Risk attitudes, competition and career choices

The willingness to take risk and the choice of further education among Finnish upper secondary school students

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### Abstract

The subject of this thesis is risk attitudes and the choice of further education among Finnish secondary school students. Data comes from a survey compiled in 2011 for 18 secondary schools in Finland. The data has 3418 respondents in total, 1984 (approximately 58 percent) of whom are female.

There are three main questions in this study. First, do gender, parental education and standard of living affect the secondary school student's willingness to take risks? We measure the risk attitudes by the general risk question which asks individuals to self-assess their willingness to take risk in general on a scale from 0 to 10. Second, does the general risk question predict the behavior of secondary school students when choosing the objective degree of further education? Moreover, do respondents, who are willing to take more risk in general, apply to more selective education programs even after controlling for gender, parental education and standard of living? In addition, we will try to determine if women shy away from competition i.e. apply to less selective study programs.

The main findings of this thesis are the following. There are no gender differences in risk attitudes measured by the general risk question. We do not find reliable evidence that parental education or proxy of standard of living measured by a survey item has a significant impact on individual risk attitudes. Students who are more willing to take risk according to the general risk question tend to apply to further education with lower admission rate. The admission rate for students in risk neutral and risk lover category is approximately 1.5 percentage points lower compared to the risk-averse applicants. This indicates that risk attitudes do have an effect on the choice of study track. When looking the gender balanced subsample, the effect is actually even larger. Students who are in risk lover category tend to apply to further education with 2.2 percentage points lower admission rates than risk-averse students. We find no evidence that women are shying away from competition. In fact, if we assume that there are no gender differences in ability of students, on average, women apply to significantly more prestigious study tracks when considering only the competitiveness that is, the admission rate of chosen study program. This result remains statistically significant with 1 percent level even when looking only the gender balanced fields of education.

### Keywords

risk, risk attitudes, competition, competitiveness, education
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Appendix
1 Introduction

Over the past century, there has been significant progress in decreasing the existing gender gaps in education and employment. However, new gender gaps are starting to arise. Young men are significantly more likely to have low skills and poor academic achievement than young women. Meanwhile, young women are under-presented in the fields of mathematics, physical science and computing. PISA 2012 finds that 14% of boys and 9% of girls did not apply for a baseline level of proficiency in the core subjects (reading, mathematics and science). By contrast, boys seem to be better prepared to enter labor force or to apply for a job than girls. (OECD, 2015.)

One possible reason for the gender gap in education might be caused by differences in risk attitudes and competitiveness. This study aims to clarify the relation between risk attitudes and the choice of further education among Finnish upper secondary school students. There are three main questions in this study. First, do gender, parental education and standard of living affect the secondary school student’s willingness to take risks? We measure the risk attitudes by the general risk question which asks individuals to self-assess their willingness to take risk in general on a scale from 0 to 10. Second, does the general risk question predict the behavior of secondary school students when choosing the objective degree of further education? Moreover, do respondents, who are willing to take more risk in general, apply to more selective education programs even after controlling for gender, parental education and standard of living? In addition, we will try to determine if women shy away from competition i.e. apply to less selective study programs. We cannot explicitly answer the question because we cannot control the ability of individuals. However, we can interpret the results with the assumption that there are no gender differences in ability or that women are at least as capable as men. According to the recent literature about gender differences in secondary school studies, these assumptions seem appropriate. We measure the ‘prestigious’ of further education by the admission rate i.e. more demanding study tracks are more competitive and therefore have lower admission rates. Specifically, we are interested in subjects’ risk attitudes measured by the ‘general risk question’. Dohmen et al. (2011) show, that the general risk question is the best all-around explanatory variable for risky behavior. Also, Lönnqvist et al. (2010) suggest using this type of general risk question
rather than lottery-choice measures when studying the relation of risk attitudes and individual behavior.

The data set comes from a survey that concerns career choices of Finnish high school students. In particular, the survey clarifies respondents’ plans for desired further education, personal traits and risk attitudes. The survey was compiled in autumn 2011 in 18 different high schools across Finland. The data has 3418 respondents in total, 1984 (approximately 58 percent) of whom are female. Data does not contain subject’s absolute income but survey item asks respondents to self-asses their standard of living during further education, which is used as a proxy for individuals’ standard of living.

In their well-known paper, Niederle and Vesterlund (2007) studied gender differences in competitiveness. Their controlled laboratory experiment indicated that twice as many men as women enter tournament over non-competitive environment, even after controlling for performance. Gupta, Poulsen and Villeval (2005) found identical results in their lab experiment where participants choose their payment scheme similar way as in Niederle and Vesterlund (2007). However, the results from field studies are not unambiguous. Buser, Niederle and Oosterbeek (2013) studied competitiveness and career choices of secondary school students in Netherlands. They found girls to be less willing to compete in the lab and this gender difference in competitiveness leads boys to choose more prestigious academic tracks. Örs, Palonimo and Peyrache (2013) do not find any support for the claim that women are shying away from competition. As a matter of fact, in their data the proportion of female in the initial candidate pool with science background is higher than the proportion of females graduating from high school with a science major. These findings are in line with Jurajda and Münich (2011) who examined an entire cohort of Czech secondary-school graduates applying to universities. They show that women do not shy away from applying to more competitive university programs when compared to equally talented men with the same studying preferences i.e. students who wish to study the same field. Pekkarinen (2014) showed that in Finland women do apply to less demanding universities than men with similar ability but the gender difference disappears when examining the subsample of applicants who actually show up in the examinations.
Jurajda and Münich (2011) found women to perform worse than men of equal ability in entrance exams to university and this performance gender gap rises with the degree of competition i.e. gender admission gap increases in more selective study programs. Pekkarinen (2014) examines business and economics entrance examinations to university among Finnish applicants. He shows that on average, there is no clear difference in performance between genders. However, once the starting points are controlled, women score significantly lower in the entrance exam than men, and are therefore less likely to gain entry to the university. Örs et al. (2013) examine three cohorts of applicants that took the entrance exam to the business school of Paris. They found that men perform better than women in the competitive setting despite women’s dominant performance in the non-competitive setting. Furthermore, within the subsample of admitted students, females appear to perform better than males during their first year but only in the non-mathematics-oriented classes.

Almås et al. (2014) show that there are substantial differences in the willingness to compete between students from low and medium/high socio-economic status\(^1\). Even after controlling for performance, confidence and risk-preferences\(^2\) the probability of low SES student is willing to compete is 12.2 percentage points lower comparing to others. Furthermore, the family background affects boys’ willingness to compete but has no such effect for girls. In addition, results show that even in a gender equal society, there is gender difference in competitiveness that cannot be explained by controlling for performance, confidence and family background.

Sutter et al. (2009) argue that studies of behavioral differences between men and women should control for the gender pairing. Ignoring it could lead to misleading conclusions and the evidence found in the literature for gender differences might actually disappear if results were controlled for gender pairing. Dargnies (2011) studied gender differences in competitiveness in individual and team competition framework. There is significant gender gap in decision to enter the individual tournament but she did not found gender gap in the

\(^1\) A student is defined to be from low socio-economic status if one of the parents has only compulsory school degree, the other has no higher education than high school, and the total parental income is in the lowest 20\(^{th}\) percentile.

\(^2\) Actually, Almås et al. (2014) do not find differences in individual risk preferences or in overconfidence between low and high SES students.
team competition entry: 62 percent of women and 59 percent of men chose to enter the team tournament. Healy and Pate (2011) found similar results on gender differences in competitiveness between individual and team competition. When competing in two-person teams, the gender gap in competition reduces by two-thirds. Female participants prefer to compete in teams but male participants prefer the individual competition environment. This result is not explained by the differences in risk aversion or confidence but rather by the differences in competitive preferences.

