 if a participant answered all questions correctly and accurately estimated her score, score decile and how she placed compared to the average. As there were two tasks, the maximum number of points available was 60. This scoring rule rewards not only good performance on the task, but also provides incentive to give the most accurate predictions of how well one has performed compared to oneself and to others.

5. Results

The study was carried out on secondary school students from five schools and eight classes in Stockholm and Gävle. A total of 182 students participated, resulting in 174 useful survey answers as not all participants stated their gender. Of these 174 participants, 94 were female and 80 male. See Table 1a and 1b for descriptive statistics of participants.

Subsection 5.1 provides descriptive statistics and evaluation of the experiment while Subsection 5.2 tests and answers our hypotheses by using our regression model.

5.1 Descriptive statistics and evaluation of experimental design

Table 1a: Descriptive statistics of participants, dummy variables

Total number of observations: 182	**Frequency**	**Percentage**	**Missing Observations**
Man	80	45.98	8
Stockholm	163	89.56	0
Social Science	93	51.10	0
University degree	153	87.93	8

Table 1b: Descriptive statistics of participants, Age

Total number of observations: 175	**Age**
Mean	17.51
Median	17
Max	20
Min	16

In Tables 1a and 1b, descriptive statistics from our experiments can be found. While it can be said that we have a satisfactory division between men and women in our sample, the same cannot be said for our other variables. Naturally, as only one experiment was carried out outside of Stockholm, only 11% of our participants are from outside the Swedish capital. However, it can be said that an even larger skew in our sample comes from the fact that 88% of our sample has parents with a university education or higher. This is likely because of our schools' locations – Stockholm's city centre. While it is clear that our sample is not very representative of the entire Swedish population, this sample was chosen as we were constrained by both time and funds.

Table 2: Aggregated results

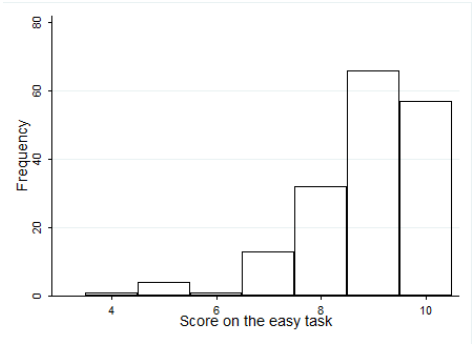
	Easy quiz	**Difficult quiz**
Score mean	8.86/10	2.78/10
Score variance	1.36	1.90
Believed average score	7.44/10	4.23/10
Average overestimation	-0.32***	1.11***
Average score overplacement	1.09***	-0.34**
Average decile overplacement	1.83***	-0.27

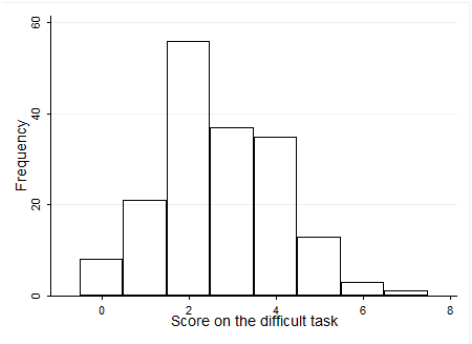
**significant on 10% level ** significant on 5% level ***significant on 1% level*

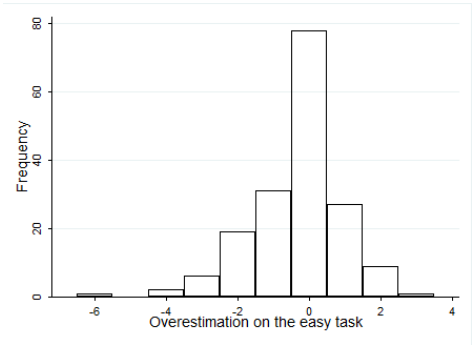
As presented in Table 2, we find both underestimation and overplacement on the easy task as well as overestimation and underplacement on the difficult task. This is in line with the predictions of the Moore and Healy theory, and it is clear that our experiment induces the phenomena we want to study. It is important to note that while the average score for the difficult task is very low, the average score on both tasks are significantly different from the 2.5 points that guessing would on average bring. From the difference between the believed average scores on the easy and difficult task, which is statistically significant on a 1% level, we conclude that our difficult task was perceived as more difficult by the participants. In Figure 2 we can see the score distribution from both tasks. It clearly shows that the difficult task has a wider distribution of the scores compared to the easy task. This is probably because the easy task was so simple that many subjects hit the maximum score, essentially cutting off the right hand tail of the distribution.

