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***Do Girls Really Outperform Boys in
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Abstract

The reversing gender gap observed in many countries led to a heated debate to explain the persistent gap in academia and other top fields despite the reversal. This paper aims at analyzing the gender gap in education outcomes from different evaluation and exam techniques and gender gap in outcomes of college applications using Turkish administrative data. In Turkey, university applications are centralized based on a standardized test. Assignments of applicants depend on an assignment score which is calculated as a weighted sum of standardized test score and high school GPA with a little contribution from the latter. I find considerable gender gap in favor of females in high school GPAs which is a long term evaluation of students based on every written exam during high school while the female outperformance is not as obvious in standardized test scores which comes from a stressful 3 hours multiple choice test. I also analyze the gender gap in college application outcomes and show that females are less likely to be assigned to a top major conditional on test scores. These findings contribute to the discussion of gender gap in performance in education suggesting that evaluation systems might have gender biased impacts on students and underrepresentation of females in top fields and/or universities can not be explained only by mean differences in test scores and test score distributions.

JEL Classification: C35, I20, I24

Keywords: gender gap, test scores, university entrance exam

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1 Introduction

It is well acknowledged that education of women is crucial especially for developing world as the social benefits of women's schooling are significantly high for several reasons such as fertility, infant mortality and child health and education, social cohesion, and crime (De Walque 2007; Filmer 2006; Herz and Sperling 2004; Schultz 1993, 2002; Sen 1999; Subbarao and Raney 1995; Summers 1994; Thomas 1990; UNESCO 2000; Watson 2005).

Moreover, private returns to education is higher for women. Although results vary by country, women receive higher returns to their schooling investment in terms of earnings: their return, on average, is 9.8%, compared with 8.7% for men (Psacharopoulos and Patrinos 2004).

Even though lower rates of participation of women in education is unequal, inefficient, and detrimental for development, women still participate in education less than men. Nevertheless, the gender gap in educational outcomes has disappeared and even reversed in most of the developed countries as well as in some developing countries. In recent years, female educational attainment clearly dominated male educational attainment in a majority of industrialized countries. Women are in clear majority among secondary school graduates, among students enrolled in tertiary education, and among tertiary graduates. Also a gender equality or female out-performance has been observed in standardized test scores or school grades.

For the United States, Goldin, Katz, and Kuziemko (2006), showed how females have been catching up in math and outperforming in reading from 1972 to 1992. Hyde, Fennema, and Lamon (1990) suggested that gender gap in standardized test scores was very small and statistically insignificant. Some other studies showed that variance of test scores differ significantly and found that males were dominating on the upper tail of the test score distributions for science and math while females score highly on reading and language tests (Hedges and Nowell, 1995; Husain and Millimet, 2009; Hyde, Fennema, and Lamon, 2008). These findings led to heated debates about the sources of gender gap in academia and other top fields. Pope and Sydnor (2010) examined the geographic variation in test scores and found significant variation across states and census divisions

suggesting that gender gap is driven by different social forces in different states rather than gender differences in innate abilities.

A debate on evaluation techniques which also concerns gender gap has been the critique of using standardized tests to select and/or assign students to schools or colleges (Connor and Vargyas, 1992; Medina et al. 1990; Rosser, 1989). Moreover, a literature on gender differences in social preferences and attitude towards competition has been developed in recent years. This literature provided consistent evidence that females under-perform in competitive environments. (Gneezy et. al., 2003; Paserman, 2007; Niederle and Vesterlund, 2007). These findings motivated also other studies to explain gender differences in education outcomes. Ors et al. (2013) show that competitive nature of the evaluations generate a gender gap in academic examinations.

The aim of this paper is to provide an overview of the gender gap in educational attainment in terms of different evaluation methods used in Turkey in particular for the transition to higher education. In particular, my contribution is two fold. First, I investigate whether gender gap varies under different evaluation methods. To answer this question, I compare the gender gap in outcomes of same students under different evaluation measures where the combination of these outcomes are used for access to university. Second, after evaluating gender gap in achievement, I analyze the gender gap in assignment outcomes conditional on performance at high school and standardized test in Turkey.

Turkey is a very interesting case because the recent reports show interesting indicators for gender gap in educational outcomes in Turkey. According to PISA 2009 (OECD 2010), gender difference in reading performance is in favor of girls with around 43 score points and it is above OECD average which is 39 score points. Girls outperform boys also in science performance in by 17 score points while the OECD average gender gap was equal to 0. Gender gap in math performance is in favor of boys with -11 score points but it is slightly lower than OECD average which is -12 score points. Another interesting finding is that between PISA 2006 and PISA 2009, performance in science improved only in 11 OECD countries and Turkey had one of the best performance improvement in science. On the other hand, in Turkey similar to most developing countries, a sizable

gap remains in schooling levels. Gender gap in participation rates in education is still high.

In Turkey access to university is only possible through a nation-wide university entrance exam. The number of applicants exceeds far beyond the capacity of Turkish universities therefore college applicants compete fiercely for high return major programs in top universities. Applicants are evaluated according to their test scores as well as high school GPAs where high school GPA has very little contribution to admission probabilities. High school GPA is calculated based on the weighted averages of the grades of each written exam during 4 years of high school education. The standardized test is a multiple choice test of 3 hours conducted at a national level only once every year. Final assignment scores are calculated for each applicant as a weighted sum of standardized test scores and high school GPAs¹ Finally, centralized algorithm system assign applicants according to their final assignment scores and choices of university and major degrees that applicants submit after receiving their results.

The most important advantage of working on gender gap in Turkey is that high school GPAs and standardized multiple choice test scores are used together to evaluate students for college admissions. The tracking system of secondary education and centralized system of university applications based on a standardized test score and high school GPAs provide the opportunity to analyze the gender gap in high school grades, standardized test scores as well as gender differences in likelihood of getting into a college using administrative data. Moreover, institutional setting provides some insights for usual problem of positive selection of females. I compare the results from a sample of retakers and first takers to infer the direction of selection bias assuming the sample of retakers are much more exposed to positive selection.

In this paper, I document the gender gap in educational outcomes using the dataset of Student Selection and Placement System (OSYS in Turkish) for the college admissions in Turkey in year 2008. After a descriptive analysis of data and a graphical analysis of gender differences, I estimate the gender gap on average as well as at different quantiles

¹High school GPA has relatively a small weight in final score with respect to the standardized test score. High school GPAs are also corrected with certain coefficients according to the type of high school, average achievements of students in the school, and ranking of the applicant within the school.

of the test score and high school GPA distributions. First, I elaborate the gender gap in high school GPAs in different high school tracks and I find very significant and large gender gap in favor of female students at all quantiles of high school GPAs of all tracks. Second, I analyze the gender gap in standardized test scores in different subjects and I find mixed results in different subjects for different quantiles of the test score distributions. I then elaborate the gender gap in assignment rates and find that controlling for test scores females are more likely to enroll in higher education programs in their first trial controlling for test scores. Nevertheless, men still predominate at highly selective programs that lead to high-paying careers controlling for their assignment scores.

These findings are important not only because this is the first comprehensive study on gender gap in Turkey using administrative data for standardized test scores and high school GPAs but it also provides a suggestive evidence on the discussion of gender gap under different evaluation methods (high school grades vs standardized test scores) and underrepresentation of females in top fields. It seems that there is a clear gap in high school GPAs in favor of females at all quantiles of the distribution in all subjects while the quantile regressions show that gender gap in standardized test scores remains in favor of males for both high and low ends of the test score distributions. In terms of assignment scores which are calculated as a combination of high school GPA and test scores, females perform better on average while there is no significant difference in quantitative scores. Moreover, when we control for assignment scores and look at the differences in major degrees it seems there is still significant gender differences in assignment rates to top majors.

The findings of this paper are also consistent with the literature on gender differences in social preferences such as attitude towards competition. The fact that female students outperform males in terms of high school grades while they are not as successful at standardized test brings along the question that the effect of competitive environment and application of 3 hours exam for a lifetime matter based on a multiple choice test might have a negative effect on females. Findings on gender gap in assignment to a college degree also sheds some light on nature vs nurture debate on cognitive ability and test scores which rose from the underrepresentation of women in top fields explained by male domination in high test score intervals. Obviously test score differences affect the gender

gap in assignment rates but there is a significant gap remained unexplained by score differences which supports the argument of differences in preferences for college choice²

2 Education System in Turkey and An Overview of Gender Gap

The formal education system in Turkey consists of primary education, high school education and university. The primary education is the only compulsory part and it consists of 8 years. Until 1997, primary education was only 5 years and middle schools that give 3 years education were not compulsory. In 1997, compulsory education has been extended to 8 years of basic education merging middle school with primary school education.

