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A labor market investigation of the Jewish-Arab differences in academic major choices

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Abstract

There is a noticeable difference in the academic majors chosen by Arab and Jewish students in the Israeli higher education system. This paper examines how labor market outcomes contribute to the disparity in major choices by applying a two-phased analysis. In the first phase I generate labor market outcomes expectations for each student in each academic major. In the second phase I use a conditional logit model to measure the effects of expected labor market outcomes on the choice of academic majors made by individuals from different ethnic groups and genders. The paper finds significant wage gaps between Jews and Arabs in six out of eight majors, and these gaps have a significant effect on the major choices of Arab students and account for 13-27% of the ethnic differences in major choices. In addition, preferences over academic majors are found to differ considerably between Jews and Arabs, with the latter caring less about expected wages, but more about expected months of work and the probability of graduating relative to Jewish students. I conclude that Arab students are more risk-averse than Jews in their choices of academic majors, and that this difference might be a reaction to discrimination in the workforce, pushing Arabs to choose safer majors.

1 Introduction

This paper examines the choices of academic majors by Israeli students, with the aim of shedding light on the factors facilitating the ethnic and gender differences in major choice. The paper tries to answer two main research questions: what are the structural differences in preferences over labor market outcomes between students from different ethnic groups and genders in Israel, and how differences in labor market outcomes between different population groups affect individual major choices.

I investigate these questions by using data on all the students that started their bachelor's degrees between the years 1999-2001 and follow their performance in the first four years after graduation (until the year 2008). To analyze the data I employ a two-phased method: In the first phase I generate expectations for monthly wages, months of work and probability of graduating for each individual in each major, and calculate the monthly wage, months of work per year and total income gaps between population groups in each major. In the second phase I use a

conditional logit regression model to estimate how the labor market expectations affect the individual's choice of academic major controlling for individual ability.

I find considerable differences labor market outcomes and preferences between students from different ethnic groups and genders. Arab and women graduates earn significantly less than their Jewish and men colleagues even after controlling for ability. Additionally, Arabs of both genders have a lower probability of graduating from most majors compared to Jewish students, while women have a higher probability of graduating relative to men in all the majors. The conditional logit regressions suggest that Jewish men have the strongest preference for majors with high expected future earnings, followed by Arab men, while women from both ethnic groups put significantly lower emphasis on studying in majors characterized by high monetary payoff. In contrast, the difference in preferences between population groups goes the other way around when it comes to expected months of work. Jewish men attach the lowest weight to expected months of work per year when choosing majors, while Arab women have the strongest preference to majors with high expected months of work. Similarly, Arab and women students have higher preference to majors in which they are more likely to graduate than Jews and men. This pattern suggests that Arab and women students are more risk-averse than Jews and men.

I also find that wage gaps, measured relative to the wages of Jewish men, have a significant negative effect on the major choices of Arabs. In contrast, the gaps in expected months of work have a much smaller effect on major choices. On the whole, I find that wage and months of work gaps are responsible for 13-27% of the difference in major choices between Jewish and Arab students. The differences in ability as measured by Psychometric test scores (hereafter PTS) explain two-fifths of the differences in major choices between Jewish and Arab women, while having only a negligible effect on the differences in major choices between Jewish and Arab men.

In the past, academic research on schooling decisions tended to focus on measuring the returns to years of schooling, treating education as homogenous. However, with the majority of the population in the developed countries now attending higher-education (OECD 2014), and

further specialization in the workforce, the decision of which major to study at the university becomes increasingly more important. Countless studies have documented significant differences in payoffs to different majors, usually finding that graduates from Science, Technology, Engineering and Math (hereafter STEM), as well as Business and Medicine earn considerably higher wages than students who graduate from Humanities, Social Sciences and Education (see e.g. Daymont and Andrisani 1984; James et. al 1989; Arcidiacono 2004).

Although large payoff differences between majors are frequently documented, obtaining reliable causal estimates for the returns to different majors is tricky, since major choices are endogenous and correlated with unobservable characteristics on both the individual and institutional levels. The most obvious obstacle to estimating the returns to different majors is the fact that students sort themselves into majors with accordance to their abilities, with high ability students having higher preferences for more lucrative and higher paying fields (Turner and Bowen, 1999; Arcidiacono 2004). A second difficulty lies in the fact that wages are only observed in the majors actually chosen by individuals, and not their potential payoff from other majors, causing estimates for the returns to majors to be speculative at best (Berger 1989).

The most compelling evidence to date on the causal returns to different majors is provided by Hastings et al. (2013) and Kirkebøen et al. (2015). Both papers take advantage of the centralized admission systems to higher education in their countries (Chile and Norway respectively) and employed a regression discontinuity framework to measure the causal effect of specific majors on wages. The paper by Kirkebøen et al. compares only students with similar first-best and second-best choices, finding significant differences in the payoff to different majors. They find that STEM and Business majors are characterized by high returns while Humanities and Social Science majors have the lowest returns. They conclude that "[the] *Earnings differences across fields rival college earnings premium …* [which] *indicates that the choice of field of study is potentially as important as the decision to enroll in college*" (pp. 1058).

In light of the economic importance of the choice of college major, it is not surprising that many researchers have attempted to analyze the mechanisms behind individual major choices.[1] Expected future earnings are usually considered as the most important variable in education choices, although researchers differ in their assumptions regarding what adolescents know about their future earnings. Some studies suggest that the educational choices of individuals are based on inaccurate and incomplete information on labor market returns,[2] and that their expected outcomes and choices are based on subjective valuations of their abilities.[3]

Another key aspect in major choice is the presence of ability sorting into majors. Turner and Bowen (1999) and Arcidiacono (2004) find that pre-collegiate achievements play a significant role in the choice of college major. However, both papers conclude that preferences regarding schooling and workplace environment might play an even larger role in determining major choice than ability sorting. Although not directly measured by the papers above, other papers find that gender differences in preferences play a significant role in the choice of majors.[4]

Risk attitudes also affect major choices.[5] Saks & Shore (2005) find that students from wealthier background tend to choose riskier majors such as business, while Pistolesi (2014) finds that students have lower preference to majors they are less likely to graduate from successfully. Finally, Fricke et al. (2015) provide evidence that major choices are also a result of the exposure to majors, possibly suggesting the existence of ambiguity aversion in major choice.

This paper contributes to the literature in a number of ways. First, it measures the differences in labor market outcomes for students from different genders and ethnic groups, finding considerable differences even after controlling for abilities and specific major choice. Second, this paper measures how labor market outcomes affect the major choices of students in the

[1] See Willis and Rosen, 1979 or Altonji et al. (2012) for a review of the relevant literature.
[2] See e.g. Manski (1993), Hastings et al. (2013), Betts (1996), Wiswall and Zafar (2014), and Reuben et al. (2013). Freeman (1971, 1975, 1976) assumes that students base their wage expectations on the observed initial wages in the years prior to their college enrollment, relating to the limited information at the base of wage expectations. In contrast, Berger (1988) and Willis and Rosen (1979) find that expected lifetime earnings have stronger explanatory power than initial wages.
[3] See e.g. Arcidiacono et al. (2012), Attanasio and Kaufmann (2009), and Stinebrickner and Stinebrickner (2014).
[4] See e.g. Daymont and Andrisani (1984), Zafar (2013) and Gemici & Wiswall (2014)
[5] See e.g. Nielsen & Vissing-Jorgensen (2005) and Wiswall & Zafar (2014).

Israeli higher education system, finding that students from different population groups have different preferences over labor market outcomes. Specifically, this paper examines how gaps in monthly wages and months of work per year between individuals from different population groups affect major choices in the Israeli context and finds that these gaps account for 13-27% of the ethnic differences in major choices. .

This paper proceeds as follows. Section 2 describes the differences in major choices and labor market outcomes between Jews and Arabs in Israel. Section 3 presents the model and explains the empirical strategy of this paper. Section 4 reports the gaps between Jewish and Arab graduates from each major in monthly wages, months of work per year, income per year and probability of graduation. Section 5 reports the main empirical results from the conditional logit regression used to measure the effect of labor market expectations on major choices of different population groups. In section 6 I estimate the effect of PTS differences and gaps in monthly wages and months of work per year on the degree dissimilarity of major choices between Jewish and Arab students. Section 7 concludes.

2 The Differences in Post-Secondary Major Choices and labor market outcomes between Jews and Arabs in Israel

This paper examines the differences in major choices between Jewish and Arab students in the Israeli higher education system. Arabs (both Muslim and Christian) are a marginalized minority group in Israel consisting about one fifth of the country's population and characterized by lower income and educational attainment relative to the Jewish majority (Lewin-Epstein and Semyonov 1994). The Arab population is largely segregated from the Jewish majority – they live in different localities and neighborhoods, attend different primary and secondary schools and work in different occupations and workplaces. Jews and Arabs have separate primary and secondary education systems, and for the majority of the students, the higher education system in Israel is their first experience of a shared environment with people from the other ethnic group. Although the higher education system is shared by Jews and Arabs, Arabs are largely under-represented, and tend to concentrate in specific majors (e.g. Pharmaceutical

Studies and Social Work) while being all but absent from others (e.g. Philosophy and International Relations).

Lewin-Epstein and Semyonov (1994) find that Arabs in Israel have significantly different returns to higher education than Jews, but also that the returns to higher education for Arabs depend on the segment in the labor force they are employed in. specifically, they find that Arabs have a higher returns to education "*in the ethnic labor market than in the dominant labor market and in the public sector than in the private sector*" (pp. 645).[6]

2.1 Data

The calculations and results presented in this paper are based on administrative data collected by the Central Bureau of Statistics (hereafter CBS) in Israel. The data contain all the students that started their Bachelor's degree in a post-secondary education institution in Israel between the years 1999-2001 and follow their labor market outcomes until 2008. For each student the database reports the following information: Ethnic group (Jewish/Arab), gender, age (under/over 27), Psychometric Test score (hereafter: PTS),[7] last major (before graduating or dropping out), graduation status and type of higher education institution (e.g. university, private college etc.). PTS is considered in this paper both as a proxy for ability and as a variable restricting the choice of major for students with low PTS.[8] In addition, the data reports the monthly wages, months worked and economic branch in the first four years in the labor force for students that graduated from their Bachelor degree studies. I use real wages reported in 2008 prices.

[6] The "ethnic labor market" in this quote refers to business owned located in Arab localities which are owned by Arabs, and serve mostly Arab clients, as opposed to the "general labor market" which serves the entire population.
[7] The data report PTS grouped into 30 groups instead of the real PTS which are the integers between 200 and 800. Therefore each PTS in the paper represents approximately 20 real PTS (e.g. "1"=200-219, "2"=220-239, etc.) The full scaling appears in appendix 1. In the rest of this paper I would use the PTS scores as they appear in the data.
[8] In reality students are accepted into higher education based on both their PTS and their matriculation examination scores, but data on the latter were not available for this research. This doesn't necessarily pose a big setback since both scores are highly correlated. It is however worth mentioning that PTS might have a certain ethnic bias, though the Psychometric test can be undertaken in Hebrew, English and Arabic.

Table 1 - Data

	All observations		Final database		W/ labor market data	
Total	145,704		110,390		46,552	
Population group						
Jewish men	60,213	(41.3)	45,761	(41.5)	16,932	(36.4)
Jewish women	73,374	(50.4)	55,044	(49.9)	25,513	(54.8)
Arab men	4,879	(3.4)	4,013	(3.6)	1,374	(3.0)
Arab women	7,238	(5.0)	5,572	(5.1)	2,733	(5.9)
Major						
Education (including Social Work)	19,838	(13.6)	12,434	(11.3)	6,429	(13.8)
Humanities (including Arts)	20,314	(13.9)	15,962	(14.5)	5,781	(12.4)
Social Science	36,070	(24.8)	22,410	(20.3)	7,391	(15.9)
Medicine (including Paramedical Studies)	5,595	(3.8)	5,345	(4.8)	2,934	(6.3)
Science (excluding Math and Physics)	12,464	(8.6)	9,822	(8.9)	2,357	(5.1)
Business (including Law)	21,611	(14.8)	18,433	(16.7)	10,486	(22.5)
Math, Physics and Computer Science (MPC)	13,725	(9.4)	11,965	(10.8)	5,047	(10.8)
Engineering	16,087	(11.0)	14,019	(12.7)	6,127	(13.2)

Note: Numbers in parenthesis represent the share of the observations from the total.

Table 1 reports the distribution of observations on the database across population groups and majors. The average wages and months worked per year in this paper are the average values in the first four years after graduation. For robustness, the calculations were also done using only data from the fourth year after graduation. A major shortcoming of the data on wages and months of work is that the data only reports the average wages and number of months worked in each year, without specifying if the individual was looking for a job while not working. In order to overcome this obstacle the base calculations were only performed on individuals that worked at least one month in each of the four years after graduation. For robustness, the calculations were also performed on all the individuals that worked at least a single month in the entire four years after graduation, wielding roughly similar results.

All in all 145,704 students started their Bachelor's degrees in the Israeli higher education system between the years 1999-2001. Of these students, 34,656 were omitted because they did not have PTS in the data and an additional 658 were omitted because they have exceptionally low PTS (340 or lower, which correspond to the lowest 0.6% of the PTS

distribution for students) that would have essentially prevented them from choosing their majors.[9] Therefore, the data consist of 110,390 students, of which 78,557 (71%) graduated by the year 2008. Data on labor market outcomes are not available for students that didn't graduate before 2008, and are only available for 46,552 students that worked at least one month in each of the first four years, which represent 59% of the graduates.[10] STEM and business majors are slightly over-represented in the database (due to higher rate of students from these majors having PTS in the data) while Education and Social Science are slightly under represented. Similarly, female students (both Jews and Arabs) are slightly over represented relative to males.[11]

It is important to note that 2001-2004 were recession years the Israeli economy following the dot-com bubble in 2000 that had a severe effect on the Israeli high-tech companies, and the second "Intifada" which lasted from September 2000 to February 2005. The economic and diplomatic conditions in Israel at that time probably affected the educational choices and economic performance of the students examined in this paper and I cannot control for these influences. However, since the students in the data spent most of the recession years studying while most of the labor force data comes from the period where the economy was booming, it is not clear that the effect of the economic cycle would lead to a substantial bias. In addition, since the results from this paper are very similar using the average of the first four years in the work force and only the fourth year, it doesn't seem that the economic recession of the early 2000's poses a major problem. However, it is possible that the proximity to tense period had an effect on the ethnic gaps in labor market outcomes (Shayo and Zussman 2011).

[9] Moreover, such a low PTS would have made it impossible to use these individuals in the conditional logit regressions after applying PTS thresholds to each major.

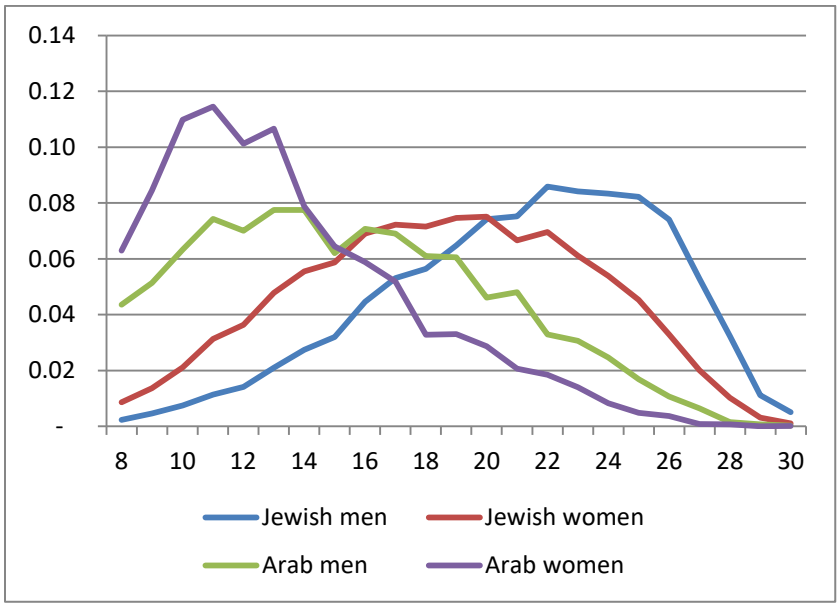
[10] If I use data on all the graduates that worked at least one month in total instead of one month each year I have labor market data on 73,144 students.