Understanding individual attitudes towards risk is linked to the aim of understanding and predicting economic behavior of individuals (Dohmen et al. 2011, 2). There are numerous risk elicitation methods used in the literature. The most used method to measure risk attitudes is the Holt and Laury (2002) task. Two widely replicated alternatives are the investment game by Gneezy and Potters (1997) and an ordered lottery selection task introduced by Eckel and Grossman (2002). Dohmen et al. (2011) illustrate that individual risk attitudes can be measured in a reliable way also with a more simple and understandable survey question. The results from the investment game and the Eckel-Grossman task are explicit: On average, female behavior is more risk averse (Filippin and Crosetto 2014, 6). For the Holt and Laury replications results show that the existence of gender gap is more of an exception than a rule. Consistent results from Holt and Laury task showed that men and women display similar risk behavior and when gender differences do exist they are usually negligible. Furthermore, Filippin and Crosetto argue gender differences should not be treated as a fact and when analyzing gender differences in risk preferences it should be done jointly with the characteristics of the task used to elicit risk attitudes. (Filippin and Crosetto 2014.)

The rest of the study is organized as follows. Chapter 2 provides a discussion of closely related literature including topics in competitiveness and risk attitudes. Chapter 3 presents the data and descriptive statistics with preliminary analysis. Chapter 4 provides the empirical econometric analysis and finally chapter 5 discusses the implications of results.
2 Competitiveness and individual risk attitudes

An individual’s willingness to compete is an important factor of her or his success. Competition is crucial not only from evolutionary point of view but also from an economic perspective. Career choices and efforts take often place in a competitive environment and individual’s performance under these conditions has an effect on income distribution (Bartling, Fehr and Schunk, 2012, 59). The decision of further education is affected by individual risk preferences but also by the subjective probability for the applicant to get admitted. The admission rate for certain field of education or degree is an objective probability. However, the subjective probability to get admitted for two different applicants for the same further education is not the same, because they have specific believes about their ability and performance. This means that the effect of risk attitudes on career choices cannot be explicitly explained without controlling for individual believes and ability. The individual decision making for further education can be represented with a simple model.

\[ U_i = p_i(R) \]

The applicant is maximizing the expected utility function, where she or he chooses the ranking of objective degrees. Study track \( i \) yields utility of \( U_i \). Students are maximizing the utility function with their subjective probability \( p_i \). The ranking, \( R \), of the further education choices is crucial because often primary applicants are compensated with extra points in the application process. In addition, the decision of further education depends on students’ preferences towards specific field of education as well as preferences towards risk and competitiveness.

2.1 Do women shy away from competition?

Niederle and Vesterlund (2007) examine whether men and women differ in their preferences for competition by analyzing the type of compensation scheme they prefer in a controlled laboratory experiment. Participants solve a real task, first under piece rate compensation (noncompetitive) and then under a competitive tournament. Participants then choose a compensation scheme that is applied to the performance of their next task. There
is no gender difference in performance under either compensation scheme when comparing men and women of equal performance. Nevertheless, twice as many men as women enter the tournament. (Niederle and Vesterlund 2007.)

Gupta et al. (2005) investigate gender gap in competitiveness in a similar manner to Niederle and Vesterlund (2007). They set up a laboratory experiment, where each subject is paired to another participant and then proceeds to choose a reward method between a piece rate and a tournament payment scheme. Once the decision is made, the subject learns his or her co-participant’s payment choice. In the experiment subjects perform by solving real tasks, as in Gneezy, Niederle and Rustichini (2003). The competitiveness refers to the likelihood of preferring a compensation scheme, where subject is rewarded based on his or her relative performance, rather than on individual performance. The reward per unit is higher in the tournament payment scheme, but subject has to perform better than co-participant in order to receive the reward. If the co-participant has chosen a piece rate and subject has chosen a tournament scheme, he or she will receive the high reward per unit. 60 percent of men and only 34 percent of women end up choosing the tournament payment scheme. When the payoffs are increased so that the reward from the tournament is relative higher than from the piece rate, both genders choose to compete significantly more. Although, both men and women chose the tournament payment scheme more frequently when the tournament rewards were increased, the gender gap in competitiveness remains to occur. (Gupta et al. 2005.)

Buser et al. (2013) examine gender differences, competitiveness and career choices among secondary school students in Netherlands who choose their academic track. Students choose at the age of 15 between four different academic tracks which differ considerably in their prestige and in math and science intensity. For measuring competitiveness they use same methods as Niederle and Vesterlund (2007). Participants solve real tasks under piece rate and tournament incentive schemes and then choose payoff method for their final round. Results indicate that boys are significantly more likely to choose the tournament than the girls and this gender gap in tournament entry does not disappear when controlling for performance. This gender difference in competitiveness leads boys to choose more prestigious academic tracks. (Buser, Niederle and Oosterbeek 2013.)
Örs et al. (2013) do not find any support for the claim that women are shying away from competition. As a matter of fact, in their data the proportion of female in the initial candidate pool with science background is higher than the proportion of females graduating from high school with a science major. These findings are in line with Jurajda and München (2011) who examined an entire cohort of Czech secondary-school graduates applying to universities. They show that women do not shy away from applying to more competitive university programs when compared to equally talented men with the same studying preferences i.e. students who wish to study the same field.\textsuperscript{3} This finding rests heavily on the fact that men and women are compared within the subject-of-study.

Pekkarinen (2014) studied gender performance differences in Finnish university entrance examinations in economics and business. He concludes that women do apply to less demanding universities than men with similar ability (with same amount of starting points which are defined by the Finnish Matriculation Examination). However, this gender difference disappears when examining the subsample of applicants who actually show up in the examinations. (Pekkarinen 2014, 9–10.)

Numerous studies that have examined the preferences for competition have used the same method as Niederle and Vesterlund (2007). Most of lab experiments have similar results which imply that women choose to compete significantly less than men by choosing a noncompetitive payment scheme. This gender difference arise already at young age and do not disappear when controlling for performance. Also Gupta (2005) concludes that both men and women do react to increased payoffs so the differences in entering the tournament cannot be explained by the fact that women are not incentived to compete. Buser et al. (2013) found that the gender difference in competitiveness leads boys to choose more prestigious academic tracks but evidence in the literature is mixed. Findings of Örs et al. (2013) and Jurajda and Munich (2011) are quite the opposite as they did not find evidence that women apply to less demanding university programs with lower admission rate.