After compulsory education, the secondary level of schooling consists of high school with an additional 4 years of education or a vocational high school.³ Allocation of primary school graduates to high schools is also conducted by a centralized examination with a standardized test. Depending on the test scores all students are sorted into different type of high schools in line with their preferences. This examination is called Secondary School Examination (OKS in Turkish) and is administered by the Ministry of Education. The aim of this examination is to restrict the access to special high schools that are expected to provide a higher standard of education⁴. Those types include Anatolian High Schools, Scientific High Schools, Foreign Language High Schools and some private high schools. There are also general type high schools as well as vocational high schools that are open to every student regardless of their test scores in the OKS. The OKS test scores therefore are only important to students who aim at attending one of these special high schools.

After entering high school, another important decision students face in their second year of high school is the choice of a subject, namely sciences, social sciences, Turkish-mathematics, foreign languages or arts. This specialization results in different curricula focusing on the respecting subjects. General high schools offer a curriculum preparing

²In a companion paper Saygin(2012) further evidence on gender differences in preferences in college and major choices is provided.

³Before 2006, there were also vocational and general type of high schools where the education duration was 3 years. In 2006, all high schools started to give 4 years of education.

⁴Some of these schools provide the regular curriculum in a foreign language as instruction language

students for university education with a tracking system where students are expected to be specialized in a subject and choose a future education or labor market career accordingly. Similarly, the vocational high schools offer technical education preparing students for vocational higher education within the higher education system. Some school types allow specialization only in certain subjects, such as scientific high schools offer only science as specialization subject.

Turkish government provides formal education for all the citizens free of charge at each level. Primary and high school education is under Ministry of Education's control. Together with public schools, there are also private schools at each stage of the education system that is regulated again by Ministry of Education. There are also privately operated tutoring centers which both give additional support during the formal education and also prepare students for both high school entrance and university entrance examinations.

Access to university is provided with a centralized system since 1974. Private universities have started to operate in late 1980s. In 2008 there were around 160 universities in Turkey and around 35 of them were private universities. In last couple of years number of private universities have been sharply increasing and providing college seats for many applicants. Both private and public universities provide 4-years university programs as well as 2 years vocational programs. There is also the so-called Open Education which is a distance learning system granting four-year degree where students follow lectures broadcast on national TV or online and sit for the centrally administered examinations.

Access to any kind of higher education program is provided only through a test-based exam at a national level implemented by a central authority (Student Selection and Placement Center-OSYM in Turkish). After taking the test, applicants submit a list of higher education programs in an order of their preferences and OSYM assigns students to each program with limited capacities considering the preferences and test scores⁵. In other words, each applicant gets one or no assignment as an outcome of the allocation mechanism. Given the number of applications, the demand for higher education is quite far from to be met and this creates a fierce competition for a seat at a high quality university

⁵See Balinski and Sonmez (1999) for further information about the allocation algorithm.

and a high return major.

In 2008, about 1.5 million applicants took the university entrance examination where about 20% were high school graduates who take the exam for the first time and the rest of the applicants were retakers. Out of 1.5 million applicants t 12.5% were assigned to a four-year university program, 9.0% were assigned in a two-year program and 13.4% were assigned in the Open Education programs. Given these numbers, the university entrance is clearly a very competitive matter which starts to influence students' lives much earlier than the actual application period arrives and finally students and families face even a bigger pressure during their last year at high school.

The OSS consists of two main parts, a quantitative and a qualitative sections and an additional foreign language section and there are two sets of main sections where the Quantitative-I and Qualitative-I sections are less difficult and sophisticated than Quantitative-II and Qualitative-II. All applicants are expected to answer Quantitative-I and Qualitative-I sections while Quantitative-II and Qualitative-II are required only for certain university majors applications. Therefore, while Qualitative-II section is irrelevant for a student with a science high school background who aims at an engineering major, Quantitative-II section is the most relevant section. Similarly, a student who followed a social science track at high school does not need to answer the section Quantitative-II while she needs to maximize her correct answers in Qualitative-II.

In addition to the test scores obtained in OSS the high school GPA is also used to calculate final assignment scores. These assignment scores are calculated for different categories where different weights are given to different sections of the test.⁶ Each university program puts special interest to one of these assignment scores. For instance, a student can be assigned to an engineering university degree according to the quantitative assignment score.

High school GPA is also a part of the evaluation for university entrance. Firstly, high school GPA scores are calculated for social science, equally weighted and science subjects

⁶A higher weight is given to math and science sections for calculating the quantitative test scores.

and they are calculated taking the specialization subjects into account giving students with a specialization subject in sciences a bonus for the science weighted GPA. Then these weighted high school GPA scores are added to the test scores to calculate the final assignment score for university assignment. These weights lead to a situation in which students are strongly encouraged to apply to university programs that fit their specialization subjects.

There are several areas of concern related to gender gap within the education system in Turkey. The most severe one is the low female enrollment rates especially in rural areas. In Turkey, in general, women's returns to education is not any lower than those of men's. Using 1987 Household Budget Survey, Tansel (1994) shows that women's returns to education is higher than those of men at the primary and middle school levels. Similar results are reported by Tansel (2005) using 1987 Household Labor Force Survey and 1994 Household Budget Survey. According to these results, for the wage earners, women's returns to education are higher at the middle school, high school and at the university level and also for the self-employed, women's returns to education are much higher than that of men's. Bakis et. al. (2010) analyze returns to education in Turkey using data from 2006 Household Labor Survey and find that Turkish labor market is segmented by gender and returns to education are uniformly higher for women.

Table 1 shows the gender ratio of schooling at different levels of education for the period between 1997 and 2011. Although Female-Male ratio is considerably lower than 1 except for primary education level in 2010-2011 academic year, it has been considerably improving over these years: It has increased from 85.63 to 100.42 at primary education level, from 74.70 to 88.14 at secondary education level and from 69.58 to 83.38 at higher education level.

In Turkey, also female labor force participation (especially urban level) has been lower than any other country in the OECD or Europe. Female labor participation has been higher in rural areas of the country, as girls usually stay home and join family labor while boys are more likely to go to school in these areas. As for the wage inequality, it mainly comes from low levels of female education and the inequality in education starts at very

early levels of education where girls fail to complete even 8 years of compulsory schooling. On the other hand, similar to many other countries in the world, girls have been showing higher performance compared to boys in terms of general educational outcomes in Turkey. In order to understand the source of gender differences in performance, Turkey is a unique case given the particular institutional settings of the education system.

3 Data, Descriptive Statistics, and Sample Selection

3.1 Dataset

The dataset employed in this study was obtained from a merge of the 2008 OSS (Student Selection Examination) dataset and 2008 Survey of the OSS Applicants and Higher Education Programs dataset. The OSS dataset provides administrative individual information on test scores, high school weighted GPA's, the submitted choice list of university programs and the assignment outcome for the 1,646,376 applicants. On the other hand, the Survey of OSS applicants is a survey conducted by OSYM where the applicants are asked questions about the socioeconomic characteristics of their household, high school achievements, private tutorials, applicant's views about high school education and private tutorials. This is a survey conducted online and 62,775 applicants answered the survey questions in 2008. I have access to only a random sample of about 16 percent with 9983 observations.

Table 2 provides the summary statistics for the sample of 9983 applicants of 2008 OSS. From this table, it is clear that on average girls have higher high school GPAs, test scores and a lower rate for retaking the test than boys. Similar characteristics hold when only first taker applicants are considered. As for first taker sample, unconditional mean gender difference in assignment rates is larger than the one of whole sample indicating that females on average are more likely to be assigned in their first OSS trial.

From Table 2, on average females have higher high school GPAs and test scores. As our sample consists of only those who graduate from high school and apply for university entrance test, we do not observe those who drop out or graduate from high school but do not apply for university. Although the gender gap in terms of university applications as not as severe as earlier levels of education, still only 44% of high school graduate ap-

plicants were girls while 38% of applicants (including retakers) were girls. As the girls are less likely to obtain a high school degree and take the university entrance test and this might create a positive selection bias. Hence, one of the possible drivers causing the gender differences in test scores could be differences driven by the positive selection of females. Indeed, it seems females have better financial support and their parents are relatively better educated with respect to boys. Table 3 shows parents education and some family support indicators by gender and it shows that the mean differences in parents education levels are positive and significant. Female applicants do not only have better educated parents but also they are significantly more likely to attend private tutoring centers. Also, it seems that their parents are more likely to be willing to pay a private university tuition which is considerably higher than public universities.

One of the most distinctive difference across gender at university applications appears to exist in retaking decision. Given the fierce competition for getting an assignment to a university, it is very difficult to be assigned to a top major and/or university. Therefore failing applicants⁷ retake the test in the following year. Among the 2008 university entrance test applicants, 55% of girls were retakers while 66% of boys retook the test. Similarly for those who are placed in a program, 76% of girls and 84% of boys have taken the test at least once before. Based on this observation, it is possible to argue that when we analyze the whole sample of 9983 applicants including retakers and first takers together, the positive selection of females should be more dominant. On the other hand if we analyze only a sample of first takers where the share of females is not as much smaller than boys, positive selection of females should create less of a bias. In this paper the gender gap analysis will be based on various samples and the coefficients will be compared according to the expectation of selection bias.

