UNIVERSITY OF GOTHENBURG
SCHOOL OF BUSINESS, ECONOMICS AND LAW

Master's Thesis in Economics

Do Swedish students differ from each other and the general population in terms of patience and risk taking?

Emelie Jönsson & Therese Persson

Abstract

Do student samples provide insights that are generalizable to the general public? Could the results be affected by what study area or study year the students are in? Using student samples is an ongoing debate in economic research and we look at this problem in terms of time and risk preferences. Using survey data on students and non-students in Sweden, we study if there are any differences in patience and risk taking between the two samples. We also investigate whether time and risk preferences differ between genders. In addition, we analyze whether what kind of students that are used affects the results which, to the best of our knowledge, has never been studied before. We find no significant differences in time/risk preferences between the two samples and a gender difference is only found in the general sample. Our most important results are that study area and years at university have a significant effect on time and risk preferences which indicates that it is important to consider what type of students are used as subjects.

Personal numbers: 951130-3407, 930611-3763

Supervisor: Elina Lampi

Keywords: Time Preferences, Risk Preferences, Student Sample, Gender

June 4, 2019

Acknowledgements

First and foremost, we would like to dedicate a huge thank you to our supervisor Elina Lampi. We are forever grateful for all her help and comments as well as her strong support and encouragement throughout the entire semester. We would also like to thank Eva Ranehill and our fantastic group from the Economic Research Process course for their help and comments during the process of developing and improving our idea. Additionally, we would also like to thank our classmates for all the discussions, support and fun times we have shared during our last semester together as well as our friends and family for their everlasting love and encouragement. Lastly, we would like to dedicate a tremendous thank you and acknowledgement to each other for all the hard work, long hours, many phone calls, support and encouragement which have not only led us to write and finish a thesis that we are proud of but also created a valuable friendship.

Table of content

1. INTRODUCTION & LITERATURE REVIEW

Despite the ongoing discussion regarding the validity of using student samples in economic research, university students are still widely used as a subject pool within economics and social sciences in general since they are cheaper to use and more easily available. (See among others Weber et al., 2002; Andreoni & Sprenger, 2012; Peterson & Merunka, 2014; Hanel & Vione, 2016; Wang et al., 2016). In addition to this, most research that is performed with student samples usually have very limited variation concerning study area and/or years at university. Alternatively, very little information is provided regarding what kind of students that are used (See among others Carpenter et al., 2005; Borghans et al., 2009; Anderson et al., 2013; Falk et al., 2013). This common practice of using students raises many questions regarding how well the results from these studies can actually be applied to the general population, especially when there is usually not much variation in the students used.

As Hanel & Vione (2016) argued in their study, students differ from the representative sample in the way that they are often considered to be more homogenous in general. Carlson (1971) stated that students are "unfinished" personalities and Peterson (2001) suggested that this could mean that students might be systematically different from non-students that have much more experiences. Social sciences such as marketing and psychology have shown that there are important differences in for instance perceptions and attitudes between students and non-students (Belot et al., 2015). Sears (1986) addressed the issue that psychological research relies so much on student samples and suggests that because students are likely to differ in levels and depth of attitudes, sense of self, cognitive skills, etc, the research might provide systematic biases in how we consider human behavior. More specifically regarding economic preferences, Anderson et al. (2013) stated that non-students in general seem to be much more prosocial. Carpenter et al. (2005, 2008), Falk et al. (2013), Belot et al. (2015) and Cappelen et al. (2015) discovered that students are systematically more selfish than non-students and therefore not a representative sample. Burks et al. (2009) found that students are much less cooperative and optimistic than non-students and Bellemare et al. (2008) suggested that students are less inequity averse than the general Dutch population. Belot et al. (2015) also found that students on average are more risk averse than non-students and Harrison et al. (2002) showed that students seem to have higher discount rates. Several studies have stated that the use of students have a tendency to produce estimates of social preference measurements that are in the lower bound (Burks et al., 2009; Falk et al., 2013; Cappelen et al., 2015). On the other side, there are researchers such as Kardes (1996) and Güth et

al. (2007) who argued that the decisions of students and non-students are actually similar. Hanel & Vione (2016) stated that there has not been much research on the differences between students and what would be considered a representative sample of the population. Peterson (2001) acknowledged that there is lacking empirical support for either side of the student vs non-students debate and concluded that researchers need to be careful when attempting to generalize the results from studies using student samples. He also stated that it is important to replicate research with non-students to be able to make any statements of more general relationships.

These potential differences are of course a very important aspect of economic research. If students cannot be considered to be representative enough and if important differences prevail, the generalizability and comparability of research results will be low and this might be an indicator that researchers should consider if students are really the best option. We therefore want to investigate if there is in fact significant differences between students and the general population. To do this, we focus on differences in behavioral preferences, more specifically time and risk preferences, and we hypothesize that there is a significant difference in preferences between these two samples. Studies analyzing potential significant differences between students and the general population could greatly contribute to the discussion of whether economic researchers should rely on students or not. Not only could this have an impact on future research, but it could also create questions regarding the external validity of previous research using student samples.

In comparison to the lack of empirical evidence in the student sample debate, time and risk preferences are two areas that are widely researched. Time and risk preferences are two popular areas within behavioral economics and both are very important when considering human decision making. Individuals' risk preferences affect all decisions where some kind of uncertainty is involved (Weber et al., 2002; Dohmen et al., 2011). It can affect both more complicated and specific situations such as investments and other financial decisions, but it also concerns more general situations such as choosing a job or deciding on what education to apply to. Time preferences indicate individuals' patience and in turn affects important decisions where the reward might be delayed to the future (Chao et al., 2009; Lampi & Nordblom, 2009; Golsteyn et al., 2014). Time preferences can therefore affect both big and important decisions, such as whether or not to go to college and saving decisions, and also smaller, less important decisions such as going to the gym. Both of these preferences affect a wide array of decisions that we have to make every day and it is therefore very important to learn about what individuals' preferences actually look like and how they vary. There have been many studies regarding what characteristics influence

preferences using both surveys and experiments. Falk et al. (2018) suggested that preferences vary with for instance age and cognitive ability and Dohmen et al. (2011) found that parental background, gender and age influence risk taking. Green et al. (1994) as well as Read and Read (2004) showed that age is a significant predictor of time preferences and Meier (2018) found that both risk taking and patience is positively correlated with income. Albert & Duffy (2012) investigated how risk preferences differ among younger and older adults and their results confirmed that older adults were more likely to be risk averse than younger adults. Their findings also showed that time preferences vary with age, older adults had higher discount rates than young adults. In line with this, Harrison et al. (2002) found small differences among age and discount rates, the greater age the higher discount rate. In comparison to this, Chao et al. (2009) found that age is not significant for time preferences and Green et al. (1996) did not find any age differences when they matched by income levels. Since the characteristics analyzed in the literature are some of many that probably differs between non-students and students, these results also indicate that preferences might differ between students and the general population.

Connected to the discussion regarding which characteristics affects preference is also the topic of gender differences. Gender differences are an important aspect of economic research in general as well as for time and risk preferences. Several studies have concluded that women tend to be more risk averse than men (See among others Weber et al., 2002; Borghans et al., 2009; Croson & Gneezy, 2009). When it comes to time preferences however, there seem to be fewer studies on gender differences and the results are more mixed. Studies by for instance Chao et al. (2009) and Almås et al. (2012) found no significant gender difference while Gränsmark (2012), Dittrich & Leipold (2014) and Golsteyn et al. (2014) found that men seem to be more impatient than women. Connected to the discussion of student samples above, the results on gender differences also differ somewhat depending on what samples are used. Cappelen et al. (2015) discussed that gender differences in social preferences are larger in a representative sample compared to students and Silverman (2003) found no change in gender differences over age concerning time preferences. However, Boschini et al. (2018) discovered that the gender difference in risk taking is smaller for a random sample of the Swedish population compared to what is usually found for student samples and Byrnes et al. (1999) also stated that the gender gap in risk taking seems to decrease with age.

In addition to analyzing differences in time and risk preferences between students and the general population, we also want to look at potential gender differences. More specifically, we analyze if there are any gender differences in time and risk preferences in the two samples and whether the

potential gender differences are the same in both samples or if they differ. We hypothesize that men are more risk taking and less patient compared to women and that the gender effect differs between the two samples.

As mentioned previously, another potentially important aspect concerns the variation within the student population. It comes naturally that different types of individuals choose different study areas and it follows that they are likely to differ in economic preferences such as time and risk preferences as well. Much of the economic research that uses students either fail to acknowledge what study area/year the students are in or they tend to base their research on only one type of student. Anderson et al. (2013) and Falk et al. (2013) conducted studies about social preferences and Carpenter et al. (2005) on social framing but all of them only mentioned that their experiments were based on students at different universities. They provided no information about what programs they were from or for how long they had studied. Keren & Roelofsma (1995), Anderhub et al. (2001) and Andreoni & Sprenger (2012) performed experiments on time and risk preferences but only Anderhub et al. (2001) mentioned what study area their students were from, namely undergraduates from one study area, Economics. Keren & Roelofsma (1995) and Andreoni & Sprenger (2012) only mentioned that their student samples were based on undergraduates but not what programs they were enrolled in. Belot et al. (2013) conducted an experiment about risk preferences but they only stated that their student sample was a mix of undergraduates and graduates. Research on gender and time such as Castillo et al. (2011) and Almås et al. (2012) used high school students and Borghans et al. (2009) used university students but none of them specified what study area the students were enrolled in.

It seems to be the common practice to provide insufficient information about the students used as well as to use student samples with small variations in study areas and years at university without discussing how this could affect the results. This suggests that this is not something that researchers have in mind when designing their research. The last, and possibly most important, part of this thesis is therefore to analyze whether students in different study areas and/or different years differ in terms of patience and risk taking which we hypothesize is the case. This has, to the best of our knowledge, never been studied before and combined with our large student sample, we therefore consider this section to be our largest contribution. Potential differences within the student population could have important implications for both past and future research.

To conclude, the aim of this study is to combine these aspects of economic research to take the analysis of time and risk preferences one step further with our main focus being the potential differences both within the student population and between the students and the general population. In addition to analyzing these differences, we also look at gender differences in time and risk preferences and investigate if these differ between students and the general population. More specifically, we seek to answer the following research questions:

Are university students in Sweden different from the general population in terms of patience and risk aversion? Are there any gender differences in time and risk preferences among students and the general public? Are there any differences in patience and risk aversion within the student population depending on study area or number of years studied at university?

To investigate our research questions, we use data from a survey which was sent out to the general public mainly in the Gothenburg and Stockholm areas as well as to students currently studying at the University of Gothenburg. The gathered data is divided into two samples, one student sample and one comparison sample with the general public. The main results from our research are that students do not appear to be significantly different from the general population regarding time and risk preferences. However, what type of students that are used in economic research could greatly impact the results. We find that both study area and the number of years at university have an impact on time and risk preferences, indicating that there are differences within the student population that are important to consider. We also find that, in the comparison sample, men seem to be significantly more risk taking and patient compared to women, while in the student sample, we find no significant gender differences.

The remainder of this thesis is organized in the following manner. In the following section, we provide a brief overview of relevant theory and section 3 presents our hypotheses. Section 4 describes the data and methodology used. Section 5 presents the results of the research and section 6 concludes.

2. THEORY ABOUT DISCOUNTED AND EXPECTED UTILITY

An important part of neoclassical economic theory is the idea of Homo economicus, the Economic man, which many economic theories treat as a baseline for human behavior. According to theory, Homo economicus is a completely rational individual whose goal is always to maximize its own utility or payoff. Homo economicus has no ethical or moral concerns and only cares about their own personal gain. Even though most people know that Homo economicus often do not fit how individuals truly think and/or behave, the individuals who deviate from this is considered to be exceptions to this rule (Stout, 2008). For time and risk preferences specifically, this connects to the idea that individuals pursue the options which maximizes their discounted utility, for intertemporal decisions, or expected utility, for decisions under uncertainty (Camerer & Loewenstein, 2003).

Concerning intertemporal choices, i.e. choices where individuals have to make trade-offs between outcomes in the present and the future, the discounted utility (DU) model introduced by Paul Samuelson in 1937 remains the dominantly used economic theory. The DU model assumes that an individual's total utility is the discounted sum of the utility received in each time period (Frederick et al., 2002). Utility to be received in the future is generally valued less than utility in the present and is discounted exponentially with a discount factor between 0 and 1 which remains the same in each period (Camerer & Loewenstein, 2003). This discount factor therefore represents an individual's specific time preferences (Frederick et al., 2002). More formally, if an individual is facing an outcome *X* in *T* time periods, the individual will value this outcome today (T=0) as $\delta^T * u(X)$ where δ is the constant discount factor and $u(X)$ is the utility that the individual gets from the outcome *X*. Following this, two choice alternatives can be compared by comparing the discounted utility of receiving *X* at time *A*: $\delta^A * u(X)$, and the discounted utility of receiving *Y* at time *B*: $\delta^B * u(Y)$. If $\delta^A * u(X) > \delta^B * u(Y)$, this indicates that the individual prefers to get *X* in *A* time periods and will therefore chose the first option (Manzini & Mariotti, 2007). For example, if an individual with a monthly discount rate of 0.98 is given the choice between 1,000 SEK today or 1,500 SEK in 12 months (assuming that u(X) = X), they will compare these options as $0.98^0 * 1{,}000 = 1{,}000 < 1{,}177 = 0.98^{12} * 1{,}500$ and therefore chose the option in 12 months.