[11] I report only weighted results to correct for the over representation, but un-weighted regression generated similar results.

2.2 Differences in wages of university graduates between Jews and Arabs[12]

The overall differences in average wages between Jewish and Arab university graduates are substantial. Arabs with Bachelor's degrees earn only 61% of the wages their Jewish counterparts earn. Similarly, whether Arab or Jewish, women make just 59% of the average wage for men.

Graph 1 – PTS probability density function by population group



The wage gaps between population groups could be a result of a number of factors including differences in abilities and major choices, as well as other factors not observed in the data such as number of hours worked per month, work force preferences, and discrimination. At least some of the observed wage gaps can be attributed to differences in PTS. Graph 1 shows the distribution of PTS by population group. It is immediately visible that Jews have on average a much higher PTS than Arabs, with a slightly higher difference between Jewish and Arab men than between Jewish and Arab women.[13] As in the case with wages, the gaps are persistent not

[12] Unless otherwise stated I use University as shorthand for all acknowledged higher education institutions providing Bachelor's degrees considered in the database.

[13] As mentioned above, each PTS point in the data represents approximately 20 points in the real PTS. See appendix 1 for a conversion table between the grouped scores used in this paper and the real scores. Hereafter I would use only the grouped PTS as they appear in the data.

only on the ethnic axis but also on the gender axis, with men from both ethnic groups having higher PTS than women.

Table 2 - Summary statistics[14]

		Jewish		Arab		
		Men	Women	Men	Women	Total
Total	Average PTS	21.1	18.6	15.6	13.5	19.3
	Graduation rate	68.0	74.4	60.1	73.6	71.2
With labor market data	Average wage	11,841	7,024	7,250	4,286	8,622
	Months worked per year	10.8	10.4	10.8	10.4	10.6
	Average PTS	21.6	19.1	15.5	13.7	19.6

Table 2 reports summary statistics for the entire population in the data. Interestingly, the differences in wages and PTS don't translate to significant differences in number of months worked per year. Additionally, though their PTS are generally lower, women have higher graduation rates than men, and the difference between the graduation rates of Jewish and Arab women is negligible despite large PTS difference. In contrast, Arab men do display considerably lower graduation rates than Jewish men.

2.3 Ethnic and gender wage differences controlling for PTS

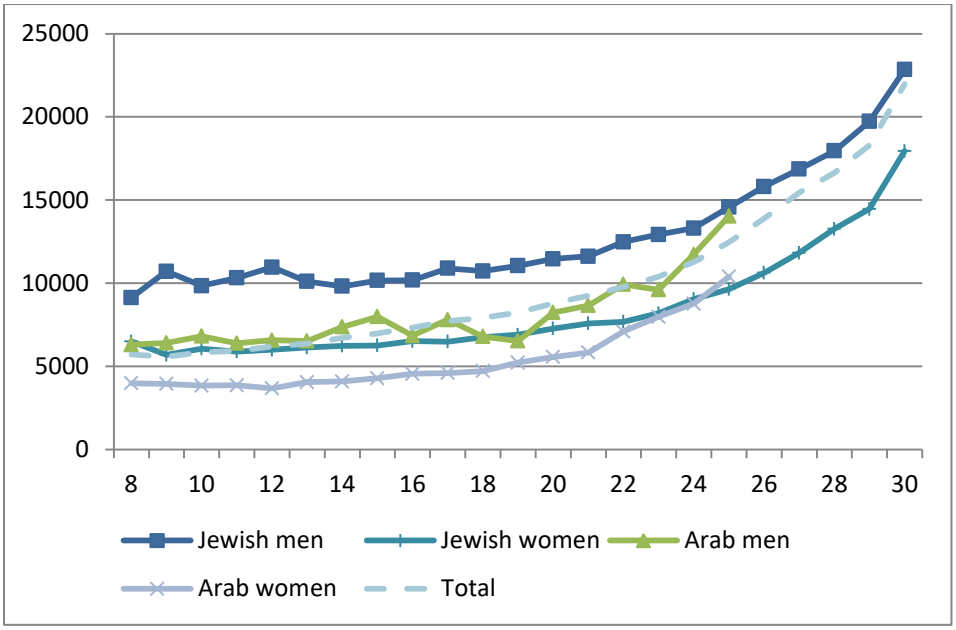
In light of the large differences in PTS between Jews and Arabs, and men and women, it is clear that any comparison of labor market outcomes has to control for this difference. Graph 2 presents the average wages for graduates who did not continue to further studies by population group and PTS.

As expected, wages increase with PTS for all population groups, but the data reveals that Arabs earn significantly less than Jews and women earn less than men even when the PTS is similar. The wage gap between Jews and Arabs is significant for both men and women in almost all PTS levels, but the gap decreases sharply with PTS. The wage gap for men in absolute terms is between 2,175-4,519 NIS per month throughout most of the PTS distribution but decreases sharply at the top of the distribution. Similarly, the wage gap between Jewish and Arab women

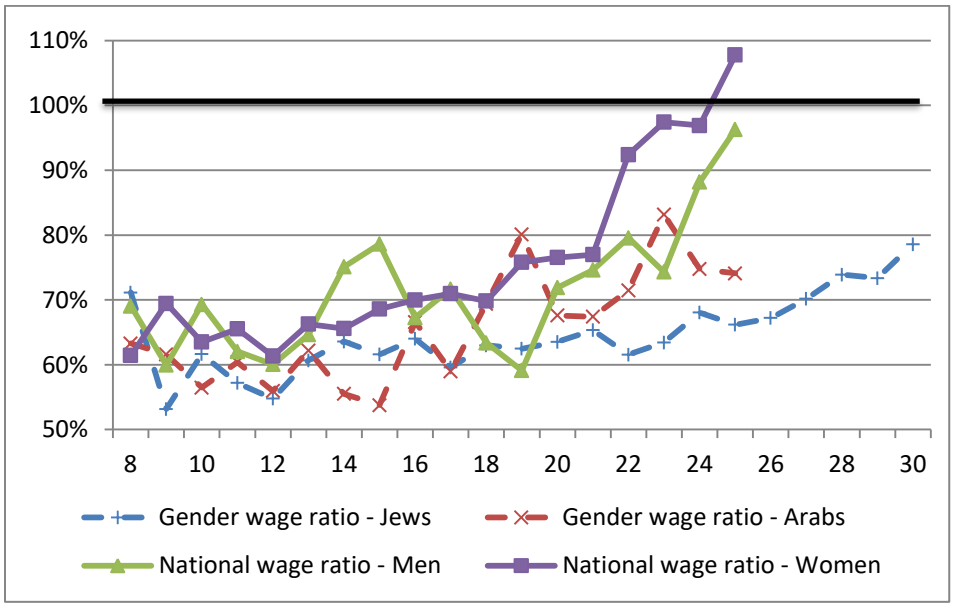
[14] PTS scores for students with wage data are somewhat higher than for students without wage data (whether graduated or not) for Jews and Arab women. In contrast, Arab men with wage data have slightly lower PTS than Arab men without wage data, though the difference is not significant.

decreases from around 2,000 NIS per month at the lower part of the distribution to a negative gap of 750 NIS per month at the top of the PTS distribution (meaning that Arab women earn more than Jewish women at the top of the PTS distribution).

Graph 2 – Average wage by population group and PTS[15]



Graph 3 – Gender and ethnic wage ratios by PTS



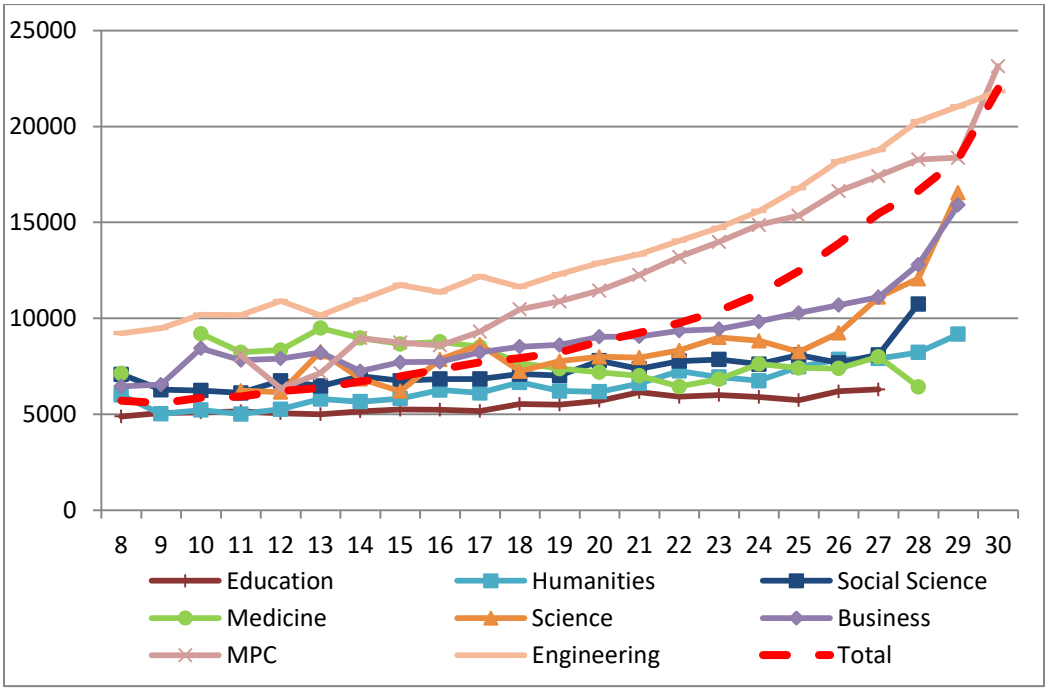
[15] I omitted the data points for Arab men and women with PTS greater than 25 due to small number of observations.

Graph 3 shows the Gender and ethnic wage ratios by PTS. The ethnic wage gap has a much clearer trend when expressed in relative term; Arab men and women earn between 60%-65% compared to their Jewish counterparts at the bottom of the PTS distribution, 80% at PTS levels of 20-22 and the gap nearly closes at PTS levels of 24 and higher.[16] Graduates from both ethnic groups exhibit gender wage gaps throughout the PTS distribution. These gaps correspond with a 0.53-0.84:1 wage ratio between women and men, with Arabs revealing slightly lower gender wage gaps than Jews.

2.4 Wage differences between different majors

Although the data clearly shows that Arabs with similar PTS earn less than Jews, at least some of this gap might be a result of the differences in major choices. Graph 4 presents the average wages for graduates who did not enroll in further education by academic major and PTS.[17]

Graph 4 – Average wage by major and PTS



[16] However, due to a small number of observations it is worth taking the results at the top of the distribution for Arab students with care. This remark is true for all the graphs depicting wages by population group and PTS.

[17] I omit graduates that pursued further education because further education is positively correlated with PTS and is usually entail giving up on present income in order to increase future income. This leads to a somewhat artificial negative correlation between PTS and wages in some majors.

While the MPC (Math, Physics and Computer Science) and engineering graduates earn around 14,000 NIS per month on average, Education and Humanities graduates earn less than half of that amount. These gaps might indeed result from differences in abilities between the students who enroll in different majors, but substantial wage differences remain even after comparing students with similar PTS.

Students that graduate from MPC and Engineering earn considerably higher wages than graduates from any other major throughout most of the PTS distribution, and an increase in PTS in these majors result in significantly higher wages. In contrast, wages increase very moderately with PTS for graduates of all the other majors until a PTS level of 26. At the top of the PTS distribution wages rise sharply for Business and Science graduates, but are still noticeably lower than wages for MPC and Engineering graduates. Wages for Education and Humanities graduates are lower than wages for other majors for all PTS levels and they increase more modestly as PTS rises.[18] Moreover, the data suggests that in accordance with Arcidiacono's (2004) findings, a large part of the increase in returns to ability across the total population is driven by sorting of high ability students into high paying majors (MPC and Engineering), rather than by an actual rise in the returns to ability within each major.

The data in graph 4 demonstrates the importance of major choice for individual's earnings. However, large wage differences between graduates from different ethnic groups and genders persist even within majors. Some of these gaps might be a result of differences in abilities between graduates within each major, but since these gaps appear even in majors that are characterized by very low returns to ability it seems unlikely that ability differences explain all or even most of the ethnic wage gaps for graduates within each major.

Table 3 reports the wages, months worked per year, PTS and graduation rates by major and population group. Jews earn more than Arabs in every major except Medicine. The magnitude of the wage gaps ranges from a little over 1,300 NIS per year for Education graduates to more than 6,000 NIS for Engineering graduates. The absolute ethnic wage gaps are larger between

[18] Medicine graduates have very low wages in the first years in the labor force because after graduation they have to undertake a compulsory internship phase in which they earn very low wages.

Table 3 - Summary statistics by major and population group

		Jewish		Arab		
Major	Variable	Men	Women	Men	Women	**Total**
Education	Average wage	7,948	5,458	6,606	3,955	**5,329**
	Months worked/year	11.1	10.7	11.5	10.8	**10.7**
	PTS	19.0	16.1	13.0	12.3	**15.6**
	Graduation rate	45.7	75.8	68.2	75.1	**72.0**
Humanities	Average wage	8,578	5,809	5,932	3,855	**6,186**
	Months worked/year	10.5	10.2	10.6	9.9	**10.2**
	PTS	19.6	17.6	12.5	12.7	**17.7**
	Graduation rate	67.5	72.2	62.7	72.5	**70.4**
Social Science	Average wage	9,611	6,578	6,560	3,997	**7,140**
	Months worked/year	10.8	10.4	10.8	9.7	**10.5**
	PTS	18.8	17.2	12.7	12.3	**17.4**
	Graduation rate	52.4	62.1	43.5	60.9	**58.8**
Medicine	Average wage	9,965	7,062	10,489	7,259	**7,622**
	Months worked/year	11.0	10.7	11.6	11.0	**10.8**
	PTS	23.6	20.8	18.7	18.8	**21.1**
	Graduation rate	91.6	92.8	83.2	93.6	**92.0**
Science	Average wage	11,099	7,367	5,904	3,884	**8,363**
	Months worked/year	10.5	10.3	10.5	10.1	**10.4**
	PTS	21.7	21.2	17.2	16.6	**21.2**
	Graduation rate	36.7	65.4	25.7	63.4	**49.7**
Business	Average wage	10,688	8,031	6,330	5,223	**9,073**
	Months worked/year	10.7	10.2	10.3	9.6	**10.4**
	PTS	20.9	19.9	16.5	16.5	**20.1**
	Graduation rate	85.2	89.9	70.5	83.3	**86.7**
MPC	Average wage	15,329	11,878	9,784	5,805	**13,983**
	Months worked/year	11.1	10.8	10.9	10.7	**11.0**
	PTS	23.2	22.2	18.6	17.9	**22.7**
	Graduation rate	68.6	75.5	49.7	73.3	**70.0**
Engineering	Average wage	15,539	11,952	8,755	5,898	**14,432**
	Months worked/year	11.3	10.8	10.7	9.3	**11.1**
	PTS	21.6	20.9	17.5	18.7	**21.2**
	Graduation rate	79.4	81.7	56.9	65.1	**78.7**

men than between women in every major except MPC, while the relative ethnic wage gaps are larger for women in every major except Business. The ethnic wage gaps are largest amongst Science and Engineering graduates, and for women also amongst MPC graduates, with a wage ratio of 0.6:1 and lower between Arab and Jewish students. In contrast the Arab-Jewish wage

ratio for Education graduates is 0.72-0.83:1, and in Medicine Arab graduates earn higher wages than their Jewish colleagues in both genders.

The large variation in wage gaps between different majors is possibly a result of differences in major-specific human capital between population groups, but could also indicate for the existence of discrimination against Arabs and women in certain occupations.[19] This discrimination can be manifested in two major ways – either by preferring Jewish and men over Arab and women candidates, or by paying Arab and women workers less for similar jobs. Paying Arab and women workers less than their Jewish and male colleagues makes jobs less appealing, thus discouraging Arab and women candidates from searching and applying for jobs in certain occupations. This might explain, for example, why the rate of Arab graduates from Science majors working in education is larger than the respective share amongst Jewish graduates.