Moreover, in order to reduce the selection bias, I use a rich set of control variables as well as high school fixed effects. Controlling for high school fixed effects is very crucial to control for unobserved heterogeneity as the selection into high schools is also conducted with a nationwide exam with a high level of competition for best high schools. Table 4, shows the high school type and specialization subjects by gender for both first taker

⁷An applicant might get no assignment if the preferred programs require higher test scores than what applicant obtains.

sample and whole sample.

Figure 1 shows high school GPA and weighted GPA scores for all sample and first takers sample and there is a visible female outperformance in all GPA distributions. On the other hand looking at Figure 2 where assignment score distributions are shown, the female outperformance is not as clear especially on the highest ends of the distributions.

4 Gender Gap in High School GPA and University Entrance Test Scores

In this section, in order to answer whether females outperform males in terms of some outcome variables that are relevant for the university entrance. I analyze the gender gap in high school GPA and weighted high school GPA scores, OSS test scores, and final assignment scores which are a combination of test scores and weighted high school GPA scores. In order to understand the gender gap better, I will compare the gender differences in different subjects in high school GPAs and test scores and compare them on different samples.

The variable of interest M is an indicator variable taking the value of 1 for male applicants, and 0 else. Let the educational outcome Y , (high school GPA, OSS score, and assignment score) of applicant i at school h with the subject field f be denoted by Y_{ihf} , then the model is given by:

$$Y_{ihf} = \delta M_i + x_i' \beta + \mu_h + \mu_f + \epsilon_{ihf} \quad (1)$$

where $i = 1, \dots, N$, $h = 1, \dots, H$, $f = 1, \dots, F$, and ϵ_{ihf} is a random error term.

I estimate this model for every category separately⁸. Further, I test whether the estimates of δ change when the model is estimated on different subsamples of applicants such as only first takers and subsamples of different high school types. The dataset described

⁸Equally Weighted-1, Equally Weighted-2, Qualitative-1, Qualitative-2, Quantitative-1, Quantitative-2

in the previous section allows to use a rich set of control variables (including parents education) and both high school type and high school city fixed effects as well as high school specialization subjects.

As it is previously stated, there is a positive selection of females in the university applicants population. In order to reduce the selection bias in the estimate of gender differences in test scores, I first estimated applicant's test scores in each category on individual characteristics controlling also for high school and high school type fixed effects. In a given high school, a student might choose different subjects at the end of the first year and students are assigned to classrooms based on the subject choice. Therefore, controlling for retaking status, high schools and high school subjects brings the analysis almost to the level of comparing students in the same classroom. Moreover, as it is explained earlier, the procedure of transition to high schools in Turkey is based on a very similar centralized test based system therefore students are already sorted into different type of high schools based on their observed and unobserved characteristics. This feature helps to control for unobserved individual characteristics once I control for high school related fixed effects.

Moreover, I run the estimations also on different sub-samples such as only first and second takers and only first takers. This analysis is necessary not only because retaking status could be crucial determinant of success but it is also important because the selection into retaking is not equal across gender. As it is mentioned earlier, when we consider the full sample of applicants including retakers, female applicants share drops to 38% while among new high school graduate applicants this share is 44%.

4.1 Gender Gap in High School GPA

Estimation results for high school GPAs are reported in Table 5 where high school type, subject and city fixed effects are included as well as controls for other individual characteristics such as retaking, private tutoring, and working status as well as parents' education status. The gender gap in high school GPA is around 5 score points where the average of the sample is 73.63 with 11.65 standard deviation. Following columns of the Table 5, represents the results respectively for the sample of only first and second taker applicants, only first taker applicants and finally only applicants with one of the three main high

school subjects excluding technical and vocational high school subjects.

High school GPA is also used as an input to calculate the weighted high school GPA scores to be used in assignment score for university entrance. These scores are calculated in three different categories: Quantitative High School GPA Score, Qualitative High School GPA Score, and Equally Weighted High School GPA Score. I estimated the gender gap in these scores as well and estimated gender gap is still statistically significant and in favor of females even though slightly smaller in magnitude.

The results for Equally Weighted High School GPA Scores are reported in Table 6. First column represents the whole sample and reports a gender gap of 3.02 score points in favor of females. Gender gap remains almost the same when we exclude the retakers who took the OSS test more than once before. On the other hand gender gap among first takers seems to be relatively smaller as reported in column 3. Column 4 represents the applicants with one of the 3 main high school subject while column 5 excludes also science background students. Similar results are obtained for Qualitative and Quantitative High School GPA scores and results are reported in Table 8 and Table 7 respectively.

I also estimated the gender gap in high school GPA scores with quantile estimation method. Results are reported in Table 9. The first three columns reports the gender gap in high school GPA for whole sample, only first and second takers and only first takers respectively. I find a significant gender gap in favor of females at 0.10 to 0.90 with largest gap at median. The last three columns shows the gender gap in Quantitative, Qualitative, and Equally Weighted High School GPAS for the sample of students with corresponding high school backgrounds. Gender gap is slightly lower for quantitative and qualitative high school GPA scores while it is always significant and in favor of females at all quantiles.

As for the concern of the positive selection, I argue that the expected bias in gender gap in favor of females due to positive selection should be even higher for a sample where we have retakers. On the other hand I do not find a decrease in gender gap when I run the estimation only on first taker sample. In all type of GPA estimations, there is a

slight increase in gender gap in favor of females when I consider the subsample of first takers with respect to the sample of all 9983 applicants which is arguably a signal that the difference is not necessarily driven by selection.

4.2 Gender Gap in Standardized Test Scores

OSS Test scores in different categories are calculated based on the number of correct and incorrect answers in relevant sections of test for each category. The three main test scores Quantitative-1, Qualitative-1 and Equally Weighted-1 test scores are calculated based on the for main sections of the test: Turkish-1, Social Science-1, Math-1, and Science-1. These sections are relevant to all applicants regardless their high school background subject and these three test scores are calculated for all applicants.

There are also field weighted test scores such as Quantitative 2, Qualitative-2, and Equally Weighted-2 where applicants need to answer the relevant sections from the second part of the test. For instance for Quantitative-2 test scores, the number of correct answers (after canceling out for the incorrect answers) in sections Math-2 and Science-2 would be particularly crucial. Similarly, for those who want to maximize Qualitative-2 test score, Social Science-2 and Turkish-2 sections are the most important sections of the test.

First, I estimate the gender gap in 3 main test scores which are calculated for all applicants based on the four main sections that are relevant to all applicants so that these results will not be exposed to a bias due to sorting into specialization fields. Estimation results are reported at the Table 10 where high school type, subject, and city fixed effects are included controlling for other individual characteristics such as retaking, private tutoring, and working status as well as parents' education status. First three columns represents the results for the whole sample for Equally Weighted-1, Quantitative-1, and Qualitative-1 test scores respectively. A significant gender gap in favor of females is estimated for Equally weighted-1 and Qualitative test scores by 1.66 and 3.19 respectively while males outperform in Quantitative-1 test scores. Once I estimate the gender gap by excluding the retakers who took the test more than once before, gender gap in favor of females in Qualitative-1 and Equally Weighted-1 becomes larger in magnitude and the

male outperformance in Quantitative-1 lose significance. As the gap gets larger when I exclude the retakers, one can argue that positive selection of females is not driving these results.

Second, I estimate the gender gap in subject weighted test scores and report the results at Table 11. First three columns report the results for the sample of applicants with corresponding high school tracks while the last three columns consider only first and second takers of these samples. Similar to the main subject test scores, I find a significant gender gap in favor of females in Qualitative-2 and Equally Weighted-2 test scores while there is no significant difference in Quantitative-2 test scores. Again, the significant gender gaps become larger once I exclude the retakers who took OSS test more than once before.

I also used quantile estimation method for main subject test scores on both whole sample and only for first and second takers sample. Results are reported in Table 12. Gender gap in Equally Weighted-1, Quantitative-1 and Qualitative-1 test scores are shown respectively in three different columns of these tables. As for the gender gap in Equally weighted-1 and Qualitative-1, I find a significant gender gap in favor of females only for 0.10, 0.25 and 0.50th quantiles. There is no significant difference in Qualitative-1 at 0.75 and 0.90 while there is a significant gap in favor of males at 0.90 of Equally weighted-1 test score. As for the Quantitative-1 test score, I find no significant difference at 0.10 and 0.25 while there is an increasing gender gap in favor of males at 0.50, 0.75 and 0.90. Similar to OLS estimations, I find a stronger gender gap in favor of females in Equally Weighted-1 and Qualitative-1 while the gender gap in favor of males becomes smaller in Quantitative-1. Moreover lower part of the table reports a higher gender gap for the sample of first and second takers for all test scores and quantiles.

4.3 Gender Gap in Assignment Scores

So far, I estimated the gender gap in high school GPA and test scores from a standardized test. Both of these measures are used to select and assign students for university programs. After calculation of OSS test scores and high school GPA scores in corresponding categories final assignment scores are calculated for each category. For instance, Quantitative-1 Assignment score would be a weighted sum of quantitative high school

GPA score and Quantitative-1 test score and similarly Quantitative-2 Assignment score would be the weighted sum of quantitative high school GPA score and Quantitative-2 test score. These final assignment scores are considered to rank students who choose a university program from a given category. For instance, all students choosing Economics program of University A will be ranked according to their Equally Weighted-2 score and the first ranked students as many as the capacity of the program will be assigned to this program.