When analyzing decisions under uncertainty, the expected utility model originally formulated by Bernoulli in 1738 has been frequently used by economists. This model assumes that the expected utility for a specific option equals the sum of the utilities received from each outcome in that option

multiplied by the probability that each outcome will occur. This means that an individual facing a decision under uncertainty will have one expected utility for each possible option that he or she can make and under the assumption of maximization will therefore chose the alternative with the highest expected utility (Slovic et al., 1974). Formally expressed, the possible outcomes of a certain choice alternative can be noted X_i and the probability of X_i occurring is P_i. The expected utility of that alternative can then be noted as

$$\mathrm{E}\,[\mathrm{U}(\mathrm{X})] = \sum_{i=1}^{n} P_i * u(X_i)$$

where the utility from each possible outcome X_i is weighted by the probability of that outcome being realized P_i (Quiggin, 2012). By weighting the utility of each possibility, the individual takes into consideration not only maximization but also their own risk preferences. The expected outcome of a coin toss between 0 SEK or 100 SEK is 50 SEK but the expected utility of 50 SEK and the expected utility from the coin toss might not be the same. The expected utility of the coin toss is calculated as $P(heads) * U(0\,SEK) + P(tails) * U(100\,SEK)$ and depending on the individuals risk preferences, in other words the curvature of the utility function, the expected utility of the coin toss could differ from the utility of 50 SEK (Calhoun, 2002). The risk attitude traditionally assumed in economic models is risk aversion. This is characterized by a concave utility function and risk averse individuals are assumed to always prefer a sure outcome *X* over a risky option with the same expected value of *X* (Slovic et al., 1977). In comparison, risk seeking individuals are assumed to have a convex utility function and risk neutral individuals a linear utility function (Hey, 2003). Risk seeking individuals value the risk and can prefer an option with lower expected outcome if the option is more risky while risk neutral individuals do not account for the risk at all and only considers the expected value (Lee & Lee, 2006).

The actual observed behaviour of individuals does not always fit with the idea of the Homo economicus or with the models of discounted and expected utility. Economic models and theories are more and more evolving to include behavioral aspects, creating a behavioral branch of economics which is closely related to psychology. Behavioral economists have introduced important discussions regarding topics such as fairness concerns, altruism, motivations, relative concerns, reciprocity, behavioral biases etc with the understanding that including these aspects will increase the realism of economic models and in turn improve economic analysis. (See among others Camerer & Loewenstein, 2003; Güth et al., 2007; Bellemare et al., 2008; Carpenter et al., 2008; Dohmen et al., 2010; Koch et al., 2015)

3. HYPOTHESES

As discussed in the introduction, many economic researchers have found evidence suggesting that the preferences of students in fact differ from preferences of the more general population (See among others Harrison et al., 2002; Carpenter et al., 2005; Bellemare et al., 2008; Carpenter et al., 2008; Burks et al., 2009; Anderson et al., 2013; Falk et al., 2013; Belot et al., 2015; Cappelen et al., 2015). In addition to this, studies have shown that characteristics such as age and cognitive ability, both associated to be important differences between students and non-students, also have an impact on preferences (Green et al., 1994; Harrison et al., 2002; Read & Read, 2004; Dohmen et al., 2011; Albert & Duffy, 2012; Falk et al., 2018). We therefore hypothesize that Swedish students and a more general Swedish population differ in terms of time and risk preferences. Regarding the direction of this difference, there have been studies which concluded that higher incomes are correlated with higher patience and risk taking. While others have suggested that students are for example more patient since they have chosen to postpone income for education (Perez-Arce, 2011; Meier, 2018). The direction is therefore not completely clear, but we hypothesize that students are less risk taking and more impatient compared to the general population in line with Belot et al. (2015) and Meier (2018). We test this hypothesis by comparing levels of patience and risk taking in amongst students and a more general sample to see if there are any significant differences.

H1: Swedish students' time and risk preferences differ from the general Swedish populations' with students being less risk taking and more impatient.

Concerning gender differences in time and risk preferences, several researchers have concluded that women are more risk averse and more patient (Weber et al., 2002; Borghans et al., 2009; Croson & Gneezy, 2009; Gränsmark, 2012; Dittrich & Leipold, 2014; Golsteyn et al., 2014). Following this literature, we hypothesize that men are more risk taking and less patient compared to women. In addition to this, research by for example Byrnes et al. (1999), Cappelen et al. (2015) and Boschini et al. (2018), suggests that the gender difference might not be the same for both students and the general population. In what direction this effect differs is not clear since previous literature is mixed on this subject. This hypothesis is tested by analyzing if there are any significant differences in patience and risk taking for men and women in the two samples.

H2: Men are more risk taking and less patient compared to women. There is also a difference in the gender effect between the two samples, but the direction is unclear.

Lastly, we hypothesize that there are preference differences within the student sample depending on study area and how long they have studied. As mentioned in the introduction, it comes naturally that different types of individuals choose different study areas and it follows that they likely differ in time and risk preferences as well. However, due to the lack of previous research in this area, we cannot hypothesize regarding in what directions the differences are. Regarding how long an individual has studied at university, we believe that attending university influences individuals' patience and risk taking both due to higher education and more knowledge but also the prospect of higher incomes due to a university education. We test this last hypothesis by comparing patience and risk taking levels for students within different study areas and for students who have studied at university for different amounts of time.

H3: There are differences in students' patience and risk taking depending on study area and study year due to selection effects and higher education, however, the direction is not clear.

4. DATA AND METHODOLOGY

4.1 Data Collection

The data for this thesis is divided into two samples: one student sample and one comparison sample. The data was gathered using a web-survey with hypothetical time and risk preference questions following the design by Falk et al. (2016). For all our survey questions, see Appendix A. Before the data was collected, the survey was tested using a focus group which consisted of 6 individuals. After the focus group, a pilot study was sent out to 30 respondents in order to make sure that the questions were understandable and to gather some feedback on the survey.[1] The survey was then improved and the final survey was sent out in the beginning of February 2019 and was closed mid-March 2019. The survey took approximately 5 minutes to answer. The respondents were able to choose if they wanted to answer it in Swedish or in English, and approximately 7 percent of the respondents in the final dataset chose English. The survey consisted of four main parts starting with general demographic questions and study related questions which were followed by the time and risk preference questions. We had no monetary incentives in our

[1] The people who participated in the focus group and pilot study were asked not to answer the final survey in order to avoid that some answered the survey more than once.

survey due to the fact that we wanted a large-scale survey with many respondents in order to make comparisons within the student population and monetary incentives were therefore not economically possible.

To be able to perform as clean tests as possible between our samples, we developed two identical surveys. The survey to the student sample was sent by using only Gothenburg University (GU) student emails. The survey to the comparison sample was sent out through social media, GU student emails in the case where respondents were not students anymore, a few companies in Gothenburg and Stockholm, and we also asked people in person at the central station in Gothenburg. After both surveys were closed, all respondents under 18 years old as well as those who did not live in Sweden were excluded from the study. The observations were then divided into two separate samples: our student sample of 3,574 respondents, which are current university students from 13 different study areas[2] and the comparison sample of 520 respondents.[3,4] From the social media channel we received 324 usable answers, however a response rate cannot be calculated since there is no way to measure the number of people who received the survey. For the GU emails channel, we sent the survey to 22,235 GU emails and received 3,713 usable answers, which corresponds to a response rate of 17 percent. Out of these 3,713 answers, 139 respondents are included in the comparison sample and 3,574 in the student sample. For our last mixed channel, workplaces and people in person, we received 57 answers out of 99 which correspond to a response rate of 58 percent.[5]

We are aware that it is generally considered as a cleaner design to only use one method for gathering data and that there might be some risk of differences in answers for the different approaches due to for example time to think and potential concerns regarding anonymity and what we as researchers think about the answers. However, combining methods allowed us to gather as many observations as possible due our time frame and we believe that in our case, getting as many observations as possible was more important than the potential problems that could arise by using different methods of gathering data. Because the data was gathered through different channels, a

[2] Study areas that were not possible to categorize in a valuable way was put in a 14th category called "Other"

[3] The number of university students in the comparison sample was randomly reduced to more accurately represent the Swedish population.

[4] 62 percent of the comparison sample was gathered through social media, 27 percent from GU emails and 11 percent from the other channels (workplaces/companies and asked in person)

[5] Due to time constraints we were not able to wait for more answers or send out reminders except for social media where we posted the survey a second time at the beginning of March 2019.

control regression was also performed to check if the source has a significant impact on our dependent variables, which was not the case. For more details see section 5. Results and Analysis.

We are also aware that using a survey with hypothetical questions has both its advantages and disadvantages. Many studies do rely on hypothetical questions and the largest reason to use it is the reduction in cost it comes with. However, there is an ongoing discussion of whether hypothetical questions lead to a difference in choices compared to using real payoffs. Concerning risk preferences for instance, Edwards (1953) and Barreda-Tarrazona et al. (2011) suggested that the willingness to take risk increases when there is a question about real money while studies such as Wiseman & Levin (1996) and Faff et al. (2008) on the other hand, did not find a significant difference in answers when using hypothetical questions compared to real payoffs. The specific elicitation method used for this survey was validated by Falk et al. (2016) who showed that this method of retrieving time and risk preferences using hypothetical questions actually provides good estimates of true preferences. The researchers have later used this method themselves for economic research (Falk et al., 2018) and it has also been used by for instance Ubfal (2016). We are aware of this discussion concerning hypothetical vs incentivized elicitation methods but we believe that for the purpose of our study, the hypothetical questions are sufficient. Potential effects of the hypothetical aspect should affect all respondents the same and therefore not affect the purpose of our study, namely to investigate differences between samples. Using this type of questions allowed us to get more information than by using a multiple price list while at the same time keeping it short and easy to understand for the respondents. We are also aware that there is a risk that in which order the time and risk preference questions are presented could matter. Presenting the time preference questions first and thereby affecting the respondents' mindset, might influence how they perceive risk and in turn how they answer the following risk preference questions. However, the same risk would prevail if the order was the opposite and since many participants in the focus group and pilot study commented that the risk preference questions where somewhat harder to understand, we chose to start with the preference questions that were easiest to understand.

4.2 Variables

The two dependent variables used in our analyses are the individuals' time and risk preferences, *patience* and *risktaking*, measured by the procedure used and validated by Falk et al. (2016)[6]. The

[6] Note that there are two mistakes in Falk et al. (2016): A is for lottery and B for certain payment on page 60 and 122 and 129 have switched places on page 66.

respondents' time preferences were measured by asking five questions where they have to choose between 1,000 SEK today or a higher amount in 12 months. The amount today remained the same in all five questions and the amount in 12 months changed depending on the previous answer. All respondents started with the same amount in 12 months and if a respondent chose the payment today, the future payment in the next question increased and equivalently, the future payment decreased if the respondent chose the future payment. The following questions continued in the same manner. Similarly, the risk preferences were measured by asking the respondents five questions where they have to choose between a certain amount of money or a 50/50 gamble for 3,000 SEK or nothing. In this case, the gamble remained the same in all questions while the certain amount increased if the lottery was chosen and decreased if the certain amount was chosen. In both cases, the amounts that changed in each question depended on the answer in the previous question, creating a "tree" or "staircase" of possibilities that resulted in different end-nodes representing the levels of patience and risk aversion with values between 1 and 32. For the full staircase model, see Appendix B. Higher values of *patience* and *risktaking* indicates a higher level of patience and risk taking, respectively. The amounts used, following Falk et al. (2016), were multiplied by 10 since they used Euro and 1 Euro is approximately 10 SEK.

Our independent variables of interest are *studentsample*, which equals 1 if the respondent is in our student sample, *male,* which equals 1 if the respondent is male, and dummy variables for study area, faculty and years at university. In addition to this, the dataset contains information on various demographic and control variables such as age, income, university degree and time/risk preference studies. For a full list of variables and descriptions, see Appendix C.

4.3 Summary Statistics

Table 1 below presents summary statistics both for the full dataset and the two samples separately as well as mean values for age, income and the share of people with a university degree at a national level from Statistics Sweden. Due to time and budget constraints, our two samples are limited to respondents from the Gothenburg and Stockholm area and the dataset is not fully representative for the Swedish population. This will be discussed more below together with how we work to solve this.