\textsuperscript{3} Compared to men with similar ability, women apply to university programs that have less than one percentage point difference in the admission rate.
2.2 Performance under competition

Jurajda and Münich (2011) showed that, when applying to a more selective (competitive) university program, women perform significantly worse than their equally able male counterparts. This means that the gender admission gap increases with the degree of competition. Their data forms from an entire cohort of Czech secondary-school students who are applying to further education. Applicants’ ability can be observed from their test scores in a national comprehensive examination conducted shortly before the admission process to university. University programs are categorized by the admission rate to represent the competitiveness of the program. Data is grouped by the quartile of the school-specific admission rate distribution and estimated with least squares admission regressions within each category. Table 2.1 represents their main results in more detail. Possible gender differences in program-specific unobservable determinants, is minimized by examining the ‘gender balanced’ fields of education in column (2). Columns (3) and (4), corresponds to the regressions for top and bottom ability applicants, respectively. In the two most competitive quartiles (groups with low admission rates), there are significant gender differences in favor of men. The negative gender gap in columns (1) and (2) imply that women are significantly disadvantaged in the admission process to the most selective schools. The small differences in coefficients between columns (1) and (2) show that the effect of selection based on unobservable ability differences between genders is small or balanced with respect to female and male dominated programs. Regressions for the top and bottom ability students in the two last columns confirm the presented results. (Jurajda and Münich 2011)
Table 2.1 Female-dummy coefficients from university admission least-squares regressions

<table>
<thead>
<tr>
<th>University programs Applicants</th>
<th>All (1)</th>
<th>“Gender balanced” (2)</th>
<th>All Top ability (3)</th>
<th>All Bottom ability (4)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Observations</td>
<td>36,566</td>
<td>15,952</td>
<td>17,478</td>
<td>10,858</td>
</tr>
<tr>
<td>1st (most selective)</td>
<td>-0.043 (0.004)</td>
<td>-0.033 (0.005)</td>
<td>-0.062 (0.007)</td>
<td>-0.033 (0.006)</td>
</tr>
<tr>
<td>2nd</td>
<td>-0.016 (0.005)</td>
<td>-0.014 (0.005)</td>
<td>-0.014 (0.009)</td>
<td>-0.027 (0.007)</td>
</tr>
<tr>
<td>3rd</td>
<td>0.012 (0.007)</td>
<td>0.007 (0.008)</td>
<td>0.024 (0.015)</td>
<td>-0.001 (0.011)</td>
</tr>
<tr>
<td>4th (least selective)</td>
<td>0.012 (0.008)</td>
<td>0.002 (0.015)</td>
<td>0.004 (0.012)</td>
<td>0.015 (0.015)</td>
</tr>
<tr>
<td>Observations</td>
<td>19,587</td>
<td>4,347</td>
<td>8,383</td>
<td>6,914</td>
</tr>
</tbody>
</table>

Note: Each coefficient comes from a separate regression. Bolded coefficients are statistically significant at the 1% level. All specifications control for the Abitur test scores, secondary school type and average success rate, and university subject of study. The top (bottom) ability group consists of applicants with the math and the Czech test scores above (below) the 75th (25th) percentile.

Source: Jurajda and Münich (2011, 517)

Pekkarinen (2014) examines business and economics entrance examinations to university among Finnish applicants. He shows that on average, there is no clear difference in performance between genders. However, once the starting points of the applicants are controlled, notable performance gender gap arise. Women have explicitly higher starting points than men on average which demonstrate their outperformance in secondary education. Nevertheless, when controlling the differences in starting points, women score significantly lower in the entrance exam than men, and are therefore less likely to gain entry to the university. Pekkarinen derives the optimal answering strategies for each applicant using the Rasch Model, which calculates the predicted probability of answering an item correctly. Answering strategies plays an important role in business and economics entrance examinations because they are multiple choice tests, where wrong answers are
penalized by minus points and omitted items yield zero points. Both men and women answer too few items in terms of maximizing the probability of gaining entry but the difference from the optimal strategy is greater for women. In conclusion, women seem to be more conservative and timid test takers than men in entrance examinations (Pekkarinen, 2014.)

Örs et al. (2013) study performance gender gap by comparing real-world academic achievement examinations between men and women under different levels of competition for the same group of subjects. They examine three cohorts of applicants that took the entrance exam to the business school of Paris. They compare the performances of the same population in the high school finishing exam, in the admission exam and their first-year performance at the business school. The two main findings are: first, at the very competitive admission examination, men perform better than women despite the fact that in the same cohort women outperform men in the ‘non-competitive’ high school finishing exam just two years before the admission exam. Second, among the subsample of admitted students, females appear to perform better than males during their first year but only in the non-mathematics-oriented classes.

2.3 Willingness to compete

Mayr et al. (2012) performed a field study where they focused on the question of age-related changes in competitive preferences. Their data consist of 543 adults between the age of 25 and 75. They use familiar method where participants solve real life tasks under piece rate and competition scheme and make decision about their compensation scheme for an additional round. There was a remote trend that young women perform better than men and that older women perform worse than men, but gender effects were not found reliable. There was no gender performance gap under piece rate but the performance of women drops under competition scheme as men perform slightly increases. There exist a significant difference in the competitive preferences between women and men. Overall, 56 percent of men but only 36 percent of women enter the competition. This gender gap remains relatively consistent across the life span as seen in figure 2.1. The willingness to
compete seems to increase for both genders up to the age of 50 or so before it starts to decline.

Figure 2.1 Willingness to compete across life span by gender

Source: Mayr et al. 2012

Leibbrandt, Gneezy and List (2013) compared the competitiveness between two groups of fishermen in Brazil. The key exogenous difference is whether fishermen spend their lives at the sea or at a lake. They hypothesis is that the sea ecology favors fishermen to work in a more collective manner whereas the lake ecology incentives to fish in isolation. First finding is that the willingness to compete is more important for individualistic societies. Within the individualistic group, fishermen who chose to compete earned almost 50% than fishermen who chose not to compete. Results also show that fishermen from individualistic societies are more willing to compete than those who are from collectivistic societies. Finally, the gap between the groups in competitiveness emerges with time. That is, the

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4 Participants performed a simple real life task where they throw a tennis ball into a bucket. Competitiveness was measured by the choice whether to enter competition before performing the task.
longer the work experience (or the older the fishermen are) in the individualistic society the more willing one is to compete.

Bartling, Fehr and Schunk (2012) studied children’s willingness to compete with others. They used experimental tools in combination with household survey data in order to question whether child health can explain developmental gaps in non-cognitive skills. The study use data from German Socio-Economic Panel (SOEP) and targeted mothers with preschool children. Mothers and their children also went through experimental tests. Each mother filled out a survey concerning her personality, cognitive abilities and socio-economic status along with an experiment that measures mother’s risk preferences. They used identical measure for the mother’s risk preferences as Dohmen et al. (2010). The experiments children went through were executed in a more playful environment but involved making decision between a piece rate and a tournament scheme for a real effort task. Children’s confidence was also measured by enquiring their beliefs after their compensation scheme choice but before the task. The children’s risk preferences were measured with a gambling game. They find out that if child had a medical condition at least once in the last three months, her or his probability of entering the tournament environment decreases. However, the negative relationship between health condition and competitiveness is only significant in sub-sample with low socio-economic status. Ability (measured by the practice rounds in real effort task), risk aversion, gender and mother’s risk aversion seem to have no significant effect on the willingness to compete. On the other hand confidence has a positive and significant effect on the willingness to enter tournament within the sample and both low and high socio-economic sub-samples. (Bartling et al. 2012)

Almås et al. (2014) study the role of family background as a determinant for the willingness to compete. They use data set where they combine experimental data, on the willingness to compete among representative sample of Norwegian 9th grade students, with register data on parents’ income and education. Results show that there are substantial differences in the willingness to compete between students from low and medium/high socio-economic
status\textsuperscript{5}. Even after controlling for performance, confidence and risk-preferences\textsuperscript{6} the probability of low SES student is willing to compete is 12.2 percentage points lower comparing to others. Furthermore, the family background affects boys’ willingness to compete but has no such effect for girls. In addition, results show that even in a gender equal society, there is gender differences in competitiveness that cannot be explained by controlling for performance, confidence and family background. (Almås et al. 2014.)

Sutter et al. (2009) argue that studies of behavioral differences between men and women should control for the gender pairing. Ignoring it could lead to misleading conclusions and the evidence found in the literature for gender differences might actually disappear if results were controlled for gender pairing. In their bargaining setup they find no significant gender effect on behavior \textit{per se}, while gender pairing systemically affects behavior. When bargaining with the same gender, there is considerably more competition and retaliation than when bargaining partners are not the same gender. (Sutter et al. 2009.)