In some occupations, such as Education and Medicine, the principal employer is the government and most of the workforce is subject to national wage agreements. These features make it difficult to pay Arab and women workers less than Jewish and men workers for similar jobs or discriminate against job Arab and Women job applicants. Indeed the wage gaps in the majors leading to these occupations (i.e. Education and Medicine) are relatively small. In contrast, discriminating against Arab and women in engineering and business occupations is easier since most positions in these occupations are in the private sector and require intangible skills. Thus, it is not surprising that graduates from majors naturally leading to these occupations exhibit the largest wage gaps.

In addition to the ethnic wage gap, gender wage gaps exist in every major in both ethnic groups. The gender wage gap has a smaller range than the ethnic wage gap and it stays between 2,000-3,800 NIS per month, which translates to a wage ratio of 0.59-0.83:1 between graduates from the same ethnicity and major. The gender wage gaps are larger than the ethnic wage gaps in Education and Medicine but smaller in Science, MPC, Business and Engineering.

[19] See e.g. Altonji and Pierret (2001) and see Lang and Manove (2011) for theoretical and empirical discussions on statistical discrimination in the labor market.

The differences in months worked per year are much smaller than the differences in monthly wages. There doesn't seem to be a significant ethnic difference between either men or women in any of the majors, and except for the difference between Jewish and Arab women in Engineering the magnitude of the differences don't exceed one month per year. The gender differences in months worked are slightly larger than the ethnic differences, and are most prominent (though still not significant) between Arab men and women who graduated from Social Science and Engineering.

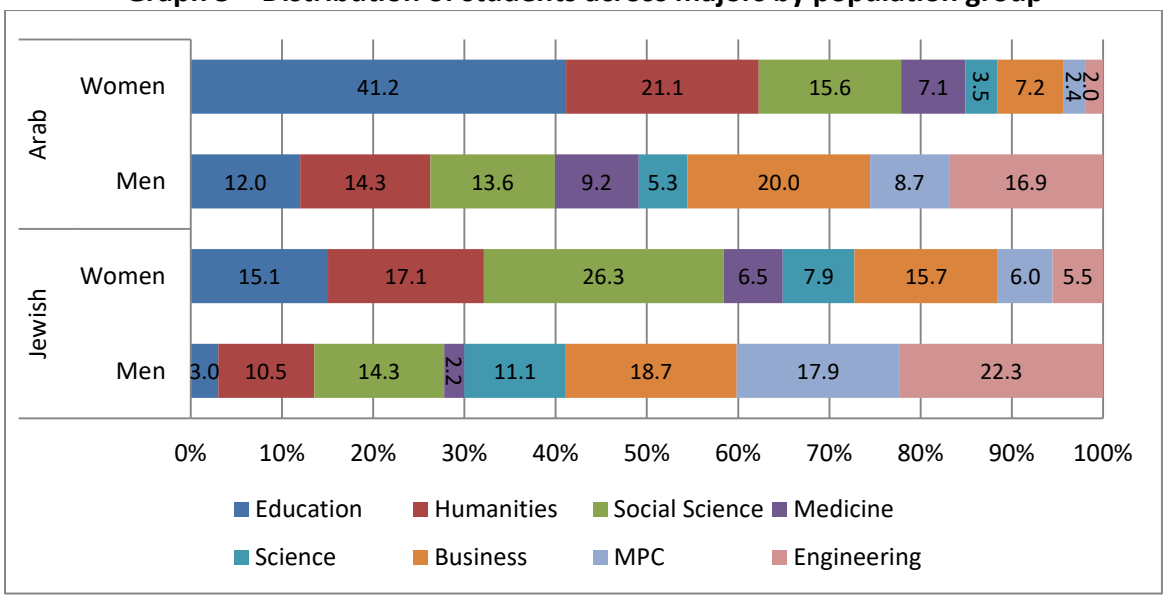
The wage differences for graduates from the same major might result from differences in abilities, and indeed there are significant differences in PTS between students of every major. The ethnic differences in PTS are larger between Jewish and Arab men than between women, and they range from 4-7 PTS for men and 2-5 PTS for women. These differences are largest in Humanities and Social Science and smallest in MPC and Business. In contrast, the gender differences in PTS are much smaller. This result suggests that though some of the ethnic wage gap can be explained by ability differences, ability differences are not likely the principal driver behind the gender wage gap.

Finally, the graduation rates vary significantly between students from different ethnic groups and genders. Arab men have lower probability of graduating than Jewish men in every major except Education, and this difference is especially large in Science, MPC and Engineering. The differences in probability of graduating between Jewish and Arab women are smaller than the differences between men, though still considerable. The differences between Jewish and Arab women are exceptionally large for Engineering students. Women from both ethnic groups have a considerably higher probability of graduating than men in every major, and this difference is especially prominent in Science.

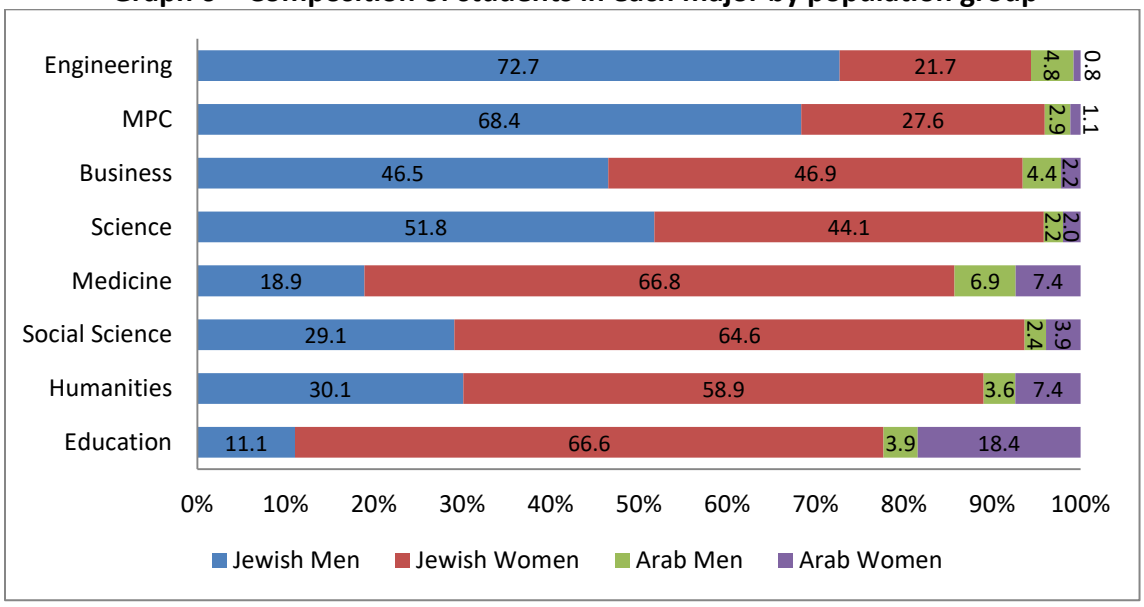
2.5 Differences in major choices by population group

In light of the differences in background abilities and the major-specific labor market performance it is not surprising that Arab and Jewish students enroll into different majors. Graphs 5 and 6 present the distribution of students across majors for each population group and the Composition of students in each major by population group.

Graph 5 – Distribution of students across majors by population group



Graph 6 – Composition of students in each major by population group



Arabs are noticeably more likely to choose Education, Humanities and Medicine relative to Jews. In contrast, the share of Arabs choosing Science, MPC and Engineering is much smaller than the share of Jewish students attending those majors. This pattern can be intuitively explained by the two factors mentioned above; On the one hand, lower PTS bars many Arabs from choosing lucrative majors, driving them to choose majors with low acceptance threshold

such as Education and Humanities. On the other, the high preference Arabs have for Education and Medicine can also be a result of the lower ethnic wage gaps in these majors.

Though there are considerable differences in ethnic-based preferences over majors, the distribution of students across majors reveals that gender, even more than ethnicity, plays an important role in major choice. Female students form a large majority in four of the eight majors. Science and Business are pretty evenly split between female and male students, while MPC and engineering have large male majorities. However it seems that women actually tend to prefer the majors where the relative gender wage gaps are larger.

3 Model and estimation strategy

3.1 A conditional logit model for major choice

I employ a two-phase strategy to investigate individuals' academic major choices. First I generate labor market expectations variables for each student in each of the majors, and then I use the conditional logit regression framework to estimate individuals' major choices based on their labor market outcomes expectations. I assume that the choice of major is a function of the following major-specific characteristics:

1. Expected monthly wage
2. Wage gaps
3. Expected months of work per year
4. Month of work gaps
5. Probability of graduating

In addition, I assume major choice is also a function of individuals' PTS score and their gender and ethnic identities.[20] In addition, I include interaction terms between the labor market expectations and the population group dummies. This method allows measuring the structural

[20] In an alternative setting reported in appendix 5 I use labor market expectations that disregard the gender and ethnic identities of the individuals.

differences in preferences between population groups with relation to wages, months of work and probability of graduating.[21]

In the second phase I present a simple model for academic major choice, wherein each individual i chooses one of J majors[22], subject to the constraint that she has a sufficient PTS to be accepted into that major. Since I do not have data on the acceptance thresholds I define the cutoff as the 5th PTS percentile amongst students of each major, labeling the students in each major who have PTS scores lower than the cutoff as exceptions.[23] A student whose PTS does not exceed the cutoff for a major other than the one she chose is barred for enrolling into it.

Individual's i utility from choosing major j is represented by:

$$(1)\quad U_{ij} = \beta' X_{ij} + \alpha'_j Z_i + \varepsilon_{ij} \qquad j = 0,1,\dots,J$$

Where X_{ij} is a vector of properties for the j^{Th} major for individual i. The variables X assume different values for each major and individual, but their impact on the choice of major, which is represented by the parameter β, is constant across majors and shared by all individuals. Z_i is a vector of individual characteristics. These variables represent attributes of the individual and remain constant across all majors for each individual. α'_j is a parameter which measures how the individual-characteristics affect major choice, and it is constant across individuals but receives a different value for each major j.

If individual i chooses major j then her utility from choosing j is higher than her utility from choosing any other major. Therefore the probability that individual i will choose the j^{th} major can be represented by:

$$(2)\ P(y_i = j) = P(U_{ij} > U_{ik})\ \forall k \neq j$$

[21] It's worth noting that the conditional logit regressions that included population group dummies as individual-specific variables in addition to PTS did not converge.

[22] The base calculations in this paper define eight majors, though a 13-major alternative was also examined.

[23] Exceptions of this kind might be a result of very high matriculation examination results, which I don't observe in the data, prior post-secondary studies in another major, or a subject of the institutions decision to accept a student despite having low PTS.

In conditional logit model this probability equals:

$$(3)\ P_{ij} = \exp(Z_i\alpha_j + X_{ij}\beta) / \sum_{k=1}^{J} \exp(Z_i\alpha_k + X_{ik}\beta)$$

All else being equal I assume that the individuals' utility is strictly increasing with both wages, moths of work and probability of graduating, but that individuals from different population groups attach different weights to each characteristic. Combined, expected wage and months of work represent the expected income. However, the disaggregation allows for a more in-depth analysis of the mechanisms. Specifically, Expected wage measures the relative importance individuals attach to monetary returns, while expected months of work measure how much the individual values occupational security.[24] The disaggregation of expected wages and months of work makes it possible to evaluate how risk-averse are individuals from different population groups by observing how much weight they assign to each factor. Individuals who are more risk averse will be willing to give up on some of their expected wages (and even expected income) in order to increase their expected months.

The probability of graduation represents another aspect of risk aversion. Individuals face a certain outside option for income in case they drop out of university. I assume that this outside option wields lower utility than attending higher education in their chosen major; otherwise individuals wouldn't have chosen to study in the first place.[25] There are two possible reasons for dropping out. The first is inability to meet the requirements for graduating (e.g. passing the exams), and the second is realizing during your studies that the outside option yields higher utility than continuing your studies or changing major. This is either because of the disutility from studying is larger than first expected or because the individual has updated her expected wage after graduating or her outside option (Arcidiacono 2004). It is worth noting that the outside option is not constant across individuals, and that differences in the outside option can

[24] Since individuals can also be employed in jobs that don't fit their qualifications or field of study, it would have been useful to control for these issues. However, since this information does not exist in the data I use only the months of work as a measure of the ability to find a job in general, even if it does not match the individuals' qualifications. This problem is not too severe though, since the ability to find a suitable job is partly represented by the introduction of the wage gap variables.

[25] Unless individuals attach positive consumption value to education, their outside option must also wield lower monetary payoff than the expected wage after graduation. For a discussion on the consumption value of higher education see e.g. Lazear, 1977; Heckman et al, 1999.

affect the returns from graduating. In reality, I assume that the outside option is lower for women and Arabs than it is for men and Jews, and these differences would lead women and Arab to have a higher preference for majors with higher graduation rates.

3.2 The formation of labor market outcomes expectations

I assume that the expectations for monthly wages, months of work per year, income and probability of graduating are formed by individuals comparing themselves with roughly equally talented individuals from the same ethnic group and gender. Thus, I compute the labor market outcomes expectations in the following way: students in each major are assigned into PTS quartiles for which average wages, months of work and probability of graduating are calculated. I assume that each individual can observe other peoples abilities and major choices, and knows her PTS quartile in each major. For example, an individual with a PTS of 19 knows she will be in the lowest PTS quartile if she chose a MPC major, but in the highest PTS quartile if she chose an Education major.

The individual develops her wage, months of work and graduation probability expectations based on her corresponding PTS quartile in each major. If her PTS positions her at the top PTS quartile of Education students, she expects her wages, months of work and probability of graduating to equal the average values of these variables amongst Education graduates with the same ethnic and gender identity who were at the top PTS quartile.[26] More formally, $Expected(y_{ij})$ is individual i from population group H expectations with regards to variable y in the j^{th} major, which equals the average value of y amongst all the graduates of major j that are in the same PTS quartile and population group, h, as the one individual i would have been in, had she chosen to study in major j:

$$(4)\ Expected(y_{ij}) = \frac{\sum_{n=1}^{N} y_{nj}}{N_{Q_{ij}}}, Q_{ij} = Q_{nj} \in \{1,2,3,4\}, i,j \in H$$

[26] This specification ignores the fact that major choice is also a result of private information about abilities and relative advantages students have. However, this data is not available and lacking better information I assume that the method described above provides a close enough approximation for the expectations one can form about their outcomes from studying each major.

Where Q_{ij} represents i's PTS quartile in major j. $N_{Q_{ij}}$represents the total number of students in Q_{ij}, and y_{nj} represents the value of the dependent variable of the n^{th} graduate in major j under the constraints that individual n is a graduate of major j and is in the same PTS quartile of major j as individual and from the same population group.

In addition to the PTS quartile-based estimations for expected wages, months of work and probability of graduation, I also generated regression based estimations as the X variables.[27] However, the conditional logit regressions that included the regression-based estimates as X variables did not converge, so I only report the results from the regression that used the PTS quartile-based estimates as X variables.

3.3 measuring wage, months of work and income gaps by major

The expectations for wage, income, months of work, and probability of graduating described above are formed according to one's PTS and ethnic and gender identities. However, as demonstrated in the previous section, the wages and months of work vary significantly between the individuals from different population groups even when they have similar PTS. Therefore, in order to examine how these differences effect individual major choices I measure the wage, months of work and income gaps between different population groups. The regressions I use to measure these gaps are as follows:

$$(5)\ y_i = \beta_1 PTS_i + \beta_2 {PTS_i}^2 + \beta_3 Age_i + \beta_4 Continue_i + \beta_5 Jewishwomen_i + \beta_6 Arabmen_i + \beta_7 Arabwomen_i + \delta' Specificmajor_i + \eta' Institution_i + \varepsilon_i$$

Where y_{ij} represents the dependent variable value for individual i in major j, PTS_i and ${PTS_i}^2$ represent her Psychometric test score and its square respectively, to allow for a non-linear relationship. Age_i is a dummy variable that equals "1" if individual i is was older than 27 when she started her studies and "0" otherwise. $Continue_i$ is a dummy variable indicating individuals that enrolled in further education within four years from graduation, since such a decision affects the individual's availability for work. $Jewishwomen_i$, $Arabmen_i$ and $Arabwomen_i$ are dummy variables representing individual i's population group. Coefficients β_4, β_5 and β_6

[27] The regression-based estimates were computed using the regressions described in the following section.

represent the major-specific wage, month and income gaps variables for Jewish women, Arab men and Arab women relative to Jewish men respectively. Finally, $\delta' Specificmajor_i$ is a set of dummy variables controlling for the specific major individual i chose,[28] and $\eta' Institution$ are dummy variables controlling for the institution type. The regressions were run without a constant because a regression through the origin (RTO) generated better predictions than the OLS version, specifically for the observations with very low PTS scores.[29]

The inclusion of the further education variable is debatable, since the decision whether or not to continue to further education is not exogenous and is definitely correlated with both individual characteristics and the labor market conditions.[30] However, the results are robust to exclusion of this variable, as well as the age and specific major dummy variables.

