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Institutional versus labor market discrimination: The case of Israeli Arabs

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Abstract

Economic outcomes are compared between Jewish and Arab university graduates in Israel. A unique dataset is used which includes all individuals who graduated with a first degree from universities and colleges in Israel during the period 1995-2008. The findings show that the wage gap between Jewish men and Arab men is a result of differences in skills that the workers bring to the labor market rather than racial discrimination against Arab men. Thus, there is no wage gap between Jewish men and Arab men with the same skill levels and human capital. In contrast, among women there exist wage gaps that are the result of statistical discrimination. The wage gap between Israeli Jewish women and Israeli Arab women with psychometric entrance score of 600 disappears after five years in the labor market. The difference in average psychometric entrance test scores between Israeli Arabs and Israeli Jews tends to indicate the existence of institutional discrimination in the allocation of public investment in education as opposed to labor market discrimination.

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1. Introduction

The wages of Jews are higher than those of Arabs in Israel. It appears that the gap remains even when one controls for all the measures of human capital, such as education, occupation, etc. The issue to be studied here is whether this is statistical discrimination or racial discrimination.

The dataset used, which includes all individuals who graduated university or college with a first degree during the period 1995-2008, enables us to answer the question of whether the wage gap between Jews and Arabs is due to racial discrimination or statistical discrimination. The dataset includes annual salary, name of the university or college from which the individual graduated occupation and psychometric entrance test (PET)[1] score. The PET score captures the level of skills of workers, rather than the human capital variables.

If it is found that the wage of a Jewish worker is higher than that of an Arab worker, it may be that employers in Israel have better information on the quality of a Jewish worker than an Arab worker.

However, if that is the reason for the wage gap, then the wage gap should decline with number of years in the labor market, since employers should become increasingly able to evaluate the skills of the their Arab workers as time passes. Therefore, the wage gap between Arab and Jewish workers with the same characteristics and skills should close over time. If after a number of years in the labor market, the wage gap does not close, then racial discrimination against Arab workers is indicated.

The findings show that if human capital characteristics are not controlled for, the initial wage gap between Arabs and Jews is 36 percent in favor of the latter. This gap grows to 46 percent after seven years in the labor market. If human capital characteristics, apart from the PET score, are controlled for, then the initial wage gap is only 5 percent and grows to 21percent after seven years in the labor market. When the PET score is also controlled for, the findings for men and women are no longer the same: for men, there is no wage gap over time between Jews and Arabs while for women the difference in the return on work experience between Jews and Arabs is negatively correlated with the PET score. Among women with a PET score of 600 or more, the wage gap closes after four years in the labor market.

[1] The Psychometric Entrance Test (PET) is a standardized test in Israel, generally taken as a higher education admission exam. The PET covers three areas: mathematics, verbal reasoning and the English language. It is administered by the Israeli National Institute for Testing and Evaluation (NITE) and is heavily weighed for university admissions. The PET is a tool for predicting academic performance, and is used by institutions of higher education to screen applicants for the various departments. The test ranks all applicants on a uniform scale and, compared to other admissions tools, is less affected by differences in applicants' backgrounds or other subjective factors. A large body of research demonstrates the high predictive ability of the Psychometric Entrance Test. In general, students who received high Psychometric Entrance Test scores are more successful in their academic studies than students who received low scores. The max score in the PET is 800 and the min score is 200. The scores 800 and 200 are absolute and are reserved uniquely for applicants who have answered all questions correctly and none of them correctly, respectively.

30 percent of Jewish graduates have a score of over 650 as compared to only 6 percent of the Arabs.

The fact that the average score of Israeli Arabs is lower than that of Israeli Jews may indicate the existence of institutional discrimination, which is the result of differences in public investment in education between Jews and Arabs, as opposed to labor market discrimination.

2. Survey of the Literature

Numerous studies have been done on discrimination, particularly in the US. Neal and Johnson (1996) looked at the wage gap between whites and Afro-Americans in the US and found that when controlling for Armed Forces Qualifying Test (AFQT) scores, the wage gap between Afro-Americans and whites narrows to only 7 percent in favor of the latter and is not statistically significant. The conclusion from such findings is that the wage gap between whites and Afro-Americans is due to differences in the skills workers bring to the labor market, rather than racial discrimination.

In contrast, Lang and Manove (2011) found that education should be controlled for, in addition to AFQT scores. When this is done, the wage earned by white workers is higher than that of Afro-Americans and the difference is statistically significant. The difference may be explained by racial discrimination against Afro-Americans.