Gneezy and Rustichini (2004) tested whether differences in competitiveness exist between boys and girls in fourth grade. They examined the speed of the children in a short distance race\textsuperscript{7}. Each child ran the race two times. There were two treatment groups in the second round: in the ‘no competition’ group children ran alone while in the ‘competition’ group children were matched into pairs according to their first round speed. In the competition subgroup boys improved their speed whereas girls ran slower than in the first round. When matched with the same sex, boys significantly improved their time whereas girls performance dropped compared to the initial round speed. In the mixed-pair matches, girls did not catch up with boys but boys who were slower in the first round caught up with girls. (Gneezy and Rustichini 2004.)

Gupta et al. (2005) showed that the beliefs about the co-participant’s payoff scheme do not seem to affect the choice of women, but do affect the men’s payoff scheme choice and the affect depends on the co-participant’s gender. Men are more likely to choose the

\textsuperscript{5}A student is defined to be from low socio-economic status if one of the parents has only compulsory school degree, the other has no higher education than high school, and the total parental income is in the lowest 20\textsuperscript{th} percentile.

\textsuperscript{6}Actually, Almås et al. (2014) do not find differences in individual risk preferences or in overconfidence between low and high SES students.

\textsuperscript{7}At the age of 9–10 there is no speed differences between boys and girls.
tournament when competing against men. Also when competing with a woman, men are more likely to enter the tournament if he believes the woman is choosing tournament. (Gupta et al. 2005, 1–11.)

Dargnies (2011) studied gender differences in competitiveness in individual and team competition framework. There is significant gender gap in decision to enter the individual tournament but she did not found gender gap in the team competition entry: 62 percent of women and 59 percent of men chose to enter the team tournament. Women did not choose to enter team tournament more frequently compared to individual competition but men chose to enter team tournament less often. Their reluctance to enter team competition seems to stem from uncertainty of their teammate’s ability. (Dargnies 2011.)

Healy and Pate (2011) found similar results on gender differences in competitiveness between individual and team competition. When competing in two-person teams, the gender gap in competition reduces by two-thirds. Female participants prefer to compete in teams but male participants prefer the individual competition environment. This result is not explained by the differences in risk aversion or confidence but rather by the differences in competitive preferences. (Healy and Pate, 2011.)

2.4 Risk attitudes and competitiveness

Understanding individual attitudes towards risk is linked to the aim of understanding and predicting economic behavior of individuals (Dohmen et al. 2011, 2). There are numerous risk elicitation methods used in the literature. The most used method to measure risk attitudes is the Holt and Laury (2002) task. Two widely replicated alternatives are the investment game by Gneezy and Potters (1997) and an ordered lottery selection task introduced by Eckel and Grossman (2002). Dohmen et al. (2011) illustrate that individual risk attitudes can be measured in a reliable way also with a more simple and understandable survey question.

Investment game is an experimental experiment in a form of an investment decision between a safe and a risky lottery. The risky choice yields 2.5 times the investment with 50
percent probability and zero otherwise. Risk neutral subjects should choose to invest all of their endowment to the risky asset because the marginal return is greater than one. The Eckel and Grossman risk elicit method is quite similar to the investment game. This method was introduced by Binswanger (1981) to specifically measure individual risk preferences. Subjects face 5 different lottery choices where expected value is linearly increasing but also the standard deviation of returns are increasing. Risk neutral subjects should choose the lottery with highest expected return. In the Holt and Laury (2002) method subjects face a series of lottery choices between a safe and a risky option. The set of lottery choices are ordered with increasing expected value.

The results from the investment game and the Eckel-Grossman task are explicit: On average, female behavior is more risk averse than men’s (Filippin and Crosetto 2014). For the Holt and Laury replications results show that the existence of gender gap is more of an exception than a rule. Consistent results from Holt and Laury task showed that men and women display similar risk behavior and when gender differences do exist they are usually negligible. Furthermore, Filippin and Crosetto argue gender differences should not be treated as a fact and when analyzing gender differences in risk preferences it should be done jointly with the characteristics of the task used to elicit risk attitudes. (Filippin and Crosetto 2014.)

Dohmen et al. (2011) use data from German Socio-Economic Panel (SOEP) which measures the risk attitudes of more than 22 000 individuals and which is constructed to be representative of the adult population of Germany. One question they particularly examine is the individual’s willingness to take risks in general. Respondents rate their willingness on a scale from 0 to 10, ten being very willing and zero not at all willing to take risks. They call this measure the “general risk question” and use it to study heterogeneity and determinants of risk attitudes in the population. Dohmen et al. (2011) raise two important concerns about research of individual risk attitudes. First of all, previous studies that have measured risk attitudes using survey data have found mixed evidence on determinants of risks, such as gender. Second, economists are hesitant to make strong conclusions based on survey methods because questionnaires are not incentive compatible. It raises a concern whether self-reported personal attitudes and traits such as the general risk question are
meaningful for the individual’s behavior. Experimental studies with real money at stake, which deliver incentive compatible risk measures, do not share this issue but an obvious disadvantage is that they will become costly to perform with large samples. Another concern for survey methods is how context and question formatting affects the risk attitudes. The most used survey questions are the hypothetical lottery decisions that rely on relatively precise context. However, alternative risk measures such as the general risk question can achieve reliable information on risk attitudes. The general risk question is also more understandable than the relatively complicated hypothetical lotteries. In order to address whether survey questions can be meaningfully interpreted in terms of actual risk-taking behavior, they use second data from a field experiment with an additional representative sample of 450. Participants in the experiment answer the same general risk questions asked in the SOEP and also make decisions in a lottery experiment where real money is at stake. They conclude that the responses to the general risk question are indeed a reliable predictor of actual risky behavior. (Dohmen et al. 2011.)

Byrnes, Miller and Schafer (1999) did a meta-analysis of 150 studies which examined the risk-taking behavior of individuals and found the average effect of 14 out of 16 types of risk taking, larger for men than for women. Males were willing to take risk even in situations where it was certain that it was a bad idea. On the other hand, women seemed to be hesitant to take risk even in situations when it would be beneficial. These findings suggest that males suffer negative outcomes more often but women tend to achieve success less often than they should. (Byrnes, Miller and Schafer 1999, 378.)

Eckel and Grossman (2002) found women to be consistently more risk averse, on average, than men. Women were only about one-third as likely to choose the highest-risk gamble and four times more likely to choose risk-free gamble as men. However, they didn’t find evidence of greater loss aversion among women in their sample.

Andersen et al. (2008) use representative sample of Danish population to study risk attitudes over time. They found variation in individual risk attitudes during 17-month span but did not observe a general tendency for risk attitudes to increase or decrease over time. Furthermore, their results suggest that risk preferences seem to decline when subjects become more optimistic about their current finances and future expenditures. Demographic
determinants have no significant effect on individual risk preferences. (Andersen et al. 2008, 1111.)

Mather et al. (2012) did an experimental study where they examined age differences in risk seeking when choices consist of a sure gain or a sure loss. Age differences in risk preferences seem to emerge only when participants have to choose between a risky and a certain gamble. Older adults prefer sure gains and have a greater preference to avoid sure losses compared to young adults i.e. older adults seem to weigh certainty more heavily. (Mather et al. 2012.)

Caner and Okten (2010) examine the career choices of Turkish university applicants. They have data from university entrance examinations and study the choice of major subject in a risk and return framework. Their main finding is that the income of parents, father’s employment status and social security status are important determinants when choosing a riskier major over a less risky one. (Caner and Okten, 2010.)