4 Empirical results

This section provides the results from the major-specific wage, months worked per year and graduation probability regressions as explained in section 3.3. The results from these regressions are used to estimate the wage and month gaps, which are used in the conditional logit regressions to estimate individuals' major choices. The results from the conditional logit regressions are presented in the second part of this section.

4.1 Wage regressions

The results from estimating the average wages in the first four years after graduation are presented in table 4. The population group coefficients report the wage gaps between the different population groups controlling for the factors mentioned in section 3.3. All but one of the population group coefficients are negative and significant, most of them at a 1% level. This means that Jewish men who graduate from university earn significantly more than Jewish women, Arab men and Arab women graduates in almost every major. In contrast, Arab women are the lowest paid population group in all the majors.

[28] The CBS defines 135 majors grouped into 13 fields. For the purpose of this paper I grouped the majors into 8 larger majors. Appendix 2 details the comparisons between the CBS classification and the majors in this paper.
[29] Regression results with constant are reported in appendix 4.
[30] E.g. people with higher ability are more likely to continue to further education, and periods with high unemployment are characterized by an increase in higher education enrollment.

Table 4 - Wage regressions by major

	Education	Humanities	Social Science	Medicine	Science	Business	MPC	Engineering
Jewish women	-1.660***	-1.868***	-2.002***	-1.567***	-1.178***	-2.013***	-2.825***	-2.271***
	(0.116)	(0.108)	(0.0994)	(0.133)	(0.182)	(0.0905)	(0.187)	(0.172)
Arab men	-0.288*	-1.147***	-1.335***	0.546**	-1.993**	-2.817***	-2.779***	-3.181***
	(0.172)	(0.253)	(0.299)	(0.230)	(0.785)	(0.279)	(0.637)	(0.419)
Arab women	-2.605***	-3.076***	-3.510***	-1.712***	-2.787***	-3.523***	-5.473***	-5.708***
Observations	6,429	5,781	7,391	2,934	2,357	10,486	5,047	6,127
R-squared	0.872	0.791	0.810	0.893	0.753	0.816	0.838	0.883
Controls:								
Age	X	X	X	X	X	X	X	X
Further education	X	X	X	X	X	X	X	X
PTS	X	X	X	X	X	X	X	X
Specific major and type of institution dummies	X	X	X	X	X	X	X	X

Note: Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

The wage gap coefficients between Jewish and Arab men in all the majors except Medicine are negative and significant with an un-weighted average value of -1,624 NIS per month. Arab men who graduate from Medicine are predicted to earn more than their Jewish men counterparts, with a wage gap coefficient of 546 NIS per month. In contrast, the wage gaps range from -288 NIS per month for Education graduates (significant at the 10% level) to -3,181 NIS per month for Engineering graduates. The wage gap coefficients for Arab men in Humanities, Social Science, Science, MPC and Engineering graduates represents around 20% of the average wage for each of these major. Meanwhile, the wage gap for Business graduates is larger and represents nearly one-third of the average wage in that major.

The wage gap coefficients for Arab women are on average more than twice as large as those for Arab men. The largest gaps against Arab women in absolute terms are in MPC and Engineering, where they're predicted to earn 5,000 NIS per month less than Jewish men with similar characteristics. The wage gap coefficients against Arab women express 33-40% of the average wages in Science, Business, MPC and Engineering and 49-50% of the average wages in

Education, Humanities and Social Science. In contrast, the wage gap between Arab women and Jewish men who graduated from Medicine is only 22% of the average wage in that major.

The wage gaps experienced by Jewish women are much smaller than those experienced by Arab women and range between -1,178 in Medicine and -2825 in MPC. Jewish women earn significantly less than Arab men in Education, Humanities, Social Science and Medicine, but they earn more in Science and Business. The only major where Jewish women don't earn significantly more than Arab women is Medicine.[31] Similar to Arab women, the wage gaps Jewish women face are largest in relative terms in Education, Humanities and Social Science, where they represent 28-31% of the average wage, and lowest in Science and Engineering, where they represent 14-16% of the average wage.

Overall, the wage gap coefficients are much smaller than the observed wage gap between the population groups. This is not surprising since Arabs, and to a lesser degree also Jewish women, have lower PTS than Jewish men and choose less lucrative majors than Jewish men, both between the main majors and within each major. For example, the observed wage gap between Jewish and Arab men that studied Engineering is 6,783 while the wage gap coefficient is 3,181. Similarly, the observed wage gap between Jewish men and Arab women in Engineering is 9,641 but the wage gap coefficient is 5,708. In general, controlling for specific majors, institution type, age and PTS reduces the wage gaps estimations between the population groups by 40-50% on average, though there is considerable variation between different majors and population groups.

4.2 Months worked per year regressions

The results from estimating the average months worked in the first four years after graduation are given in table 5. This table is equivalent to table 4, except for the dependent variable.

The first thing that is immediately apparent from the table is that unlike the wage regressions, the gap coefficients in the months worked per year regressions (hereafter months regressions) are less significant and don't have such a clear pattern. The coefficients for Arab men are posi-

[31] This result could be driven by the fact that more Arab women work in their profession than Jewish women.

Table 5 - Months worked per year regressions by major

	Education	Humanities	Social Science	Medicine	Science	Business	MPC	Engineering
Jewish women	0.148	-0.0142	-0.155***	-0.324***	-0.226**	-0.268***	-0.279***	-0.344***
	(0.0930)	(0.0648)	(0.0497)	(0.0846)	(0.0923)	(0.0325)	(0.0459)	(0.0453)
Arab men	1.091***	0.957***	1.045***	0.249*	0.961**	0.153	0.127	0.215*
	(0.138)	(0.152)	(0.150)	(0.146)	(0.397)	(0.1000)	(0.156)	(0.110)
Arab women	0.522***	0.181	0.0930	-0.111	0.524*	-0.220*	0.205	-1.382***
	(0.109)	(0.110)	(0.115)	(0.144)	(0.273)	(0.120)	(0.195)	(0.243)
Observations	6,429	5,782	7,391	2,934	2,357	10,486	5,047	6,127
R-squared	0.977	0.967	0.974	0.978	0.961	0.978	0.982	0.984

Note: The controls used for this regression are similar to the controls used in table 4. Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

tive in all majors, but significant at the 1% level only in Education, Humanities and Social Science, where Arab men with similar characteristics are predicted to work one month more every year compared to than Jewish men. Arab women don't display a clear pattern across all majors; they work significantly more than Jewish men in Education and Science and significantly and considerably less in Engineering. However, none of the coefficients in the other majors is significant at the 5% level. The coefficients for the month gaps for Jewish women are significant and negative in all the majors except for Education and humanities. However, the magnitude of these gaps is not very large and none surpasses the negative 0.35 months per year limit.

4.3 Income per year regressions

Table 6 reports the income regressions used to measure the income gap by population group in each major. This table is equivalent to table 4, except for the dependent variable. The income variable is computed by adding all the income in the four years after graduation and dividing it by the number of years with a positive number of months worked, disregarding years in which the individual did not work at all. The income regressions reveal a very similar picture to that of the wage regressions, which is not surprising given the relatively small and insignificant gaps reported in the months of work regressions in table 5. Arab women have the lowest income of all population groups in all the majors, though they're income is not significantly lower than Jewish women's in Medicine. The magnitude of the income gaps between Jewish men and Arab women range from 21,490 NIS per year in Medicine to 72,810 NIS per year in Engineering. In

relative terms the income gaps are smallest in Medicine and largest in Education, Humanities and Social Science where Arab women are predicted to earn just 0.43-0.48 NIS for each 1 NIS earned by Jewish men.

Table 6 - Income per year regressions by major

	Education	Humanities	Social Science	Medicine	Science	Business	MPC	Engineering
Jewish women	-20.91***	-22.49***	-24.64***	-20.37***	-14.49***	-25.19***	-34.89***	-31.03***
	(1.462)	(1.309)	(1.215)	(1.686)	(2.191)	(1.098)	(2.297)	(2.161)
Arab men	-1.605	-12.69***	-14.57***	7.145**	-20.51**	-31.90***	-33.44***	-38.95***
	(2.168)	(3.073)	(3.661)	(2.901)	(9.428)	(3.378)	(7.813)	(5.264)
Arab women	-30.24***	-36.12***	-41.74***	-21.49***	-31.19***	-41.03***	-62.53***	-72.81***
	(1.707)	(2.229)	(2.808)	(2.864)	(6.476)	(4.052)	(9.761)	(11.61)
Observations	6,429	5,781	7,391	2,934	2,357	10,486	5,047	6,127
R-squared	0.840	0.745	0.770	0.865	0.705	0.777	0.813	0.861

Note: The controls used for this regression are similar to the controls used in table 4. Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Arab men are the highest paid population group in Medicine, predicted to earn over 7,145 NIS more per year relative to Jewish men (1.1:1 wage ratio). In four of the other majors Arabs are the second highest paid population group, with a wage ratio of 0.78-0.97:1 relative to Jewish men in Education, Humanities, Social Science and MPC. The largest income gap between Arab men and Jewish men, both on absolute and relative levels is in Business, where Arab men earn 31,900 NIS per year less than Jewish men, which represent an income ratio of 2:3.

Jewish women earn less than Jewish men in every major and they are the second highest paid population group in Engineering, Business and Science. The income gaps between Jewish men and women range from 14,490 NIS per year in Science to 34,890 NIS per year in MPC. In relative terms the gaps between Jewish men and women are largest in Education, Humanities and Social Science, where the income ratio is smaller than 2:3, while in other majors it's between 0.73-0.81:1.

4.4 Graduation probability regressions

The graduation probability gaps don't appear in the conditional regression, but I report them in table 7 because they shed light on the mechanisms of major choice of the different population groups. This table is equivalent to table 4, except for the dependent variable.

Table 7 - Graduation probability regressions by major

	Education	Humanities	Social Science	Medicine	Science	Business	MPC	Engineering
Jewish women	0.193***	0.0557***	0.0737***	0.0239**	0.0483***	0.0492***	0.0935***	0.0358***
	(0.0144)	(0.00811)	(0.00583)	(0.0104)	(0.00797)	(0.00520)	(0.00898)	(0.00874)
Arab men	0.136***	-0.0119	-0.0762***	-0.0530***	-0.120***	-0.0933***	-0.0428*	-0.197***
	(0.0236)	(0.0200)	(0.0172)	(0.0172)	(0.0251)	(0.0127)	(0.0239)	(0.0167)
Arab women	0.243***	0.0731***	0.0823***	0.0462***	-0.00230	0.0273	0.177***	-0.178***
	(0.0177)	(0.0157)	(0.0142)	(0.0172)	(0.0269)	(0.0177)	(0.0379)	(0.0388)
Observations	12,434	15,962	22,410	5,345	9,822	18,433	11,965	14,019
R-squared	0.763	0.732	0.753	0.921	0.747	0.871	0.737	0.805
Controls:								
Age								
Further education								
PTS	X	X	X	X	X	X	X	X
Specific major and type of institution dummies	X	X	X	X	X	X	X	X

Note: Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Like wages, graduation probabilities exhibit a clear and significant, though different, pattern. Arab men face a lower probability of graduating from each of the majors relative to Jewish men with similar characteristics except for Education and Humanities, with gaps ranging between 5% difference in Medicine to 16% in Engineering.[32] These differences could be a result of many factors, including difficulties unique to Arab students such as language and cultural barriers, or of differences in abilities not captured by PTS. However, it is worth noting that Arab men have a much higher probability of graduating from Education majors than Jewish men.

The coefficients for the graduation probability gaps for Arab women are positive for all majors except for Engineering and Science, and are significant at the 1% level for all the majors except for Science and Business. The magnitudes for these coefficients range from 4.6% higher probability of graduating in Medicine to 24.3% in Education. In contrast, Arab women have 17.8% lower probability to graduate from Engineering relative to Jewish men. The higher graduation probabilities for Arab women correspond with the results for Jewish women, hinting that gender roles are a key factor in determining graduation probabilities.

[32] Throughout this section the % difference means percentage points difference and not percentage difference.

Jewish women have significantly higher probabilities of graduating than Jewish men in all the majors, with magnitudes ranging between 2.4% in medicine to 19.3% in Education. Overall Arab women's probabilities of graduating are slightly though not significantly larger than that of Jewish women except for Science, Business and Engineering. The fact that unlike Arab men, Arab women don't have lower graduation probabilities than their Jewish counterparts suggests that the difficulties associated with being an Arab student (e.g. cultural barriers) might be gender specific.

5 Major choice regressions

The results from the conditional logit regressions on major choice are reported in table 8. These regressions estimate how major-specific labor market characteristics affect individuals' major choices while controlling for individual characteristics. The variables considered in these regressions are expected wages, months of work per year and probability of graduating, as well as the wage and month gaps in each major. The wage, months of work and probability of graduating in each major are assigned based on the individuals' PTS and population group in the method explained in section 3.2, and the wage and month gaps are assigned according to their gender and ethnicity in the method explained in section 3.3. The regressions are weighted to control for the selection into the database due to availability of PTS data.[33] The coefficients reported in table 8 don't represent the marginal effects, but rather the regression output from the conditional logit regression. Though the coefficients don't specify the magnitude of the effect each variable has on major choice, they are indicative of the sign and relative magnitude of the effects. Later in the paper I present the marginal effects of the explanatory variables on major choices and estimate the total effect of PTS differences and wage and months of work gaps on the differences in major choices between Jews and Arabs.

[33] The non-weighted regressions results are similar to the weighted regressions. Contact author for the results from the non-weighted regressions.

Table 8 – Reported coefficients from the conditional logit regressions on major choice

	4-year average			4th year only		
	(1)	(2)	(3)	(4)	(5)	(6)
log(wage)	2.269***	2.142***	1.544***	2.130***	1.627***	1.658***
	(0.0861)	(0.0986)	(0.107)	(0.0568)	(0.0641)	(0.0648)
log(wage)*Jewish women	-3.704***	-3.703***	-3.695***	-3.123***	-2.916***	-3.273***
	(0.0462)	(0.0736)	(0.0765)	(0.0438)	(0.0562)	(0.0593)
log(wage)*Arab men	-0.771***	-2.116***	-1.644***	0.175	-0.905***	-1.002***
	(0.118)	(0.137)	(0.141)	(0.131)	(0.140)	(0.146)
log(wage)*Arab women	-2.374***	-3.024***	-2.771***	-2.572***	-1.920***	-2.817***
	(0.115)	(0.191)	(0.198)	(0.123)	(0.114)	(0.134)
Wage gap - Jewish women		0.244***	0.0512		0.221***	0.0111
		(0.0400)	(0.0421)		(0.0196)	(0.0233)
Wage gap - Arab men		0.284***	0.357***		0.177***	0.105***
		(0.0331)	(0.0393)		(0.0153)	(0.0169)
Wage gap - Arab women		0.840***	0.693***		0.543***	0.361***
		(0.0562)	(0.0539)		(0.0252)	(0.0237)
Months worked	-0.995***	-0.955***	-0.712***	-0.442***	-0.481***	-0.504***
	(0.0400)	(0.0440)	(0.0470)	(0.0305)	(0.0318)	(0.0322)
Months worked*Jewish women	1.597***	1.755***	1.553***	1.070***	1.214***	1.081***
	(0.0321)	(0.0394)	(0.0411)	(0.0298)	(0.0329)	(0.0340)
Months worked*Arab men	0.497***	1.035***	0.775***	0.0635	0.592***	0.575***
	(0.0573)	(0.0708)	(0.0730)	(0.0488)	(0.0548)	(0.0555)
Months worked*Arab women	2.140***	1.984***	1.537***	1.564***	1.201***	1.167***
	(0.0464)	(0.0663)	(0.0794)	(0.0543)	(0.0615)	(0.0538)
Month gap - Jewish women		-0.350***	-0.265***		0.193***	-0.115**
		(0.0858)	(0.0910)		(0.0464)	(0.0533)
Month gap - Arab men		-1.627***	-1.695***		-0.884***	-0.798***
		(0.0646)	(0.0892)		(0.0623)	(0.0703)
Month gap - Arab women		-0.612***	-0.215		-0.562***	-0.381***
		(0.127)	(0.163)		(0.0909)	(0.0944)
Pr(graduate)	0.912***	0.971***	1.227***	0.196**	0.334***	0.445***
	(0.0704)	(0.0783)	(0.0813)	(0.0762)	(0.0802)	(0.0813)
Pr(graduate)*Jewish women			1.558***			1.670***
			(0.0739)			(0.0843)
Pr(graduate)*Arab men			0.354*			1.540***
			(0.199)			(0.160)
Pr(graduate)*Arab women			4.082***			5.076***
			(0.329)			(0.311)
Observations	804,419	804,419	804,419	804,419	804,419	804,419

Note: The regressions are weighted to correct for selection into the database. Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Column 1 reports the most basic regression, which examines whether students from different population groups have different preferences over the expected wage and months of work. The explanatory variables in this regression include the expected wages and months of work, the probability of graduating and the interaction between the expected wages and months of work with the dummy variables for each population group. Thus, the coefficients of log(Wage) and Months worked represent the coefficients for Jewish men. And the coefficients of the interaction term represent the difference in choices between Jewish men and the other population groups. Column 2 adds the interaction terms between the population group dummies and wage and month gaps in each major found in the first phase regressions and reported in table 4 and 5. The coefficients for these interaction terms report how a 1,000 NIS (one month of work) increase in the wage (month) gap between Jewish men and each population group in major j affects the probability that an individual from that population group would choose to study in major j. Column 3 adds interaction terms between the excepted probability of graduating in each major and the population group. This allows the different population groups to have heterogeneous preferences over the expected probability of graduating. Columns 4-6 are equivalent to columns 1-3 with the exception that labor market variables are computed only using data from the fourth year after graduation.