I estimated the gender gap in main subject assignment scores and subject weighted assignment scores using quantile estimation method. Table 13 shows the results for main subjects final assignment scores in Equally Weighted-1, Quantitative-1 and Qualitative-1 in three columns respectively. I find a significant gender gap in favor of females in Qualitative assignment scores which decreases in magnitude at higher quantiles of the score distribution. I also find a significant female outperformance in Equally weighted-1 score except for 0.90 where the difference becomes insignificant. On the other hand, I find no significant difference in Quantitative score for 0.10, 0.25 and 0.50 while male outperformance starts at 0.75 by 1.67 and increases at 0.90 to 2.35. Once I exclude the retakers who took the test more than once before, consistently with previous findings I find stronger gender gap in favor of females in Qualitative and Equally Weighted scores and I also find female outperformance in Quantitative score at 0.10 and 0.50 while the rest of the coefficients for the other quantiles are insignificant.

Finally, I estimated the gender gap in subject weighted final assignment scores namely, Equally Weighted-2, Quantitative-2, and Qualitative-2. Quantile estimations on samples of applicants with corresponding high school tracks are shown at Table 14. These assignment scores are the most relevant scores for top majors such as Medical School, Law School, Engineering, Economics, Sciences etc. I find a significant gender gap in favor of females in Equally weighted-2 and Qualitative-2 except for the lowest quantile. I find no significant gender gap in Quantitative-2 except for at 0.25 where females perform better by 7.03 score points.

5 Gender Differences in Assignments to Higher Education Programs

In this section, it is aimed to estimate the gender differences in probability of getting an assignment to a college. In order to take into account the characteristics of the institutional setting we estimate the assignment probabilities with different specifications. OSS test scores are calculated in seven categories where all college majors are associated with a given category. Applicants can choose any major from those seven categories and they get an assignment to the first major in their choice list for which the corresponding test score is sufficiently high. If there are multiple affordable majors associated with different categories than the highest ranked in the list will be the assignment outcome. Therefore it is important to consider all test scores and probabilities of assignment from each category compared to no assignment outcome.

First, I run a multinomial logit in order to analyze the gender differences in assignment probabilities in any of these categories where no assignment is the base category. Second, I analyze the gender differences in assignment probabilities to majors where all possible majors provided in the alternative set are aggregated to 18 main majors. Finally, I consider some of these main majors as top majors for those job opportunities and earnings are expected to be higher.

I estimated discrete assignment outcome by 7 categories and no assignment option with multinomial logit on gender controlling for all of the test scores and high school GPAs, and I found that there are significant differences between boys and girls in terms of assignment outcome. Table 15 shows the mean gender differences in predicted probabilities of assignment in all categories. First line indicates that females are significantly less likely to get no assignment with respect to males. While they are significantly more likely to get assigned to a major associated with social science, foreign languages or equally weighted categories they are less likely to get assigned to a major associated with quantitative categories.

The predicted probabilities of assignment outcome by categories for females and males are shown also in graphs in order to see how the predicted probabilities of assignment

outcome changes by test scores. As one can easily observe from the first graph of Figure 3, the difference between boys and girls in terms of predicted probability of getting no assignment is more visible for low and high test score applicants.⁹

Second, I analyze the gender gap in probability of getting an assignment to majors. I estimated discrete assignment outcome by 18 majors with multinomial logit controlling for all of the test scores and high school GPAs as well as individual characteristics. Table 16 shows the mean gender differences in predicted probabilities of to 18 majors where the base category is no assignment.

As a final step, it is aimed to provide evidence for gender differences in probability of getting an assignment to a top major that has higher expected returns is reported in Table 17. I first estimated the probability of getting an assignment to one of the high return majors controlling for test scores, individual characteristics, parents education levels, high school types and high school subject for the full sample of applicants. I find around 8% higher probability of being assigned to a top major for males with respect females. I estimated the gender gap with different sample specifications where the results are reported in Table 17. First column gives the results for the whole sample, second column excludes the retakers who took the test more than once before. Third column represents only first time takers. In order to control for differences in test scores distributions between females and males, I also introduced the second and third polynomials of test scores into the analysis and in the 4th column for the sample of only first and second takers. Finally the last column includes only applicants with one of the 3 main high school subjects and excludes the retakers who took the test more than once before.

Given that I find females are more likely to get an assignment, I applied the same estimations reducing the sample to the applicants who get an assignment. Doing so, it is possible to measure the gender differences in probability of getting an assignment to a top major conditional on test scores and being assigned to a college/major. I find a gender difference of around 13% assignment probability to a high return major for the sample of

⁹One might be concerned about the high share of male applicants in the sample when it comes to placement outcomes as it is a procedure of assignment of applicants to a limited number of programs that have pre-announced capacities. On the other hand, this bias goes to a direction supporting the result.

applicants who is assigned to a university program in 2008 OSS. Similarly, I applied the estimation to different subsamples as before where all results are reported in Table 18. What is really interesting about these findings is that compared to gender difference in probability of assignment to a high return major is almost doubled when it is conditional on being assigned in 2008. This result is an evidence to argue that there is a considerable gender gap in major choice driven by outside option which is most of the time is to retake the exam in the following year.

6 Conclusion

In this paper, the gender differences in educational outcomes from different evaluation systems used in a centralized college admission system in Turkey. I use administrative data for high school GPAs and standardized test scores and assignment outcomes for college admissions as well as other individual characteristics.

I show that female students outperform male students in terms of high school GPAs both on average and at all quartiles of the distributions. I also estimate the gender gap in standardized test scores in different subjects both on average and at different quartiles of test score distributions. I find that gender gap is still in favor of males in the highest quartiles of test score distributions. Comparing these findings, I argue that gender gap is affected by the evaluation technique.

I finally analyze the gender gap in assignment rates and find that controlling for assignment scores which is a combination of high school GPAs and test scores, females are more likely to enroll in higher education programs in their first trial controlling for test scores and males still predominate at high paying majors.

Providing a comprehensive study on gender gap in education using administrative data, these results are important as an evidence for the differential impact of evaluation systems on gender gap in performance. It also contributes to the discussion on the causes of underrepresentation of females in top fields. The findings of this paper is consistent with the literature on gender differences in social preferences and attitude towards com-

petition. The evidence that female students outperform males strongly in terms of high school grades while they relatively fall behind when it comes to a standardized is consistent with the finding that females might underperform when the evaluation is made under pressure and characterized by high competition.

Findings on gender gap in assignment to a college degree also sheds some light on nature vs nurture debate on innate ability and test scores which rose from the underrepresentation of women in top fields explained by male domination in high test score intervals. I find a significant gap remained unexplained by test score differences which supports the argument of differences in preferences for college choice. In order to assess the gender gap driven by social preferences and preferences for college and major choices, further analysis considering other aspects of gender gap is needed. In a companion paper Saygin (2012), I show that gender differences in preferences for college choice might explain the underrepresentation of females in top fields despite the outperformance of girls.

Finally, the findings that are reported in this paper imply a potential persistence in the gender gap of the skill supply in Turkish labor market. Therefore, the gender gap is likely to be persistent both in terms of wages and occupational choice even though females obtain better educational outcomes with respect to males. Given the higher returns to education for women and the importance of the education and labor market participation of women for economic development of a country, the potential reasons and consequences of the gender differences in university applications are a very relevant question to be studied in order to provide a policy framework for both education system and labor market.