Table 1: Summary Statistics and Statistics from Statistics Sweden

	Full Sample					Student Sample					Comparison Sample					SCB
VARIABLES	N	mean	sd	min	max	N	mean	sd	min	max	N	mean	sd	min	max	
Studentsample	4,094	0.873		0	1	3,574	1		1	1	520	0		0	0	
Male	4,059	0.317		0	1	3,540	0.308		0	1	519	0.380		0	1	0.503
Age	4,094	27.73	8.614	18	92	3,574	26.47	6.508	18	71	520	36.35	14.44	18	92	49
Age 18-29	4,094	0.741		0	1	3,574	0.783		0	1	520	0.456		0	1	
Age 30-44	4,094	0.199		0	1	3,574	0.190		0	1	520	0.263		0	1	
Age > 45	4,094	0.0598		0	1	3,574	0.0277		0	1	520	0.281		0	1	
Income	4,035	13.91	10.03	2.500	102.5	3,523	12.38	8.738	2.500	102.5	512	24.43	11.84	2.500	102.5	23.24
Low income	4,035	0.742		0	1	3,523	0.822		0	1	512	0.191		0	1	
Medium income	4,035	0.204		0	1	3,523	0.151		0	1	512	0.566		0	1	
High income	4,035	0.0545		0	1	3,523	0.0272		0	1	512	0.242		0	1	
Years at uni 0-2	3,930	0.390		0	1	3,574	0.412		0	1	356	0.169		0	1	
Years at uni 2-4	3,930	0.352		0	1	3,574	0.342		0	1	356	0.449		0	1	
Years at uni > 4	3,930	0.258		0	1	3,574	0.246		0	1	356	0.376		0	1	
University degree	4,085	0.354		0	1	3,565	0.327		0	1	520	0.544		0	1	0.206
Timerisk	4,094	0.0835		0	1	3,574	0.0834		0	1	520	0.0846		0	1	
Patience	4,094	19.72	10.09	1	32	3,574	19.76	10.09	1	32	520	19.48	10.04	1	32	
Risktaking	4,094	10.32	5.380	1	32	3,574	10.26	5.331	1	32	520	10.69	5.695	1	32	

Low Income: 0 – 15,000 SEK. Medium Income: 15,000 – 30,000 SEK. High Income: > 30,000 SEK.

As we can see above, our full dataset consists of 4,094 observations which is divided into our student sample of 3,574 observations and our comparison sample of 520 observations. Notable is also that the number of observations for some variables differ from these numbers and there are a few reasons for this. Regarding gender, a few respondents chose the option "Other/Do not want to say" and was therefore entered as missing. Regarding income, the income question in the survey was not mandatory and some respondents did choose to not provide their income information. A few questions where only asked depending on the answer in the previous question and variables such as years at university and was therefore only asked to those who either study at university now or have at some point, leading to some missing observations for the rest of the respondents.

Our full sample consists of approximately 32 percent males, with 31 percent and 38 percent in each sample, respectively, and the mean age is 28 in the full dataset and 26 and 36 in the two samples. The quite low mean age can be explained by looking at the age dummies. We can see that 74 percent of our dataset is between 18 and 29 years old and 94 percent is under 45 years old. For the student sample we can see a similar pattern with 78 percent between 18 and 29 years old while for the comparison sample the observations are not as skewed with 46 percent, 26 percent and 28 percent in each age category. For income, we can see that our full dataset and the student sample have a mean income of 13,910 SEK and 12,380 SEK, respectively, while the comparison sample has a higher mean of 24,430 SEK. Since students often have a low income, 82 percent of the student sample is in the low income section, the mean income of the full dataset therefore is much lower than the comparison sample. For the comparison sample we can see that 57 percent of the respondents has a medium income and 24 percent a high income. Most of the respondents in the student sample, 41 percent, has studied at university between 0 and 2 years, followed by those between 2 and 4 years. In the comparison sample, 45 percent of the respondents who at some point studied at university has studied between 2 and 4 years and 38 percent more than 4 years. The table also shows that 33 percent of the student sample and 54 percent of the comparison sample has a university degree. The variable *Timerisk* tells us that approximately 8 percent of the respondents in both samples have studied time and/or risk preferences at university level. Lastly, we can see that the mean values for our time and risk preferences are 20 and 10, respectively which tells us that the respondents on average are on the upper half of the patience scale and on the lower

half of the risk taking scale[7]. Notable is also that these mean values for the two samples are quite similar.

Comparing our mean values to the statistics from Statistics Sweden tells us that we have an underrepresentation of males in our dataset since approximately 50 percent of the Swedish population is male (Statistics Sweden, 2019a). We can also see that we seem to have an overrepresentation of young respondents since our mean age is 28 in the full dataset and 26 and 36 in the two samples compared to 49 in Sweden (Statistics Sweden, 2019b). The mean income in the student sample, 13,910 SEK, is lower than the mean income in Sweden, 23,240 SEK, while the mean income in the comparison sample is somewhat higher, 24,430 SEK (Statistics Sweden, 2019c). The last statistic included is the percentage of the population with a university degree which in Sweden is approximately 21 percent (Statistics Sweden, 2018a). In our dataset we can see that we have an overrepresentation of respondents with a university degree in both our samples, 33 percent in the student sample and 54 percent in the comparison sample. Since our comparison sample is not completely representative of the Swedish population, we will deal with this through weighting these four variables, see section 5.1 Non-parametric analysis of patience and risk taking.

4.4 Methodology

We divide our analysis of the dataset described above into two main parts where each part is divided into two sections with non-parametric analyses and regression analyses. The first part is the analysis of time and risk preferences regarding differences between our two samples as well as gender differences. Starting with a non-parametric analysis of patience and risk taking, we check the correlation between our time and risk preference variables and perform two-sample Wilcoxon rank-sum tests, also known as Mann-Whitney tests, to compare patience and risk taking between our two samples. For all Wilcoxon rank-sum tests, only the p-values are reported. This test is used to compare differences in a dependent variable between two samples when normal distribution cannot be assumed. The data is ranked without regard to which sample the observations belong to and the hypothesis tested is that that the two samples come from populations with the same distribution. For the regression analyses we start with three general regressions performed on the full sample in the dataset (Table 2). The first is a probit regression where the dependent variable equals 1 if the respondent is in the student sample. The second and third general regressions are performed using ordinary least squares (OLS) with robust standard

[7] Both scales range from 1 to 32.

errors and the dependent variables are *Patience* and *Risktaking*, respectively. The independent variables are the same in all three general regressions, namely *Male*, age and income dummies with *Age 30-44* and *Medium income* as the reference categories, *University degree* and *Timerisk*, see EQ1 and EQ2 below. We have chosen to include these variables because we believe that the first four are the main differences between students. More women compared to men study at university and university students are often younger, have lower incomes as well as have higher education than those who chose not to attend university. We also want to include *Timerisk* since we believe that there is a risk that time and/or risk preference studies can affect respondents' answers. These regressions are performed to see which variables seem to affect the likelihood of being in the student sample and which variables affect time and risk preferences for our entire sample.

EQ1: $Studentsample = \alpha + \beta_1 * Male + \beta_2 * Age\ 18-29 + \beta_3 * Age > 45 + \beta_4 * Low\ income + \beta_5 * High\ income + \beta_6 * University\ degree + \beta_7 * Timerisk + \varepsilon$

EQ2: $Patience/Risktaking = \alpha + \beta_1 * Male + \beta_2 * Age\ 18-29 + \beta_3 * Age > 45 + \beta_4 * Low\ income + \beta_5 * High\ income + \beta_6 * University\ degree + \beta_7 * Timerisk + \varepsilon$

The general regressions are followed by four OLS regressions where we analyze if there are any differences in preferences between our samples using *Patience* and *Risktaking* as the dependent variables (Table 3). For each preference, we perform two regressions where in the first we only have *Studentsample* as the independent variable and in the second we also add control variables for gender, age, income, university degree and time and/or risk preference studies, see EQ3 and EQ4 below. Analyzing the coefficient for the student dummy and its statistical significance will tell us if the two samples significantly differ in these preferences and in which direction. The last four regressions in this part analyzes potential gender differences (Table 3). The regressions are similar to the ones previously described, with *Patience* and *Risktaking* used as the dependent variables and for each preference we perform one regression without control variables and one with all control variables added, see EQ5 and EQ6. In the first regression for each preference, the independent variables are *Studentsample, Male* and the interaction term of these two, *SS*male*, and in the second we add control variables for age, income, university degree and time and/or risk preference studies. Women in Sweden statistically have lower incomes and higher levels of education than men do (Statistics Sweden, 2018b; Statistics Sweden, 2019d) and previous researchers such as Byrnes et al. (1999) and Boschini et al. (2018) have indicated that age might

be correlated with gender differences in preferences. The coefficient for *Male* will represent the gender difference in the comparison sample while the coefficient for *SS*male* will represent the gender difference in the student sample.

EQ3: $Patience/Risktaking = \alpha + \beta_1 * Studentsample + \varepsilon$

EQ4: $Patience/Risktaking = \alpha + \beta_1 * Studentsample + \gamma * control\ variables + \varepsilon$

EQ5: $Patience/Risktaking = \alpha + \beta_1 * Studentsample + \beta_2 * Male + \beta_3 * SS * male + \varepsilon$

EQ6: $Patience/Risktaking = \alpha + \beta_1 * Studentsample + \beta_2 * Male + \beta_3 * SS * male + \gamma * control\ variables + \varepsilon$

Following the discussion in the introduction regarding what type of students are used, the second part of our analysis concerns potential differences in preferences within our student sample. Here we analyze whether study area, which faculty the respondent belongs to and how long they have studied at university has an effect on preferences. In line with the first part, we start with the non-parametric analyses where we perform two-sample Wilcoxon rank-sum tests on *Patience* and *Risktaking* for all combinations of *Faculty* (Table 4 and Figure D1), *Studyarea* (Table 5 and Figure D2) and our years at university dummies (Table 6 and Figure D3). Following this, we perform four OLS regressions for each of these three independent variables following the same pattern as previous regressions with two regressions for each preference where the first is without control variables and the second with control variables, see EQ7-EQ12. For the regressions with faculty (Table 7) and study area (Table 8), we include the variables as dummy variables where we have the faculty of Business, Economics & Law and the study area Business/Economics as the reference categories, respectively. For years at university we use our created dummy variables *Years at uni 0-2, Years at uni 2-4* and *Years at uni > 4* with the first as the reference category (Table 9). The control variables included in these regressions are *Male*, age dummies with *Age 30-44* as the reference categories and *Timerisk* since we believe that they might have an effect on preferences as well as being correlated with what a respondent studies and how long they have studied.

EQ7: $Patience/Risktaking = \alpha + \beta * faculty\ dummies\ + \varepsilon$

EQ8: $Patience/Risktaking = \alpha + \beta * faculty\ dummies + \gamma * control\ variables + \varepsilon$

EQ9: $Patience/Risktaking = \alpha + \beta * studyarea\ dummies\ + \varepsilon$

EQ10: $Patience/Risktaking = \alpha + \beta * studyarea\ dummies + \gamma * control\ variables + \varepsilon$

EQ11: $Patience/Risktaking = \alpha + \beta_1 * Years\ at\ uni\ 2-4\ + \beta_2 * Years\ at\ uni\ >\ 4 + \varepsilon$

EQ12: $Patience/Risktaking = \alpha + \beta_1 * Years\ at\ uni\ 2-4\ + \beta_2 * Years\ at\ uni\ >\ 4 + \gamma * control\ variables + \varepsilon$

In all the regressions, we use robust standard errors in order to solve any potential problems with heteroscedastic errors, and throughout all analyzes, results are considered significant if the p-value is 0.10 or less, indicating a significance level of at least 10 percent.

5. RESULTS AND ANALYSIS

Because the data was gathered through a few different channels, we perform a control regression to check if the source, in other words whether where the respondent found the survey, has a significant impact on the time and risk preference variables. Two separate regressions are performed, one with *Patience* as the dependent variable and one with *Risktaking* as the dependent variable. In both regressions, dummies for the sources *Social Media* and *Other*[8] are included with *Student email* used as the reference category, as well as controls for gender, age, income, university degree and time/risk preference studies, see Table D1 in Appendix D. For both patience and risk taking, none of the sources are statistically significant indicating that the source of the survey does not affect the answers. Due to this result, a control for the source is not included in the coming regressions.