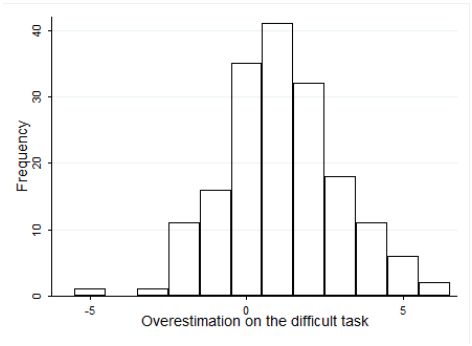
There were 57 participants who scored ten out of ten points on the easy task, and who by virtue of their score could not overestimate themselves on the easy task. Of the 57 participants with a perfect score, 32 estimated their score to be ten points out of ten and did therefore not underestimate at all. Out of the 32 who perfectly estimated their score, 23 were men and were statistically overrepresented. There are three possible explanations why such a large share, 56 percent, of the participants with perfect scores did not underestimate. Either they were very good at judging their performance to start with or the low difficulty of the task combined with ample time allowed them to accurately judge their performance. The third explanation is that some of these participants actually are prone to overestimation, but could not overestimate because of their perfect score. Overall, however, this group did underestimate their scores with an average of 0.77 points, which is statistically different from zero.

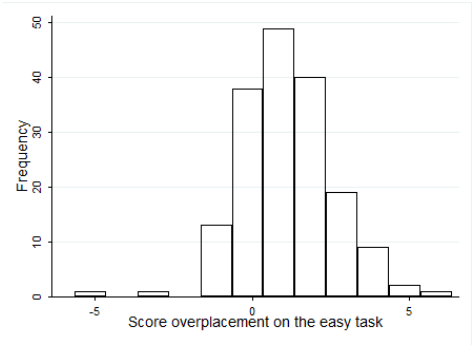
Figure 2: Distribution of scores, overestimation and overplacement

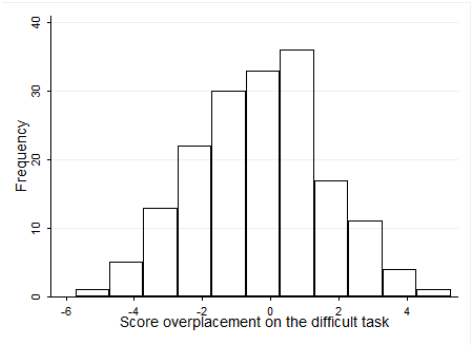


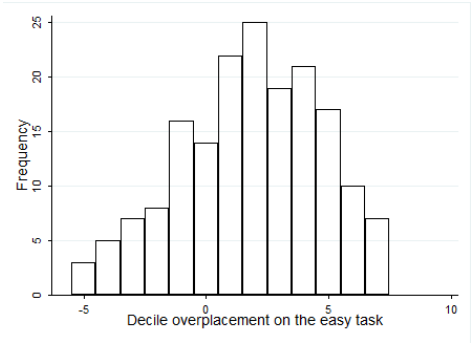


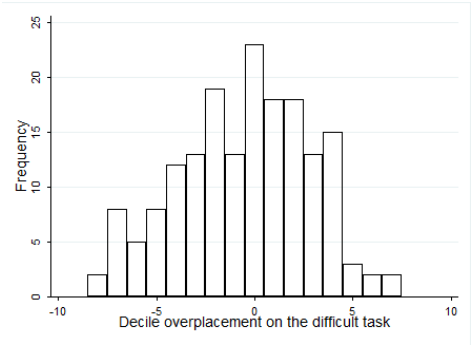












As can be seen in Figure 2, we also observe underestimation together with overplacement on the easy task and overestimation together with underplacement on the difficult task, as predicted by the Moore and Healy theory. On the easy task, many subjects are good at judging their own performance, with zero as the clear mode value, but we see some more under- than overestimation. Further, the majority of the subjects overplace themselves on the easy task both in the score and the decile measure. On the difficult task, a clear majority of the subjects overestimate their scores, while many of the subjects are fairly accurate when placing themselves compared to others. While the score measure of overplacement on the difficult task shows a higher density of subjects below zero, that is subjects underplace themselves, the result is not as clear when looking at the decile measure. A consequence of this is that the decile overplacement measure on the difficult task is not statistically different from zero. This is the only aggregate result that contradicts the predictions of Moore and Healy's theory. On all measures we have a larger spread for the difficult task than the easy one, which is probably a consequence of the easy task being very simple, making people perform similarly.

5.2 Gender differences in over- and underconfidence

In Table 3, the results from the regression analysis on task performance, overestimation and overplacement are shown. The R^2 values of the OLS regressions on task performance and confidence measures are all below 11% and make it clear that the variables used to explain these phenomena have very low explanatory value. This points to both task performance and confidence to be mostly decided by either idiosyncratic parameters or variables apart from the ones studied in this paper. As we look at gender differences in confidence and not what variables explain confidence per se, the R^2 values are not seen to be a problem in our analysis.