A Figures and Tables

Figure 1: High School GPA Distributions

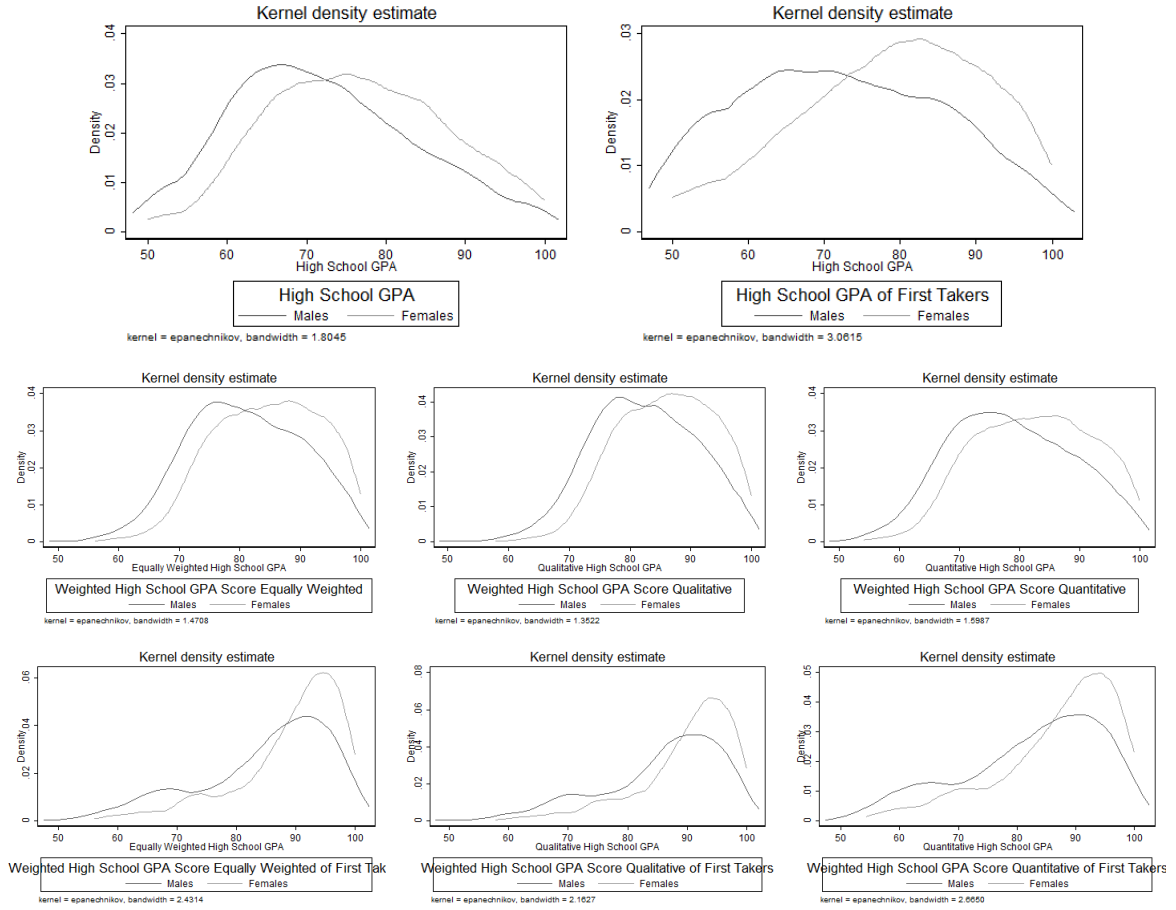


Figure 2: Test Score Distributions

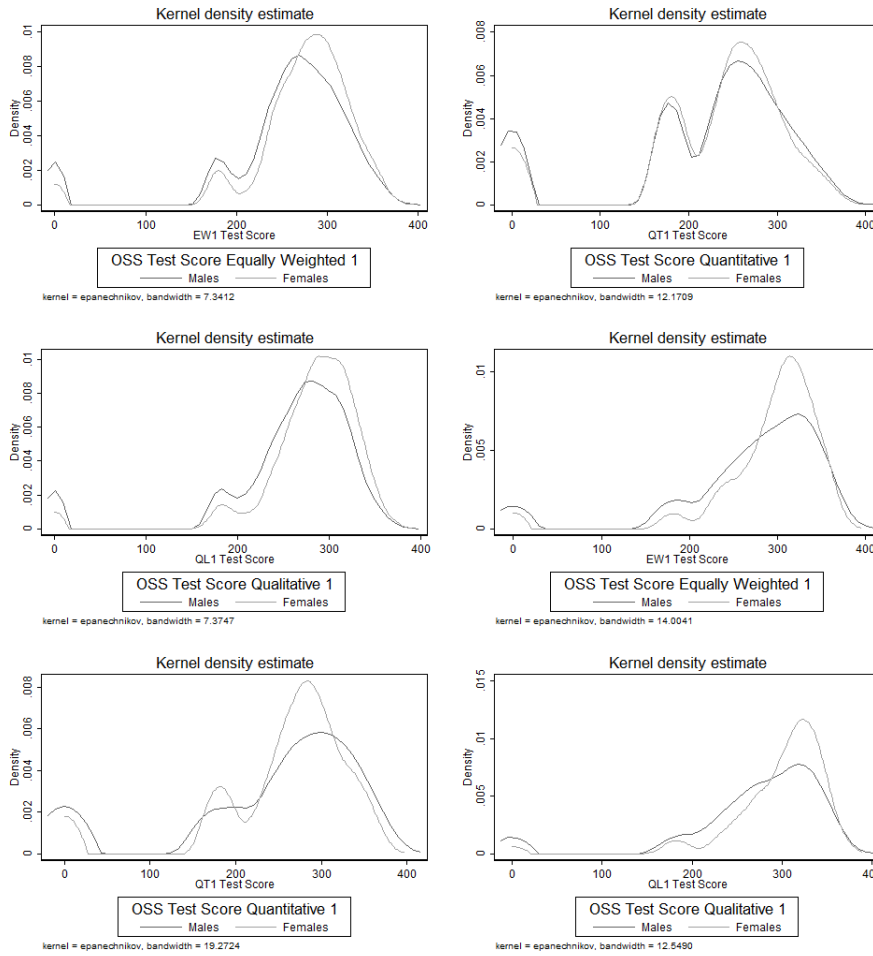


Table 1: Gender ratio by educational year and level of education

Education Year	Primary Education	Secondary Education	Higher Education
1997/'98	85,63	74,70	69,58
1998/'99	86,97	75,50	69,44
1999/'00	88,54	74,74	70,96
2000/'01	89,64	74,41	73,56
2001/'02	90,71	75,87	75,17
2002/'03	91,10	72,32	74,33
2003/'04	91,86	78,01	74,09
2004/'05	92,33	78,72	74,66
2005/'06	93,33	78,76	77,20
2006/'07	94,11	79,65	77,65
2007/'08	96,39	85,81	78,74
2008/'09	97,91	88,99	80,08
2009/'10	98,91	88,59	83,38
2010/'11	100,42	88,14	-

Source: Ministry of Education. National Education Statistics 2001.