Dan Suan (2008) wrote that: "Although the Israeli Arabs constitute about 20 percent of the population, they have no representation in the economic elite, the government elite, the military elite or the cultural elite." The discrimination against Israeli Arabs in the labor market has two components: wage discrimination and job discrimination.

Ben David, Ahitov and Levin-Epstein (2004) found that the rate of participation in the labor market among Arab men is significantly lower than that among Jewish men. To explain the difference, they cited the relatively low level of education among Israeli Arabs. They are more exposed to structural changes occurring in the economy and to competition from foreign workers. The Trajtenberg Committee (2011) found that the rate of participation among the Arab population is 41 percent, as compared to 59.6 percent among Jews. In addition, the rate of unemployment in the Arab sector is higher than in the Jewish sector. The Committee also found that the average net income of an Arab household in which the main breadwinner is unemployed is NIS 4666, which is 22.6 percent less than that of a similar Jewish household (NIS 6025). It should be added that the size of an Arab household is 1.47 times larger than that of a similar Jewish household.

Sabriski, Connor-Attias and Abu Hala (2010) found that unemployment is higher in Arab towns than in Jewish towns. For example, the rate of jobseekers in Rahat is 36.7 percent, in Umm el Fahem 28.6 percent, in Sahnin 26.2 percent and in Tamra 24.1 percent. They also found that in the 2009 academic year, the proportion of students studying toward a first degree among the residents of well-off Jewish towns aged 20-29 stood at 10.1 percent, as opposed to 4.8 percent in Arab towns and 6.1 percent in development towns. The proportions of college students paints a similar picture: 1.6

percent in better-off Jewish towns, 6.4 percent in development towns and 2.1 percent in Arab towns.

The Abraham Fund Initiatives Report (2009) found that 44 percent of the Arab population lives below the poverty line, which is twice their proportion in the total population

Miari, Nevuani and Hateb (December 2011) looked at the time it takes for a worker to find a job during a period of economic growth and the time until a worker is laid off during a recession. Their findings show that Arab workers are the first to be laid off in a recession and they also the last to be hired during a period of growth. Asali (2006) found that the wage gap between Jews and Arabs was 45 percent during the period 1990-94 and reached a peak of 77 percent in 2003. In addition, Asali found that unexplained wage differences ranged from 5 to 10 percent during the period 1990-1. However, starting from 1991, the unexplained wage differences rose to 25-38 percent.

Miari, Nevuani and Hateb (October 2011) found similar results. During the period 1997-2009, the wages of Jews were higher than those of Arabs by between 40 and 60 percent. When human capital variables are controlled for, the wage gap shrank to 20 percent. Furthermore, the wage gap among skilled workers was 21 percent and among unskilled workers was 15.9 percent.

Levin-Epstein and Semyonov (1994) found that the return on schooling for Arabs was higher in a workplace with a higher concentration of Arab workers. In addition, the return on schooling for Arabs was higher in the public sector than in the private sector.

3. The Data

The database includes all individuals who graduated with a first degree from universities and colleges in Israel between the years 1995 and 2008. The data for each individual starts from the year of his graduation and ends in 2008. Thus, for example, an individual who graduated in 1995 will have data from 1995 until 2008.

The basic database was constructed from various sources within the Central Bureau of Statistics and merged; the data on academic degrees was obtained from the universities and colleges; the data on wages was obtained from the Income Tax Authority; and demographic information was obtained from the Population Registry.

The data includes the following information for each graduate and for each year following graduation:

1. Wage and employment data: average monthly wage, number of months worked, number of jobs held, the sector in which the highest monthly wage was earned and the average wage for all workers in the individual's place of employment.
2. Demographic information: gender, country of origin, father's country of origin, age, marital status, occurrence of a birth that year, number of children and place of residence.

3. Education: PET test scores, type and name of the academic institution, field of study and occupation, both for a first degree and for more advanced degrees.

The research population is limited to graduates who remained in Israel and are salaried employees (i.e. excluding emigrants and the self-employed). The database consists of a panel, where the time variable is the number of years since graduation. The analysis is limited to no more than seven years since graduation, which is imposed due to the low number of observations for Israeli Arabs with high PET scores. Thus, those who graduated between 1995 and 2001 are tracked for seven years. Those who graduated after 2002 are tracked until 2008. For example, an individual who graduated in 2003 is tracked for only 5 years (until 2008).

It should be noted that the data for each individual may or may not be continuous since only years with a positive salary were used.