On average, male students outperformed women on the easy task, scoring almost half a point higher, but there was no significant difference on the difficult task. The schools in central Stockholm scored better on the difficult task, but the variable was not found to be a significant determination of performance on the easy task. Age and the programme of study was found to affect the performance on the easy task, with older subjects as well as subjects studying natural science scoring higher. None of the other control variables were significant with regards to the performance on the tasks.

Looking at the results for overestimation, we see no statistically significant differences between men and women, on neither the easy nor the difficult task. Further, we find no significant differences between how men and women overplace on the easy task.

In both our measures of overplacement there are statistically significant differences between how men and women place themselves on the difficult task. The regressions in Table 3 show men to underplace less than women do. This difference helps explain why we could not find any aggregate over- or underplacement in one of our measures, as women's underplacement was mitigated by the fact that men accurately estimated their relative performance, as can be seen in Table 4. This result contradicts the belief that men are worse at judging their own performance.

With the results presented above, we can answer our hypotheses as follows:

- $H0_1$ cannot be rejected as men do not underestimate more than women on tasks perceived as easy.
- $H0_2$ cannot be rejected as men do not overplace more than women on tasks perceived as easy.
- $H0_3$ cannot be rejected as men do not overestimate more than women on tasks perceived as difficult.
- $H0_4$ cannot be rejected as men underplace less than women on tasks perceived as difficult.

From these results, the following statement answers our research question:

Men are not simultaneously more over- and underconfident than women are. Men and women overplace and underestimate in equal degrees on easy tasks and overestimate in equal degrees on difficult tasks. On difficult tasks, men underplace *less* than women do.

Table 3: Gender differences in quiz performance and confidence level

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Score easy quiz	**Score difficult quiz**	**Over-estimation easy quiz**	**Over-estimation difficult quiz**	**Score overplacement easy quiz**	**Score overplacement difficult quiz**	**Decile overplacement easy quiz**	**Decile overplacement difficult quiz**
Man	0.464***	0.331	-0.117	0.286	-0.143	0.593**	-0.413	1.033**
	(0.174)	(0.210)	(0.200)	(0.287)	(0.233)	(0.295)	(0.448)	(0.516)
Sthlm	0.0728	0.684***	-0.190	0.02s61	-0.138	-0.309	-0.564	-1.188**
	(0.196)	(0.237)	(0.226)	(0.324)	(0.263)	(0.333)	(0.507)	(0.583)
SS	-0.613***	0.0257	-0.242	-0.141	0.435	0.188	0.0625	-0.202
	(0.219)	(0.265)	(0.252)	(0.362)	(0.294)	(0.372)	(0.565)	(0.651)
Uni	0.368	0.378	-0.342	0.225	0.0248	0.312	-0.936	-0.0235
	(0.256)	(0.310)	(0.295)	(0.423)	(0.344)	(0.435)	(0.661)	(0.761)
Age	0.287**	-0.0283	0.217	0.453**	-0.0195	0.274	0.290	0.360
	(0.134)	(0.162)	(0.154)	(0.221)	(0.179)	(0.227)	(0.345)	(0.397)
Constant	3.606	2.540	-3.570	-7.053*	1.304	-5.667	-2.115	-6.820
	(2.277)	(2.752)	(2.623)	(3.757)	(3.053)	(3.863)	(5.876)	(6.764)
Observations	174	174	174	174	173	173	174	174
R-squared	0.109	0.068	0.023	0.041	0.026	0.049	0.029	0.049

**significant on 10% level ** significant on 5% level ***significant on 1% level*

Table 4: Men's and women's overplacement on the difficult quiz

	Score overplacement	Decile overplacement
Men	*-0.01*	*0.08*
Women	*-0.55****	*-0.96****
Difference	*0.54**	*1.04***

**significant on 10% level ** significant on 5% level ***significant on 1% level*

6. Discussion

6.1 Findings

To summarise the results, we find no evidence that men are simultaneously more over- and underconfident compared to women. In contrast to our expectations, we neither found men to underestimate more on the easy task nor overestimate more on the difficult task. We do not find any differences between the genders in how they place on the easy task. However, men do significantly underplace less than women do on the difficult task and are in this sense better to judge their relative performance, which speaks against our predictions from the Moore and Healy theory. However, as we do not find any evidence for men's excessive overconfidence, the fact that men underplace less than women on the difficult task is not as surprising as it otherwise would have been if overconfidence is the result of the regression of one's own and others' scores.