One must be careful when interpreting these results. The two biggest challenges in interpreting the results in table 8 are that the expected wage in each major is calculated based only on individuals who have actually chosen that major, and this choice is likely correlated with unobserved variables and private information of the individuals'. Another problem is that the supply of available spots in each major (i.e. the number of students that can study in each major) is not a result of free choice, but is rather a result of policy and budgetary decisions made by the higher education authorities in Israel. This might make the preference for the more lucrative majors seem artificially low, because the size of these majors is constrained.[34] Therefore, the results are not very good at revealing the real preferences and shouldn't be taken at face value. However, they help to expose the differences in preferences between the population groups.

[34] This is most obvious in Medicine, where demand greatly exceeds supply.

The regressions show that Jewish men have the highest preference for high-wage majors relative to the other population groups. Arab men have the second highest preference for high-wage majors, though it is still significantly lower than Jewish men. Arab women have lower preference for high paying majors relative to men from both ethnic groups, but their preference for high paying majors is higher than that of Jewish women.

Wage gaps have a significant effect on the preferences for academic majors. The effect is largest for Arab women, who are deterred from choosing majors characterized by high wage gaps between them and Jewish men. The effect wage gaps have on Arab men and Jewish women is smaller, but still significant.

The relative preferences of the different population groups with regard to expected months of work are exactly opposite to the relative preferences for expected wages. Jewish men have the lowest preferences for majors with higher expected months of work followed by Arab men. Jewish women and Arab women have the strongest preference for higher months of work, and the differences between the women from the two ethnic groups are insignificant. The effect of major specific gaps in the number of months worked per year is puzzling. Both Jewish women, Arab men, and Arab women seem to prefer majors characterized by higher gaps in the months of work per year between them and Jewish men. This result is counter intuitive and I assume it stems from omitted variable bias.

Finally, Jewish men seem to attach less importance to the expected probability of graduating relative to other population groups. In contrast, Arab women have the highest preference for majors they are more likely to graduate from. This result confirms the prediction presented earlier that Arabs and women are expected to put more emphasis on majors with better chances for graduating, since their outside option in case of dropping out are likely lower than those of Jews and men.

Overall, the results from the regressions in table 8 imply that Arabs are more risk averse than Jews in their choices of academic majors, and women from both ethnic groups are more risk averse than men. Arab and women put less emphasis on earning high wages, but care more

than their Jewish and men counterparts about their expected months of work per year and the probability of graduating.

Table 9 reports the conditional regressions on major choice with an expected income variable which replaces the expected wage and expected months of work variables from the regressions in table 8.

Table 9 - Conditional regressions output

	4-year average		4th year only	
	(1)	(2)	(3)	(4)
log(income)	0.911***	0.800***	1.222***	1.100***
	(0.0756)	(0.0727)	(0.0799)	(0.0779)
log(income)*Jewish women	-1.777***	-2.180***	-1.656***	-2.137***
	(0.0457)	(0.0482)	(0.0454)	(0.0500)
log(income)*Arab men	-0.164*	-0.249**	-0.156*	-0.242**
	(0.0967)	(0.0990)	(0.0885)	(0.0952)
log(income)*Arab women	-0.850***	-1.246***	-1.171***	-1.224***
	(0.114)	(0.106)	(0.114)	(0.0875)
Income gap - Jewish women	0.00110	-0.0219***	9.80e-06***	-7.03e-06***
	(0.00336)	(0.00346)	(1.72e-06)	(1.90e-06)
Income gap - Arab men	-0.0211***	-0.0296***	-7.97e-06***	-1.17e-05***
	(0.00271)	(0.00243)	(1.52e-06)	(1.31e-06)
Income gap - Arab women	0.0876***	0.0694***	4.73e-05***	3.73e-05***
	(0.00441)	(0.00451)	(1.94e-06)	(2.01e-06)
Pr(graduate)	0.958***	1.266***	0.567***	0.851***
	(0.0676)	(0.0715)	(0.0698)	(0.0725)
Pr(graduate)*Jewish women		2.132***		2.186***
		(0.0696)		(0.0750)
Pr(graduate)*Arab men		3.180***		2.945***
		(0.152)		(0.147)
Pr(graduate)*Arab women		4.986***		4.309***
		(0.268)		(0.250)
	804,883	804,883	804,883	804,883

Note: The regressions are weighted to correct for selection into the database. Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

The regressions in table 9 reinforce the insight from the regressions in table 8 that Jewish men are the population group that has the highest priority for high-income majors, followed by Arab

men. Also similar to the results in table 8, Arab women seem to care more about expected income than Jewish women. However, there are two main differences in the results from tables 8 and 9. First, when we examine the effect of expected total income as opposed to the disaggregation to expected wages and expected months of work the differences between Arab and Jewish men become less significant, indicating that Arab men compensate the lower wages with more months of work at least to some extent. Second, only Arab women seem to be adversely affected by the presence of income gaps, and Arab men actually seem to prefer majors where they are subject to income gaps relative to Jewish men. Like in the previous regressions, I find this result puzzling.

If the income, months of work and wage expectations are formed without taking into account the gender and ethnic identities of the individual the results are somewhat different. Specifically, contrary to the results from table 9 Arab men seem to have a slightly higher preference for high income than Jewish men while the difference between Arab and Jewish women is inconclusive. Additionally, if labor market expectations are based solely on PTS and not on gender and ethnic identity, Arab men seem to be deterred from choosing major with large income gaps between them and Jewish men.[35]

Finally, the regressions from table 9 reinforce the results from table 8 with regards to probability of graduating, suggesting that Arab women have the strongest preference for majors they are more likely to graduate from while Jewish men have the lowest preference for high probability of graduating. This result fits the notion stressed earlier that Arabs are more risk averse in their choice of majors. The marginal effects from regression 3 in table 8 and regression 2 in table 9 are reported in Appendix 6.

5.1 Being a double minority – The case of Arab women

This section addresses the question whether being an Arab women in Israel is simply a conjunction of what it means to be both Arab and female, or that being an Arab women incorporates something unique beyond the ethnic and gender status. In other words, this

[35] The results from the regressions which assume that labor market expectations are formed without taking into account one's gender and ethniticity are reported in appendix 5.

section examines whether gender differences are constant across ethnic groups, and ethnic differences constant across genders. In order to investigate this issue I change equation 5 to:

$$(6)\ y_i = \gamma_1 PTS_i + \gamma_2 {PTS_i}^2 + \gamma_3 Age_i + \gamma_4 Continue_i + \gamma_5 Arab_i + \gamma_6 Women_i + \gamma_7 Arab * Women_i + \delta' Specificmajor_i + \eta' Institution_i + \varepsilon_i$$

Where $Arab_i$ is a dummy variable indicating if individual i is Arab, $Women_i$ is a dummy variable indicating if individual i is female and $Arab * Women_i$ is an interaction term between the Arab and women dummies. In the specification γ_5 measures the gap in the dependent variable between Jews and Arabs, γ_6 measures the difference between men and women, and γ_7 measures the difference between gaps in the dependent variable between Jewish men and Arab women and the sum of the gaps between Jews and Arabs and men and women.

Comparing equations 5 and 6 we can see that $\beta_7 = \gamma_5 + \gamma_6 + \gamma_7$. If $\gamma_7$is significantly different than zero, then being and Arab women has a significantly different effect on performance than merely summing the effects of being both Arab and women. I make no additional assumptions with regards to the performance of Arab women, though considering the different gender relations between the Jewish and Arab populations in Israel, and specifically the more conservative genders roles in the Arab population, I expect γ_7 to be negative in the wage, income, and months of work regressions. I also expect Arab men to suffer more from the ethnic differences between Jews and Arabs when it comes to performance during studies, and thus I expect γ_7 to be positive in the probability of graduation regression.

Table 10 - Wage regressions by major

	Education	Humanities	Social Science	Medicine	Science	Business	MPC	Engineering
Arab	-0.210	-0.891***	-1.022***	0.391**	-1.326**	-2.046***	-2.127***	-2.319***
	(0.129)	(0.187)	(0.223)	(0.174)	(0.574)	(0.205)	(0.472)	(0.312)
Women	-1.186***	-1.323***	-1.442***	-1.147***	-0.833***	-1.446***	-2.015***	-1.586***
	(0.0868)	(0.0796)	(0.0739)	(0.101)	(0.134)	(0.0666)	(0.139)	(0.128)
Arab*women	-0.528***	-0.0499	-0.175	-0.445**	0.0981	0.984***	0.258	-0.109
	(0.137)	(0.210)	(0.270)	(0.221)	(0.678)	(0.308)	(0.746)	(0.745)
Observations	6,429	5,781	7,391	2,934	2,357	10,486	5,047	6,127
R-squared	0.870	0.788	0.806	0.890	0.753	0.809	0.832	0.878

Note: The controls used in this regression are similar to the controls used in table 4. Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Table 11 – Months of work per year regressions by major

	Education	Humanities	Social Science	Medicine	Science	Business	MPC	Engineering
Arab	1.091***	0.957***	1.045***	0.249*	0.961**	0.153	0.127	0.215*
	(0.138)	(0.152)	(0.150)	(0.146)	(0.397)	(0.1000)	(0.156)	(0.110)
Women	0.148	-0.0142	-0.155***	-0.324***	-0.226**	-0.268***	-0.279***	-0.344***
	(0.0930)	(0.0648)	(0.0497)	(0.0846)	(0.0923)	(0.0325)	(0.0459)	(0.0453)
Arab*women	-0.718***	-0.761***	-0.797***	-0.0353	-0.212	-0.105	0.357	-1.254***
	(0.147)	(0.171)	(0.182)	(0.185)	(0.469)	(0.151)	(0.247)	(0.263)
Observations	6,429	5,782	7,391	2,934	2,357	10,486	5,047	6,127
R-squared	0.977	0.967	0.974	0.978	0.961	0.978	0.982	0.984

Note: The controls used in this regression are similar to the controls used in table 4. Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Table 12 – Income per year regressions by major

	Education	Humanities	Social Science	Medicine	Science	Business	MPC	Engineering
Arab	-1.146	-9.862***	-11.19***	5.025**	-13.91**	-23.16***	-25.32***	-28.33***
	(1.608)	(2.259)	(2.710)	(2.167)	(6.854)	(2.478)	(5.792)	(3.906)
Women	-15.05***	-16.01***	-17.87***	-15.01***	-10.30***	-18.11***	-24.97***	-21.90***
	(1.085)	(0.962)	(0.899)	(1.259)	(1.593)	(0.806)	(1.702)	(1.604)
Arab*women	-6.165***	-0.702	-2.238	-5.379*	1.173	12.09***	5.535	-1.680
	(1.712)	(2.537)	(3.291)	(2.755)	(8.095)	(3.734)	(9.146)	(9.330)
Observations	6,429	5,781	7,391	2,934	2,357	10,486	5,047	6,127
R-squared	0.839	0.744	0.767	0.865	0.707	0.771	0.807	0.855

Note: The controls used in this regression are similar to the controls used in table 4. Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Table 13 - Probability of graduation regressions by major

	Education	Humanities	Social Science	Medicine	Science	Business	MPC	Engineering
Arab	0.136***	-0.0119	-0.0762***	-0.0530***	-0.120***	-0.0933***	-0.0428*	-0.197***
	(0.0236)	(0.0200)	(0.0172)	(0.0172)	(0.0251)	(0.0127)	(0.0239)	(0.0167)
Women	0.193***	0.0557***	0.0737***	0.0239**	0.0483***	0.0492***	0.0935***	0.0358***
	(0.0144)	(0.00811)	(0.00583)	(0.0104)	(0.00797)	(0.00520)	(0.00898)	(0.00874)
Arab*women	-0.0850***	0.0293	0.0848***	0.0753***	0.0697*	0.0714***	0.127***	-0.0166
	(0.0252)	(0.0237)	(0.0216)	(0.0222)	(0.0360)	(0.0212)	(0.0446)	(0.0419)
Observations	12,434	15,962	22,410	5,345	9,822	18,433	11,965	14,019
R-squared	0.763	0.732	0.753	0.921	0.747	0.871	0.737	0.805

Note: The controls used in this regression are similar to the controls used in table 7. Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Tables 10-13 report the wage, months of work, income and probability of graduating regressions that were run using the specification of equation 6. These tables correspond with tables 4-7 from the previous sections. The results indicate that gender and ethnic identities have a significant effect on the labor market outcomes of individuals. In particular, Arabs seem to work more and earn less than Jews most majors. In contrast, Arabs have a lower chance of graduating from most majors. Women earn significantly less than men in all the majors, and work significantly less than men in all but two majors. Conversely, have a higher probability of graduating in all majors.

The coefficients for the interaction terms between the Arab and women dummies are insignificant in the wage and income regressions in most majors, indicating that the effect being an Arab woman has on wages and income is not different than the aggregate effects of being both Arab and women. However, the effect of being an Arab woman on wages and income is more negative than the joint effects of being Arab and female for Education and Medicine graduates, and more positive for Business graduates. Being an Arab woman also has a more negative effect on months worked per year with comparison to the effect of both being Arab and women, and this difference is significant for Education, Humanities, Social Science and Engineering graduates. In contrast, the effect of being an Arab woman on the probability of graduation is generally more positive than the effect of being both Arab and women, indicating that Arab men are finding it more difficult to adjust to the higher education system than Arab women.