5.1 Non-parametric analysis of patience and risk taking

As discussed in section 4.2, our comparison sample is not as representative of the Swedish population as we would have hoped. We have an overrepresentation of women, young respondents and respondents with a university degree as well as a mean income that is somewhat higher than the mean income in Sweden. We therefore estimate two OLS regressions with *Patience* and *Risktaking* as the dependent variables and the four non-representative variables as the independent variables. In addition, we estimate two OLS regressions with the same dependent variables and only the variables that were significant in the first regressions as the independent variables, see Table D2 in Appendix D. We then use the estimated coefficients in these regressions and multiply them with the population means to calculate weighted mean values for the two preference measurements. The weighted means for *Patience* are 20.472 and 19.910 which are slightly

[8] *Other* is a combination of all other sources such as work/companies and asked in person due to the low number of observations for these sources.

different from the unweighted mean of 19.477. For *Risktaking*, the weighted means are 10.119 and 10.112 while the unweighted mean is 10.690. These differences are quite small, however since there are some differences, potential problems could arise from the overrepresentation of these variables. We have therefore chosen to control for all these variables in our regressions below.
Next, we examine if there is any correlation between patience and risk taking in our full sample. The correlation coefficient for the full sample is -0.007 which indicates a negative, however very small, correlation between the respondents' time and risk preferences. In addition to the correlation for the full sample, we also check the correlation for our two separate samples. For the student sample, the correlation coefficient is -0.012 which is similar to the full sample only somewhat larger in absolute values. For the comparison sample however, the correlation coefficient is 0.029, indicating that there is instead a positive correlation between time and risk preferences for the comparison sample. All correlation coefficients are quite small, suggesting that there does not appear to be any meaningful correlation between time and risk preferences. This is in line with studies by for instance Van Der Pol et al. (2015) and Ioannou & Sadeh (2016).

To analyze if there are any significant differences in patience and risk taking between our student sample and comparison sample, we perform two-sample Wilcoxon rank-sum tests in addition to the regression analysis presented in the next section. The results for patience and risk taking are p-values of 0.459 and 0.172, respectively. These results indicate that there does not appear to be any significant differences in distribution between the student sample and comparison sample regarding both time and risk preferences.

5.2 Regression analysis of patience and risk taking

Table 2 below presents three general regressions performed on the full sample in the dataset. The first is a probit regression where the dependent variable equals 1 if the respondent is in the student sample, analyzing which variables affect the likelihood of a respondent being in the student sample. The results shown in the table are the coefficients, not the marginal effects, since we only interpret significance and direction. The second and third columns show the regression outputs from two OLS regressions where *Patience* and *Risktaking* are the dependent variables, respectively. These regressions analyze which variables seem to have an effect on time and risk preferences for the entire sample.

Table 2: General Regressions of Full Sample

VARIABLES	(1) Probit Dependent Variable Student Sample Dummy	(2) OLS Dependent Variable Patience	(3) OLS Dependent Variable Risktaking
Male	-0.0948	1.070***	1.477***
	(0.0644)	(0.348)	(0.187)
Age 18-29	-0.0413	0.129	0.827***
	(0.0745)	(0.430)	(0.224)
Age > 45	-1.030***	1.181	-0.0980
	(0.113)	(0.759)	(0.426)
Low income	1.359***	0.530	-0.736***
	(0.0662)	(0.422)	(0.224)
High income	-0.275***	0.942	0.804*
	(0.106)	(0.785)	(0.441)
Univeristy degree	-0.289***	-0.0831	-0.171
	(0.0625)	(0.348)	(0.182)
Timerisk	-0.0859	-0.0443	1.321***
	(0.114)	(0.595)	(0.318)
Constant	0.705***	18.84***	9.705***
	(0.0762)	(0.487)	(0.263)
Observations	3,991	3,991	3,991
R-squared		0.004	0.032

(Age 30-45 and Medium income used as base levels)
Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

In the first column we can see that age, income and university degree have significant estimates. Individuals with a low income are on average more likely to be in the student sample compared to those with a medium income, keeping all other factors constant, while individuals over 45 years old (compared to those between 30 and 45) or those with a university degree are less likely to be in the student sample. The estimated coefficients for *Male* and *Age 18-29* are not statistically significant, indicating that gender does not affect the probability of being in the student sample and that there is no statistical difference in the likelihood of being in the student sample for respondents between 18 and 29 compared to those between 30 and 45.

In column 2 we can see that gender is the only variable that has a statistically significant effect on the level of patience. Men, on average, has a somewhat higher level of patience compared to women, while age, income, university degree and time and/or risk preferences studies do not seem to affect patience. For risk taking, column 3 shows that, on average, men are more risk taking, young respondents are more risk taking compared to respondents between 30 and 45 and individuals with higher incomes have higher levels of risk taking. The positive estimated coefficient for *Timerisk* suggests that respondents who have studied time and/or risk preferences at university level on average makes more risky decisions compared to those who have not studied these areas. The estimated coefficients for *Age > 45* and *University degree* are not statistically

significant. For both patience and risk taking, gender seems to have the largest effect on preferences. For patience, the difference between men and women is approximately 1.1 levels and for risk taking it is approximately 1.5 levels.

Table 3 below presents the analysis regarding differences between the student sample and comparison sample, column 1 to 4, as well as the analysis regarding gender differences, column 5 to 8. As mentioned in section 4.4 Methodology, all eight regressions are performed using OLS with robust standard errors and for each analysis there are two regressions with *Patience* as the dependent variable and two regressions with *Risktaking* as the dependent variable. In each case, we start by only adding the main variable or variables of interest in the first regression and then add the control variables in the second. To recap from section 3, our hypotheses for these analyses are the following:

H1: Swedish students' time and risk preferences differ from the general Swedish populations' with students being less risk taking and more impatient.
H2: Men are more risk taking and less patient compared to women. There is also a difference in the gender effect between the two samples but the direction is unclear.

Table 3: Differences Between Student Sample & Comparison Sample and Gender Differences - OLS

VARIABLES	(1) Dependent Variable Patience	(2) Dependent Variable Patience	(3) Dependent Variable Risktaking	(4) Dependent Variable Risktaking	(5) Dependent Variable Patience	(6) Dependent Variable Patience	(7) Dependent Variable Risktaking	(8) Dependent Variable Risktaking
Studentsample	0.279	0.490	-0.428	-0.0868	0.796	0.771	-0.167	-0.0332
	(0.471)	(0.548)	(0.265)	(0.301)	(0.586)	(0.646)	(0.320)	(0.356)
Male		1.076***		1.476***	2.044**	1.741*	1.902***	1.603***
		(0.349)		(0.187)	(0.910)	(0.911)	(0.518)	(0.517)
SS*male					-1.136	-0.771	-0.342	-0.147
					(0.983)	(0.984)	(0.554)	(0.551)
Age 18-29		0.136		0.826***		0.136		0.826***
		(0.430)		(0.224)		(0.430)		(0.224)
Age > 45		1.340*		-0.126		1.349*		-0.124
		(0.776)		(0.436)		(0.776)		(0.436)
Low income		0.390		-0.711***		0.384		-0.712***
		(0.446)		(0.239)		(0.446)		(0.239)
High income		1.006		0.793*		0.941		0.780*
		(0.787)		(0.442)		(0.790)		(0.443)
University degree		-0.0610		-0.175		-0.0456		-0.172
		(0.350)		(0.183)		(0.351)		(0.183)
Timerisk		-0.0426		1.321***		-0.0367		1.322***
		(0.594)		(0.318)		(0.594)		(0.318)
Constant	19.48***	18.48***	10.69***	9.768***	18.68***	18.24***	9.950***	9.721***
	(0.440)	(0.633)	(0.250)	(0.348)	(0.550)	(0.705)	(0.302)	(0.390)
Observations	4,094	3,991	4,094	3,991	4,059	3,991	4,059	3,991
R-squared	0.000	0.004	0.001	0.032	0.003	0.004	0.020	0.032

(Age 30-45 and Medium income used as base levels)
Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

The main result that is of interest for the first four columns is the estimates of the student sample dummy. The dummy is insignificant in both models for both patience and risk taking, indicating that there does not seem to be any significant differences in patience or risk taking between students and our more general sample. In addition, we can see in column 2 that the only significant estimates regarding patience are *Male* and *Age > 45*. This suggests that men are on average more patient in line with Table 2, and also that older respondents are on average more patient compared to those between 30 and 45 years old. Regarding risk preferences, a few more variables are significant. These indicate that, on average, men are less risk averse compared to women, young take more risks compared to respondents between 30 and 45 years old, respondents with low income tend to be more risk averse as well as that past studies of time and/or risk preferences seems to affect the respondents' choices concerning the risky option, all in line with the results in Table 2. As with time preferences, the fact that the student sample dummy is insignificant suggests that there is no significant difference in risk taking between the student sample and comparison sample. However, since *Age > 45*, *Low income* and *High income* are significant for either patience or risk taking and also significant in the probit regression in Table 2 where the student sample dummy is the dependent variable, this could indicate that there is an indirect effect on preferences of being in the student sample. Individuals over 45 years old are less likely to be in the student sample than those between 30 and 45 years old and at the same time they are on average more patient compared to individuals between 30 and 45 years old. This suggests that individuals with these characteristics in the comparison sample are more likely to be more patient compared to the student sample. Similarly, income and the probability of being in the student sample seems to be negatively correlated, individuals with a low income are more likely to be in the student sample, and since the estimated coefficients for income are significant for risk taking, this could indicate that the student sample is more likely to be less risk taking compared to the comparison sample.

Regarding the analysis of gender differences, we can see that the estimated coefficient for *Male* is the only one that is statistically significant in column 5 which represent the results for patience. This indicates that there is no gender difference in the student sample but men in the comparison sample are on average 2 levels more patient than the women. This result holds when we add our demographic controls as well as *Timerisk* with the exception that the statistical significance and magnitude decreases somewhat. Column 6 also shows that the estimated coefficient for *Age > 45* is statistically significant suggesting that older people on average tend to be more patient compared to people between 30 and 45 years old. All other included control variables are statistically insignificant. For risk taking, the results are quite similar concerning the main effects. *Male* is the

only significant estimate in column 7, indicating that women in the comparison sample are on average 1.9 levels more risk averse than the men while there is no gender difference in the student sample. The results remain when we add the control variables in column 8 except for a slight decrease in magnitude. In addition, we find that younger respondents are on average more risk taking compared to those between 30 and 45 years old, increases in income suggests on average higher levels of risk taking low and if the respondent has studied time and/or risk preferences at university, they on average disclose higher levels of risk taking.

In addition to the regressions in Table 3, we also performed the same regressions but with a sample where all students from the comparison sample have been removed[9] as a robustness test, see Table D3 in Appendix D. This was conducted to see if the students in the comparison sample possibly offset potential differences. Concerning differences between the student sample and comparison sample, the main result remains the same, there is no statistically significant difference between these two samples regarding both patience and risk taking. The significant coefficients for patience changes somewhat more than for risk taking but in general there is no considerable changes in coefficients and the only noticeable change that occurs in columns 1 to 4 is that *High income* loses its significance for risk taking. For the analysis of gender differences there are a few more changes. As with the previous analysis, the significant coefficients for patience changes more than for risk taking but there are still no major changes in the magnitude. For patience, the significance of *Male* decreases in column 5 and in column 6 the estimated coefficient turns insignificant. For risk taking, *High income* loses its significance in this analysis as well.

To conclude, our main results in this section indicate that there is no significant difference in time or risk preferences between the student sample and comparison sample. These results also hold for our robustness check where we remove the students in the comparison sample. This result is not in line with our hypothesis that there is a difference between the two samples but instead follows for example Kardes (1996) and Güth et al. (2007) who stated that the decisions of students and non-student are similar. As mentioned previously, we are aware that our comparison sample is not fully representative and more studies should analyze this. Regarding gender differences in the two samples, the results both supports and rejects our hypothesis. We hypothesized that men are more risk taking than women which is confirmed for the comparison sample in our analysis, in line with for instance Weber et al. (2002) and Croson & Gneezy (2009), Borghans et al. (2009),

[9] The removal of the students increased the mean age for the comparison sample from 36 to 38.

but not for the student sample since the results suggest that there is no difference. For patience, we hypothesized that women are more patient, but our results suggest the opposite for the comparison sample and no difference in the student sample in line with Chao et al. (2009) and Almås et al. (2012). The last part of our hypothesis regarding gender was that the gender difference in the two samples differ. This is confirmed by our results since the results show a gender difference in the comparison sample but not in the student sample which follows the research by Cappelen et al. (2015). We are also aware that our R-squared is quite low for all models suggesting that our models do not explain much of the variation between individuals. However, our main purpose is the comparisons and in turn the significance of the estimated coefficients and the R-squared will therefore not be discussed any further.

5.3 Non-parametric analysis of differences within the student sample

The next part of our results concerns the differences within the student sample and discussed previously, our hypothesis is the following:

H3: There are differences in students' patience and risk taking depending on study area and study year due to selection effects and higher education, however, the direction is not clear.

We begin by analyzing this descriptively by performing two-sample Wilcoxon rank-sum tests of differences in patience and risk taking between students depending on how long they have studied at university and what study area and faculty they belong to. For each variable, we test if there are any significant differences in both patience and risk taking between any possible combinations of the variable categories. Due to the large number of combinations produced by 8 faculties and 13 study areas, we will not discuss all results in detail. For detailed results of the two-sample Wilcoxon rank-sum tests, see figures D1, D2 and D3 in Appendix D. The three tables below before each section presents the mean values for *Patience* and *Risktaking* for all categories of the three variables. The mean value of *Patience* and *Risktaking* for the entire student sample is 19.76 and 10.26, respectively.