Our results raise the question whether previous empirical research better explains differences in confidence level among men and women. The literature suggests men to have a higher confidence level than women without regard to task difficulty, and as such we should find men to be more over- and less underconfident than women on both tasks. The results from the difficult task point in favour of such an explanation, however only the measure of overplacement shows statistical significance. (Dahlbom et al. 2011; Jakobsson et al. 2013; Healy & Pate 2007)

In our paper, we do not find the differences in confidence level between men and women to be as distinct as previous research has found. Moreover, the observed gender difference cannot be explained by Moore and Healy's theory where over- and underconfidence is a result of the regression of one's own and others' scores. If our results hold for a broader population, our finding that men and women do not differ in their level of confidence has large implications for labour market policies and regulations in the financial sector. Our results suggest that men are not overrepresented in well-paying, dangerous jobs because of overconfidence, but for other reasons,

nor is underconfidence an explanatory factor in the difference between men and women's employment rates. Our results would also suggest that the inefficiencies created in capital markets and because of CEOs' overinvestments are not amplified by men being overrepresented in these positions.

6.2 Alternative explanations for the results

6.2.1 Age of subjects

One reason for not finding the expected gender differences is possibly that these differences develop later in life. In such a scenario, the differences in confidence between men and women that have been seen among university students and working adults might not yet have been developed among students at upper-secondary level. However, there is evidence for gender differences in confidence level from previous research among students as young as 14 years old (Dahlbom et al. 2011), which leads us to believe that the subjects of the study are not too young.

A possible explanation for the lack of gender differences could be that today's upper-secondary students are more gender equal than they have been in the past. This change, however, would have had to happen very quickly, as the participants for which gender differences were observed by Dahlbom et al. in 2011, are born only a few years before the participants we have studied. This makes the 'generation gap' a weak explanation to why we have not observed differences between men and women.

6.2.2 Difficulty of quiz

The difficulty of the two tasks is another factor that could explain the unexpected findings. If the easy task was too easy the subjects would have had no problem judging how many right answers they had on the quiz. 57 subjects (32.8%) scored ten out of ten points on the easy task and for them it was impossible to overestimate their results. However, some of these participants might have overestimated their results if they had had the chance to do so. On average, therefore, the low difficulty of the task might overstate the underestimation in the whole group. The same reasoning holds for the difficult task, but as only eight subjects (4.6%) scored zero points this problem is not as large for the difficult task. As men were overrepresented in the group with both a perfect score and accurate estimation of results, the overstatement of the underestimation might affect the male group more. This, however, would only reduce the gap between men and women and would therefore not alter our conclusions.

While it is clear that our easy task was easier than optimal, the difficult task was not too difficult. Kruger and Dunning (1999) emphasise the importance of reaching a certain "minimal threshold of knowledge" (p. 1132) to be able to make any valid estimations of one's performance. Most people would easily see their own inability to translate Slovenian proverbs and will therefore not overestimate, but rather underestimate their performance. While the average score was low on the difficult task, the participants did not randomly guess their answers. Moreover, the participants overestimated their results on an aggregate level, as predicted by Moore and Healy's theory. From this we conclude that our difficult task was not too difficult for our study.

6.2.3 Quiz topics

Another important factor that could have altered our results is the chosen topics of our quizzes. Extensive literature suggests that the differences in confidence level between men and women vary depending on topic (Beyer 1990; Jakobsson et al. 2013). Men are more overconfident than women on masculine-coded tasks such as math, while men and women respond more similarly to social science tasks (Jakobsson et al. 2013). The fact that men performed significantly better on the easy task in this study could mean we did not fully succeed in creating gender neutral topics, however the tasks do in general lean more towards the gender-neutral social science and could thus be a reason for not getting the gender differences in confidence that we predicted.

A possible explanation for men performing better than women on the easy task could also stem from stereotype threat (Steele & Aronson 1995). However, as we did not mention that we were studying gender differences, and tried to avoid framing in our instructions and questions, we believe that stereotype threat is not an explanation for this result.

6.3 Validity and potential biases

There are some factors regarding the external validity that must be taken into account before generalising our results to a greater population. The fact that our subjects were adolescents could possibly make it difficult to generalise the results to working adults. In an economic context, confidence level is of most importance in the labour market and in the financial sector. Thus a result suggesting that there are no gender differences among adolescents does not necessarily imply that there are no gender differences among working adults in for example the financial sector. However, as previous research finds the same patterns of confidence level among both adolescents (Dahlbom et al. 2011) and adults (Chevalier et al. 2009) our results are likely generalisable to other age groups.

As our experiment were carried out in Sweden, predominantly in central Stockholm, this could mean that a cultural context exists that does not replicate in other countries, or even in other areas of Sweden. If attributing the results to other countries, there is a risk of overlooking important cultural differences.

The subjects of this study have been chosen through a convenience sample, primarily for financial reasons. This could have implications on the external validity for mainly two reasons. Firstly, the subjects go to schools with generally high enrolment grades (Gymnasieantagningen Gävle Kommun 2015; Gymnasieantagningen Stockholms Län 2013, 2014, 2015). Secondly, they study in programmes with a theoretical orientation. There is no previous research suggesting that such factors have implications on one's confidence level and therefore we do not believe our choice of sample alter the results, but it cannot be excluded as an explanation. With random sampling and with subjects from various age groups, the results would show greater external validity.