Tables 14 and 15 report the conditional logit regressions which examine the major choices of Arab women. The regressions in these tables correspond with the regressions in tables 8-9 with the exception that the interaction terms between the labor market variables and the population group dummies were altered to fit the specification in equation 6. The wage, months of work and income gap variables were extracted from the corresponding regressions reported in tables 10-12. The expectations for wages, months of work, income and probability of graduating are formed in the same way described in section 3.2. The conditional regressions

Table 14 – Reported coefficients from the conditional logit regressions on major choice

	4-year average			4th year only		
	(1)	(2)	(3)	(4)	(5)	(6)
log(wage)	2.269***	2.082***	1.362***	2.130***	1.654***	1.690***
	(0.0861)	(0.102)	(0.109)	(0.0568)	(0.0651)	(0.0662)
log(wage)*Arab	-0.771***	-1.997***	-1.286***	0.175	-0.768***	-0.859***
	(0.118)	(0.135)	(0.140)	(0.131)	(0.127)	(0.139)
log(wage)*Women	-3.704***	-3.139***	-3.090***	-3.123***	-2.598***	-2.962***
	(0.0462)	(0.0711)	(0.0734)	(0.0438)	(0.0545)	(0.0578)
log(wage)*Arab women	2.100***	1.444***	0.728***	0.376**	0.517***	0.263
	(0.151)	(0.156)	(0.184)	(0.170)	(0.147)	(0.172)
Wage gap - Arab		0.422***	0.396***		0.251***	0.142***
		(0.0268)	(0.0349)		(0.0132)	(0.0151)
Wage gap - Women		0.507***	0.325***		0.389***	0.194***
		(0.0374)	(0.0397)		(0.0188)	(0.0225)
Wage gap - Arab women		-0.457***	-0.732***		-0.171***	-0.245***
		(0.0795)	(0.0876)		(0.0316)	(0.0291)
Months worked	-0.995***	-0.669***	-0.369***	-0.442***	-0.448***	-0.461***
	(0.0400)	(0.0455)	(0.0482)	(0.0305)	(0.0324)	(0.0328)
Months worked*Arab	0.497***	0.785***	0.487***	0.0635	0.601***	0.559***
	(0.0573)	(0.0668)	(0.0717)	(0.0488)	(0.0556)	(0.0560)
Months worked*Women	1.597***	1.647***	1.437***	1.070***	1.223***	1.125***
	(0.0321)	(0.0391)	(0.0411)	(0.0298)	(0.0337)	(0.0346)
Months worked*Arab women	0.0449	-0.705***	-0.826***	0.431***	-0.598***	-0.575***
	(0.0645)	(0.0777)	(0.0946)	(0.0618)	(0.0712)	(0.0707)
Month gap – Arab		-1.704***	-1.516***		-1.454***	-1.097***
		(0.0556)	(0.0791)		(0.0493)	(0.0566)
Month gap - Women		0.481***	0.625***		0.617***	0.249***
		(0.0849)	(0.0894)		(0.0498)	(0.0551)
Month gap - Arab women		-0.340***	-0.314***		-1.050***	-0.877***
		(0.0765)	(0.0870)		(0.0672)	(0.0740)
Pr(graduate)	0.912***	0.633***	0.884***	0.196**	0.539***	0.503***
	(0.0704)	(0.0769)	(0.0821)	(0.0762)	(0.0837)	(0.0835)
Pr(graduate)*Arab			0.646***			1.552***
			(0.191)			(0.148)
Pr(graduate)*Women			1.584***			1.307***
			(0.0730)			(0.0818)
Pr(graduate)*Arab women			2.605***			2.335***
			(0.366)			(0.300)
Observations	804,419	804,419	804,419	804,419	804,419	804,419

Note: The regressions are weighted to correct for selection into the database. Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

in tables 14 and 15 examine whether being an Arab women has a distinct effect on the choice of academic majors that is different the joint effect of being both Arab and women.

Tables 14 and 15 indicate that Arab women have distinctively different preferences over academic majors than the joint effect of being an Arab and women. The regressions suggest that Arab students have a lower preference for high paying majors than Jewish students, and that the magnitude of the gender differences is even larger, with women caring less than men about future wages. However, Arab women don't fully internalize both effects, and though they have significantly lower preference for lucrative majors than men from both ethnic groups, they seem to have a higher preference for high paying majors than Jewish women. I hypothesis that this difference in preferences between Jewish and Arab women might be a result of Arab women having to overcome stricter social norms to attend higher education than Jewish women, and thus would need higher paying majors in order to justify their decision to study.

Both Arab and women students are deterred from choosing majors which are characterized by large wage gaps and the gender wage-gap seems to have a larger effect than the ethnic wage gap. Arab women also prefer majors with smaller wage gaps, though the effect the gaps have on their decision is smaller than the joint effects of being an Arab and a women.

In contrast with wages, Arab and women students have a stronger preference for majors characterized by large number of expected months of work per year than Jewish and men students. However, Arab women don't seem, to fully internalize both effects and their preferences with regards to expected months of work are not significantly different than those of Jewish women. Similar to the results for Arab men in table 8, the regressions in table 14 Imply that Arab students prefer majors characterized by larger month gaps between them and Jewish students, a result that is difficult to explain in the model.

Finally, both Arab and women have a stronger preference for majors with high probability of graduating than Jewish and men respectively. Arab women not only internalize both effects but even have a higher preference for majors with higher probability of graduation than the joint effect of being an Arab and women.

Table 15 - Conditional regressions output

	4-year average	
	(1)	(2)
log(income)	0.989***	0.907***
	(0.0805)	(0.0716)
log(income)*Arab	-0.216**	-0.298***
	(0.0887)	(0.0953)
log(income)*Women	-1.551***	-2.007***
	(0.0444)	(0.0473)
log(income)*Arab women	1.633***	0.928***
	(0.137)	(0.124)
Income gap - Arab	0.00642***	-0.0181***
	(0.00223)	(0.00220)
Income gap - Women	0.0252***	-0.00410
	(0.00325)	(0.00339)
Income gap - Arab women	-0.0684***	-0.103***
	(0.00503)	(0.00440)
Pr(graduate)	0.663***	1.060***
	(0.0671)	(0.0707)
Pr(graduate)*Arab		2.980***
		(0.147)
Pr(graduate)*Women		1.997***
		(0.0687)
Pr(graduate)*Arab women		4.123***
		(0.299)
	804,883	804,883

Note: The regressions are weighted to correct for selection into the database. The regressions on total income in the fourth year did not converge. Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

The regressions in table 15 reinforce the results from table 14. Arabs seem to have a slightly lower preference for high income majors than Jews and women seem to have considerably lower preference for high income majors than men. Arab women don't fully internalize the effects of being both women and Arab and while having a weaker preference for high income majors than men, Arab women have a significantly higher preference for high income majors than Jewish women. Arab women also seem to put less emphasis on income gaps relative to other population groups, while caring more about the expected probability of graduation.

To sum up, Arab women seem to have slightly different labor market outcomes than the conjunction of being an Arab and a woman, and significantly different preferences over academic majors. Arab women seem to put more emphasis on wages relative to the joint effect of being both Arab and women and less on the expected months of work, suggesting that gender identities play a different role in the Arab and Jewish populations. A further investigation is needed on the nature of the differences in the gender roles between the two ethnic groups which the data used in this paper does not allow.

5.2 Robustness of the results

The wage, months of work and income regressions that used to estimate the corresponding gaps between population groups were run using different sets of controls. The characteristics of the main regressions are explained above, and for robustness analysis the gaps were also computed without including the specific major and type of institution dummies and the results are reported in Appendix 3. Another alternative specification also dropped the age and further education dummies. The labor market expectations were computed both with and without taking the gender and ethnic identity of the individuals into account. The results of the conditional regressions that use the labor market expectations that disregard gender and ethnic identities are very similar to my main results and are reported in appendix 5. The biggest difference from the main results is that in this specification Arab men seem to have a higher preference for high income majors than Jewish men.

In addition to the above, the labor market outcomes expectations were calculated both using only individuals who worked at least one month in each year and individuals who worked at least one month in the first four years in total. Likewise, the regressions were also run using 4-year average values for wage and months of work and using only the fourth year from graduation, assuming the fourth year might be a better representative of actual the expected future wages. Moreover, an alternative classification of majors which included the original 13 academic fields defined by the CBS instead of the 8-major classification used in the main regressions. Finally, the regressions were run using both the 5^{th} and 10^{th} PTS percentiles in each

major as acceptance threshold. Overall, the main results of this paper are robust to changes in the specifications and definitions, suggesting they represent real phenomena.[36]

6 The role of PTS and wage and month gaps in generating the major choice disparity

This section examines the roles of PTS and the wage and month gaps in facilitating the differences in major choices. In order to do so I use the results from conditional logit to generate major choice predictions. The regression used in this section is the one reported in column 3 of table 8. The major choices of the different population groups were predicted under the following assumptions: First, at the mean PTS of each population group separately. This specification is used as the base prediction according to which I examine the effects of eliminating PTS differences between the population groups, and of eliminating the wage and months of work gaps. The second assumption, which examines the role of PTS differences, assigns all the population groups the mean PTS values in the entire population. Finally, the third assumption examines the role of the wage and months of work gaps by predicting the major choices of each population group at their own mean PTS value, similar to the base specification, but also assumes that the wage and month gaps are equal to zero.

Following the derivation of the three sets of major choice prediction I measure the differences in major choices between the different population groups using the "dissimilarity index" (hereafter DI) used by Turner and Bowen (1999). This index reports the share of students that would have to switch major in order to have identical major choices between two different population groups. I measure both the ethnic DI for both men and women, juxtaposing the major choices of Jewish men compared Arab men, and Jewish women compared to Arab women, and the gender DI, comparing the choices of men and women of the same ethnic group. The major choice predictions and national and gender DI are reported in appendix 7. The predicted major choice distribution presented in appendix 7 doesn't fully fit the actual choices. The deviations between actual and predicted choices are largest for Medicine and Education majors. These deviations might be a result of underestimating the enrollment cutoff into the more selective majors, and specifically Medicine.

[36] Contact author for robustness analysis not reported in this paper.

Table 16 - Contributing factors to the national and gender differences in major choice

	National differences		Gender differences	
Factor	Men	Women	Jewish	Arab
Baseline: Model's prediction at the mean PTS of each group				
PTS	-5%	41%	21%	1%
Wage and month gaps	18%	13%	-4%	3%
Other	86%	46%	84%	97%
Baseline: Actual major choices in the data				
PTS	6%	41%	28%	-1%
Wage and month gaps	27%	13%	6%	1%
Other	67%	46%	65%	99%

Table 16 reports the relative roles of PTS differences and wage and months of work gaps in the facilitation of the differences in major choices by individuals from different population groups. The relative contribution of each factor is used by comparing the DI values with and without controlling for that factor. The results suggest that PTS differences play only a small role in the formation of the major choice discrepancy between Jewish and Arab men, and if anything the PTS gap might even decrease the differences in major choices. This finding might be a result of Arab students having a higher preference for more selective majors than Jewish students, which counteracts the effect of the PTS differences. In contrast, the PTS gap plays a substantial role in the differences in major choices between Jewish and Arab women, and assigning both with the mean PTS of the total population decreases the DI between them by 41 percent. This finding might be a result of the very low PTS scores of Arab women, which prevents many Arab women from choosing their field of study freely. The PTS gaps also play a substantial role in facilitating the major choice differences between Jewish men and women, while having a negligible contribution to facilitating the gender differences in major choices between Arab students.

Wage and months of work gaps seem to have a substantial effect on the major choices of Jewish and Arab students. Eliminating these gaps decreases the DI between Jewish and Arab students by 18 percent for men and 13 percent for women. In contrast, the wage and months of work gaps don’t have a large effect on the gender DI in for either Jewish or Arab students.

7 Conclusions

There are substantial Differences between the labor market outcomes and academic major choices of Jews and Arabs. Considerable differences in labor market outcomes and major choices also exist between men and women, though the gender differences are not identical in for individuals from both ethnic groups.

In order to investigate the academic major choices of Jewish and Arab students I used a two-phase method. First, I generated labor market outcomes expectations for each individual in each major. These expectations variables were computed based on the individual's PTS and the labor market outcomes for individuals from the same population group with similar PTS and in each major. The labor market variables considered were average wages, months of work per year and total income in the first four years after graduation, as well as the probability of graduating.

Additionally, I use a simple regression analysis to compute the gaps in labor market outcomes between the graduates from different population groups in each major. These regressions find significant differences in wages and total income between Jewish and Arab students, even after controlling for background characteristics. Jewish men earn considerably higher wages and income than Arab men in every major except for Education and Medicine, and Jewish women earn significantly more than Arab women in every major except Medicine.

The existence of significant and sizeable wage and income gaps between Jews and Arabs who graduate from the same major even after controlling for PTS, age, gender, specific major choice and institution type might hint to the prevalence of discrimination against Arabs in the workforce. The discrimination against Arabs can take form in two major ways, either by employers willing to pay Arab workers less than equally qualified Jewish workers for the same job, or by employers preferring to hire Jewish candidates over equally qualified Arab candidates.[37] Since occupations are not reported in the data, I cannot examine in which

[37] Another form of discrimination that I do not focus on but might affect the labor market outcomes of the Arab population is the scarcity of commercial land in Arab localities and the low availability of public transportation to Arab localities and neighborhoods.

occupations Arab university graduates find it more difficult to get a job that suites their credentials and this issue remains unanswered. The wage gaps could also be a result of differences in human capital between Jewish and Arab students that are not captured by the variables in the data, or by differences in the intensive labor supply.

Contrary to the case with wages and income, Arabs who graduate from Bachelor's degree don't seem to work less months per year than Jews, and if anything evidence suggest they work slightly more than their Jewish counterparts, though the differences are insignificant in most majors. This suggests that the labor supply is not a primary cause of the wage gaps. It is worth noting that the data only reports the number of months worked per year, and not the number of hours worked, whether the individuals ware actively looking for a job in the months they didn't work, and whether they managed to find a job that satisfies them and meets their qualifications, or they had to settle for a job that does not require academic education.

Arab men also have a lower probability of graduating than Jewish men in all the majors except Education and Humanities. In contrast, Arab women have a lower probability of graduating comparing to Jewish women only in Science, Business, MPC, and Engineering.

After computing the expected wages, months of work per year, income and probability of graduating for each individual in each major, as well as the wage, months and income gaps in each major, I use these variables to analyze major choices by Jewish and Arab students. I do so using a conditional logit model that examines how individual characteristics and labor market outcome variables affect individuals' major choice. This analysis provides two key results:

1) Preferences over academic majors differ significantly between Jews and Arabs and between Individuals from different genders.
2) Wage and income gaps between population groups have a significant effect on major choices.

At least some of the differences in major choices between individual from different ethnic groups and genders stem from systematic differences in preference over occupations. Jewish students attach more importance to studying majors with higher expected wages relative to

Arab students. Similarly, men have a higher preference for high-wage majors relative to women. These ethnic and gender differences in preferences hold in both genders and ethnic groups respectively. The relative preference of the different population groups with regards to expected months of work per year are exactly opposite to the preferences for expected wages.[38] Additionally, Arab and women attach more weight to their probability of graduating. This behavioral pattern suggests that Arab and women students are more risk averse than Jewish and men, willing to trade higher wages for more job security. Further evidence that

Finally, wage and income gaps between Arab and Jewish graduates from a specific major also affect major choices, with Arab student less likely to choose majors characterized by larger gaps. Jewish women also seem to be affected by wage gaps between them and Jewish men, though the effect of wage and income gaps on Jewish women is less conclusive. Gaps in the months worked per year also seem to have a significant effect on major choices, however the results imply that Arabs, and especially Arab men prefer majors characterized by larger month gaps. This result is inconsistent with the model suggested and might result from misspecification or omitted variable bias. Overall, the gaps in monthly wages and months of work explain 13-27% of the ethnic differences in major choices.

Further research and richer data are required in order to reach a better understanding of the causes for the Jewish-Arab disparity in major choices, and the role of discrimination in particular. This paper makes demonstrates that such an inquiry is both possible, and socially and economically valuable.

[38] This result is interesting since it contrasts with the fact that women work less than men in both ethnic groups.

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Appendix 1 – Psychometric test score grouping in the data

Table 17 - Psychometric test score grouping in the data

score in the data	real score range
1	200-219
2	220-239
3	240-259
4	260-279
5	280-299
6	300-319
7	320-339
8	340-359
9	360-379
10	380-399
11	400-419
12	420-439
13	440-459
14	460-479
15	480-499
16	500-519
17	520-539
18	540-559
19	560-579
20	580-599
21	600-619
22	620-639
23	640-659
24	660-679
25	680-699
26	700-719
27	720-739
28	740-759
29	760-779
30	780-800

Appendix 2 – Definition of the Majors used in this paper

Table 18 – Definition of the Majors used in this paper with comparison to the CBS classification

Majors in the paper	CBS classification
Education and Social Work	Education and Teaching field (1) and Social Work major (440, originally in Social Science field)
Humanities and Arts	Humanities field (2), Architecture and Design field (13) and Industrial Design major (369, originally in Engineering field)
Social Science	Social Science field (3) excluding the majors Social Work (440), Economics (400) and Agriculture Economics (401).
Medicine and Paramedical Studies	Paramedical Studies field (4) and Medicine and Dentistry field (10)
Natural Science	Natural Science field (5)
Business and Law	Business (6) and Law (7) fields, and the majors Economics (400), Agriculture Economics (401) and Statistics (920)
Math, Physics and Computer Science	Physics (11), Computer Science (12) and Math and Statistics (8) fields, excluding Statistics major (920)
Engineering	Engineering field (9)

Note: the numbers in parentheses represent the education field and major symbols used by the CBS.