Table 4: Mean Values for Different Faculties

FACULTY	N	Patience	Risktaking
Business, Economics and Law	534	19.60	11.65
Humanities	98	18.98	8.99
Computer / IT / Technology	159	19.81	11.11
Arts	100	20.36	9.74
Science	256	21.38	10.07
Medicine	903	20.30	10.37
Social Science	905	19.92	9.97
Educational Science	604	18.25	9.48
Full Student Sample	3574	19.76	10.26

Regarding mean values of patience divided into the different faculties, we find that Science has the highest mean value (21.38), approximately 3 levels higher than for Educational Science which has the lowest (18.25). The rank sum tests showed that out of the 28 possible combinations of faculties, 11 combinations have statistically significant differences in patience mean values at at least a 10 percent level. The faculty with the most significant differences is Educational Science with a mean value of patience that is significantly lower compared to all other faculties except Humanities which is not significantly different. Students from Science (21.38) and Medicine (20.30) are on average more patient compared to students from both Business, Economics & Law (19.60) and Humanities (18.98), and students from Social science are on average 1.5 levels less patient compared to students in Science.

For risk taking, Business, Economics & Law has the highest mean value of 11.65 while Humanities has the lowest with 8.99, and the number of statistically significant differences is even higher for risk taking, 16 out of 28 combinations. Most of these differences are statistically significant at a 5 percent level and a few at a 10 percent level. The faculty with the most significant combinations is Business, Economics & Law which has a significantly higher level of risk taking compared to all faculties except Computer/IT/Technology which is not significant. Another faculty with many significant differences in risk taking is Educational Science. Students in this faculty are on average between 0.5 and 2 levels less risk taking compared to students in Business, Economics & Law, Science, Medicine, Social Science and Computer/IT/Technology as mentioned previously.

Table 5: Mean Values for Different Study Areas

STUDYAREA	N	Patience	Risktaking
Business / Economics	369	19.70	12.35
Law	148	19.95	10.16
Computer / IT / Technology	144	19.39	11.04
Educational Science	588	18.36	9.46
Health / Medical Care	903	20.30	10.37
Art	100	20.36	9.74
Humanities	98	18.98	8.99
Science	221	20.93	10.11
Geoscience / Conservation	92	22.90	10.11
Political science / Global Studies	492	19.90	9.64
Psychology / Social Work	217	21.03	10.52
Media / Communication	121	18.48	10.26
Work Science	33	16.03	10.36
Full Student Sample	3574	19.76	10.26

In addition to faculty, we expand this analysis by testing the differences between all combinations of study areas. The number of statistically significant differences at a 10 percent level are 29 for patience and 26 for risk taking out of 78 combinations for each. For both patience and risktaking, most of these are statistically significant at a 5 percent level. Regarding patience, Work Science has the lowest mean value (16.03) and the study area with the highest mean patience is Geoscience/Conservation (22.90), a difference by almost 7 levels. Students from Geoscience/Conservation are on average more patient compared to students from 8 other study areas, with differences ranging from around 2 to 7 levels, while Work Science students are on average between 4 and 5 levels less patient compared to 7 other study areas in addition to Geoscience/Conservation. Business/Economics students (19.70) are, in addition to significant differences from students in Geoscience/Conservation and Work Science, on average more patient than students in Educational Science and less patient compared to students in Science and Psychology/Social work.

For risk taking, Business/Economics students have the highest mean of risk taking, 12.35, and students in Humanities have the lowest, 8.99. Business/Economics students are on average between 1.3 and 3.4 levels more risk taking compared to all other study areas and Humanities students are on average significantly more risk averse than students in 4 other study areas, with differences ranging from about 1 to 2 levels, in addition to Business/Economics. Both Law students (10.16) and Media/Communication students (10.26) are on average more risk taking compared to students in Educational Science (9.46), and students in Art (9.74) are on average less risk taking than Computer/IT/Technology students (11.04). Students in Political science/Global studies (9.64) are on average between 0.7 and 1.4 levels more risk averse compared to students in Computer/IT/Technology, Health/Medical care (10.37) and Psychology/Social work (10.52).

Table 6: Mean Values for Different Years at Uni

YEARS AT UNI	N	Patience	Risktaking
Years at uni 0-2	1,472	19.38	10.35
Years at uni 2-4	1,222	19.74	10.39
Years at uni > 4	880	20.39	10.09
Full Student Sample	3574	19.76	10.26

Concluding the results discussed above, we can see that time and risk preferences do significantly differ depending on what faculty/study area students are in. Moving from the analysis of study area, we move on to differences depending on how long students have studied at university. For the years at university dummies, the only significant differences appear to be for patience between *Years at uni 0-2* and *Years at uni > 4*, at a 1 percent level, as well as between *Years at uni 2-4* and *Years at uni > 4*, at a 10 percent level. This indicates that those who have studied less than 2 years as well as those who have studied between 2 and 4 years are on average 1 and 0.7 levels, respectively, less patient compared to individuals who have studied more than 4 years. There does not appear to be any significant difference in terms of patience between those who have studied less than 2 years and those who have studied between 2 and 4 years, as well as in terms of risk taking for any of the samples. This suggests that how long students have studied at university could have an effect on at least time preferences together with the effects on both time and risk preferences of faculty and study area found above.

5.4 Regression analysis of differences within the student sample

Table 7 below continues the analysis regarding how time and risk preferences differ within the student sample but with dummies for each faculty at the University of Gothenburg as independent variables in four OLS regressions. The faculty used as the reference category is the faculty of Business, Economics & Law. *Patience* is the dependent variable in the first two columns and *Risktaking* in column 3 and 4. In the first column for each dependent variable, only the faculty dummies are included as the independent variables and in the second regression, controls for gender, age and time and/or risk preference studies are included.

Table 7: Differences Within Student Sample Regarding Faculty - OLS

VARIABLES	(1) Dependent Variable Patience	(2) Dependent Variable Patience	(3) Dependent Variable Risktaking	(4) Dependent Variable Risktaking
Humanities	-0.623	-0.200	-2.656***	-2.262***
	(1.062)	(1.093)	(0.512)	(0.518)
Computer/IT/Technology	0.208	0.00940	-0.539	-0.636
	(0.974)	(0.991)	(0.501)	(0.514)
Arts	0.757	0.938	-1.906***	-1.187*
	(1.083)	(1.125)	(0.608)	(0.623)
Science	1.772**	1.793**	-1.572***	-1.175***
	(0.739)	(0.767)	(0.388)	(0.399)
Medicine	0.698	0.883	-1.277***	-0.715**
	(0.542)	(0.580)	(0.287)	(0.303)
Social Science	0.312	0.400	-1.680***	-1.206***
	(0.537)	(0.569)	(0.282)	(0.293)
Educational Science	-1.355**	-1.198*	-2.169***	-1.549***
	(0.604)	(0.649)	(0.323)	(0.347)
Male		0.902**		1.326***
		(0.383)		(0.203)
Age 18-29		0.165		0.558**
		(0.439)		(0.229)
Age > 45		1.491		0.472
		(1.052)		(0.603)
Timerisk		-0.181		0.769**
		(0.675)		(0.349)
Constant	19.60***	19.05***	11.65***	10.30***
	(0.426)	(0.639)	(0.226)	(0.334)
Observations	3,559	3,526	3,559	3,526
R-squared	0.007	0.009	0.018	0.034

(Economics/Business/Law and Age 30-45 used as base levels)
Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

In column 1 and 2, Science and Educational Science are the significant faculty dummies which suggests that respondents who study Science are on average 1.8 levels more patient and respondents who study Educational Science are on average 1.4 less patient, compared to those in the Business, Economics & Law faculty. In column 2, the results remain almost the same except that the magnitude of Educational Science decreases to slightly when we add the control variables. We can also see that *Male* is significant and positive in line with previous regressions. In column 3 and 4, all faculties except the faculty of Computer/IT/Technology are statistically significant, both with and without the control variables, along with the control variables *Male*, *Age 18-29* and *Timerisk*. It is also interesting to note that the absolute value of the estimated coefficients decreases with a relatively large change when adding the control variables, indicating that some of the differences are caused by differences in gender, age and studies of time/risk preferences. Since the estimated coefficients for the faculty dummies are all negative, this tells us that students who study at the faculty of Business, Economics & Law on average have the highest level of risk taking. They are followed by students at the faculty of Medicine who, on average, are 0.7 levels less risk taking, Science, Arts and Social Science with 1.2 levels and Educational Science with 1.5 levels. The students who belong to the faculty of Humanities seem to be the least risk taking with on

average 2.3 levels lower risk taking compared to Business, Economics & Law. The estimated coefficients for *Male*, *Age 18-29* and *Timerisk* are all in line with previous results.

Table 8 presents the results regarding how time and risk preferences differ between different study areas with the area of Business/Economics as the reference category. Similar to Table 7, *Patience* is the dependent variable in the first two columns and *Risktaking* in the last two, with the first column in each case only including the study area dummies and no control variables. Note that *Other* represents a mix of other study areas and the estimated coefficients therefore do not provide any meaningful conclusions and will therefore not be interpreted.

Table 8: Differences Within Student Sample Regarding Study Area - OLS

VARIABLES	(1) Dependent Variable Patience	(2) Dependent Variable Patience	(3) Dependent Variable Risktaking	(4) Dependent Variable Risktaking
Law	0.249	0.325	-2.190***	-1.699***
	(0.949)	(1.005)	(0.484)	(0.507)
Computer/IT/Technology	-0.308	-0.558	-1.318**	-1.358**
	(1.061)	(1.097)	(0.536)	(0.560)
Educational science	-1.336**	-1.150	-2.895***	-2.222***
	(0.666)	(0.745)	(0.359)	(0.404)
Health/Medical Care	0.605	0.808	-1.984***	-1.364***
	(0.608)	(0.678)	(0.324)	(0.360)
Art	0.664	0.857	-2.612***	-1.843***
	(1.118)	(1.179)	(0.627)	(0.653)
Humanities	-0.717	-0.271	-3.363***	-2.915***
	(1.098)	(1.152)	(0.534)	(0.556)
Science	1.236	1.229	-2.239***	-1.830***
	(0.837)	(0.888)	(0.437)	(0.462)
Geoscience/Conservation	3.206***	3.294***	-2.244***	-1.743***
	(0.964)	(1.029)	(0.599)	(0.625)
Political science/Global studies	0.206	0.247	-2.712***	-2.151***
	(0.671)	(0.730)	(0.347)	(0.376)
Psychology/Social work	1.331	1.580*	-1.832***	-1.364***
	(0.824)	(0.859)	(0.454)	(0.465)
Media/Communication	-1.217	-1.117	-2.088***	-1.523***
	(1.082)	(1.127)	(0.537)	(0.563)
Work science	-3.666*	-3.419*	-1.989*	-1.301
	(1.923)	(1.944)	(1.195)	(1.182)
Other	-5.478**	-5.471**	-2.040*	-1.605
	(2.153)	(2.145)	(1.062)	(1.031)
Male		0.971**		1.303***
		(0.385)		(0.204)
Age 18-29		0.262		0.542**
		(0.440)		(0.230)
Age > 45		1.527		0.457
		(1.057)		(0.603)
Timerisk		-0.305		0.444
		(0.708)		(0.367)
Constant	19.70***	19.04***	12.35***	10.98***
	(0.507)	(0.744)	(0.272)	(0.392)
Observations	3,558	3,525	3,558	3,525
R-squared	0.013	0.015	0.025	0.039

(Economics and Age 30-45 used as base levels)
Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

In the first column, only Educational science, Geoscience/Conservation and Work Science are significant. Adding the control variables in column 2 provides significant estimates for Geoscience/Conservation, Psychology/Social work and Work Science as well as for Male. This tells us that respondents who study Geoscience/Conservation or Psychology/Social work are on average 3.3 and 1.6 levels, respectively, more patient compared to Business/Economics students, while respondents who study Work Science are on average 3.4 levels less patient. Concerning risk preferences we can see that all study areas except Work Science are significant when all controls are included. Individuals who study Business/Economics on average has the highest levels of risk taking while individuals who study Humanities are on average more risk averse than students from any other study area, with 2.9 levels lower risk taking compared to Business/Economics. Educational science and Political science/Global studies students are on average 2.2 levels less risk taking compared to Business/Economics students, Art and Science 1.8 levels, Geoscience/Conservation and Law 1.7 levels, Media/Communication 1.5 levels and 1.4 levels for Computer/IT/Technology, Health/Medical care and Psychology/Social work.

Table 9 presents the last part of the analysis of differences within the student sample, OLS regressions analyzing if time and risk preferences are affected by how many years respondents have studied at university. As with the two previous tables, *Patience* is the dependent variable in column 1 and 2 and *Risktaking* in column 3 and 4. The dummy *Years at uni 0-2* is used as the reference category.