Table I presents the number of observations for Israeli Arabs and Jews in each year following graduation.

There are 209,928 graduates, consisting of 195,602 Jews and 14,326 Arabs. As already mentioned, there are an insufficient number of Arab graduates with a high PET score (over 700) for 8-13 years after graduation, and therefore the sample was restricted to seven years after graduation. (The analysis was also carried out for 10 years after graduation but the results were unchanged.)

Table I: Number of observations and percentage of PET score by Jews and Arabs

Number of years since graduation	0	1	2	3	4	5	6	7	8	9	10	11	12	13
Jews	**195602**	**173164**	**152783**	**132650**	**113853**	**96337**	**79132**	**63676**	**49675**	**36895**	**25844**	**16222**	**7769**	**2248**
0- 500	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.16	0.15	0.15	0.15	0.15	0.15	0.16
500-550	0.15	0.15	0.15	0.15	0.15	0.15	0.16	0.16	0.16	0.16	0.17	0.17	0.19	0.20
550-600	0.19	0.19	0.20	0.20	0.20	0.20	0.20	0.21	0.21	0.21	0.22	0.23	0.24	0.25
600-650	0.21	0.21	0.21	0.21	0.21	0.22	0.22	0.22	0.22	0.22	0.22	0.23	0.23	0.22
650-700	0.19	0.19	0.19	0.18	0.18	0.18	0.17	0.17	0.17	0.17	0.17	0.16	0.14	0.13
+700	0.11	0.11	0.11	0.11	0.10	0.10	0.09	0.09	0.08	0.08	0.07	0.07	0.05	0.05
Arabs	**14326**	**12648**	**10863**	**9272**	**7858**	**6399**	**5052**	**3903**	**2916**	**2049**	**1440**	**878**	**437**	**129**
0- 500	0.51	0.52	0.53	0.54	0.54	0.54	0.54	0.54	0.52	0.51	0.51	0.53	0.54	0.56
500-550	0.19	0.19	0.19	0.19	0.19	0.20	0.20	0.21	0.21	0.22	0.23	0.23	0.24	0.26
550-600	0.15	0.14	0.14	0.14	0.14	0.14	0.14	0.13	0.14	0.15	0.15	0.15	0.14	0.13
600-650	0.10	0.10	0.09	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.07	0.06	0.04
650-700	0.05	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.03	0.02	0.01	0.01	0.01
+700	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01

Includes only employed individuals.

Table II presents the distribution of Jewish and Arab graduates according to PET score. The figures show that most Arab graduates, 69 percent (Table II, column II) have a PET score of less than 550 as compared to only 30 percent of Jewish graduates (Table II, column I) while 30 percent (Table II, column I) of Jewish graduates have a score of over 650 as compared to only 6 percent (Table II, column II) of the Arabs. The situation is similar when the comparison is made for each gender separately (Table II, column III-VI).

Table II: The distribution of Jewish and Arab graduates by PET score

	I	II	III	IV	V	VI
PET score	**Percentage of Jewish graduates**	**Percentage of Arab graduates**	**Percentage of Jewish graduates - Men**	**Percentage of Arab graduates - Men**	**Percentage of Jewish graduates - Women**	**Percentage of Arab graduates - Women**
0- 500	15.19	50.68	9.49	45.12	19.15	55.41
500-550	14.6	18.64	10.81	18.86	17.23	18.45
550-600	19.17	14.68	16.83	16.12	20.8	13.45
600-650	20.99	9.91	22.13	11.44	20.21	8.61
650-700	18.81	4.73	23.48	6.47	15.56	3.25
+700	11.24	1.35	17.25	1.98	7.06	0.83
Total	**195602**	**14326**	**80178**	**6580**	**115424**	**7746**

Includes only employed individuals

4. Empirical Analysis

The goal of the analysis is to compare the development of wages over time between Jews and Arabs for university graduates with a first degree. The database is restricted to individuals who obtained their degree in Israel.

In order to examine the wage gap between the two groups, the monthly wage (in logarithmic terms) was estimated using the following independent variables (for each individual and each year): years since graduation, age, gender, country of origin, religion, family status, number of children, place of residence, number of months employed, industry, and education (type of degree, year of graduation, institution where the degree was obtained, type of institution and field of study). All regressions are estimated using OLS. The main focus here is on the effect of years since graduation on earnings and how it varies with PET scores which capture the level of skills of workers, rather than the human capital variables.