Figure 3: Predicted Probabilities of Getting Assignment

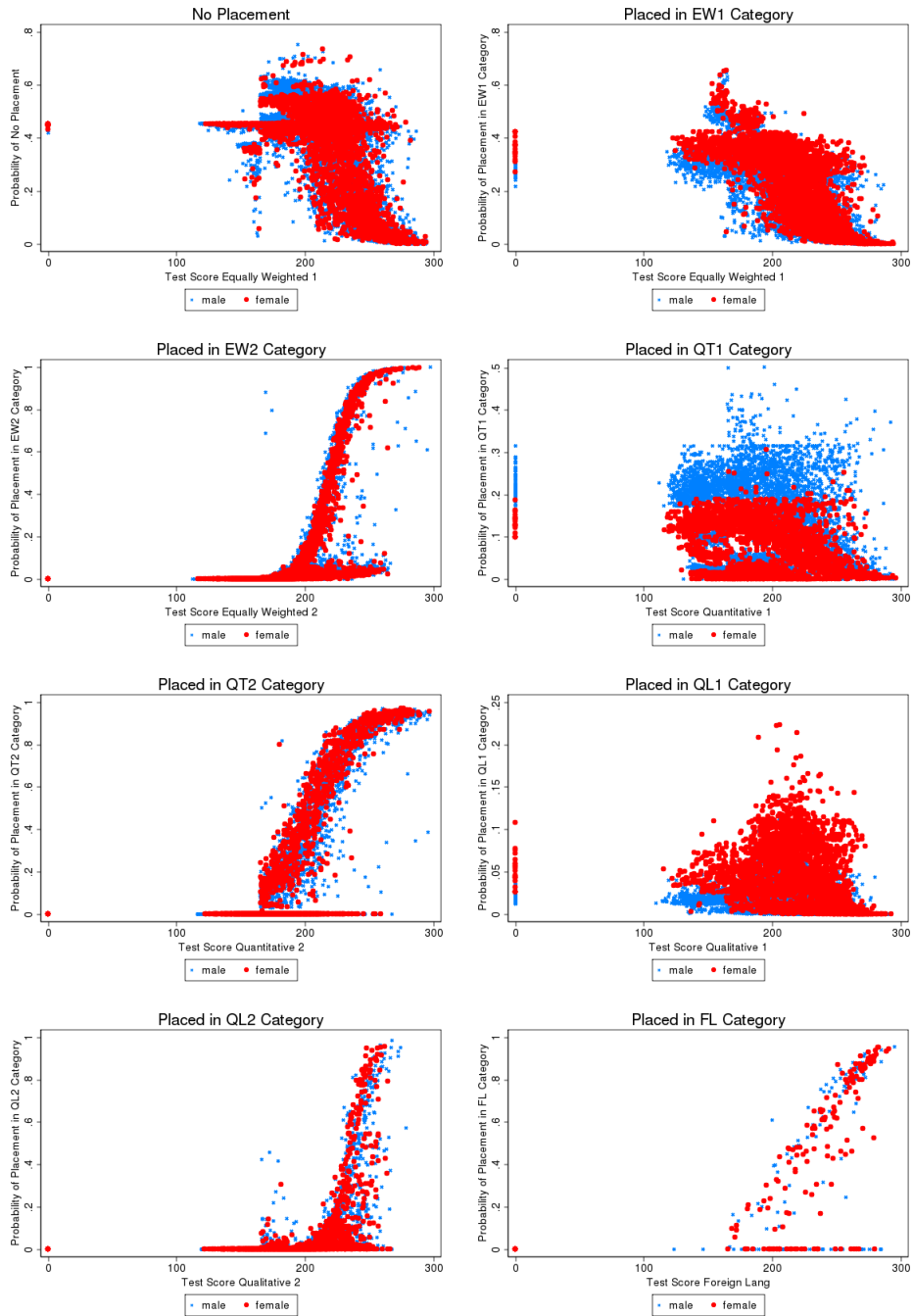


Table 2: Achievements by Gender in 2008 University Entrance Test

	Female	Male	All sample	FT Female	FT Male	All FT
High School GPA	76.53 (11.21)	72.03 (11.58)	73.63 (11.65)	78.85 (12.66)	72.44 (13.61)	75.19 (13.58)
QT Weighted GPA Score	82.44 (9.63)	78.53 (10.26)	79.92 (10.22)	87.12 (10.06)	82.58 (11.84)	84.53 (11.34)
QL Weighted GPA Score	85.89 (7.89)	82.23 (8.68)	83.53 (8.59)	90.00 (7.96)	85.90 (9.90)	87.65 (9.34)
EW GPA Score	84.69 (8.69)	80.89 (9.44)	82.24 (9.36)	89.24 (8.82)	84.96 (10.83)	86.80 (10.24)
Test Score EW 1	212.55 (35.90)	206.03 (42.80)	208.34 (40.60)	226.25 (37.92)	215.98 (50.79)	220.38 (45.99)
Test Score EW 2	153.68 (83.63)	145.22 (86.58)	148.22 (85.64)	160.89 (92.75)	150.27 (95.40)	154.82 (94.40)
Test Score QT-1	188.20 (38.71)	188.75 (45.26)	188.55 (43.04)	204.08 (41.82)	201.86 (53.99)	202.82 (49.15)
Test Score QL-1	219.11 (34.24)	209.58 (42.05)	212.96 (39.72)	230.16 (35.38)	217.15 (48.30)	222.72 (43.70)
Test Score QT-2	111.46 (98.32)	106.15 (100.30)	108.04 (99.63)	133.93 (104.54)	127.82 (109.53)	130.44 (107.43)
Test Score QL-2	111.57 (101.90)	96.25 (101.46)	101.69 (101.87)	93.62 (107.29)	71.46 (99.37)	80.96 (103.39)
Birth year	1988.23 (2.55)	1987.68 (2.99)	1987.88 (2.85)	1989.77 (1.14)	1989.65 (1.36)	1989.70 (1.27)
OSS exam retake	0.78 (0.41)	0.84 (0.37)	0.82 (0.38)			
Previously Assigned Retaker	0.24 (0.43)	0.32 (0.47)	0.29 (0.46)			
Assigned to College	0.63 (0.48)	0.62 (0.49)	0.62 (0.49)	0.67 (0.47)	0.61 (0.49)	0.64 (0.48)

Source: OSYM08 Administrative Dataset, own calculations.

Note: EW, QT, QL indicate Equally Weighted, Quantitative, Qualitative respectively. Column 4 to 6 shows descriptive statistics for first taker (FT) subsamples.

Table 3: Family Characteristics of OSS 2008 Applicants by Gender

	Female	Male	All sample
If working	0.19 (0.40)	0.34 (0.47)	0.29 (0.45)
House Index	7.29 (1.21)	6.92 (1.45)	7.05 (1.38)
Adult Support Index	2.62 (0.85)	2.57 (0.81)	2.59 (0.82)
Mother education not reported	0.00 (0.06)	0.01 (0.09)	0.01 (0.08)
Mother No School	0.11 (0.32)	0.23 (0.42)	0.19 (0.39)
Mother Primary School	0.47 (0.50)	0.43 (0.49)	0.44 (0.50)
Mother Middle School	0.12 (0.32)	0.11 (0.31)	0.11 (0.32)
Mother High School	0.20 (0.40)	0.15 (0.36)	0.17 (0.37)
Mother College or beyond	0.10 (0.29)	0.07 (0.25)	0.08 (0.27)
Father education not reported	0.02 (0.14)	0.03 (0.16)	0.02 (0.16)
Father No School	0.03 (0.18)	0.07 (0.26)	0.06 (0.23)
Father Primary School	0.29 (0.45)	0.32 (0.46)	0.31 (0.46)
Father Middle School	0.16 (0.37)	0.14 (0.35)	0.15 (0.36)
Father High School	0.27 (0.45)	0.25 (0.43)	0.26 (0.44)
Father College or beyond	0.22 (0.42)	0.19 (0.39)	0.20 (0.40)

Table 4: High School Types and Subjects by Gender

	Female	Male	All sample	FT Female	FT Male	All FT
HS Type						
Anatolian HS	0.12 (0.32)	0.11 (0.31)	0.11 (0.31)	0.30 (0.46)	0.27 (0.45)	0.28 (0.45)
Scientific HS	0.01 (0.10)	0.01 (0.11)	0.01 (0.10)	0.02 (0.13)	0.03 (0.17)	0.02 (0.15)
General HS	0.45 (0.50)	0.49 (0.50)	0.48 (0.50)	0.08 (0.27)	0.16 (0.36)	0.12 (0.33)
Foreign Language HS	0.15 (0.36)	0.08 (0.27)	0.11 (0.31)	0.32 (0.46)	0.19 (0.39)	0.24 (0.43)
Vocational HS	0.24 (0.43)	0.27 (0.45)	0.26 (0.44)	0.25 (0.43)	0.31 (0.46)	0.28 (0.45)
HS Subject						
Science	0.29 (0.45)	0.34 (0.47)	0.32 (0.47)	0.36 (0.48)	0.41 (0.49)	0.39 (0.49)
Social	0.12 (0.32)	0.14 (0.35)	0.13 (0.34)	0.10 (0.30)	0.11 (0.31)	0.10 (0.31)
Math and Social Sciences	0.36 (0.48)	0.28 (0.45)	0.31 (0.46)	0.31 (0.46)	0.23 (0.42)	0.26 (0.44)
Others	0.23 (0.42)	0.23 (0.42)	0.23 (0.42)	0.23 (0.42)	0.25 (0.43)	0.24 (0.43)

Source: OSYM08 Administrative Dataset, own calculations.

Note: HS indicates high school. Column 4 to 6 shows descriptive statistics for first taker (FT) subsamples.

Table 5: High School GPA Estimations

	(1)	(2)	(3)	(4)
Male	-4.76 (.25)***	-5.60 (.37)***	-5.26 (.63)***	-5.75 (.38)***
Second Takers	.04 (.24)	1.13 (.40)***		.72 (.43)*
Attending Dersane	2.79 (.27)***	3.72 (.46)***	4.45 (1.00)***	3.35 (.52)***
Taking Private Tutoring	-2.24 (.29)***	-2.76 (.41)***	-3.37 (.72)***	-2.72 (.43)***
If working	-2.02 (.26)***	-2.29 (.46)***	-1.61 (.92)*	-2.28 (.52)***
Obs.	9983	4991	1792	3966
<i>F</i> statistic	6.9	5.44	4.37	8.41

Source: OSYM08 Administrative Dataset, own calculations.

Note: *, **, *** indicates significance at the 10%, 5%, and 1% level, respectively. Standard errors in parentheses. All estimations include high school type, subject and city fixed effects as well as parents' education status. First column reports the results from full sample of 9983 applicants. Second column excludes retakers who took the exam more than once before. Third column takes only first taker applicants. Last column takes applicants only from three main high school specialization subjects excluding also retakers who took the exam more than once before.

Table 6: Equally Weighted High School GPA Estimations

	(1)	(2)	(3)	(4)	(5)
Male	-3.02 (.17)***	-3.15 (.23)***	-2.40 (.36)***	-3.16 (.23)***	-3.66 (.26)***
Second Takers	.99 (.17)***	1.54 (.26)***		1.30 (.26)***	1.17 (.26)***
Attending Dersane	2.30 (.19)***	2.97 (.29)***	2.92 (.56)***	2.70 (.31)***	1.80 (.30)***
Taking Private Tutoring	-1.30 (.20)***	-1.51 (.26)***	-1.47 (.41)***	-1.36 (.26)***	-1.18 (.30)***
If working	-1.59 (.18)***	-1.66 (.29)***	-1.31 (.52)**	-1.56 (.31)***	-1.64 (.30)***
Obs.	9983	4991	1792	3966	3118
<i>F</i> statistic	21.78	18.37	14.53	34.83	70.33

Source: OSYM08 Administrative Dataset, own calculations.

Note: *, **, *** indicates significance at the 10%, 5%, and 1% level, respectively. Standard errors in parentheses. All estimations include high school type, subject and city fixed effects as well as parents' education status. First column reports the results from full sample of 9983 applicants. Second column excludes retakers who took the exam more than once before. Third column takes only first taker applicants. Fourth column takes applicants only from three main high school specialization subjects excluding also retakers who took the exam more than once before. Last column has the first takers and retakers together with specialization subject in Equally Weighted.