Table 9: Differences Within Student Sample Regarding Years at University - OLS

VARIABLES	(1) Dependent Variable Patience	(2) Dependent Variable Patience	(3) Dependent Variable Risktaking	(4) Dependent Variable Risktaking
Years at uni 2-4	0.420	0.468	0.0380	0.00367
	(0.390)	(0.394)	(0.209)	(0.208)
Years at uni > 4	1.116***	1.190***	-0.280	-0.362
	(0.430)	(0.440)	(0.223)	(0.224)
Male		0.875**		1.494***
		(0.374)		(0.199)
Age 18-29		0.444		0.676***
		(0.440)		(0.228)
Age > 45		0.891		0.229
		(1.052)		(0.594)
Timerisk		-0.422		1.320***
		(0.636)		(0.331)
Constant	19.34***	18.69***	10.32***	9.245***
	(0.268)	(0.473)	(0.143)	(0.246)
Observations	3,574	3,540	3,574	3,540
R-squared	0.002	0.004	0.001	0.027

(Years at uni 0-2 and Age 30-45 used as base levels)
Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

In column 1, where there is no control variables, *Years at uni > 4* is statistically significant and this holds when controls for gender, age and time/risk studies are included. This indicates that individuals who have studied between 2 and 4 years at university on average do not differ in terms of patience compared to those who have studied between 0 and 2 years while those who have studied more than 4 years are on average 1.1 levels more patient compared to those who have not studied that long. For risk preferences, both *Years at uni 2-4* and *Years at uni > 4* are statistically insignificant in all three models, indicating that there does not seem to be any effect of how long an individual has studied on their risk taking.

To conclude, the results from both the non-parametric analyses and the regressions confirm our hypothesis that there are preference differences within the student sample depending on study area and years studied at university. The most important result that we find is that patience and risk taking do actually significantly differ depending on study area, especially for risk taking which has the most significant combinations in the Wilcoxon rank-sum tests as well as that almost all study areas are statistically different from Economics. For patience, there are fewer significant facilities/study areas but there are still significant differences. In addition, we also find significant differences in patience depending on how long the students have studied.

6. CONCLUSION

The aim of this thesis is to investigate if student samples are really always appropriate to use in economic research when the goal is to generalize the results to the general population. We examine if there are any differences in time and risk preferences between a large student sample and a more general sample. Moreover, we look at gender differences in these two samples and analyze if potential gender differences are the same in both samples or if they differ. Lastly, we take the discussion of student samples on step further by analyzing if there are any differences in time and risk preferences within the student sample which to the best of our knowledge has not been studied before. These analyses are performed using both non-parametric tests as well as OLS regressions on gathered survey data on individuals over 18 years old living in Sweden. The data is divided into a student sample of 3,574 observations and a comparison sample of 520 observations. No monetary incentives are used in the survey.

Comparing patience and risk taking between our two samples, we find that there appears to be no significant difference between the student sample and the comparison sample. This indicates that

students and the more general population are actually quite similar in their time and risk preferences and that it therefore might not be a problem to use students for research within this area. Since there are no significant differences, the results from research using students should be generalizable to the general population as well and since it is often much cheaper and more easily available to use students, student samples might still be a good subject pool. We do however find that characteristics such as age and income have significant effects both for preferences as well as for the likelihood of being in the student sample. This suggests that there could be indirect effects on preferences from being in the student sample. Regarding gender differences, we find that men in the comparison sample are on average more patient as well as more risk taking compared to women. This difference only seems to exist in the comparison sample and not in the student sample where there is no difference in preferences between genders. Our most important results concern the differences in preferences within the student sample. We find clear evidence that time and risk preferences differ between different study areas and years at university also matters for time preferences. When using both faculty and study area to divide the student samples into groups, we find that there are many significant differences in preferences for patience and even more for risk taking.

These results imply that a student sample with variation in types of students could be appropriate to use as a substitute for the general population but what type of students are used is of great importance. Using a student sample with students from only one program or faculty could bias the results and it is therefore important to include students who vary in both study area and years at university in order to get the most representative results. This is something which is generally not discussed in economic research and traditionally there is not much variation in the student samples used. Our results are therefore an important contribution to economic research as well as research within other areas by showing researchers that students differ from each other and that it might not be enough to only use one type of students. These results could also have implications for past research since results from research with little variation in the student sample might be questioned. Lastly, we believe that these results could be of use to for instance policymakers and employers by acknowledging that different groups of students might need to be targeted differently.

We are aware that this research has its limitations and could be improved and extended by future researchers. One main limitation with the data is the comparison sample. Ideally, we would have liked to have a larger random comparison sample, gathered with one method and more representative of the Swedish population. We are aware that this is not case in our data and future

research could therefore aim to compare students to a larger and more representative and random sample in order to get more accurate and precise results. Regarding our survey questions, there are two things that could definitely be interesting to change or investigate for future research. First, as mentioned in the data section, there are some disadvantages of using a survey with hypothetical questions. It could therefore be interesting for future research to extend our analysis by using incentivized elicitation methods instead even though we look at relative differences and both groups should be affected the same. Secondly, we believe that the amounts used as well as the differences between the amounts in each question could potentially influence the decisions made. Decisions regarding small amounts of money could be very different from decisions where the amounts or even time span is much larger. Researchers could therefore extend the analysis by using larger and smaller amounts and changes in order to see how those changes affects the results. Because of time constraints and feasibility, we have narrowed down our research to time and risk preferences but since differences between samples might differ depending on the area, future research should try to analyze if there are any differences both within student samples as well as between students and the general population within many more areas of economic research.

References

Albert, S. M., & Duffy, J. (2012). Differences in Risk Aversion between Young and Older Adults. *Neuroscience and neuroeconomics*.

Almås, I., Cappelen, AW., Salvanes, KG., Sørensen, EØ., Tungodden, Bertil. (2012). Willingness to compete: family matters. In: NHH Discussion Papers SAM 23/2012.

Anderhub, V., Güth, W., Gneezy, U., & Sonsino, D. (2001). On the interaction of risk and time preferences: An experimental study. *German Economic Review*, 2(3), 239-253.

Anderson, J., Burks, S. V., Carpenter, J., Götte, L., Maurer, K., Nosenzo, D., ... & Rustichini, A. (2013). Self-selection and variations in the laboratory measurement of other-regarding preferences across subject pools: evidence from one college student and two adult samples. *Experimental Economics*, 16(2), 170-189.

Andreoni, J., & Sprenger, C. (2012). Risk preferences are not time preferences. *American Economic Review*, 102(7), 3357-76.

Barreda-Tarrazona, I. Jaramillo-Gutiérrez, A. Navarro-Martínez, D. & Sabater-Grande, G. (2011). Risk attitude elicitation using a multi-lottery choice task: Real vs. hypothetical incentives. *Spanish Journal of Finance and Accounting*, 40(152), 613-628.

Bellemare, C., Kröger, S., & Van Soest, A. (2008). Measuring inequity aversion in a heterogeneous population using experimental decisions and subjective probabilities. *Econometrica*, 76(4), 815-839.

Belot, M., Duch, R., & Miller, L. (2015). A comprehensive comparison of students and non-students in classic experimental games. *Journal of Economic Behavior & Organization*, 113, 26-33.

Borghans, L., Heckman, J. J., Golsteyn, B. H., & Meijers, H. (2009). Gender differences in risk aversion and ambiguity aversion. *Journal of the European Economic Association*, 7(2-3), 649-658.

Boschini, A., Dreber, A., von Essen, E., Muren, A., & Ranehill, E. (2018). Gender, risk preferences and willingness to compete in a random sample of the Swedish population.

Burks, S., Carpenter, J., & Goette, L. (2009). Performance pay and worker cooperation: Evidence from an artefactual field experiment. *Journal of Economic Behavior & Organization*, 70(3), 458-469.

Byrnes, J. P., Miller, D. C., & Schafer, W. D. (1999). Gender differences in risk taking: a meta-analysis. *Psychological bulletin*, 125(3), 367.

Calhoun, C. (Eds.). (2002). Dictionary of the social sciences. Oxford University Press.

Camerer, C. F., & Loewenstein, G. (2003). Behavioral economics: Past, present, future.

Cappelen, A. W., Nygaard, K., Sørensen, E. Ø., & Tungodden, B. (2015). Social preferences in the lab: A comparison of students and a representative population. *The Scandinavian Journal of Economics*, 117(4), 1306-1326.

Carlson, R. (1971). Where Is the Person in Personality Research? *Psychological Bulletin*, 75(3), 203–219.

Carpenter, J. P., Burks, S., & Verhoogen, E. (2005). Comparing students to workers: The effects of social framing on behavior in distribution games. *In Field experiments in economics (pp. 261-289).* Emerald Group Publishing Limited.

Carpenter, J., Connolly, C., & Myers, C. K. (2008). Altruistic behavior in a representative dictator experiment. *Experimental Economics*, 11(3), 282-298.

Castillo, M., Ferraro, P. J., Jordan, J. L., & Petrie, R. (2011). The today and tomorrow of kids: Time preferences and educational outcomes of children. *Journal of Public Economics*, 95(11-12), 1377-1385.

Chao, L. W., Szrek, H., Pereira, N. S., & Pauly, M. V. (2009). Time preference and its relationship with age, health, and survival probability. *Judgment and Decision Making*, 4(1), 1

Croson, R., & Gneezy, U. (2009). Gender differences in preferences. *Journal of Economic literature*, 47(2), 448-74.

Dittrich, M., & Leipold, K. (2014). Gender differences in time preferences. *Economics Letters*, 122(3), 413-415.

Dohmen, T., Falk, A., Huffman, D., & Sunde, U. (2010). Are risk aversion and impatience related to cognitive ability? *American Economic Review*, 100(3), 1238-60.

Dohmen, T., Falk, A., Huffman, D., Sunde, U., Schupp, J., & Wagner, G. G. (2011). Individual risk attitudes: Measurement, determinants, and behavioral consequences. *Journal of the European Economic Association,* 9(3), 522-550.

Edwards, W. (1953). Probability preferences in gambling. *The American Journal of Psychology,* 66(3), 349–364.

Faff, R., Mulino, D., and Chai, D. (2008) On the linkage between financial risk tolerance and risk aversion. *Journal of Financial Research,* 31(1), 1-23.

Falk, A., Meier, S., & Zehnder, C. (2013). Do lab experiments misrepresent social preferences? The case of self-selected student samples. *Journal of the European Economic Association,* 11(4), 839-852.

Falk, A., Becker, A., Dohmen, T., Huffman, D., & Sunde, U. (2016). The preference survey module: A validated instrument for measuring risk, time, and social preferences.

Falk, A., Becker, A., Dohmen, T., Enke, B., Huffman, D., & Sunde, U. (2018). Global evidence on economic preferences. *The Quarterly Journal of Economics,* 133(4), 1645-1692.

Frederick, S., Loewenstein, G., & O'Donoghue, T. (2002) Time Discounting and Time Preference: A Critical Review, in Loewenstein, G., Read, D., & Baumeister, R. F. (Eds.). (2003). Time and decision: Economic and psychological perspectives of intertemporal choice. Russell Sage Foundation. 13-86.

Golsteyn, B. H., Grönqvist, H., & Lindahl, L. (2014). Adolescent time preferences predict lifetime outcomes. *The Economic Journal,* 124(580), F739-F761.

Green, L., Fry, A. F., & Myerson, J. (1994). Discounting of delayed rewards: A life-span comparison. *Psychological science,* 5(1), 33-36.

Green, L., Myerson, J., Lichtman, D., Rosen, S., & Fry, A. (1996). Temporal discounting in choice between delayed rewards: the role of age and income. *Psychology and aging,* 11(1), 79.

Gränsmark, P. (2012). Masters of our time: impatience and self-control in high-level chess games. *Journal of Economic Behavior & Organization*, 82(1), 179-191.

Güth, W., Schmidt, C., & Sutter, M. (2007). Bargaining outside the lab–a newspaper experiment of a three-person ultimatum game. *The Economic Journal,* 117(518), 449-469.

Hanel, P. H., & Vione, K. C. (2016). Do student samples provide an accurate estimate of the general public? *PloS one,* 11(12), e0168354.

Harrison, G. W., Lau, M. I., & Williams, M. B. (2002). Estimating individual discount rates in Denmark: A field experiment. *American economic review,* 92(5), 1606-1617.

Hey, J. D. (2003). Microeconomics: People are Different. McGraw-Hill.

Ioannou, C. A., & Sadeh, J. (2016). Time preferences and risk aversion: Tests on domain differences. *Journal of Risk and Uncertainty,* 53(1), 29-54.

Kardes, F. R. (1996). In defense of experimental consumer psychology. *Journal of Consumer Psychology, 5*, 279–296.

Keren, G., & Roelofsma, P. (1995). Immediacy and certainty in intertemporal choice. *Organizational Behavior and Human Decision Processes, 63*, 287–297.