The decile measure of overplacement is subject to validity concerns. The participants were placed in deciles according to their score, but because of the low variance of task scores, too many participants had the same score to be placed in a single decile. For example, all participants who scored ten out of ten points on the easy task were placed in the seventh decile. This has large implications on the validity of the decile overplacement measure. For example, if participants with perfect scores believed themselves to be in the top three deciles on the easy task they will, using our measure, be judged to be overplacing as they are all placed in the seventh decile. This inflates the amount of overplacement we observe using this measure and makes the measure inaccurate for drawing conclusions about the amount of overplacement in our sample. The problem originates from the tasks only having ten questions each, enabling eleven possible scores for the participants, and trying to split these results into deciles. This would work if the score distribution had been perfectly uniform, but as one task was designed to be difficult and one to be easy, they are not. In future research, this issue could be solved by asking the participants to place themselves into, for example, quintiles and by having more questions in each task. However, as our score measure of overplacement, which is not dependent on what deciles the participants were placed in, shows the same result as our decile measure, our conclusions are still warranted.

A potential bias in this study also comes from the optional participation. As the chosen subjects did not have to partake, nor hand in the experiment after completion, there is a self-selection bias present in the experiment. This will always be an issue when recruiting voluntary participants to experiments, but as only 8 of the 182 participants (4%) in the experiment did not hand it in, this

selection bias is judged to be very moderate in our experiment.

7. Conclusion

Our study aims to find if men are simultaneously more over- and underconfident than women are. On an aggregate level, our study shows the participants to be simultaneously over- and underconfident, as predicted by Moore and Healy's theory. In previous research, men have often been found to be more overconfident than women. In this study, we use an experimental method to show that gender differences in confidence might not be as large as previously believed. We do find men to underplace themselves less compared to women on the difficult task, but no other differences in overplacement nor overestimation can be found in our experiment. While men previously have been believed to be worse than women at judging their own performance, we show that they actually might be slightly better.

From the onset, we wanted to investigate whether Moore and Healy's theory of overconfidence, where the regression of one's own and others' scores creates simultaneous over - and underconfidence, could help in the explanation of why men have been found to be more overconfident than women. As we do not find the differences we expected, we were not able to test this implication of their theory.

The two main take-aways are the following:

1. Men underplace less than women on difficult tasks, which implies that men might be slightly better than women at judging their own performance.
2. In other aspects, men and women do not differ in their confidence level.

Such findings have large implications for the labour market and the financial sector. Previous research has suggested men's excessive overconfidence to be an explanatory factor for the gender wage gap (Croson & Gneezy 2009) and has linked overconfidence to overinvestment and the destruction of shareholder value (Malmendier & Tate 2005), which would be amplified by men's overrepresentation in executive positions. As we find few differences between the genders with regards to their confidence levels, this suggests that the gender wage gap depends on other factors than confidence and that value destruction is not amplified by male overrepresentation in board rooms.

As our results contradicts previous research of men being more overconfident than women, we encourage more studies on the subject. Furthermore, the connection between gender and underconfidence has not been studied properly and therefore future research should aim to see if there is one. Larger studies and experiments on subjects with a bigger age spread, as well as subjects from different countries and with different occupations, could all shed light on the actual patterns of gender and confidence level.

Even though only one out of four measures shows statistical significance, the tendencies of the measures reveal interesting patterns. On the difficult task men place themselves higher than women and seem to overestimate more than women, while they on the easy task appear to overplace less and underestimate more than women do. That is, men tend to be more overconfident than women on the difficult task, while they lean towards more underconfidence on the easy task. If there is any substance behind these tendencies the question is raised whether task difficulty is the decisive factor for gender differences in confidence. If so, men should be more overconfident than women on difficult tasks, both in terms of estimation and placement, while they should be more underconfident on easy tasks. Future research should aim at investigating how task difficulty affect gender differences in confidence level.

8. Summary

Previous research (Chevalier et al. 2009; Dahlbom et al. 2011; Jakobsson et al. 2013) has found men to be more overconfident than women. By using an experimental method on 174 Swedish students in upper-secondary school, this study aims at investigating if men are simultaneously more over- and underconfident than women. If men are more overconfident than women, simultaneous underconfidence is predicted by Moore and Healy's theory where over- and underconfidence is a consequence of the regression of one's own and others' scores. A gender difference in confidence level could possibly help explain the skewed gender distribution in the labour market and might also have implications for the financial sector.

In our experiment, the subjects were given two ten-question trivia quizzes, one easy and one difficult, and were supposed to judge how well they performed on the tasks. On an aggregate level we find, as expected, the subjects to underestimate and overplace on the easy task and overestimate and underplace on difficult task. This is in line with the Moore and Healy theory of overconfidence.