Dohmen et al. (2011) find that parental education and the willingness to take risk are positively correlated, indicating that the parental degree of education is an important determinant of individual’s risk attitudes. In addition, they find that gender, age and height have a significant impact on the willingness to take risks. The proportion of individuals who are relatively more risk averse is higher for women and increases strongly with age. Among men the willingness to take risks appears to decrease steadily with age. For women the willingness to take risks decreases more rapidly to the age of thirty and remains flat until it begins to decrease again from the mid-fifties onwards. (Dohmen et al. 2011)

Buser, Niederle and Oosterbeek (2013) show, that gender gap in competitiveness exist even after controlling for confidence and risk attitudes. Also, competitiveness is an important determinant when considering student’s track choices. That is, for each gender more competitive students choose more prestigious study tracks. Risk attitudes were elicited using two different measures. First, subjects made choices between sure payoff and 50/50 lotteries as in Eckel and Grosmann (2002) and were ranked from 1 to 5 according to the

---

8 Confidence was measured by the students’ beliefs about their relative performance. Specifically, students had to guess their rank in the tournament of their group.
riskiness of their choices (5 is the highest level of risk). Second, subjects ranked their willingness to take risk on a scale from 0 to 10 as in Dohmen et al. (2011). The general risk question has a positive and significant effect on tournament entry. Lottery choices are also significant determinant for tournament entry but only with 0.10 risk level. However, the general risk question seems not to be a significant determinant of student’s track choice, whereas the lottery choice is positively correlated with the track choice with 0.01 risk level.

To measure risk aversion Gupta et al. (2005) use a modified version of the psychometric test in Weber, Blais, and Betz (2002), where subjects answer sixteen questions about risky activities across different contexts. Subjects risk aversion is determined by the value of score when summing up the answers in the questionnaire. For men, risk aversion does not affect the likelihood of choosing their compensation scheme. However, women who choose to enter the tournament are significantly less risk averse than those who choose not to compete.

Eriksson, Teyssier and Villeval (2009) study competitiveness in a standard experimental design in which participants do not perform in a task but rather choose the level of effort using given cost functions and corresponding performance distributions. They found that risk is negatively correlated with tournament entry. Furthermore, when controlling for individual risk attitudes, they found no gender difference in competitiveness.

Next, we will consider our data and main questions in more detail. From the somewhat mixed results from the literature we cannot make clear assumptions about the expected results of risk attitudes between girls and boys. There is some tendency that women are more risk averse but risk elicitation method is crucial to the results. However, it seems plausible to assume that students who have high standard of living and parental education are more willing to take risks on average, which could also imply that they will apply to more prestigious study tracks after secondary school. Last, we expect girls not to shy away from competition as literature have not found reliable evidence from field data and results that support the claim are mostly from laboratory experiments.

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9 The exact question was: “How do you see yourself: Are you a person who is fully prepared to take risks or do you try to avoid taking risks?”
3 Data and Descriptive Statistics

In this study we will examine a survey that concerns the decision of further education among Finnish high school students. All survey questions used in this study can be found in the appendix. The survey was compiled in autumn 2011 in 18 different high schools across Finland and is representative sample of Finnish upper secondary school students. All of the respondents are studying their last year in high school and will complete their Finnish Matriculation Examination in the forthcoming spring before the admission process. The data set has 3418 respondents in total 1984 (approximately 58 percent) of whom are female. Nearly every respondent (over 99 percent) in the survey is between the age of 17 and 19. In particular, the survey clarifies respondent’s plans for desired further education, personal traits and risk attitudes. Survey items that we are specifically interested are gender, objective degree or desired field of education, parental education, standard of living and the willingness to take risk. In the survey, students are asked to rank, up to four objective degrees or field of studies, they are planning to apply to. Throughout the analysis we will focus only the first ranked answer. The first ranked answer should represent applicant’s preferences strongly because many university programs compensate extra points for the primary study tracks. Willingness to take risk is measured by a similar survey item that Dohmen et al. (2011) used in their study. It simply asks the students to report their willingness to take risks in general on a scale from 1 to 10, ten being very willing to take risks in general. Standard of living is measured by a self-assessed survey question about the standard of living during further education.

Table 3.1 summarizes the key descriptive statistics of the data set by gender. 94 percent of the sample has indicated that they will apply for further education after the upper secondary school. This figure was slightly higher for male. 85 percent of the respondents have given an answer indicating they already have a specific further education in mind. There seems to be no gender difference in the level of further education. Rows 5 and 6 are binary variables that indicate whether mother/father has completed the Finnish Matriculation Examination or equivalent degree of studies. The highest parental degree of education refer to the highest completed degree of education on eight point scale (value of 3 refers to the abitur level).
Table 3.1 Descriptive statistics by gender

<table>
<thead>
<tr>
<th>Survey item</th>
<th>Scale</th>
<th>Female</th>
<th>Male</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Will apply for further education after the upper secondary school</td>
<td>[0,1]</td>
<td>1 881</td>
<td>1 324</td>
<td>3 205</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(95.1 %)</td>
<td>(92.8 %)</td>
<td>(94.2 %)</td>
</tr>
<tr>
<td>Given an answer to the desired degree of education</td>
<td>[0,1]</td>
<td>1 738</td>
<td>1 181</td>
<td>2 919</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(87.6 %)</td>
<td>(82.4 %)</td>
<td>(85.4 %)</td>
</tr>
<tr>
<td>The highest degree planned to complete</td>
<td>[1-4]</td>
<td>3.11</td>
<td>3.12</td>
<td>3.12</td>
</tr>
<tr>
<td>The willingness to take risks in general</td>
<td>[1-10]</td>
<td>6.54</td>
<td>6.53</td>
<td>6.54</td>
</tr>
<tr>
<td>Mother is secondary school graduate</td>
<td>[0,1]</td>
<td>1 452</td>
<td>1 101</td>
<td>2 553</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(74.8 %)</td>
<td>(79.6 %)</td>
<td>(76.8 %)</td>
</tr>
<tr>
<td>Father is secondary school graduate</td>
<td>[0,1]</td>
<td>1 139</td>
<td>890</td>
<td>2 029</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(58.7 %)</td>
<td>(64.4 %)</td>
<td>(61.1 %)</td>
</tr>
<tr>
<td>Mother's highest degree of education</td>
<td>[0-7]</td>
<td>3.92</td>
<td>4.10</td>
<td>3.99</td>
</tr>
<tr>
<td>Father's highest degree of education</td>
<td>[0-7]</td>
<td>3.57</td>
<td>3.80</td>
<td>3.67</td>
</tr>
<tr>
<td>Study grant and the financial backing of parents will guarantee sufficient standard of living during my studies</td>
<td>[1-5]</td>
<td>3.21</td>
<td>3.43</td>
<td>3.30</td>
</tr>
</tbody>
</table>

Note: Rows 1, 2, 5 and 6 are binary variables. Percentage in the parentheses shows the ratio within subgroup. For example, 92.8 percent of females have indicated that they will apply to further education. The highest degree planned to complete has a scale from 1= the Finnish Matriculation Examination, 2= polytechnic degree, 3= Master's degree or equivalent, to 4= Doctor’s degree. The willingness to take risks in general has a scale from 1= not at all willing to take risk to 10= very willing to take risk. Highest degree of parental education has a scale from 0= comprehensive school to 7= Doctor’s degree. Last row which is the proxy of standard of living has a scale form 1= “I strongly disagree that…” 5= “I entirely agree that…”.
Every respondent that has given an answer to the desired objective degree is appointed to a certain field of education according to a classification used by the Statistics Finland. There are eight different fields of educations that consists all the objective degrees in university and polytechnic. Figure 3.1 above represents the career choices of the sample. In particular, it shows the applicants’ field of education of the reported objective degree in the survey. Social sciences and business along with health and welfare are the two most popular field of educations in our sample.