Appendix 3 – First phase regressions without specific major and institution type controls

Table 19 - Wage regressions by major

	Education	Humanities	Social Science	Medicine	Science	Business	MPC	Engineering
Jewish women	-1.196***	-1.398***	-1.608***	-1.312***	-1.376***	-1.534***	-1.913***	-2.069***
	(0.0827)	(0.0781)	(0.0741)	(0.113)	(0.142)	(0.0657)	(0.139)	(0.125)
Arab men	-0.163	-0.927***	-1.389***	0.722***	-1.539**	-2.316***	-1.937***	-2.668***
	(0.128)	(0.184)	(0.227)	(0.198)	(0.628)	(0.203)	(0.476)	(0.306)
Arab women	-2.014***	-2.374***	-3.055***	-1.301***	-2.824***	-2.965***	-3.813***	-5.260***
	(0.0901)	(0.126)	(0.171)	(0.192)	(0.420)	(0.236)	(0.588)	(0.708)
Observations	6,429	5,781	7,391	2,934	2,357	10,486	5,047	6,127
R-squared	0.860	0.779	0.795	0.850	0.697	0.807	0.827	0.864
Controls:								
Age	X	X	X	X	X	X	X	X
Further education	X	X	X	X	X	X	X	X
PTS	X	X	X	X	X	X	X	X
Specific major and type of institution dummies								

Note: Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Table 20 - Months of work per year regressions by major

	Education	Humanities	Social Science	Medicine	Science	Business	MPC	Engineering
Jewish women	0.480***	-0.0453	-0.176***	-0.256***	-0.249***	-0.357***	-0.252***	-0.362***
	(0.0902)	(0.0633)	(0.0485)	(0.0838)	(0.0896)	(0.0337)	(0.0457)	(0.0429)
Arab men	1.561***	1.171***	1.044***	0.448***	0.989**	0.00101	0.141	0.0212
	(0.140)	(0.149)	(0.149)	(0.147)	(0.397)	(0.104)	(0.156)	(0.105)
Arab women	1.039***	0.373***	0.0354	-0.0392	0.571**	-0.591***	0.234	-1.908***
	(0.0982)	(0.102)	(0.112)	(0.143)	(0.265)	(0.121)	(0.193)	(0.242)
Observations	6,429	5,782	7,391	2,934	2,357	10,486	5,047	6,127
R-squared	0.974	0.965	0.974	0.977	0.960	0.975	0.982	0.984

Note: The controls are similar to those in table 18. Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Table 21 - Income regressions by major

	Education	Humanities	Social Science	Medicine	Science	Business	MPC	Engineering

Jewish women	-15.10***	-16.87***	-19.76***	-16.41***	-16.20***	-19.75***	-23.68***	-27.54***
	(1.029)	(0.942)	(0.898)	(1.391)	(1.678)	(0.798)	(1.705)	(1.563)
Arab men	-0.589	-10.21***	-15.55***	9.352***	-15.91**	-27.05***	-22.99***	-32.38***
	(1.595)	(2.216)	(2.759)	(2.439)	(7.438)	(2.463)	(5.837)	(3.814)
Arab women	-23.53***	-27.44***	-36.27***	-15.83***	-30.91***	-36.37***	-43.48***	-66.28***
	(1.121)	(1.518)	(2.078)	(2.367)	(4.971)	(2.867)	(7.208)	(8.816)
Observations	6,429	5,781	7,391	2,934	2,357	10,486	5,047	6,127
R-squared	0.829	0.734	0.755	0.819	0.647	0.766	0.800	0.841

Note: The controls are similar to those in table 18. Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Table 22 - Graduation probability regressions by major

	Education	Humanities	Social Science	Medicine	Science	Business	MPC	Engineering
Jewish women	0.310***	0.0565***	0.116***	0.0275***	0.284***	0.0564***	0.0909***	0.0410***
	(0.0132)	(0.00813)	(0.00716)	(0.0101)	(0.00983)	(0.00515)	(0.00928)	(0.00831)
Arab men	0.262***	0.0316	0.0293	-0.0379**	-0.0685**	-0.0846***	-0.0808***	-0.143***
	(0.0236)	(0.0203)	(0.0214)	(0.0170)	(0.0333)	(0.0126)	(0.0247)	(0.0162)
Arab women	0.339***	0.124***	0.213***	0.0568***	0.315***	0.0373**	0.171***	-0.0948**
	(0.0156)	(0.0151)	(0.0174)	(0.0167)	(0.0350)	(0.0173)	(0.0390)	(0.0388)
Observations	12,434	15,962	22,410	5,345	9,822	18,433	11,965	14,019
R-squared	0.733	0.707	0.610	0.920	0.548	0.870	0.716	0.795
Controls:								
Age								
Further education								
PTS	X	X	X	X	X	X	X	X
Specific major and type of institution dummies								

Note: Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Appendix 4 – First and second phase regression results with constant

Table 23 - Wage regressions by major

	Education	Humanities	Social Science	Medicine	Science	Business	MPC	Engineering
Jewish women	-1.355***	-1.365***	-1.473***	-1.188***	-0.885***	-1.463***	-2.016***	-1.625***
	(0.0880)	(0.0813)	(0.0745)	(0.101)	(0.133)	(0.0666)	(0.139)	(0.128)
Arab men	-0.453***	-1.013***	-1.172***	0.262	-1.813***	-2.137***	-2.138***	-2.534***
	(0.130)	(0.193)	(0.227)	(0.174)	(0.581)	(0.206)	(0.474)	(0.317)
Arab women	-2.174***	-2.380***	-2.797***	-1.301***	-2.568***	-2.606***	-3.903***	-4.139***
	(0.104)	(0.143)	(0.178)	(0.172)	(0.407)	(0.246)	(0.595)	(0.688)
Observations	6,429	5,781	7,391	2,934	2,357	10,486	5,047	6,127
R-squared	0.265	0.204	0.222	0.443	0.352	0.150	0.222	0.312

Note: The controls are similar to those in table 4. Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Table 24 - Months of work per year regressions by major

	Education	Humanities	Social Science	Medicine	Science	Business	MPC	Engineering
Jewish women	-0.367***	-0.315***	-0.325***	-0.411***	-0.287***	-0.325***	-0.316***	-0.444***
	(0.0896)	(0.0634)	(0.0479)	(0.0820)	(0.0913)	(0.0313)	(0.0447)	(0.0430)
Arab men	0.353***	0.0824	0.240	-0.0242	0.382	-0.143	-0.125	-0.332***
	(0.133)	(0.151)	(0.146)	(0.142)	(0.398)	(0.0965)	(0.153)	(0.106)
Arab women	-0.239**	-0.653***	-0.757***	-0.322**	-0.0784	-0.539***	-0.225	-1.702***
	(0.106)	(0.112)	(0.114)	(0.140)	(0.279)	(0.116)	(0.191)	(0.231)
Observations	6,429	5,782	7,391	2,934	2,357	10,486	5,047	6,127
R-squared	0.063	0.034	0.032	0.146	0.073	0.144	0.051	0.065

Note: The controls are similar to those in table 4. Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Table 25 - Income regressions by major

	Education	Humanities	Social Science	Medicine	Science	Business	MPC	Engineering
Jewish women	-16.83***	-16.31***	-18.07***	-15.45***	-10.86***	-18.27***	-24.98***	-22.30***
	(1.103)	(0.984)	(0.907)	(1.258)	(1.593)	(0.807)	(1.705)	(1.609)
Arab men	-3.685**	-10.74***	-12.17***	3.634*	-19.20***	-24.01***	-25.39***	-30.47***
	(1.633)	(2.334)	(2.770)	(2.178)	(6.939)	(2.490)	(5.820)	(3.978)
Arab women	-24.98***	-27.40***	-32.33***	-16.44***	-28.53***	-30.09***	-44.88***	-53.17***
	(1.303)	(1.733)	(2.165)	(2.143)	(4.862)	(2.984)	(7.299)	(8.624)

Observations	6,429	5,781	7,391	2,934	2,357	10,486	5,047	6,127
R-squared	0.245	0.194	0.218	0.431	0.337	0.154	0.209	0.298

Note: The controls are similar to those in table 4. Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Table 26 - Graduation probability regressions by major

	Education	Humanities	Social Science	Medicine	Science	Business	MPC	Engineering
Jewish women	0.186***	0.0464***	0.0604***	0.0193*	0.0467***	0.0472***	0.0931***	0.0283***
	(0.0144)	(0.00820)	(0.00589)	(0.0104)	(0.00801)	(0.00519)	(0.00899)	(0.00872)
Arab men	0.107***	-0.0450**	-0.125***	-0.0700***	-0.127***	-0.113***	-0.0492**	-0.234***
	(0.0238)	(0.0205)	(0.0175)	(0.0171)	(0.0253)	(0.0128)	(0.0241)	(0.0169)
Arab women	0.215***	0.0401**	0.0207	0.0307*	-0.0121	0.0101	0.170***	-0.214***
	(0.0179)	(0.0164)	(0.0149)	(0.0171)	(0.0273)	(0.0177)	(0.0380)	(0.0388)
Observations	12,434	15,962	22,410	5,345	9,822	18,433	11,965	14,019
R-squared	0.159	0.098	0.406	0.037	0.497	0.039	0.121	0.092

Note: The controls are similar to those in table 7. Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Table 27 – Reported coefficients from the conditional logit regressions on major choice

	4-year average			4th year only		
	(1)	(2)	(3)	(4)	(5)	(6)
log(wage)	2.269***	2.214***	1.539***	2.130***	1.670***	1.633***
	(0.0861)	(0.0955)	(0.101)	(0.0568)	(0.0637)	(0.0639)
log(wage)*Arab	-3.704***	-3.324***	-3.330***	-3.123***	-2.989***	-3.190***
	(0.0462)	(0.0509)	(0.0505)	(0.0438)	(0.0482)	(0.0487)
log(wage)*Women	-0.771***	-2.352***	-1.737***	0.175	0.00911	-0.411***
	(0.118)	(0.163)	(0.172)	(0.131)	(0.130)	(0.141)
log(wage)*Arab women	-2.374***	-3.071***	-3.052***	-2.572***	-2.121***	-3.085***
	(0.115)	(0.122)	(0.142)	(0.123)	(0.115)	(0.134)
Wage gap - Arab		1.106***	0.978***		0.326***	0.119***
		(0.0494)	(0.0516)		(0.0217)	(0.0272)
Wage gap - Women		0.379***	0.227***		0.166***	0.0440**
		(0.0395)	(0.0476)		(0.0223)	(0.0223)
Wage gap - Arab women		0.757***	0.729***		0.570***	0.372***
		(0.0490)	(0.0503)		(0.0242)	(0.0237)
Months worked	-0.995***	-1.289***	-1.047***	-0.442***	-0.653***	-0.583***
	(0.0400)	(0.0461)	(0.0485)	(0.0305)	(0.0339)	(0.0350)
Months worked*Arab	1.597***	2.547***	2.420***	1.070***	1.317***	1.144***
	(0.0321)	(0.0486)	(0.0508)	(0.0298)	(0.0326)	(0.0370)
Months	0.497***	1.321***	1.128***	0.0635	0.488***	0.467***

worked*Women	(0.0573)	(0.0756)	(0.0804)	(0.0488)	(0.0538)	(0.0546)
Months worked*Arab women	2.140***	1.967***	1.728***	1.564***	1.319***	1.277***
	(0.0464)	(0.0611)	(0.0623)	(0.0543)	(0.0584)	(0.0523)
Month gap – Arab		5.884***	6.468***		0.817***	0.337***
		(0.225)	(0.233)		(0.0637)	(0.0782)
Month gap - Women		-2.281***	-1.473***		-1.739***	-1.088***
		(0.165)	(0.203)		(0.126)	(0.141)
Month gap - Arab women		0.628***	0.666***		0.764***	0.771***
		(0.106)	(0.110)		(0.0770)	(0.0868)
Pr(graduate)	0.912***	0.280***	0.410***	0.196**	0.599***	0.516***
	(0.0704)	(0.0745)	(0.0773)	(0.0762)	(0.0821)	(0.0828)
Pr(graduate)*Arab			1.723***			1.371***
			(0.0728)			(0.0906)
Pr(graduate)*Women			2.090***			2.337***
			(0.198)			(0.156)
Pr(graduate)*Arab women			3.264***			5.201***
			(0.296)			(0.321)
Observations	804,419	804,419	804,419	804,419	804,419	804,419

Note: The regressions are weighted to correct for selection into the database. Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Table 28 - Conditional regressions output

	4-year average		4th year only	
	(1)	(2)	(3)	(4)
log(income)	1.017***	1.214***	1.307***	1.184***
	(0.110)	(0.111)	(0.0740)	(0.0769)
log(income)*Jewish women	-2.111***	-2.268***	-1.716***	-2.167***
	(0.0378)	(0.0387)	(0.0451)	(0.0489)
log(income)*Arab men	0.685***	0.188**	-0.172**	-0.256***
	(0.0928)	(0.0960)	(0.0866)	(0.0950)
log(income)*Arab women	-1.869***	-2.741***	-1.308***	-1.309***
	(0.109)	(0.118)	(0.0944)	(0.0863)
Income gap - Jewish women	-0.0302***	-0.0266***	7.19e-06***	-8.67e-06***
	(0.00320)	(0.00318)	(1.78e-06)	(1.92e-06)
Income gap - Arab men	0.0171***	0.00628**	-9.15e-06***	-1.27e-05***
	(0.00284)	(0.00261)	(1.51e-06)	(1.33e-06)
Income gap - Arab women	0.0805***	0.0448***	4.76e-05***	3.76e-05***
	(0.00418)	(0.00515)	(1.83e-06)	(2.02e-06)
Pr(graduate)	3.800***	2.622***	0.636***	0.866***

	(0.152)	(0.156)	(0.0682)	(0.0713)
Pr(graduate)*Jewish women		1.685***		2.174***
		(0.0574)		(0.0737)
Pr(graduate)*Arab men		3.114***		2.929***
		(0.156)		(0.146)
Pr(graduate)*Arab women		3.491***		4.101***
		(0.174)		(0.260)
	804,883	804,883	804,883	804,883

Note: The regressions are weighted to correct for selection into the database. Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Table 29 – Reported coefficients from the conditional logit regressions on major choice

	4-year average			4th year only		
	(1)	(2)	(3)	(4)	(5)	(6)
log(wage)	2.269***	2.240***	1.483***	2.130***	1.804***	1.737***
	(0.0861)	(0.0961)	(0.102)	(0.0568)	(0.0631)	(0.0639)
log(wage)*Arab	-0.771***	-2.087***	-1.375***	0.175	0.0639	-0.316**
	(0.118)	(0.151)	(0.158)	(0.131)	(0.128)	(0.139)
log(wage)*Women	-3.704***	-3.317***	-3.325***	-3.123***	-2.845***	-3.064***
	(0.0462)	(0.0501)	(0.0498)	(0.0438)	(0.0474)	(0.0480)
log(wage)*Arab women	2.100***	1.392***	1.211***	0.376**	0.186	-0.0266
	(0.151)	(0.177)	(0.187)	(0.170)	(0.152)	(0.175)
Wage gap - Arab		0.378***	0.167***		0.270***	0.0842***
		(0.0306)	(0.0367)		(0.0161)	(0.0178)
Wage gap - Women		1.073***	0.962***		0.493***	0.278***
		(0.0467)	(0.0490)		(0.0216)	(0.0270)
Wage gap - Arab women		-0.966***	-1.384***		-0.202***	-0.298***
		(0.0858)	(0.0891)		(0.0353)	(0.0304)
Months worked	-0.995***	-1.248***	-0.989***	-0.442***	-0.763***	-0.605***
	(0.0400)	(0.0484)	(0.0504)	(0.0305)	(0.0360)	(0.0370)
Months worked*Arab	0.497***	1.164***	0.966***	0.0635	0.479***	0.399***
	(0.0573)	(0.0724)	(0.0772)	(0.0488)	(0.0545)	(0.0543)
Months worked*Women	1.597***	2.450***	2.344***	1.070***	1.356***	1.232***
	(0.0321)	(0.0467)	(0.0488)	(0.0298)	(0.0329)	(0.0373)
Months worked*Arab women	0.0449	-1.768***	-2.066***	0.431***	-0.220***	-0.399***
	(0.0645)	(0.0934)	(0.102)	(0.0618)	(0.0695)	(0.0676)
Month gap – Arab		-1.953***	-0.888***		-1.538***	-0.652***
		(0.110)	(0.131)		(0.106)	(0.121)
Month gap - Women		5.190***	5.755***		1.214***	0.556***