When investigating how gender affects over- and underconfidence, we find fewer differences than previous research. We find men to underplace themselves less than women on difficult tasks, but

we find no other statistically significant differences between the genders. As our results show that the gender differences in confidence level might not be as large as previously believed, we find no evidence for men being simultaneously more over- and underconfident than women.

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10. Appendix

10.1 Original survey

Undersökning

Välkommen!

Du kommer få delta i en kort undersökning som tar ca 15 minuter.

Undersökningen genomförs med gymnasieelever och ligger till grund för vår kandidatuppsats i nationalekonomi vid Handelshögskolan i Stockholm.

Det är frivilligt att delta i undersökningen och du har rätt att avbryta den när du vill. Du kommer att vara helt anonym och den information du lämnar kommer endast användas i arbetet med vår kandidatuppsats. Informationen kommer alltså inte lämnas ut till tredje part och din lärare kommer inte ta del av dina svar.

* * *

I undersökningen ska du svara på frågor i två frågesporter. Varje frågesport består av 10 frågor kring olika ämnen. Efter frågesporterna kommer du få svara på några frågor om dig själv och din bakgrund.

Efter frågesporterna kommer du också få svara på hur du tror att det gått för dig och undersökningens andra deltagare. Antalet poäng du får på varje frågesport beror dels på det antal korrekta svar du får på frågesporten, dels på hur korrekt du bedömt ditt eget resultat.

Den med högst poäng från de två frågesporterna kommer att vinna 500 kr, och de fem efterföljande kommer att vinna varsin biobiljett. För att kunna hämta ut en eventuell vinst är det viktigt att du behåller bladet med ditt nummer. Vi kommer så snart som möjligt meddela lärarna om de har en vinnare i sin klass. Kom ihåg att lärarna bara får det vinnande numren och alltså inte era namn. Du kan kontakta oss för att få ditt pris med hjälp av de kontaktuppgifter som finns på nummerbladet.

Lycka till!

Önskar
Julia Wilhelmsson & Viking Waldén

Frågesport 1 Nummer:_____

Ringa in det svarsalternativ du tror är rätt

Öresundsbron förbinder Danmark med vilken svensk stad?

A) Malmö
B) Göteborg
C) Kalmar
D) Helsingborg

Vilket av dessa är ett däggdjur?

A) Aborre
B) Delfin
C) Geting
D) Huggorm

I filmen Lejonkungen träffar Simba två kompisar. Timon är en surikat och Pumbaa är en… ja vadå?

A) En antilop
B) En gnu
C) En bisonoxe
D) Ett vårtsvin

Med vilken låt vann ABBA Eurovision Song Contest 1974?

A) Waterloo
B) Mamma Mia
C) Ring Ring
D) Voulez Vous

Hur många ben har en spindel?

A) 2
B) 4
C) 6
D) 8

Vad heter Harry Potters gudfar som rymmer från fängelset Azkaban genom att förvandla sig till en hund?

A) Remus Lupin
B) Peter Pettigrew
C) Sirius Black
D) Albus Dumbledore

Vad heter Polens huvudstad?

A) Lublin
B) Gdansk
C) Krakow
D) Warszawa

Över vilken av dessa japanska städer släppte USA en atombomb 1945?

A) Osaka
B) Tokyo
C) Nagasaki
D) Kyoto

Hur tog sig Gustav Vasa mellan Sälen och Mora när han år 1521 flydde från den danske kungen?

A) Spark
B) Skidor
C) Till fots
D) Häst och vagn

Vilken artist kallades The King of Pop och gjorde bl.a. låten Thriller?

A) Michael Jackson
B) Justin Bieber
C) Elvis Presley
D) David Bowie

Frågesport 2 **Nummer:_____**

Ringa in det svarsalternativ du tror är rätt

Vem mördade den amerikanska medborgarrättskämpen Martin Luther King?

A) John Wilkes Booth
B) Jack Ruby
C) James Earl Ray
D) Lee Harvey Oswald

Vilket är Europas tredje minsta land till ytan?

A) San Marino
B) Vatikanstaten
C) Monaco
D) Andorra

Vad hette Markus Krunegårds gamla band, som återförenades förra året?

A) Hästpojken
B) Broder Daniel
C) Florence Valentin
D) Laakso

Hur länge ligger en känguruunge i sin mammas mage innan den föds och kryper in i mammans pung?

A) Ca 1 månad
B) Ca 2 månader
C) Ca 3 månader
D) Ca 4 månader

För vilken film vann Ingemar Bergman en Oscar för Bästa utländska film?

A) Det sjunde inseglet
B) Vargtimmen
C) Fanny och Alexander
D) Persona

Vilken av dessa var inte en kommunistisk diktator?

A) Nicolae Ceauşescu
B) Augusto Pinochet
C) Kim Il-Sung
D) Josip Broz Tito

Vilken är den längsta floden i Sverige?