4.1 General analysis

Figure 1 presents the average wage by number of years since graduation for the two groups. As can be seen, Jews earn a higher monthly wage than Arabs during the entire period. The average wage gap grows from 40 percent in the year of graduation to 56 percent after seven years.

Figure 1: Average monthly wage of Jews and Arabs by years since graduation (raw data)

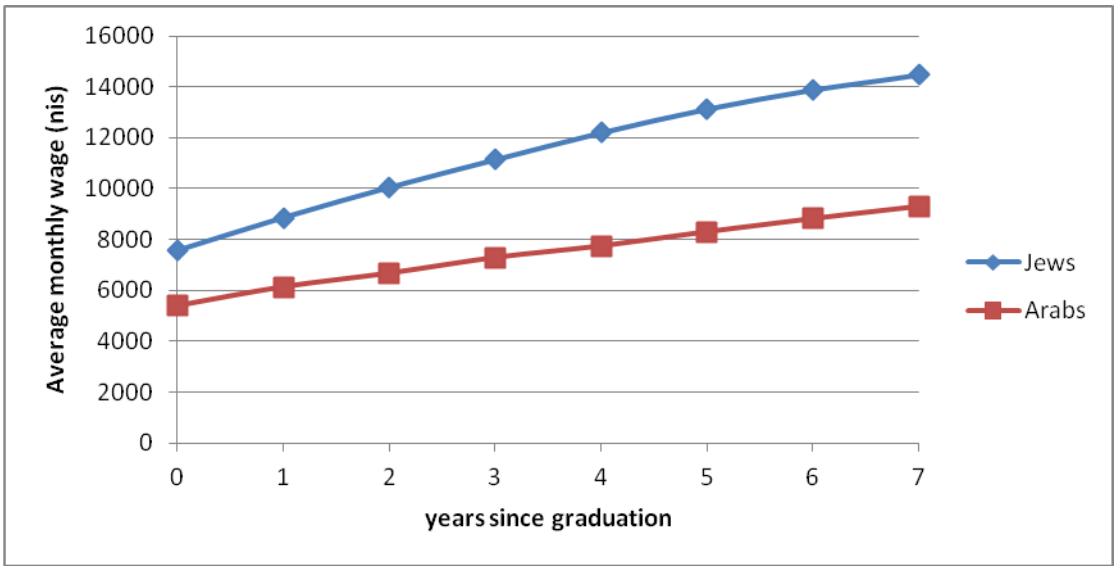


Table III and figures 2a and 2b below present the estimated log wage for each group as a function of years since graduation (while controlling for: age, gender, number of children, marital status, geographic region, type of academic education (college vs. university, MA or BA and field of study), number of months worked each year, cumulative months of absence from the labor market since graduation, cumulative number of workplaces, economic sector and year.

Table III: Estimation of log monthly wage function by OLS[2]

		I	II	III
Intercept		8.3813*** (0.0044)	5.8321*** (0.0216)	5.8354*** (0.0215)
Addition to Intercept	**Jews**	0.3602*** (0.0046)	0.0486*** (0.0039)	0.0607*** (0.0039)
	Arabs	0	0	0
Years after graduation	**Jews**	0.1535*** (0.0004)	0.0848*** (0.0005)	-0.0204*** (0.0015)
	Arabs	0.1387*** (0.0013)	0.0611*** (0.0011)	-0.0721*** (0.0042)
	Jewish - Arab	0.0148*** (0.0014)	0.0237*** (0.0011)	0.0517*** (0.0043)
Interaction between years since graduation and PET score	**Jews**			0.0178*** (0.0002)
	Arabs			0.0267*** (0.0008)
	Jewish - Arab			-0.0089*** (0.0008)
Control variables			+	+
Observations		1073838	1073838	1073838

- Control variables: age, gender, number of children, marital status, PET score, geographic region, type of academic education (college vs. university, MA or BA and field of study), number of months worked each year, cumulative months of absence from the labor market since graduation, cumulative number of workplaces, economic sector and year.
- Standard errors appear in parentheses. Levels of confidence: * significant at 10%; ** significant at 5%; *** significant at 1%.

[2] The use of OLS regressions has its limitations while one could have used a more generalized regressions, the flavor of the results would not change.