		(0.221)	(0.228)		(0.0692)	(0.0830)
Month gap - Arab women		1.601***	1.593***		-0.0355	0.184**
		(0.111)	(0.107)		(0.0788)	(0.0865)
Pr(graduate)	0.912***	0.254***	0.302***	0.196**	0.495***	0.372***
	(0.0704)	(0.0732)	(0.0761)	(0.0762)	(0.0831)	(0.0842)
Pr(graduate)*Arab			2.324***			2.496***
			(0.173)			(0.163)
Pr(graduate)*Women			1.607***			1.020***
			(0.0719)			(0.0878)
Pr(graduate)*Arab women			1.324***			3.003***
			(0.357)			(0.316)
Observations	804,419	804,419	804,419	804,419	804,419	804,419

Note: The regressions are weighted to correct for selection into the database. Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Table 30 - Conditional regressions output

	4-year average	
	(1)	(2)
log(income)	1.056***	1.001***
	(0.0797)	(0.0712)
log(income)*Arab	-0.268***	-0.344***
	(0.0878)	(0.0956)
log(income)*Women	-1.684***	-2.117***
	(0.0446)	(0.0467)
log(income)*Arab women	1.786***	0.987***
	(0.137)	(0.124)
Income gap - Arab	0.00568**	-0.0226***
	(0.00226)	(0.00222)
Income gap - Women	0.0134***	-0.0142***
	(0.00334)	(0.00339)
Income gap - Arab women	-0.0672***	-0.110***
	(0.00524)	(0.00465)
Pr(graduate)	0.732***	1.105***
	(0.0659)	(0.0691)
Pr(graduate)*Arab		3.048***
		(0.145)
Pr(graduate)*Women		2.007***
		(0.0682)

Pr(graduate)*Arab women		4.578***
		(0.302)
	804,883	804,883

Note: The regressions are weighted to correct for selection into the database. The regressions on total income in the fourth year did not converge. Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Appendix 5 – Conditional logit regression on major choice – labor market outcomes expectations computed without taking gender and ethnic identity into account.

Table 31 – Conditional logit regressions on major choice

Variables	(1)	(2)	(3)
log(wage)	0.466***	0.491***	0.479***
	(0.135)	(0.137)	(0.137)
log(wage)*Jewish women	-3.230***	-3.221***	-3.060***
	(0.0391)	(0.0657)	(0.0686)
log(wage)*Arab men	-1.190***	-2.706***	-2.962***
	(0.0962)	(0.187)	(0.195)
log(wage)*Arab women	-4.907***	-3.718***	-3.623***
	(0.0859)	(0.195)	(0.192)
Wage gap - Jewish women		0.0970***	0.0746***
		(0.0271)	(0.0278)
Wage gap - Arab men		0.111***	0.0877***
		(0.0281)	(0.0288)
Wage gap - Arab women		0.458***	0.248***
		(0.0316)	(0.0382)
Months worked	0.348***	0.277***	0.422***
	(0.0779)	(0.0786)	(0.0791)
Months worked*Jewish women	1.276***	1.355***	1.088***
	(0.0323)	(0.0378)	(0.0408)
Months worked*Arab men	1.464***	1.600***	1.597***
	(0.0800)	(0.0979)	(0.0981)
Months worked*Arab women	2.490***	2.321***	1.878***
	(0.0640)	(0.0689)	(0.0783)
Month gap - Jewish women		-0.121	0.206**
		(0.0885)	(0.0937)
Month gap - Arab men		-1.616***	-1.714***
		(0.0720)	(0.0956)
Month gap - Arab women		-0.0664	0.372***
		(0.108)	(0.118)
Pr(graduate)	3.429***	3.457***	2.647***
	(0.155)	(0.155)	(0.159)
Pr(graduate)*Jewish women			1.274***
			(0.0609)
Pr(graduate)*Arab men			0.522***
			(0.191)
Pr(graduate)*Arab women			2.851***
			(0.194)
Observations	804,883	804,883	804,883

Note: The regressions in this table are similar to those in table 8 with the exception of the formation of labor market expectations. Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Table 32 - conditional regressions on major choice

Variables	(1)	(2)
log(income)	0.956***	1.185***
	(0.107)	(0.108)
log(income)*Jewish women	-1.946***	-2.148***
	(0.0391)	(0.0405)
log(income)*Arab men	0.739***	0.273***
	(0.0964)	(0.0974)
log(income)*Arab women	-1.504***	-2.479***
	(0.111)	(0.120)
Income gap - Jewish women	-0.0103***	-0.0107***
	(0.00230)	(0.00228)
Income gap - Arab men	0.0138***	0.00703***
	(0.00213)	(0.00190)
Income gap - Arab women	0.0569***	0.0352***
	(0.00299)	(0.00334)
Pr(graduate)	3.788***	2.560***
	(0.152)	(0.155)
Pr(graduate)*Jewish women		1.740***
		(0.0575)
Pr(graduate)*Arab men		3.144***
		(0.158)
Pr(graduate)*Arab women		3.643***
		(0.155)
Observations	804,883	804,883

Note: The regressions in this table are similar to those in table 9 with the exception of the formation of labor market expectations. Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Table 33 – Conditional regressions on major choice

Variables	(1)	(2)	(3)
log(Wage)	0.546***	0.662***	0.615***
	(0.137)	(0.140)	(0.140)
log(Wage)*Arab	-1.259***	-2.833***	-2.961***
	(0.0987)	(0.172)	(0.178)
log(Wage)*women	-3.364***	-3.460***	-3.274***
	(0.0408)	(0.0682)	(0.0710)
log(Wage)*Arab*women	-0.437***	-0.422**	-0.384**
	(0.125)	(0.169)	(0.190)
Wage gap - Arab		0.144***	0.140***
		(0.0318)	(0.0363)
Wage gap - Women		0.0671*	0.0648*
		(0.0369)	(0.0376)
Wage gap - Arab*women		-0.270***	-0.317***
		(0.0814)	(0.0977)

Months worked	0.259***	0.191**	0.346***
	(0.0767)	(0.0781)	(0.0788)
Months worked*Arab	1.503***	1.656***	1.606***
	(0.0813)	(0.0936)	(0.0948)
Months worked*Women	1.342***	1.432***	1.167***
	(0.0330)	(0.0393)	(0.0425)
Months worked*Arab*women	-0.276***	-0.834***	-0.716***
	(0.0965)	(0.122)	(0.144)
Month gap - Arab		-1.626***	-1.711***
		(0.0627)	(0.0899)
Month gap - Women		-0.248***	0.0313
		(0.0901)	(0.0948)
Month gap - Arab*women		0.235***	0.236***
		(0.0757)	(0.0827)
Pr(graduate)	3.438***	3.486***	2.756***
	(0.155)	(0.156)	(0.160)
Pr(graduate)*Arab			0.425**
			(0.190)
Pr(graduate)*Women			1.219***
			(0.0611)
Pr(graduate)*Arab*women			-0.935***
			(0.222)
Observations	804,883	804,883	804,883

Note: The regressions in this table are similar to those in table 14 with the exception of the formation of labor market expectations. Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Table 34 - conditional regressions on major choice

Variables	(1)	(2)
log(income)	-7.877***	-8.228***
	(0.289)	(0.283)
log(income)*Arab	0.204***	0.389***
	(0.0449)	(0.0488)
log(income)*Women	-0.748***	-0.675***
	(0.0188)	(0.0194)
log(income)*Arab*women	0.584***	0.620***
	(0.0765)	(0.0823)
Income gap - Arab	0.0296***	0.0226***
	(0.00208)	(0.00185)
Income gap - Women	0.0797***	0.0886***
	(0.00208)	(0.00227)
Income gap - Arab*women	-0.0511***	-0.0643***
	(0.00554)	(0.00426)
Pr(graduate)	3.615***	3.066***
	(0.143)	(0.147)
Pr(graduate)*Arab		3.341***

		(0.161)
Pr(graduate)*Women		0.582***
		(0.0607)
Pr(graduate)*Arab*women		-0.296
		(0.210)
Observations	804,883	804,883

Note: The regressions in this table are similar to those in table 15 with the exception of the formation of labor market expectations. Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Appendix 6 – Marginal effects from the conditional logit regressions

Table 35 - Marginal effects at the mean from the conditional logit regressions

	Education	Humanities	Social Science	Medicine	Science	Business	MPC
Results based on regression 3 in Table 8							
Predicted probabilities	0.047	0.159	0.168	0.064	0.107	0.205	0.111
log(wage)	0.069	0.207	0.216	0.092	0.148	0.252	0.152
log(wage)*Jewish women	-0.166	-0.495	-0.516	-0.221	-0.354	-0.602	-0.365
log(wage)*Arab men	-0.074	-0.220	-0.230	-0.098	-0.157	-0.268	-0.162
log(wage)*Arab women	-0.125	-0.371	-0.387	-0.166	-0.265	-0.452	-0.273
Wage gap - Jewish women	0.002	0.007	0.007	0.003	0.005	0.008	0.005
Wage gap - Arab men	0.016	0.048	0.050	0.021	0.034	0.058	0.035
Wage gap - Arab women	0.031	0.093	0.097	0.041	0.066	0.113	0.068
Months worked	-0.032	-0.095	-0.099	-0.043	-0.068	-0.116	-0.070
Months worked*Jewish women	0.070	0.208	0.217	0.093	0.149	0.253	0.153
Months worked*Arab men	0.035	0.104	0.108	0.046	0.074	0.126	0.076
Months worked*Arab women	0.069	0.206	0.215	0.092	0.147	0.250	0.152
Month gap - Jewish women	-0.012	-0.035	-0.037	-0.016	-0.025	-0.043	-0.026
Month gap - Arab men	-0.076	-0.227	-0.237	-0.101	-0.162	-0.276	-0.167
Month gap - Arab women	-0.010	-0.029	-0.030	-0.013	-0.021	-0.035	-0.021
Pr(graduate)	0.055	0.164	0.171	0.073	0.117	0.200	0.121
Pr(graduate)*Jewish women	0.070	0.209	0.218	0.093	0.149	0.254	0.154
Pr(graduate)*Arab men	0.016	0.047	0.049	0.021	0.034	0.058	0.035
Pr(graduate)*Arab women	0.183	0.547	0.570	0.244	0.391	0.665	0.403
Results based on regression 2 in Table 9							
Predicted probabilities	0.044	0.122	0.131	0.079	0.126	0.187	0.167
log(income)	0.034	0.086	0.091	0.058	0.088	0.122	0.111
log(income)*Jewish women	-0.092	-0.234	-0.248	-0.159	-0.240	-0.331	-0.303
log(income)*Arab men	-0.011	-0.027	-0.028	-0.018	-0.027	-0.038	-0.035
log(income)*Arab women	-0.053	-0.134	-0.142	-0.091	-0.137	-0.189	-0.173
Income gap - Jewish women	-0.001	-0.002	-0.002	-0.002	-0.002	-0.003	-0.003
Income gap - Arab men	-0.001	-0.003	-0.003	-0.002	-0.003	-0.004	-0.004
Income gap - Arab women	0.003	0.007	0.008	0.005	0.008	0.011	0.010
Pr(graduate)	0.053	0.136	0.144	0.092	0.139	0.192	0.176
Pr(graduate)*Jewish women	0.090	0.229	0.242	0.155	0.235	0.324	0.296
Pr(graduate)*Arab men	0.134	0.341	0.361	0.231	0.350	0.483	0.442
Pr(graduate)*Arab women	0.210	0.535	0.566	0.363	0.549	0.757	0.693

Appendix 7 – Major choice predictions based on the conditional logit regressions

Table 36 - Model's predictions of major choices

	Actual distribution				National differences		Gender differences	
	Jewish		Arab					
Major	Men	Women	Men	Women	Men	Women	Jewish	Arab
Education	3.0	15.1	12.0	41.2	9.0	26.1	12.0	29.2
Humanities	10.5	17.1	14.3	21.1	3.8	4.0	6.6	6.8
Social Science	14.3	26.3	13.6	15.6	-0.6	-10.7	12.0	2.0
Medicine	2.2	6.5	9.2	7.1	7.0	0.6	4.3	-2.2
Science	11.1	7.9	5.3	3.5	-5.8	-4.4	-3.2	-1.9
Business	18.7	15.7	20.0	7.2	1.3	-8.5	-3.0	-12.8
MPC	17.9	6.0	8.7	2.4	-9.2	-3.6	-11.9	-6.3
Engineering	22.3	5.5	16.9	2.0	-5.4	-3.6	-16.8	-14.9
DI					21.0	30.7	34.9	38.0

	Prediction: Each population group at own mean PTS				National differences		Gender differences	
	Jewish		Arab					
	Men	Women	Men	Women	Men	Women	Jewish	Arab
Education	1.0	9.2	3.3	11.4	2.3	2.2	8.1	8.1
Humanities	9.2	15.9	7.1	12.3	-2.2	-3.7	6.7	5.2
Social Science	9.5	17.2	7.9	10.0	-1.6	-7.2	7.7	2.1
Medicine	3.8	9.8	22.5	34.1	18.7	24.3	6.1	11.7
Science	11.2	12.1	5.0	16.2	-6.2	4.1	0.8	11.2
Business	20.8	17.0	20.8	8.4	0.0	-8.6	-3.8	-12.4
MPC	20.7	9.2	18.3	6.6	-2.5	-2.6	-11.5	-11.7
Engineering	23.7	9.6	15.2	1.0	-8.5	-8.7	-14.1	-14.2
DI					21.0	30.7	29.4	38.2

	Prediction: all population groups at total mean PTS				National differences		Gender differences	
	Jewish		Arab					
	Men	Women	Men	Women	Men	Women	Jewish	Arab
Education	2.7	14.3	4.6	17.4	1.9	3.1	11.6	12.7
Humanities	11.6	17.2	8.6	18.1	-3.0	0.9	5.6	9.5
Social Science	15.2	19.5	8.3	11.2	-6.9	-8.3	4.3	2.9
Medicine	2.5	6.0	12.1	16.9	9.6	10.9	3.5	4.8
Science	8.6	8.7	3.6	11.9	-5.0	3.2	0.0	8.3
Business	23.0	18.8	30.9	17.2	7.9	-1.6	-4.2	-13.7
MPC	14.5	6.7	14.8	6.0	0.3	-0.7	-7.8	-8.8

Engineering	21.9	8.9	17.1	1.4	-4.8	-7.5	-13.0	-15.7
DI					19.7	18.1	25.0	38.2

	Prediction: Each population group at own mean PTS and no wage and month gaps				National differences		Gender differences	
	Jewish		Arab					
	Men	Women	Men	Women	Men	Women	Jewish	Arab
Education	1.8	16.5	3.7	13.1	1.9	-3.5	14.7	9.4
Humanities	10.9	17.6	6.7	13.3	-4.1	-4.3	6.7	6.5
Social Science	12.1	20.4	8.8	14.9	-3.4	-5.4	8.2	6.2
Medicine	2.6	5.7	8.8	14.0	6.2	8.3	3.1	5.2
Science	8.9	8.1	4.0	14.3	-4.9	6.1	-0.8	10.2
Business	24.2	17.2	28.7	9.4	4.5	-7.8	-7.0	-19.2
MPC	16.2	6.4	19.0	18.7	2.8	12.3	-9.8	-0.3
Engineering	23.3	8.1	20.3	2.3	-3.0	-5.8	-15.2	-18.0
DI					15.4	26.8	32.8	37.5

Note: * The predictions are based on regression 3 in table 8. DI represents the share of students who would have to switch major in order to have similar choices, either between men and women from different nationalities or between Jews and Arabs from the same gender.