Table 3.2 below summarizes the respondent’s field of education according to the given answer to the desired further education. Note that the admission rate in table 3.2 does not correspond to actual admission rate in a given field of studies. It is the average admission rate within sample for a given field of study i.e. 156 respondents of the sample reported to

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10 In the survey, students are asked to rank up to four different fields of studies or objective degrees, they are willing to apply to. Throughout the analysis we will focus only the first ranked answer.
apply study teacher education and educational science and, on average, 3.48 percent of those candidates got accepted.

**Table 3.2** Descriptive statistics by the field of education

<table>
<thead>
<tr>
<th>Field of Education</th>
<th>Admission rate (%)</th>
<th>Number of applicants</th>
<th>Female applicants</th>
<th>Standard of living (proxy)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Teacher education and educational science</td>
<td>3.48</td>
<td>174</td>
<td>84.5 %</td>
<td>3.37 3.40</td>
</tr>
<tr>
<td>Humanities and arts</td>
<td>8.89</td>
<td>378</td>
<td>71.2 %</td>
<td>3.19 3.44</td>
</tr>
<tr>
<td>Social sciences and business</td>
<td>9.51</td>
<td>798</td>
<td>58.0 %</td>
<td>3.15 3.45</td>
</tr>
<tr>
<td>Natural sciences</td>
<td>38.8</td>
<td>122</td>
<td>41.0 %</td>
<td>3.30 3.69</td>
</tr>
<tr>
<td>Technology</td>
<td>18.6</td>
<td>346</td>
<td>22.5 %</td>
<td>3.42 3.34</td>
</tr>
<tr>
<td>Agriculture and Forestry</td>
<td>23.7</td>
<td>46</td>
<td>60.9 %</td>
<td>3.22 3.44</td>
</tr>
<tr>
<td>Health and welfare</td>
<td>7.78</td>
<td>625</td>
<td>77.3 %</td>
<td>3.27 3.41</td>
</tr>
<tr>
<td>Services</td>
<td>8.78</td>
<td>380</td>
<td>52.6 %</td>
<td>3.12 3.45</td>
</tr>
<tr>
<td>Other or unknown field</td>
<td>49</td>
<td>49</td>
<td>40.8 %</td>
<td>3.25 3.62</td>
</tr>
</tbody>
</table>

Note: Admission rates are calculated within the sample and do not correspond to the average admission rates for certain field of education. Third column refers to the share of women among all applicants. The last two columns show the mean value of the standard of living survey question for each field of education by gender.

We are specifically interested in a ‘general risk question’ which asks individuals to self-assess their willingness to take risk on a scale from 0 to 10. From table 3.1 we see that there is no gender difference in risk attitudes in general on average. Figure 3.2 shows the distribution of the responses to the general risk question.
Our responses to the general risk question, differs quite significantly compared to the SOEP survey which was used in the study of Dohmen et al. (2001) with identical risk measure. From figure A1 (see appendix) we can see substantial heterogeneity in risk attitudes across the SOEP population sample. In their study, the modal response is exactly at the center of the scale at 5 but responses vary widely over the entire scale. Only a small number of respondents choose value of 9 or 10, indicating that only few are willing to take a lot of risks. Roughly 7 percent choose 0 meaning they are not at all willing to take risks. (Dohmen et al. 2011, 7.) In our sample, the mean response to the general risk question is approximately 6.5 and we notice no gender differences in the willingness to take risks. Also the distribution of responses for women and men are almost identical (see figure 3.3). However, among men the willingness to take risk has slightly bigger standard deviation, which makes the distribution a bit wider.

**Figure 3.2** Responses to the general risk question
One obvious explanation for the differences of the two data sets is, that the SOEP surveys all the selected household members over the age of 17, while in our data nearly all the respondents are between age of 17 and 19. The willingness of taking risks declines with age which indicates that our population sample is on average more willing to take risk in general than the sample of SOEP. In fact, the age effect is particularly strong for young and old ages. For women, the willingness to take risks decreases more rapidly than for men between the age of 20 and 30, and then remains steady, until it continue to decrease again from the mid-fifties onwards. (Dohmen et al. 2011, 8–9.) Buser et al. (2013) found girls to be slightly more risk-averse, on average, in their sample of secondary school students in Netherlands. The mean answer to the general risk question is 6.5 for boys and 6.0 for girls.\footnote{Sample size in Buser et al. (2013) was only 362 students.}
Figure 3.4 The willingness to take risk in general in three categories

Figure 3.5 The responses to the ‘standard of living’ survey question by gender

Figure 3.4 represents the willingness to take risk in three categories. ‘Risk lover’ consist responses from 8 to 10, ‘risk neutral’ responses 6 and 7 and ‘risk averse’ category responses from 1 through 5.\(^{12}\) The idea to categorize responses in this way is, to compare the relative willingness to take risk within our sample. One could argue that value of 7 is too high response for a risk neutral individual. Our risk neutral category is constructed simply by looking the mean response. The mean response being 6.5, it seems appropriate

\(^{12}\) Risk-averse, risk neutral and risk lover also has a specific meaning in economics, but in here they simply represent the value of the general risk question in three categories.
that responses around it to represent the risk neutral sub group of our sample. Figure 3.4 above verifies our initial observation, that there are no gender differences in the willingness to take risk in our sample on average. Figure 3.5 shows the responses to the proxy of standard of living. The mean response to the question is slightly higher (3.43) for women than for men (3.21). This doesn’t mean that women have higher standard of living but it does imply that, on average, women believe that their standard of living during studying is a touch higher compared to men.

In the next chapter we will analyze our main research questions in more detail. Particularly, we will use linear regression analysis to clarify if gender, parental education and standard of living are significant determinants of individual’s risk attitudes. We will also examine whether the willingness to take risk varies across the selected field of education. In addition, do respondents, who are willing to take more risk in general, apply to more selective education programs even after controlling for gender, parental education and standard of living? Last, we see if women are shying away from applying to more prestigious study tracks relative to men.
4 Econometric analysis

4.1 Determinants of the general risk question

We ran six different regressions to test how the willingness to take risk in general is affected by gender, standard of living and parental education. It is notable that the standard of living is a proxy that refers to the subjective answer (on a scale from 1 to 5) to the survey item that states: “Study grant and the financial backing of parents will guarantee sufficient standard of living during my studies” This means that the determinant of standard of living is not an absolute value (of disposable income for example), which would measure the actual standard of living. It only measures the respondent’s believes of the hypothetical living standards during the time of studying. One could argue that a more risk-averse person will understate the standard of living with a given income level, when compared to a person who is willing to take more risk in general. The abitur determinants are binary variables that indicate whether mother/father has completed the Finnish Matriculation Examination or equivalent degree of studies. The education determinants refer to the degree of education on an eight point scale (value of 3 refers to the abitur level).