Figure 2a: Estimated log wage gap between Jews and Arabs by years since graduation

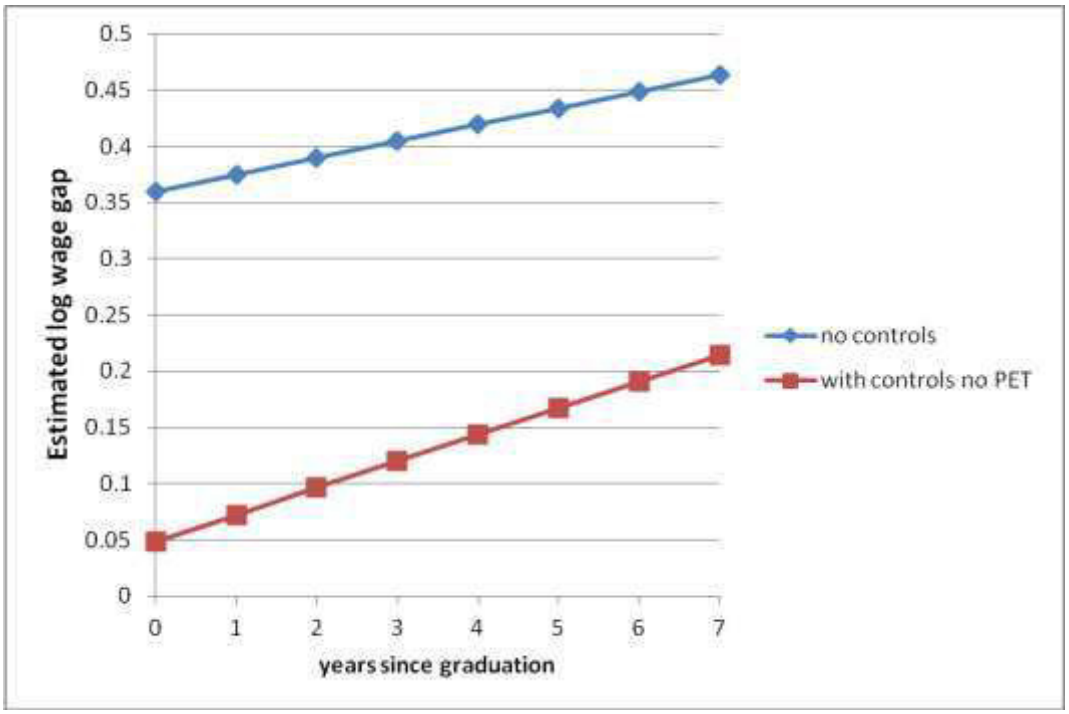
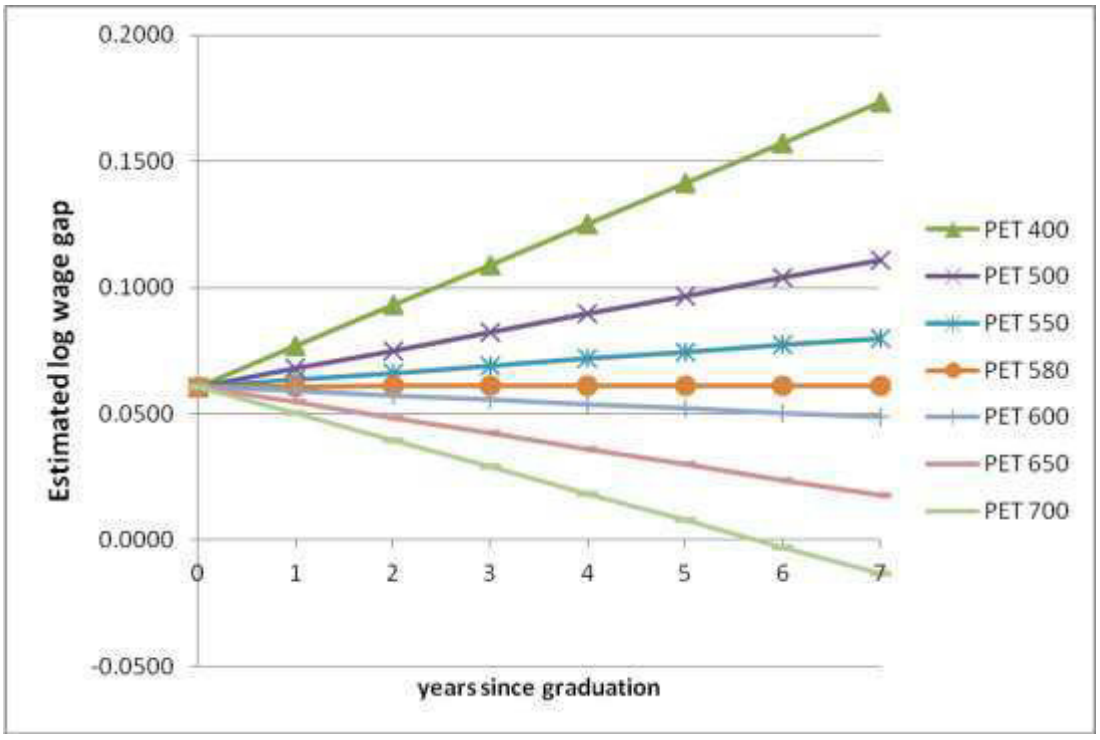