A) Dalälven
B) Klarälven
C) Ljusnan
D) Ume Älv

Vilken artist har varit på sin "Never Ending Tour" sedan 1988?

A) Bruce Springsteen
B) Patti Smith
C) Ulf Lundell
D) Bob Dylan

Hur många vargar finns i Sverige?

A) Ca 250
B) Ca 350
C) Ca 500
D) Ca 1000

Vad heter berättaren i J.D. Salingers roman Räddaren i nöden?

A) Atticus Finch
B) Nick Carraway
C) Holden Caulfield
D) Tom Joad

Övriga frågor del I

Nummer:_____

Ringa in ditt svar

I den första frågesporten, hur många korrekta svar tror du att du har fått?

0 1 2 3 4 5 6 7 8 9 10

I den andra frågesporten, hur många korrekta svar tror du att du har fått?

0 1 2 3 4 5 6 7 8 9 10

I den första frågesporten, hur skulle du ranka dig själv i förhållande till resten av undersökningsdeltagarna?

Jag tror att jag har fler rätt än:

0% 10% 20% 30% 40% 50% 60% 70% 80% 90%

av undersökningsdeltagarna

I den andra frågesporten, hur skulle du ranka dig själv i förhållande till resten av undersökningsdeltagarna?

Jag tror att jag har fler rätt än:

0% 10% 20% 30% 40% 50% 60% 70% 80% 90%

av undersökningsdeltagarna

Övriga frågor del II

Nummer:_____

Ringa in ditt svar

I den första frågesporten, hur många korrekta svar tror du att de andra undersökningsdeltagarna fått i genomsnitt?

0 1 2 3 4 5 6 7 8 9 10

I den andra frågesporten, hur många korrekta svar tror du att de andra undersökningsdeltagarna fått i genomsnitt?

0 1 2 3 4 5 6 7 8 9 10

Övriga frågor del III Nummer:_____

Ringa in det alternativ som stämmer bäst

Kön:

- Kvinna
- Man

Ålder: _____

Skola: : _____

Program:

- Naturvetenskaplig linje
- Samhällsvetenskaplig linje
- Annat: _____

Årskurs:

- 1
- 2
- 3

Föräldrars högsta utbildning:

- Grundskola
- Gymnasium
- Högskola/universitet
- Doktorsexamen

Tack för ditt deltagande och för att du hjälpt oss med vår kandidatuppsats!

10.2 Original identification sheet

Nummerblad

Ditt nummer är:

XXX

Vi kommer meddela lärarna om vilka nummer som vunnit ett pris. Lärarna kommer enbart meddelas nummer och alltså inga namn. Om du har ett av de vinnande numren ber vi dig kontakta oss för att hämta ut ditt pris.

Mejla till:
23042@student.hhs.se

Spara detta blad och ta med till oss när du hämtar ut ditt pris.

Julia Wilhelmsson

Viking Waldén

10.3 Translated survey

Survey

Welcome!

You will take part in a short survey that takes about 15 minutes.

The survey is conducted by students in upper secondary school and is the basis for our bachelor thesis in economics at Stockholm School of Economics.

Participation is optional and you have the right to terminate whenever you want to. You will be anonymous and the information you give us will only be used in the thesis process. The information will thus not be given to a third party and your teacher will not take part of your answers.

* * *

In the survey you will answer questions in two quizzes. Each quiz consists of 10 questions on different topics. After the quizzes you will answer a few questions bout yourself and your background.

After the quizzes you will also answer how you believe that you and other participants have performed. The points you get on each quiz is partly due to how many correct answers you have, and partly due to how well you have judged your own performance.

The one with the highest total score will win 500 SEK, and the following five will win a cinema ticket each. Vi will as soon as possible inform the teachers if they have a winner in their class. Remember that the teachers only get the winning numbers and thus not your names. You may contact us to collect your prize by emailing the address at the number sheet.

Good Luck!

Julia Wilhelmsson & Viking Waldén

Quiz 1 Number:_____

Circle your answer

Öresundsbron (the Öresund Bridge) connects Denmark with which Swedish city? E) Malmö F) Göteborg G) Kalmar H) Helsingborg
What animal is a mammal? E) Sea Bass F) Dolphin G) Wasp H) Viper
In the movie The Lion King, Simba meets two friends. Timon is a meerkat and Pumbaa is a…well what? E) An antelope F) A wildebeest G) A bison H) A warthog
With what song did ABBA win the Eurovision Song Contest 1974? E) Waterloo F) Mamma Mia G) Ring Ring H) Voulez Vous
How many legs has the spider? E) 2 F) 4 G) 6 H) 8
What is Harry Potter's godfather called, who escapes the Azkaban prison by transforming into a dog? E) Remus Lupin F) Peter Pettigrew G) Sirius Black H) Albus Dumbledore
What is the capital of Poland? E) Lublin F) Gdansk G) Krakow H) Warszaw
Over what Japanese city did USA drop a bomb in 1945? E) Osaka F) Tokyo G) Nagasaki H) Kyoto
How did Gustav Vasa travel between Sälen and Mora when he in 1521 fled the Danish king? E) Kicksled F) Skis G) By foot H) Horse Carriage
What was the name of the artiste that was called The King of Pop and has made songs like "Thriller"? E) Michael Jackson F) Justin Bieber G) Elvis Presley H) David Bowie