Table 7: Quantitative High School GPA Estimations

	(1)	(2)	(3)	(4)	(5)
Male	-3.43 (.19)***	-3.65 (.27)***	-2.82 (.42)***	-3.68 (.27)***	-2.56 (.31)***
Second Takers	.66 (.19)***	1.41 (.29)***		1.13 (.30)***	.61 (.30)**
Attending Dersane	2.48 (.21)***	3.25 (.33)***	3.26 (.66)***	2.95 (.36)***	3.58 (.44)***
Taking Private Tutoring	-1.51 (.22)***	-1.76 (.30)***	-1.75 (.47)***	-1.60 (.30)***	-1.53 (.35)***
If working	-1.74 (.20)***	-1.85 (.34)***	-1.46 (.61)**	-1.74 (.36)***	-2.08 (.37)***
Obs.	9983	4991	1792	3966	3227
<i>F</i> statistic	19.05	16.21	12.31	30.98	17.87

Source: OSYM08 Administrative Dataset, own calculations.

Note: *, **, *** indicates significance at the 10%, 5%, and 1% level, respectively. Standard errors in parentheses. All estimations include high school type, subject and city fixed effects as well as parents' education status. First column reports the results from full sample of 9983 applicants. Second column excludes retakers who took the exam more than once before. Third column takes only first taker applicants. Fourth column takes applicants only from three main high school specialization subjects excluding also retakers who took the exam more than once before. Last column has the first takers and retakers together with specialization subject in Science and Math.

Table 8: Qualitative High School GPA Estimations

	(1)	(2)	(3)	(4)	(5)
Male	-2.83 (.16)***	-2.98 (.22)***	-2.29 (.33)***	-2.98 (.21)***	-2.18 (.42)***
Second Takers	.52 (.15)***	1.19 (.24)***		.95 (.24)***	.31 (.40)
Attending Dersane	2.14 (.18)***	2.80 (.27)***	2.75 (.52)***	2.54 (.29)***	1.05 (.40)***
Taking Private Tutoring	-1.21 (.19)***	-1.42 (.25)***	-1.38 (.38)***	-1.29 (.24)***	-.86 (.54)
If working	-1.42 (.17)***	-1.56 (.28)***	-1.22 (.48)**	-1.48 (.29)***	-1.11 (.41)***
Obs.	9983	4991	1792	3966	1332
<i>F</i> statistic	20.24	17.59	13.8	32.47	4.54

Source: OSYM08 Administrative Dataset, own calculations.

Note: *, **, *** indicates significance at the 10%, 5%, and 1% level, respectively. Standard errors in parentheses. All estimations include high school type, subject and city fixed effects as well as parents' education status. First column reports the results from full sample of 9983 applicants. Second column excludes retakers who took the exam more than once before. Third column takes only first taker applicants. Fourth column takes applicants only from three main high school specialization subjects excluding also retakers who took the exam more than once before. Last column has the first takers and retakers together with specialization subject in Social Sciences.

Table 9: High School GPA Quantile Regressions with High School Type and City Fixed Effects

	(1)	(2)	(3)	(4)	(5)	(6)
Male	-4.105*** (0.346)	-4.767*** (0.428)	-4.654*** (1.171)	-2.150*** (0.514)	-3.123*** (0.565)	-3.360*** (0.451)
q25						
Male	-4.817*** (0.272)	-5.702*** (0.347)	-5.910*** (0.859)	-3.161*** (0.484)	-2.998*** (0.647)	-3.407*** (0.229)
q50						
Male	-5.555*** (0.348)	-6.375*** (0.509)	-6.363*** (0.944)	-2.738*** (0.528)	-2.278*** (0.343)	-4.097*** (0.333)
q75						
Male	-4.914*** (0.379)	-5.101*** (0.561)	-4.688*** (0.843)	-2.323*** (0.380)	-1.856*** (0.457)	-3.748*** (0.340)
q90						
Male	-4.214*** (0.497)	-4.383*** (0.461)	-4.055*** (0.823)	-1.855*** (0.258)	-2.303*** (0.823)	-2.901*** (0.486)
Observations	9983	4991	1792	3227	1332	3118

Source: OSYM08 Administrative Dataset, own calculations.

Note: *, **, *** indicates significance at the 10%, 5%, and 1% level, respectively. Standard errors in parentheses. All estimations include high school type, subject and city fixed effects as well as parents' education status. First column reports the results from full sample of 9983 applicants. Second column excludes retakers who took the exam more than once before. Third column takes only first taker applicants. Columns 4 to 6 include first takers and retakers together with specialization subject in Science and Math, Social Sciences and Equally Weighted respectively.

Table 10: Main Subjects Test Score Estimations

Male	-1.66 (.75)**	2.39 (.70)***	-3.19 (.78)***	-2.96 (.95)***	1.02 (.90)	-4.14 (1.00)***
Second Takers	4.53 (1.06)***	3.79 (.99)***	4.68 (1.10)***	8.92 (1.04)***	7.94 (.98)***	8.94 (1.09)***
Third Takers	7.05 (1.09)***	4.83 (1.02)***	7.57 (1.14)***			
Fourth Takers	6.55 (1.41)***	2.60 (1.32)**	7.81 (1.47)***			
Attending Dersane	9.07 (.82)***	8.62 (.76)***	7.77 (.85)***	14.05 (1.18)***	12.56 (1.12)***	12.47 (1.24)***
Taking Private Tutoring	-6.90 (.87)***	-6.72 (.81)***	-6.69 (.90)***	-7.46 (1.08)***	-7.09 (1.02)***	-7.80 (1.13)***
If working	-12.28 (.81)***	-11.33 (.76)***	-11.67 (.84)***	-11.18 (1.20)***	-9.90 (1.14)***	-11.14 (1.26)***
Obs.	9983	9983	9983	4991	4991	4991
<i>F</i> statistic	22.11	38.33	15.27	22.69	36.14	15.69

Source: OSYM08 Administrative Dataset, own calculations.

Note: **,*** indicates significance at the 10%, 5%, and 1% level, respectively. Standard errors in parentheses. All estimations include high school type, subject and city FE. First three columns include the test score estimations for Equally Weighted 1 (EW1), Quantitative 1 (QT1), Qualitative 1 (QL1) respectively for the full sample of 9983 applicants. Last three column drops the retakers (NoRT) who took the exam more than once before.

Table 11: Subject Weighted Test Scores

Male	-6.52 (1.81)***	3.50 (2.38)	-5.97 (1.92)***	-10.46 (2.33)***	1.77 (2.53)	-10.24 (2.44)***
Second Takers	7.61 (2.85)***	.14 (3.20)	8.78 (3.02)***	11.98 (2.77)***	6.98 (2.76)**	12.60 (2.90)***
Third Takers	6.03 (2.95)**	-12.43 (3.35)***	8.89 (3.13)***			
Fourth Takers	-.67 (3.84)	-30.14 (4.66)***	.91 (4.08)			
Attending Dersane	10.25 (1.96)***	14.25 (3.35)***	10.88 (2.08)***	19.01 (2.76)***	24.75 (4.80)***	19.42 (2.88)***
Taking Private Tutoring	-6.04 (2.13)***	-3.82 (2.69)	-6.03 (2.26)***	-3.59 (2.68)	-6.80 (2.87)**	-4.13 (2.79)
If working	-18.08 (2.01)***	-19.54 (2.90)***	-18.81 (2.14)***	-12.36 (3.04)***	-15.00 (3.72)***	-11.99 (3.17)***
Obs.	4450	3227	4450	2198	1768	2198
<i>F</i> statistic	7.31	9.87	5.24	7.53	8.74	5.15

Source: OSYM08 Administrative Dataset, own calculations.

Note: **,*** indicates significance at the 10%, 5%, and 1% level, respectively. Standard errors in parentheses. All estimations include high school type, subject, and city FE. First three columns include the test score estimations for Equally Weighted 2 (EW2), Quantitative 2 (QT2), Qualitative 2 (QL2) respectively for the full sample of 9983 applicants. Last three column drops the retakers (NoRT) who took the exam more than once before.

Table 12: Main Subjects Test Score Quantile Regressions

	(EW-1)	(QT-1)	(QL-1)
q10			
Male	-4.432*** (1.100)	-0.181 (0.951)	-6.094*** (1.173)
q25			
Male	-2.944*** (0.831)	1.016 (0.630)	-4.435*** (0.866)
q50			
Male	-1.355* (0.736)	1.597*** (0.613)	-1.376* (0.747)
q75			
Male	0.700 (0.642)	3.692*** (0.703)	-0.819 (0.724)
q90			
Male	2.233*** (0.731)	4.787*** (0.950)	-0.417 (0.654)
Observations	9983	9983	9983
Only First and Second Takers:			
q10			
Male	-6.123*** (1.525)	-1.051 (1.407)	-7.856*** (2.017)
q25			
Male	-4.454*** (0.949)	-0.748 (1.002)	-5.509*** (1.333)
q50			
Male	-2.692*** (0.843)	0.156 (0.997)	-2.622** (1.148)
q75			
Male	-1.317 (0.896)	2.301** (0.980)	-1.915* (1.092)
q90			
Male	0.393 (1.069)	3.801*** (1.219)	-0.670 (1.089)
Observations	4991	4991	4991

Source: OSYM08 Administrative Dataset, own calculations.