Figure 2b: Estimated log wage gap between Jews and Arabs by years since graduation and PET score



The estimated raw log wage gap between Jews and Arabs (column 1 in table III) is 36 percent on graduation, which increases by 1.48 percent annually to 46 percent after seven years. Controlling for background characteristics (column 2) decreases the estimated

initial gap to only 4.86 percent, which increases by 2.37 percent annually to 21.45 percent after seven years.
If PET score is added to the regression, the estimated initial gap rises to 6.07 percent and the effect of years since graduation becomes a function of the PET score. In the low range of PET scores (up to 550), the gap grows over time (to 17.34 percent for a score of 400; to 11.11 percent for a score of 500; and to 8 percent for a score of 550 after seven years). At a score of 580, there is no change in the gap over time (6.13 percent). In the higher range of PET scores, the gap decreases over time (to 4.88 percent for a score of 600; to 1.76 percent for a score of 650). Finally, at a score of 700 the gap decreases rapidly and after 5 years Arabs in fact earn more than Jews.
As can be seen from table II, column IV, only 16 percent of Arab graduates have PET scores over 600, while most of them (69 percent) have scores of less than 550.

4.2 Gender

Table IV and figures 3a and 3b present the estimated log wage for men in each group as a function of years since graduation.

Table IV: Estimation of log monthly wage function by OLS – by gender

		Men only			Women only		
		I	II	III	IV	V	VI
Intercept		8.629*** (0.006)	5.478*** (0.036)	5.508*** (0.036)	8.171*** (0.006)	6.098*** (0.027)	6.108*** (0.027)
Addition to Intercept	**Jews**	0.332*** (0.006)	-0.013** (0.006)	0.001 (0.006)	0.414*** (0.0056)	0.092** (0.005)	0.104*** (0.005)
	Arabs	0	0	0	0	0	0
Years since graduation	**Jews**	0.172*** (0.0006)	0.088*** (0.0007)	-0.045*** (0.003)	0.141*** (0.0004)	0.082*** (0.0006)	0.001 (0.002)
	Arabs	0.133*** (0.002)	0.049*** (0.002)	-0.054*** (0.006)	0.144*** (0.002)	0.069*** (0.002)	-0.085*** (0.006)
	Jewish - Arab	0.038*** (0.002)	0.038*** (0.002)	0.009 (0.006)	-0.003* (0.002)	0.013*** (0.001)	0.087*** (0.006)
Interaction of years since graduation and PET score	**Jews**			0.022*** (0.0004)			0.014*** (0.0003)
	Arabs			0.020*** (0.001)			0.032*** (0.001)
	Jewish - Arab			0.001 (0.001)			-0.018*** (0.001)
Control variables			+	+		+	+
Observations		432441	432441	432441	641397	641397	641397

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- Control variables: age, gender, number of children, marital status, PET score, geographic region, type of academic education (college vs. university, MA or BA and field of study), number of months worked each year, cumulative months of absence from the labor market since graduation, cumulative number of workplaces, economic sector and year.
- Standard errors appear in parentheses. Levels of confidence: * significant at 10%; ** significant at 5%; *** significant at 1%.

Figure 3a: Estimated log wage gap between Jews and Arabs by years since graduation - Men only