The summary of the regressions are presented in a table 4.1. As we can see the coefficients of the standard of living and parental education variable are on the contrary to the results of Dohmen et al. (2011). Results in table 4.1 suggest that there are no gender differences in the willingness of taking risks in general. This result remains consistent with all the 6 regressions. Somewhat surprisingly the parental education does not seem to have any impact on individual risk attitudes in the sample. Standard of living is the only determinant that has significant coefficient on the willingness to take risks. The coefficient is quite small but remains to be significant even after controlling for parental education. This contradicts our assumption that higher standard of living will imply higher willingness to take risk in general. In fact table 4.1 says the exact opposite: respondents who are more optimistic about their standard of living are slightly less willing to take risk in general. Strong arguments from this result should not be made as it might not be a reliable proxy of standard of living.
### Table 4.1 Primary determinants of the general risk question

<table>
<thead>
<tr>
<th>Dependent variable: willingness to take risk in general</th>
<th>(1)</th>
<th>(2)</th>
<th>(3)</th>
<th>(4)</th>
<th>(5)</th>
<th>(6)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Female</td>
<td>0.013</td>
<td>0.004</td>
<td>0.01</td>
<td>0.008</td>
<td>-0.002</td>
<td>-0.001</td>
</tr>
<tr>
<td></td>
<td>[0.061]</td>
<td>[0.061]</td>
<td>[0.062]</td>
<td>[0.062]</td>
<td>[0.062]</td>
<td>[0.063]</td>
</tr>
<tr>
<td>Abitur mother</td>
<td>-0.05</td>
<td>-0.05</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>[0.076]</td>
<td>[0.076]</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Abitur father</td>
<td>0.003</td>
<td>0.01</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>[0.066]</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Education mother</td>
<td>-0.019</td>
<td>-0.019</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>[0.019]</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Education father</td>
<td>-0.007</td>
<td>-0.006</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>[0.017]</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Standard of living (proxy)</td>
<td><strong>-0.081</strong></td>
<td></td>
<td><strong>-0.073</strong></td>
<td><strong>-0.074</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>[0.027]</td>
<td></td>
<td>[0.027]</td>
<td>[0.027]</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Observations</td>
<td>3385</td>
<td>3365</td>
<td>3294</td>
<td>3294</td>
<td>3278</td>
<td>3278</td>
</tr>
</tbody>
</table>

Note: Coefficients in columns (1) to (6) are from OLS regressions where dependent variable is the response to the general risk question. Abitur refers to the secondary school graduate binary variable presented in table 3.1. Education is the degree of education on a scale from 0 to 7. Proxy of standard of living refers to the individual beliefs of the standard of living on a five point scale (see last row of table 3.1). Standard errors are shown in brackets. *, ** and *** denote the significance at 10, 5 and 1 percent level, respectively.
Table 4.2 Fields of education as the determinants of the general risk question

<table>
<thead>
<tr>
<th>Field of study</th>
<th>Willingness to take risk</th>
<th>Female</th>
<th>Willingness to take risk x Female</th>
</tr>
</thead>
<tbody>
<tr>
<td>Teacher education and educational science</td>
<td>-0.049</td>
<td>0.849</td>
<td>-0.030</td>
</tr>
<tr>
<td>Humanities and arts</td>
<td>-0.011</td>
<td>0.117</td>
<td>0.031</td>
</tr>
<tr>
<td>Social sciences and business</td>
<td>0.014</td>
<td>0.468</td>
<td>-0.079</td>
</tr>
<tr>
<td>Natural sciences</td>
<td>-0.038</td>
<td>-1.052</td>
<td>0.115</td>
</tr>
<tr>
<td>Technology</td>
<td>0.022</td>
<td>-1.333</td>
<td>0.059</td>
</tr>
<tr>
<td>Agriculture and Forestry</td>
<td>-0.049</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Health and welfare</td>
<td>-0.013</td>
<td>0.593</td>
<td>-0.002</td>
</tr>
<tr>
<td>Services</td>
<td>0.079</td>
<td>-0.231</td>
<td>0.008</td>
</tr>
</tbody>
</table>

Table 4.2 shows the results from probit regressions where dependent binary variable is the chosen field of further education. The differences in risk attitudes between different applicant groups are only minor. There is a slight tendency that students who apply in the field of teacher education and natural sciences are more risk averse. Applicants in a field of services are a bit more willing to take risk relative to other applicants. To examine if the responses to the general risk question differs between women and men, we made variable which is a product of binary variable ‘female’ and the value of the willingness to take risk. We can therefore examine the differences between genders to the general risk question within different fields of education. This determinant is in the fourth column of the table 4.2 above. We find no significant gender differences in the willingness to take risk within subject-of-study subgroups.
4.2 Do students who are more willing to take risks in general apply to more selective (low admission rate) universities or polytechnics?

Table 4.3 Determinants of the admission rate of objective degree

| Coef.  | Std. Err. | P > |t| |
|--------|-----------|-----|----|
| Constant | 14.28 | 0.451 | 0.000 |
| Female | -4.150 | 0.295 | 0.000 |
| Risk neutral | -1.370 | 0.359 | 0.000 |
| Risk lover | -1.527 | 0.378 | 0.000 |
| Low standard of living (proxy) | -0.148 | 0.326 | 0.649 |
| Mother abitur | 0.274 | 0.357 | 0.443 |
| Father abitur | 0.015 | 0.309 | 0.960 |

Note: Bolded coefficients are statistically significant at the 1 percent level. All determinants are binary variables. N=2340.

We ran regression for the admission rate of the selected further education with six determinants: gender, the categorical risk variable, standard of living and parental education. All determinants are binary variables. Risk neutral and risk lover coefficients refer to the effect on admission rate relative to risk-averse observations. Low standard of living is described by the survey item that self-asses the student’s standard of living. Low standard of living gets value 1 if student’s response disagreed (responses 1 and 2 on a scale from 1 to 5) with the claim “Study grant and the financial backing of parents will guarantee sufficient standard of living during my studies”. Parental education is determined simply by whether parents have completed the Finnish matriculation examination or equivalent.

Table 4.4 above summarizes the results. On average, men apply to less prestigious universities or polytechnics than women. The selected further education chosen by women has 4.15 percentage point lower admission rate, on average, relative to men. This is strong evidence against the argument that women are shying away from competition. This finding is in line with Jurajda and Munich (2011), Örs et al. (2013) and Pekkarinen (2014) whom
did not find any reliable evidence that women are shying away from applying to competitive further education. We have to note, however, that we cannot control the ability of the applicants. It might be that women's dominant performance in the matriculation examination should actually make women to apply more competitive objective degrees relative to men. Also, results may vary when examining the sample which actually enters to the entrance examination. For example Pekkarinen (2014) found that women do apply to less demanding universities than men but this gender difference disappeared when looking the sample of applicants who finally showed up in the examinations.

The willingness to take risk in general has a statistically significant relation to the admission rate of further degree. The general risk question was categorized into three groups (see figure 3.4) and used as a regressor for model in table 4.3. Note that the coefficients for risk neutral and risk lover refer to the effect on relative to risk averse. In other words, students defined as risk neutral, according to the response to the general risk question, applied to demanding further education. On average, the admission rate for risk neutral applicants was 1.4 percentage points lower than for risk-averse students. For risk lover subgroup the coefficient is even larger compared to the risk-averse students but there is no substantial difference relative to risk neutral students. These findings suggest that risk attitude has some impact on the willingness to compete which is usually not found in the lab experiments in the literature. For example, Almås et al. (2014) did not find any substantial relation between risk taking and competitiveness. It seems that the general risk question gives more reliable and significant results than risk variables formulated by lottery choices (Buser, Niederle and Vesterlund, 2013, 29).

As we see from figure 3.1 and from table 3.2 the gender distribution varies heavily between fields of education. For example the share of women applicants to teacher education and educational science is almost 85 percent. As the average admission rate for teacher education studies is by far the lowest, the gender distribution will lead to a large gender difference in average admission rate between men and women. Also, women (men) who apply to highly ‘male’ (‘female’) dominated further education are likely to possess strong specific skills for certain field of education. (Jurajda and Münich, 2008). To minimize the effect of such selection of specific unobservables, which may misrepresent the regression,
we repeat the model from table 4.3 for gender balanced subgroup. The field of education is included in the regression if the share of women applicants is over 25 percent but below 75 percent. With this condition teacher education and educational science, technology and, health and welfare are excluded from the regression.