Koch, A., Nafziger, J., Nielsen, H.S. (2015). Behavioral economics of education. *Journal of Economic Behavior & Organization*, Volume 115, 3-17.

Lampi, E & Nordblom, K (2009). Gender and birth-order differences in time and risk preferences and decisions. *Working Papers in Economics 388*, University of Gothenburg, Department of Economics, revised 30 Jun 2011.

Lee, C. F., & Lee, A. C. (Eds.). (2006). Encyclopedia of finance. New York: Springer.

Manzini, P., & Mariotti, M. (2007). Choice over time, in: Anand, P., Pattanaik, P., & Puppe, C. (eds.). (2009). The Handbook of Rational and Social Choice, Oxford University Press, Oxford.

Meier, A. (2018). Emotions, Risk Attitudes, and Patience. *Mimeo*.

Perez-Arce, F. (2011). The effect of education on time preferences. RAND Working Paper Series WR- 844.

Peterson, R. A. (2001). On the use of college students in social science research: Insights from a second-order meta-analysis. *Journal of consumer research*, 28(3), 450-461.

Peterson, R. A., & Merunka, D. R. (2014). Convenience samples of college students and research reproducibility. J*ournal of Business Research,* 67(5), 1035-1041.

Quiggin, J. (2012). Generalized expected utility theory: The rank-dependent model. Springer Science & Business Media.

Read, D., & Read, N. L. (2004). Time discounting over the lifespan. *Organizational behavior and human decision processes*, 94(1), 22-32.

Samuelson, P. A. (1937). A Note on Measurement of Utility. *The Review of Economic Studies*, 4(2), 155-161.

Sears, D. O. (1986). College Sophomores in the Laboratory: Influences of a Narrow Data Base on Social Psychology's View of Human Nature. *Journal of Personality and Social Psychology*, 51(3), 515–530.

Silverman, I. W. (2003). Gender differences in delay of gratification: A meta-analysis. S*ex roles*, 49(9-10), 451-463.

Slovic, P., Kunreuther, H., & White, G. F. (1974). Decision processes, rationality and adjustment to natural hazards, in: Slovic, P. (2000). The perception of risk. Routledge. 1-31.

Slovic, P., Fischhoff, B., Lichtenstein, S., Corrigan, B., & Combs, B. (1977). Preference for insuring against probable small losses: Insurance implications, in: Slovic, P. (2000). The perception of risk. Routledge. 51-72.

Statistics Sweden. (2018a). Register on Participation in Education. Excel file: Participation in education autumn term 2017 for the population 16-64 years of age. Available online: http://www.scb.se/uf0507-en. (Accessed on 24 March 2019).

Statistics Sweden. (2018b). Utbildningsnivån i Sverige. Available online: https://www.scb.se/hitta-statistik/sverige-i-siffror/utbildning-jobb-och-pengar/utbildningsnivan-i-sverige/ (Accessed on 3 June 2019).

Statistics Sweden. (2019a). Population by sex and year. Year 1860 - 2018. Available online: http://www.statistikdatabasen.scb.se/pxweb/en/ssd/START__BE__BE0101__BE0101A/BefolkningR1860/table/tableViewLayout1/?rxid=52aa46fd-c12b-4714-86ac-d4fe335d7085 (Accessed on 26 April 2019).

Statistics Sweden. (2019b). Population by region, marital status, age and sex. Year 1968 - 2018 Available online: http://www.statistikdatabasen.scb.se/pxweb/en/ssd/START__BE__BE0101__BE0101A/BefolkningNy/?rxid=44065e86-5164-4f20-81c4-6d4f23e33775 (Accessed on 3 June 2019).

Statistics Sweden. (2019c). Income and tax statistics. Excel file: Net income 2017. Available online: https://www.scb.se/he0110-en. (Accessed on 26 April 2019).

Statistics Sweden. (2019d). Inkomster för personer i Sverige. Available online: https://www.scb.se/hitta-statistik/sverige-i-siffror/utbildning-jobb-och-pengar/inkomster-for-personer/ (Accessed on 3 June 2019).

Stout, L. A., Taking Conscience Seriously, in: Zak, P. J (Eds.). (2008) Moral Markets: The critical role of values in the economy. Princeton University Press. 157-172.

Ubfal, D. (2016). How general are time preferences? Eliciting good-specific discount rates. *Journal of Development Economics*, 118, 150-170.

Van Der Pol, Walsh, & Mccartney. (2015). Comparing time and risk preferences across three post-industrial UK cities. *Social Science & Medicine, 140*, 54-61.

Wang, M., Rieger, M. O., & Hens, T. (2016). How time preferences differ: Evidence from 53 countries. *Journal of Economic Psychology*, 52, 115-135.

Weber, E. U., Blais, A. R., & Betz, N. E. (2002). A domain-specific risk-attitude scale: Measuring risk perceptions and risk behaviors. *Journal of behavioral decision making*, 15(4), 263-290.

Wiseman, D. B., and Levin, I. P. (1996). Comparing risky decision making under conditions of real and hypothetical consequences. *Organizational Behavior and Human Decision Processes*, 66(3), 241-250.

Appendix A: Survey Questions

General Questions

1. Which language do you prefer to have the survey in? (Swedish or English)
2. How old are you?
3. Are you:
   a) Female
   b) Male
   c) Other/do not want to say
4. Do you currently live in Sweden?
5. Do you have children that you provide for (either alone or together with someone)?
6. Where do you live?
   a) In a large city (Stockholm, Gothenburg or Malmö)
   b) In a quite large city (more than 50,000 inhabitants)
   c) In a middle-size city (between 20,000 and 50,000 inhabitants)
   d) In a small city or the county side (less than 20,000 inhabitants)
7. What is your personal monthly income after tax in SEK (including any subsidies/CSN)?

Study Related Questions

1. What is your highest level of completed education?
2. Do you currently study? Which of the following options is correct for you?
   a) Yes, I study at secondary school (go directly to time questions)
   b) Yes, I study at komvux (go directly to time questions)
   c) Yes, I study at university (go to question 3)
   d) No, I do not study (go directly to time questions)
   e) No, I do not currently study but I have studied at university at some point (go to question 4)
3. Do you study full- or part-time? Chose the alternative that best describes your study situation (if no option fits, chose "Övrigt" and write your answer)
4. How long have you studied at university?
5. Which alternative best describes your study area? (if no option fits, chose "Övrigt" and write your answer)

Time questions (See Appendix B for levels of payment in 12 months)

Assume that you have won a lottery where you can choose between receiving your prize today or in 12 months. Please mark the alternative you prefer in each of the following 5 questions.

Do you prefer to receive 1,000 SEK today or XXX SEK in 12 months?

Risk questions (See Appendix B for levels of certain payment)

Assume that you get the choice between a certain payment and a lottery. The lottery means that there is a 50% chance that you will get 3,000 SEK and a 50% chance that you will get 0 SEK. Please mark the alternative you prefer in each of the following 5 questions.

Do you prefer to receive XXX SEK for sure or a lottery where there is a 50% chance that you receive 3,000 SEK and a 50% chance that you receive 0 SEK.

Last questions

1. Have you ever studied the areas of time and/or risk preferences at university level?
2. As our last question we would like to know where you found this survey? (if no option fits, chose "Övrigt" and write your answer)

.

Appendix B: Time and Risk Trees

Figure B1: Time preference tree from Falk et al. (2016)

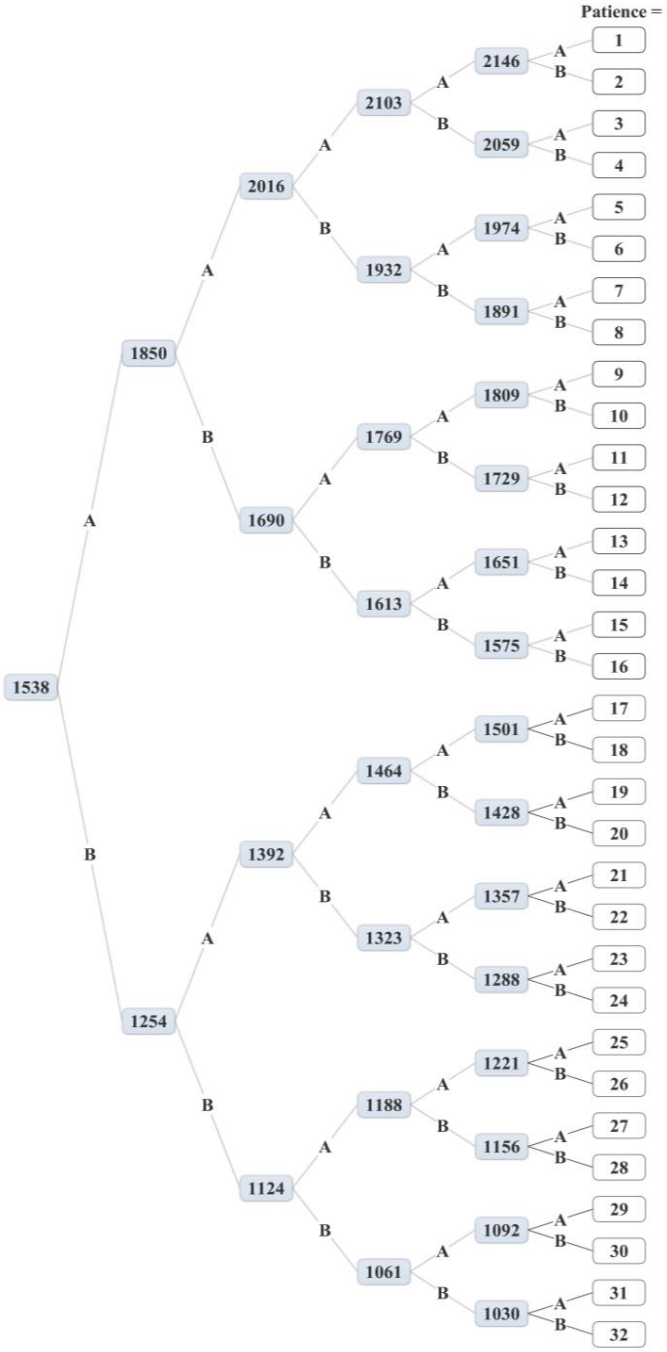
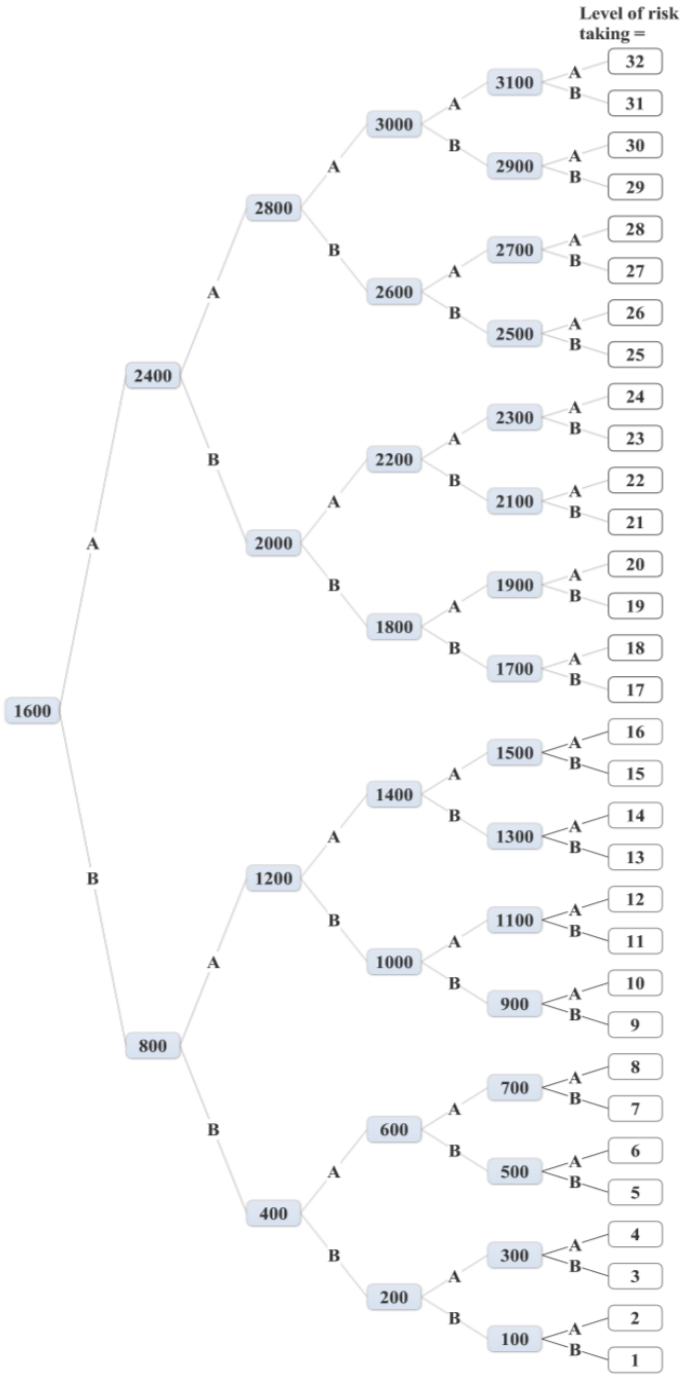