Quiz 2 **Number:_____**

Circle your answer

Who shot the civil rights activist Martin Luther King? E) John Wilkes Booth F) Jack Ruby G) James Earl Ray H) Lee Harvey Oswald
Which country is the third smallest in Europe in terms of area? E) San Marino F) The Vatican G) Monaco H) Andorra
What was the name of Markus Krunegårds old band that was reunited last year? E) Hästpojken F) Broder Daniel G) Florence Valentin H) Laakso
For how long is a kangaroo pregnant before the joey is born and crawls into its mothers pouch? E) About 1 month F) About 3 months G) About 4 months
Which movie got Ingmar Bergman an Oscar for best foreign language film? E) The Seventh Seal F) Hour of the Wolf G) Fanny and Alexander H) Persona
Which person below was not a communist dictator? E) Nicolae Ceaușescu F) Augusto Pinochet G) Kim Il-Sung H) Josip Broz Tito
Which river is the longest in Sweden? E) Dalälven F) Klarälven G) Ljusnan H) Ume Älv
Which artiste has been on his "Never Ending Tour" since 1988? E) Bruce Springsteen F) Patti Smith G) Ulf Lundell H) Bob Dylan
How many wolves are there in Sweden? E) About 250 F) About 350 G) About 500 H) About 1000
What is the name of the narrator in J.D. Salingers novel The Catcher in the Rye? E) Atticus Finch F) Nick Carraway G) Holden Caulfield H) Tom Joad

Other questions part I Number:_____

Circle your answer

In the first quiz, how many correct answers do you think you have got?

0 1 2 3 4 5 6 7 8 9 10

In the second quiz, how many correct answers do you think you have got?

0 1 2 3 4 5 6 7 8 9 10

In the first quiz, how would you rank yourself compared to the rest of the participants?

I think I have got more correct answers than:

0% 10% 20% 30% 40% 50% 60% 70% 80% 90%

of the participants

In the second quiz, how would you rank yourself compared to the rest of the participants?

I think I have got more correct answers than:

0% 10% 20% 30% 40% 50% 60% 70% 80% 90%

of the participants

Other questions part II

Number:_____

Circle your answer

In the first quiz, how many correct answers do you think the other participants got on average?

0 1 2 3 4 5 6 7 8 9 10

In the first quiz, how many correct answers do you think the other participants got on average?

0 1 2 3 4 5 6 7 8 9 10

Other questions part III Number:_____

Circle the most correct alternative

Sex:

- Female
- Male

Age: _____

School: _____

Programme:

- Natural Sciences
- Social Sciences
- Other: _____

Year:

- 1
- 2
- 3

Parents' highest education:

- Elemantary School
- Secondary School
- College/University
- Doctor's degree

Thank you for your participation and for helping us with our bachelor thesis!

10.4 Translated identification sheet

Number Sheet

Your number is:

XXX

We will inform the teachers about which numbers have won prizes. The teachers will only be informed about the winning numbers, and thus not any names. If you are one of the winners, please contact us to collect your prize.

Email:

23042@student.hhs.se

Save this sheet and bring it with you when you collect your prize.

Julia Wilhelmsson

Viking Waldén

10.5 Correlation matrixes

Correlation matrix for the original variables:

	Man	NR	EG	KG	Vasa	SS	PhD	University	Upper-secondary school	Age
Man	1									
NR	0.1865	1								
EG	0.0172	-0.3539	1							
KG	-0.0753	-0.2097	-0.2192	1						
Vasa	-0.0905	-0.1851	-0.1936	-0.1147	1					
SS	-0.1566	-0.6162	0.0039	0.3402	-0.3371	1				
PhD	0.0078	-0.0374	0.1821	0.0177	-0.0977	0.0438	1			
University	-0.0621	0.0438	-0.1583	0.0111	0.0196	0.0158	-0.5910	1		
Upper-secondary school	0.0333	-0.0024	-0.0163	-0.0169	0.0724	-0.0568	-0.1107	0.6934	1	
Age	-0.0057	-0.2173	0.1884	0.3458	-0.5128	0.6017	0.1577	-0.1209	-0.0050	1

Correlation matrix for the variables used in the final regression:

	Man	Sthlm	SS	Uni	Age
Man	1				
Sthlm	0.0172	1			
SS	-0.1566	0.0039	1		
Uni	-0.0699	-0.0412	0.0565	1	
Age	-0.0057	0.1884	0.6017	-0.0157	1