**Table 4.4** Determinants of the admission rate of objective degree in gender balanced fields of education

| Dependent variable: admission rate (%) of the chosen objective degree | Coef. | Std. Err. | P > |t| |
|---------------------------------------------------------------|-------|-----------|-----|---|
| Constant                                                      | 13.91 | 0.648     | 0.000 | |
| Female                                                        | -1.839 | 0.412     | 0.000 | |
| Risk neutral                                                  | -1.615 | 0.513     | 0.002 | |
| Risk lover                                                    | -2.238 | 0.530     | 0.000 | |
| Low standard of living (proxy)                                | -0.581 | 0.458     | 0.205 | |
| Mother abitur                                                 | 0.226  | 0.507     | 0.655 | |
| Father abitur                                                 | -0.211 | 0.435     | 0.628 | |

Note: Bolded coefficients are statistically significant at the 1 percent level. Risk neutral coefficient is statistically significant at the 5 percent level. All determinants are binary variables. This regression includes only applicants from gender balanced field of educations. Furthermore, the field of education is included in the regression if the share of women applicants is over 25 but below 75 percent. With this condition teacher education and educational science, technology and, health and welfare are excluded from the regression. N=1373.

Table 4.4 summarizes the results from the regression, where dependent variable is the admission rate of further education for gender balanced subset. Gender coefficient is much smaller than in the regression for the whole sample. Women still apply, on average, more prestigious study programs but the difference to men is smaller, just below two percentage points. This result is statistically significant at the 1 percent level. The coefficients of risk attitudes seem to have even stronger impact in the gender balanced regression. The admission rate of further education of risk neutral students is 1.6 percentage points and risk lovers 2.2 percentage points lower compared to the risk-averse applicants. This suggest that
risk attitudes do play a role in the choice of further education and that students who are willing to take more risk in general, will choose more prestigious study programs.
5 Results and discussion

This study has three main objectives. First is to determine if gender, parental education and standard of living have an impact on risk attitudes measured by the general risk question among Finnish secondary school students. Second, is there a relation between risk attitudes and further education in a sense that students who are more willing to take risk in general, will apply to more prestigious and competitive study tracks. Also, do women shy away from competition i.e. apply to less selective study programs compared to men, if we assume that there are no gender differences in the ability of students.

The main findings are the following. There are no gender differences in risk attitudes measured by the general risk question. The risk measures for men and women are, on average, approximately 6.5. Also, the distribution of the responses to the general risk question, are almost identical for both genders. Buser, Niederle and Osterbeek (2013) found statistically significant differences in risk attitudes between boys and girls using similar risk measure. Their sample consist of secondary school students in Netherlands, which makes the results highly comparable, although their sample is much smaller. The value of risk measure is the same for men in our sample as in their sample but girls are more risk-averse: The average response to the general risk question for girls is only 5.9. It seems that risk attitudes of boys are very similar on average in the two samples but in our data girls are substantially more willing to take risks in general. For comparison, the mean response to the general risk question in Dohmen et al. (2011) is 4.4. This implies that the willingness to take risks tends to be lower when the average age of the sample is higher. Furthermore, the differences in risk attitudes between genders can vary for different risk elicitation methods. The general risk question has not been widely used in the literature but results of this study indicate that, like in Holt and Laury task, gender gap in risk attitudes might be more of an exception than a rule.

We do not find reliable evidence that parental education or proxy of standard of living measured by a survey item has a significant impact on individual risk attitudes. The assumption was that students with high standard of living and parental education are more willing to take risks in general. However, results from regressions showed no differences in risk attitudes between low and high parental education. Standard of living had a statistically
significant coefficient on the willingness to take risk on a 10 percent level. The effect was opposite to the assumption: higher standard of living lowers the willingness to take risks, although the effect was quite negligible. We cannot say for sure whether our hypothesis, that higher standard of living enables more risk taking, was in fact invalid or if the variable does not measure standard of living in a way we thought.

We do find that students who are more willing to take risk according to the general risk question tend to apply to further education with lower admission rate. The admission rate for students in risk neutral and risk lover category is approximately 1.5 percentage points lower compared to the risk-averse applicants. This indicates that risk attitudes do have an effect on the choice of study track. When looking the gender balanced subsample, the effect is actually even larger. Students who are in risk lover category tend to apply to further education with 2.2 percentage points lower admission rates than risk-averse students. To determine if risk attitudes actually affect the choices of study tracks we should consider only students with the same ability. Since we cannot control the ability of students we have to interpret the results with the assumption that there exist no ability differences between students. This is of course not true and the ability of individual student also affects the ‘riskiness’ (probability to get admitted) of the study track.

We find no evidence that women are shying away from competition. In fact, if we assume that there are no gender differences in ability of students, on average, women apply to significantly more prestigious study tracks when considering only the competitiveness that is, the admission rate of chosen study program. This result remains statistically significant with 1 percent level even when looking only the gender balanced fields of education. Buser, Niederle and Osterbeek (2013) claims that gender difference in competitiveness leads boys to choose more prestigious study tracks than girls. As our result is quite the opposite it could mean that girls in our sample are more competitive than boys. However, the ability of students may also explain the differences as we cannot control it in our analysis as they did. With the assumption that there is no gender difference or that women are at least as capable as men, results indicate that women are not applying to less demanding universities as men and conclusion is similar to Pekkarinen (2014); Örs et al (2013); Jurajda and Münich (2011). In our sample, it actually looks like men might be shying away from competition.
References


Appendix
A1. Willingness to take risk in general in SOEP 2004

Source: Dohmen et al. (2011)
### A2. Survey question sheet
(Note: This is not the original survey but includes all those survey questions used in this study)

1) Sukupuoli

- Nainen
- Mies

2) Ikä

3) Aiotko hakeutua jatkokoulutukseen lukion jälkeen?

- Kyllä
- Ei
- En ole varma

4) Mikä on korkein koulutus jonka arvelet koskaan suorittavasi?

- Ylioppilastutkinto tai ammatillinen oppilaitos
- Ammattikorkeakoulututkinto
- Yliopistotutkinto
- Tutkijankoulutus
- En ole varma

5) Kun pohdit lukion jälkeistä koulutusvalintaa, mitkä ovat todennäköisimmät hakukohteesi?

<table>
<thead>
<tr>
<th>Koulutusala ja/tai tavoite tutkinto</th>
<th>Oppilaitos (jos tiedossa)</th>
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6) Kun ajattelet opintojesi aikaista tilannettasi, miten arvioisit seuraavia väitteitä? (1= täysin samaa mieltä, 2= jokseenkin eri mieltä, 3= ei samaa eikä eri mieltä, 4= jokseenkin samaa mieltä, 5= täysin samaa mieltä)

- Opintotuki ja vanhempien taloudellinen avustus takaavat minulle riittävän elintason opintojen aikana:

| 1 | 2 | 3 | 4 | 5 |
7) Kuinka mielelläsi otat tyypillisesti riskejä, asteikolla 1-10?
   (1 = en ota lainkaan mielelläni riskejä, 10 = erittäin mielelläni riskejä):

   1  2  3  4  5  6  7  8  9  10

8) Mikä on vanhempiesi korkein koulutus?

   Äiti  Isä
   
   Kansankoulu tai peruskoulu
   Oppikoulu
   Ammattikoulu
   Ylioppilastutkinto
   Opistotason tutkinto
   Yliopistotutkinto
   Tutkijankoulutus
   En ole varma