Figure B2: Risk preference tree from Falk et al. (2016)



Appendix C: Variable Description

Table C1: Variable description

Variable	Description
Source	1 = Other (work, asked in person) 2 = Student email 3 = Social media
Currently	1 = Study at secondary school 2 = Study at komvux 3 = Study at university 4 = Do not study 5 = Do not study but have at some point studied at university
Studentsample	1 = If currently a student and responded through GU student emails, 0 = Otherwise
Male	1 = Male, 0 = Female
*SS*male*	Interaction term between male and student sample
Age *Age 18-29* *Age 30-44* *Age > 45*	Age in years 1 = If respondent is between 18 and 29 years old, 0 = Otherwise 1 = If respondent is between 30 and 44 years old, 0 = Otherwise 1 = If respondent is 45 years old or older, 0 = Otherwise
Income *Low income* *Medium income* *High income*	Income in thousands SEK (Mean value of chosen range) 1 = If respondent has an income under 15,000 SEK, 0 = Otherwise 1 = If respondent has an income between 15,000 and 30,000 SEK, 0 = Otherwise 1 = If respondent has an income over 30,000 SEK, 0 = Otherwise
University degree	1 = Respondent has a university degree, 0 = Otherwise
Years at uni 0-2 *Years at uni 2-4* *Years at uni > 4*	1 = Respondent has studied between between 0 and 2 years at university, 0 = Otherwise 1 = Respondent has studied between between 2 and 4 years at university, 0 = Otherwise 1 = Respondent has studied more than 4 years at university, 0 = Otherwise
Timerisk	1 = If respondent has studied time/risk at university level, 0 = Otherwise
Patience	1-32 (higher value → more patient)
Risktaking	1-32 (higher value → more risk taking → less risk averse)
Studyarea	1 = Business / Economics 2 = Law 3 = Computer / IT / Technology 4 = Educational science 5 = Health / Medical care 6 = Art 7 = Humanities 8 = Science 9 = Geoscience / Conservation 10 = Political science / Global studies 11 = Psychology / Social work 12 = Media / Communication 13 = Work science 14 = Other (unable to categorize)

Faculty	1 = Business, Economics and Law 2 = Humanities 3 = Computer / IT / Technology 4 = Arts 5 = Science 6 = Medicine 7 = Social Science 8 = Educational Science

Appendix D: Tables and Figures

Table D1: Source Control - Full Sample - OLS

VARIABLES	(1) Dependent Variable Patience	(2) Dependent Variable Risktaking
Other	-1.700	1.509
	(1.711)	(0.965)
Social Media	0.0150	0.780
	(1.104)	(0.612)
Male	2.101**	1.378***
	(0.938)	(0.526)
Age 18-29	-0.303	0.614
	(1.139)	(0.635)
Age > 45	2.148*	-0.700
	(1.235)	(0.704)
Low income	1.027	-0.526
	(1.225)	(0.660)
High income	0.107	1.461**
	(1.107)	(0.654)
Univeristy degree	1.961**	-0.968*
	(0.991)	(0.536)
Timerisk	-0.699	1.183
	(1.750)	(1.027)
Constant	17.30***	9.655***
	(1.496)	(0.849)
Observations	511	511
R-squared	0.026	0.056

(Student email, Age 30-45 and Medium income used as base levels)
Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table D2: OLS Regressions for the Comparison Sample, Weighted Means of Patience and Risktaking

VARIABLES	(1) Dependent Variable Patience	(2) Dependent Variable Patience	(3) Dependent Variable Risktaking	(4) Dependent Variable Risktaking
Male	1.100***	1.053***	1.574***	1.584***
	(0.347)	(0.345)	(0.184)	(0.184)
Age	0.0299		-0.0423***	-0.0427***
	(0.0213)		(0.0115)	(0.0111)
Income	-0.0158		0.0429***	0.0429***
	(0.0179)		(0.0102)	(0.0102)
University degree	-0.178		0.0120	
	(0.346)		(0.184)	
Constant	18.86***	19.38***	10.40***	10.41***
	(0.554)	(0.189)	(0.304)	(0.303)
Observations	3,991	4,059	3,991	4,000
Unweighted mean	19.477	19.477	10.690	10.690
Weighted means using SCB statistics	20.472	19.910	10.119	10.112

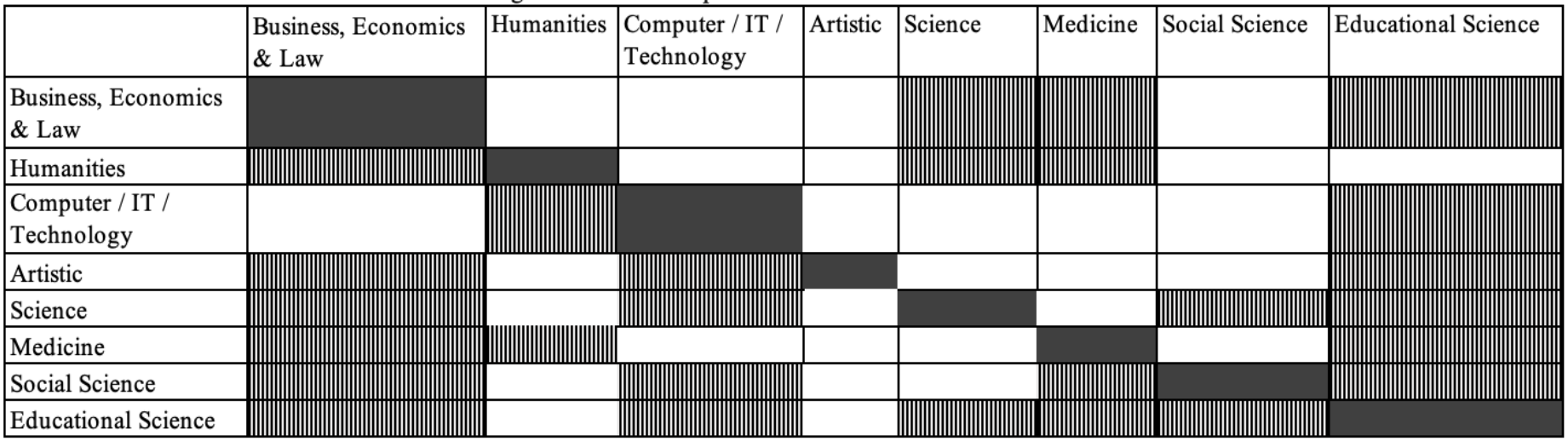
Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table D3: Differences Between Student Sample & Comparison Sample and Gender Differences
No Students In Comparison Sample

VARIABLES	(1) Dependent Variable Patience	(2) Dependent Variable Patience	(3) Dependent Variable Risktaking	(4) Dependent Variable Risktaking	(5) Dependent Variable Patience	(6) Dependent Variable Patience	(7) Dependent Variable Risktaking	(8) Dependent Variable Risktaking
Studentsample	0.542	0.999	-0.339	0.000700	0.969	1.130	-0.0657	0.0612
	(0.510)	(0.619)	(0.278)	(0.327)	(0.630)	(0.716)	(0.332)	(0.383)
Male		1.002***		1.483***	1.836*	1.325	1.967***	1.631***
		(0.353)		(0.188)	(1.001)	(1.008)	(0.549)	(0.545)
SS*male					-0.928	-0.366	-0.407	-0.169
					(1.068)	(1.074)	(0.583)	(0.578)
Age 18-29		0.115		0.799***		0.115		0.799***
		(0.433)		(0.224)		(0.433)		(0.224)
Age > 45		1.525*		-0.0617		1.530*		-0.0596
		(0.784)		(0.438)		(0.784)		(0.439)
Low income		0.270		-0.713***		0.267		-0.715***
		(0.457)		(0.243)		(0.457)		(0.243)
High income		1.173		0.702		1.139		0.686
		(0.794)		(0.436)		(0.798)		(0.435)
University degree		-0.0337		-0.144		-0.0264		-0.141
		(0.354)		(0.185)		(0.355)		(0.184)
Timerisk		0.0402		1.237***		0.0423		1.238***
		(0.609)		(0.319)		(0.609)		(0.319)
Constant	19.21***	18.09***	10.60***	9.700***	18.50***	17.97***	9.849***	9.646***
	(0.481)	(0.670)	(0.263)	(0.360)	(0.597)	(0.748)	(0.315)	(0.407)
Observations	4,027	3,925	4,027	3,925	3,992	3,925	3,992	3,925
R-squared	0.000	0.004	0.000	0.030	0.003	0.004	0.020	0.030

(Age 30-45 and Medium income used as base levels)
Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Figure D1: Two-sample Wilcoxon Rank-sum Tests of Faculties

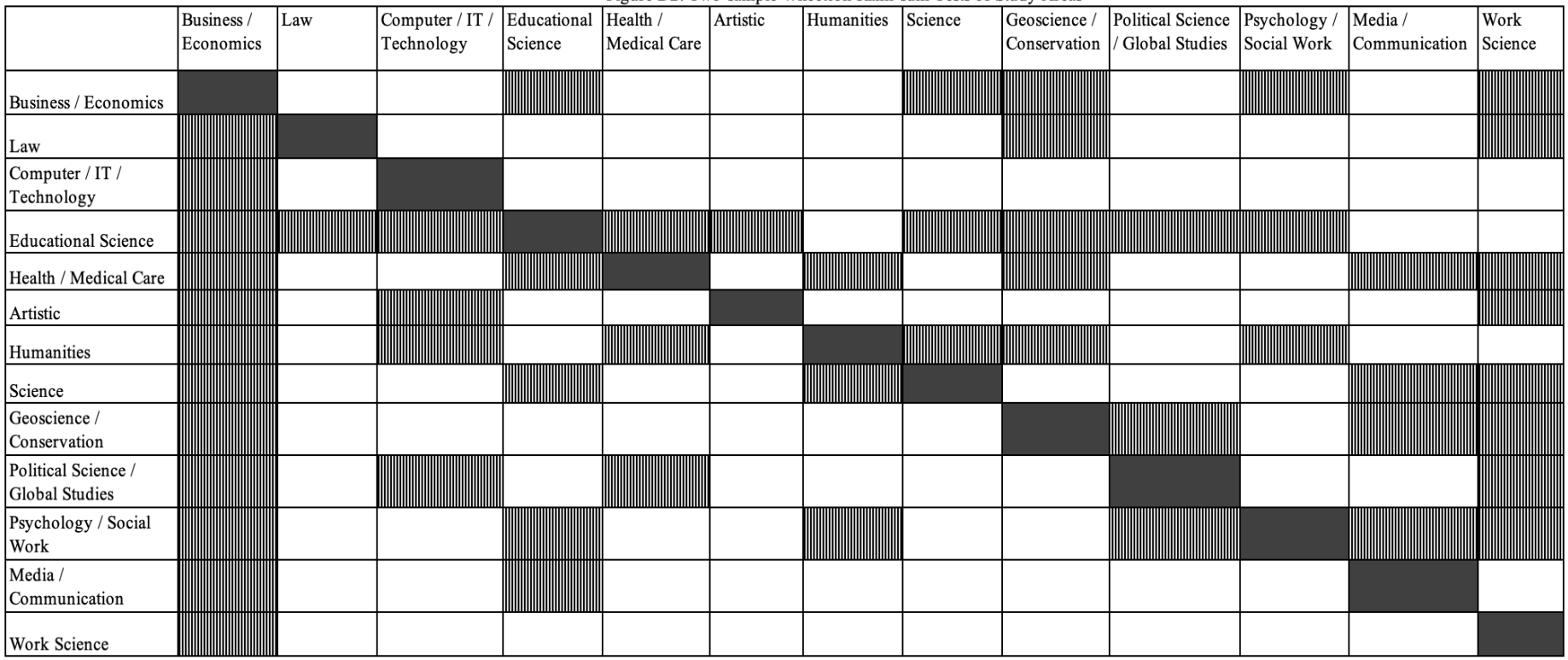


Patience to the right of the dark boxes and risk taking to the left.

Stripes marks statistically significant combinations

Significance level = 10%

Figure D2: Two-sample Wilcoxon Rank-sum Tests of Study Areas



Patience to the right of the dark boxes and risk taking to the left.

Stripes marks statistically significant combinations

Significance level = 10%

Figure D3: Two-sample Wilcoxon Rank-sum Tests of Years at University

	Years at University 0 - 2 Years	University 2 - 4 Years	University over 4 Years
Years at University 0 - 2 Years			
Years at University 2 - 4 Years			
Years at University over 4 Years			

Patience to the right of the dark boxes and risk taking to the left.

Stripes marks statistically significant combinations

Significance level = 10%