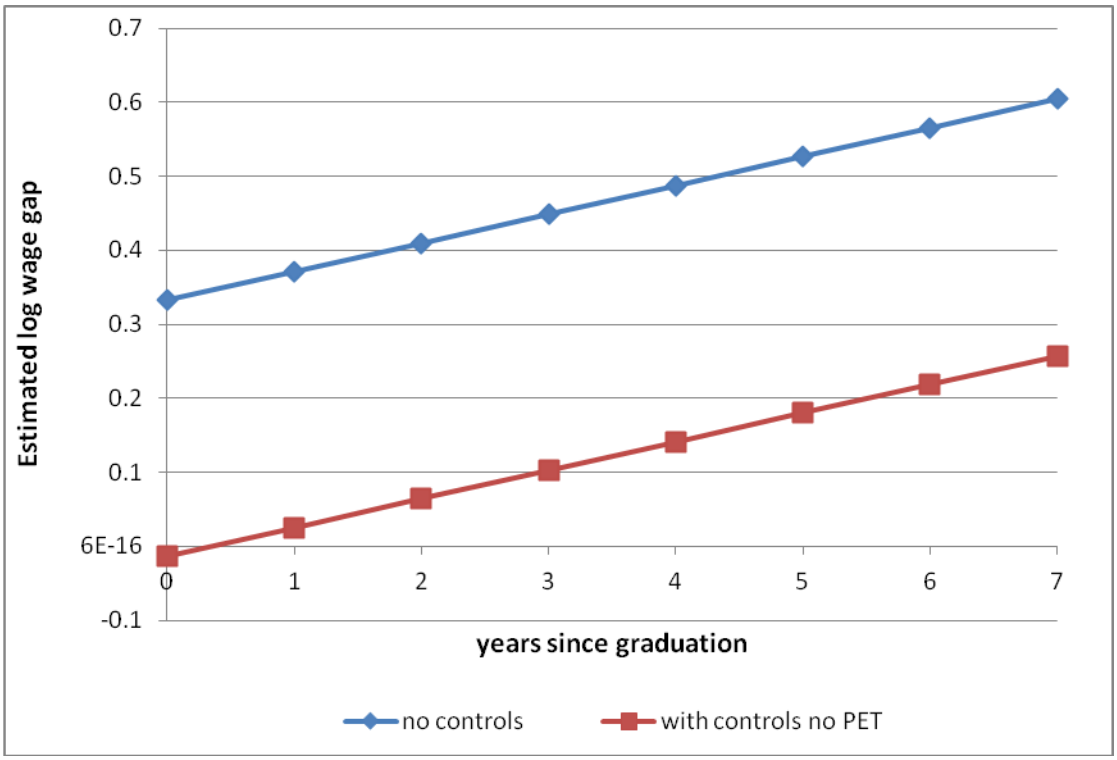
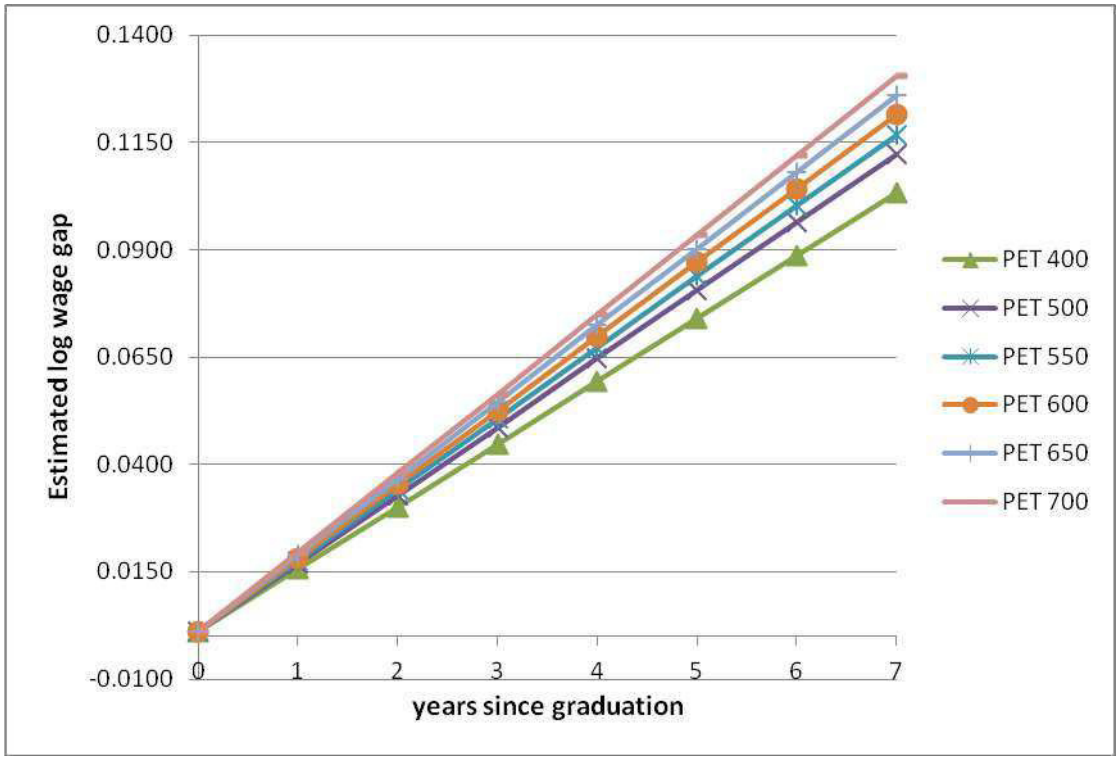


Figure 3b: Estimated log wage gap between Jews and Arabs by years since graduation and PET scores - Men only



The estimated raw wage gap between men Jews and Arabs (table IV, column I) is 33.24 percent on graduation, which grows by 3.88 percent annually to 60% after seven years.