Note: *, **, *** indicates significance at the 10%, 5%, and 1% level, respectively. Standard errors in parentheses. All estimations include high school type and city FE. Upper part of the table includes the quantile regression results for test scores in Equally Weighted 1 (EW1), Quantitative 1 (QT1), Qualitative 1 (QL1) respectively for the full sample of 9983 applicants. Lower part drops the retakers (NoRT) who took the exam more than once before.

Table 13: Main Subjects Final Assignment Scores Quantile Regressions

	(EW-1)	(QT-1)	(QL-1)
q10			
Male	-8.631*** (1.566)	-2.042 (1.693)	-10.90*** (1.962)
q25			
Male	-4.930*** (1.049)	0.830 (1.438)	-6.368*** (1.006)
q50			
Male	-3.666*** (0.966)	0.559 (1.088)	-4.398*** (0.868)
q75			
Male	-1.738** (0.804)	1.669* (0.911)	-2.548*** (0.944)
q90			
Male	-0.222 (0.879)	2.352** (0.998)	-2.870*** (0.807)
Observations	9983	9983	9983
Only First and Second Takers:			
q10			
Male	-11.05*** (1.857)	-4.331* (2.589)	-10.92*** (2.471)
q25			
Male	-7.160*** (1.434)	-2.423 (1.936)	-7.598*** (1.328)
q50			
Male	-5.090*** (1.251)	-2.301* (1.398)	-5.581*** (1.144)
q75			
Male	-3.141*** (1.140)	0.777 (1.288)	-3.951*** (1.173)
q90			
Male	-1.365 (1.265)	0.932 (1.315)	-3.097*** (1.172)
Observations	4991	4991	4991

Source: OSYM08 Administrative Dataset, own calculations.

Note: *, **, *** indicates significance at the 10%, 5%, and 1% level, respectively. Standard errors in parentheses. All estimations include high school type and city FE. Upper part of the table includes the quantile regression results for final assignment scores in Equally Weighted 1 (EW1), Quantitative 1 (QT1), Qualitative 1 (QL1) respectively for the full sample of 9983 applicants. Lower part drops the retakers (NoRT) who took the exam more than once before.

Table 14: Subject Weighted Final Assignment Scores Quantile Regressions:

	(1)	(2)	(3)
Male	4.15e-13 (6.26e-08)	-2.458 (3.655)	-0.331 (3.913)
q25			
Male	-8.471* (4.629)	-7.031** (3.041)	-8.413*** (2.827)
q50			
Male	-10.34*** (2.007)	-2.633 (2.326)	-7.006*** (1.443)
q75			
Male	-5.266** (2.350)	3.240 (2.215)	-3.078** (1.221)
q90			
Male	-4.916* (2.770)	3.517 (2.147)	-1.405 (1.331)
Observations	2198	1768	2198

Source: OSYM08 Administrative Dataset, own calculations.

Note: *,**,*** indicates significance at the 10%, 5%, and 1% level, respectively. Standard errors in parentheses. All estimations include high school type and city FE. In the first column, the dependent variable is the final assignment score in Equally Weighted 2 (EW2) and the sample consists only of applicants with high school specialization in Equally Weighted and Social Sciences. Second column's dependent variable is final assignment score in Quantitative 2 (QT2) and considers only applicants with corresponding specialization. Last column's dependent variable is final assignment score in Qualitative 2 (QL2) and includes only those with Social Sciences and Equally Weighted specializations.

Table 15: Gender Differences in Predicted Probabilities from Multinomial Logit Estimation of Placement by Categories: Females w.r.t. Males

	Mean difference wrt males	P-value
Probability of No Placement	-0.0125	0.0000
Probability of Placement in FL Category	0.0121	0.0000
Probability of Placement in EW1 Category	0.0204	0.0000
Probability of Placement in EW2 Category	0.0232	0.0000
Probability of Placement in QT1 Category	-0.0575	0.0000
Probability of Placement in QT2 Category	-0.0107	0.0000
Probability of Placement in QL1 Category	0.0231	0.0000
Probability of Placement in QL2 Category	0.0018	0.0000

Source: OSYM08 Administrative Dataset, own calculations.

Note: Multinomial logit estimation includes sample of 9983 applicants.

Table 16: Mean gender differences in Predicted Probabilities of Placement in Faculties: Females w.r.t. Males

	Mean difference wrt males	P-value
Predicted Prob of Agriculture	-0.0016	0.0000
Predicted Prob of Communication	0.0016	0.0000
Predicted Prob of Dentist or Pharmacy	0.0001	0.0235
Predicted Prob of Econ or Business	0.0225	0.0000
Predicted Prob of Administrative Sciences	0.0017	0.0000
Predicted Prob of Technical Science	-0.0085	0.0000
Predicted Prob of Health School	-0.0007	0.0000
Predicted Prob of Law	0.0052	0.0000
Predicted Prob of Foreign Language and Literature	0.0040	0.0000
Predicted Prob of Literature	0.0082	0.0000
Predicted Prob of Medical School	-0.0019	0.0000
Predicted Prob of No Assignment	-0.0237	0.0000
Predicted Prob of Open Education	-0.0039	0.0000
Predicted Prob of Pre-College	-0.0000	0.3067
Predicted Prob of Religion	0.0019	0.0000
Predicted Prob of Natural Sciences	-0.0061	0.0000
Predicted Prob of Technical Education	-0.0074	0.0000
Predicted Prob of Tourism	0.0020	0.0000
Predicted Prob of Vocational School	-0.0101	0.0000

Source: OSYM08 Administrative Dataset, own calculations.

Note: Multinomial logit estimation includes sample of 9983 applicants.

Table 17: Gender Differences in Probability of Assignment to a High Return Major Conditional on Test Scores

Male	.0721 (.0069)***	.0769 (.0107)***	.0673 (.0188)***	.0874 (.0099)***	.0873 (.0126)***
Second Takers	.0147 (.0098)	.0273 (.0118)**		.0444 (.0108)***	.0339 (.0143)**
Third Takers	-.0312 (.0101)***				
Fourth Takers	-.0545 (.0131)***				
Attending Dersane	.0079 (.0076)	-.0010 (.0136)	-.0158 (.0306)	.0118 (.0125)	.0047 (.0175)
If working	-.0064 (.0076)	.0006 (.0136)	.0069 (.0275)	.0030 (.0125)	.0018 (.0173)
Obs.	9983	4991	1792	4991	3966
<i>F</i> statistic	16.3551	12.6428	6.4685	17.9833	17.6819

Source: OSYM08 Administrative Dataset, own calculations.

Note: *, **, *** indicates significance at the 10%, 5%, and 1% level, respectively. Standard errors in parentheses. All estimations include all assignment scores, high school type, subject and subject fixed effects as well as parents' education status. First column reports the results from full sample of 9983 applicants. Second column excludes retakers who took the exam more than once before. Third column takes only first taker applicants. Fourth column adds the control for assignment scores' second and third order polynomials to the 2nd column. Fifth column takes applicants only from three main high school specialization subjects excluding also retakers who took the exam more than once before.

Table 18: Conditional on Being Assigned: Gender Differences in Probability of Assignment to a High Return Major

Male	.1173 (.0099)***	.1291 (.0145)***	.1301 (.0246)***	.1335 (.0140)***	.1472 (.0170)***
Second Takers	-.0359 (.0138)***	-.0305 (.0160)*		-.0069 (.0154)	-.0312 (.0195)
Third Takers	-.0824 (.0147)***				
Fourth Takers	-.1120 (.0196)***				
Attending Dersane	.0179 (.0115)	.0025 (.0203)	.0166 (.0447)	.0169 (.0195)	.0113 (.0267)
If working	-.0064 (.0113)	-.0115 (.0193)	-.0110 (.0381)	-.0016 (.0184)	-.0097 (.0248)
Obs.	6184	3243	1142	3243	2553
<i>F</i> statistic	15.7796	11.5139	6.8869	13.2886	13.7692

Source: OSYM08 Administrative Dataset, own calculations.

Note: *, **, *** indicates significance at the 10%, 5%, and 1% level, respectively. Standard errors in parentheses. All estimations include all assignment scores, high school type, subject and subject fixed effects as well as parents' education status. This table replicates the previous table by conditioning on getting an assignment. First column reports the results from the sub-sample of assigned applicants from full sample of 9983 applicants. Second column excludes retakers who took the exam more than once before. Third column takes only first taker applicants. Fourth column adds the control for assignment scores' second and third order polynomials to the 2nd column. Fifth column takes applicants only from three main high school specialization subjects excluding also retakers who took the exam more than once before.

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