Controlling for background characteristics (table IV, column II) decreases the estimated initial gap to -1.33 percent (i.e. in favor of Arabs), while each year after graduation increases the gap by 3.87 percent per year to 25.76 percent.

When the PET scores are included, the estimated initial gap decreases to 0.1 percent, which is not statistically significant. The effect of years since graduation on the wage gap is positively correlated with the PET scores (a 10.32 percent wage gap for a score of 400 and a 13.05 percent wage gap for a score of 700), although the difference is not significant. The gap between Arabs and Jews that we saw in column 2 is due to the differences in PET scores between the two groups. As can be seen in table II, columns III-IV, only 20 percent of Arab male graduates have PET scores of over 600 as compared to 63 percent of Jews. Most Arab men (64 percent) have scores of less than 550 as compared to only 20 percent of Jews.

Table IV, columns IV-VI and figures 4a and 4b below present the estimated log wage for women in each group as a function of years since graduation

Figure 4a: Estimated log wage gap between Jews and Arabs by years since graduation - women only

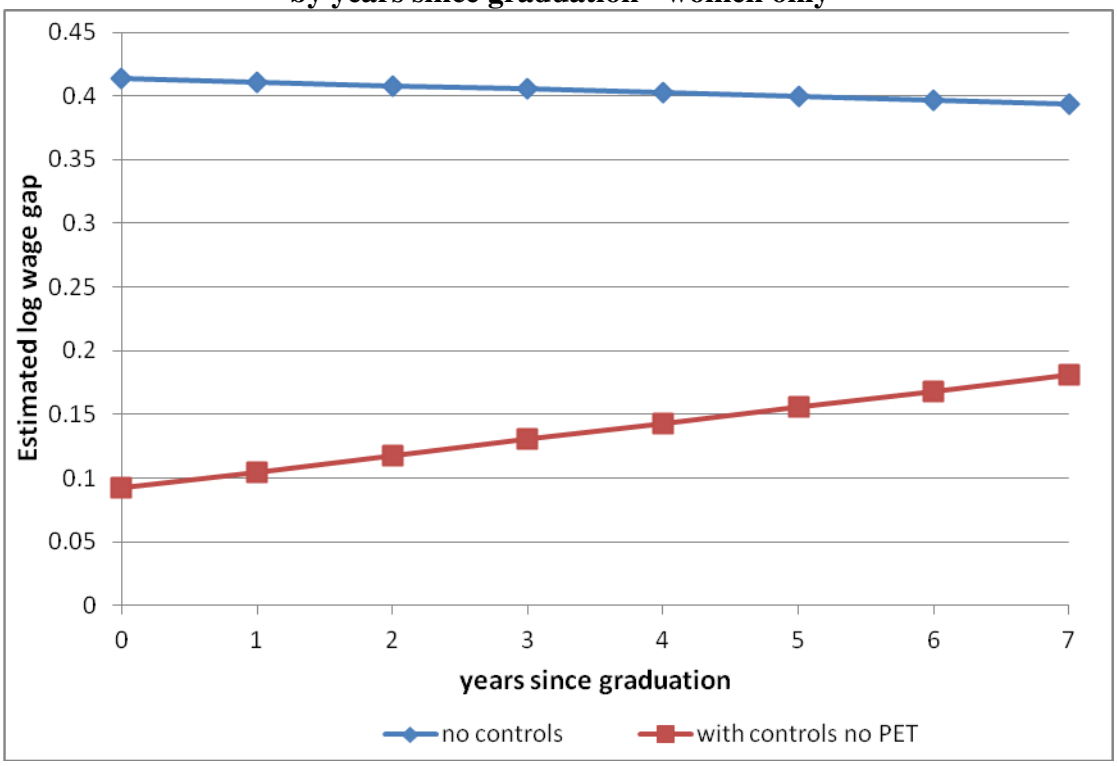
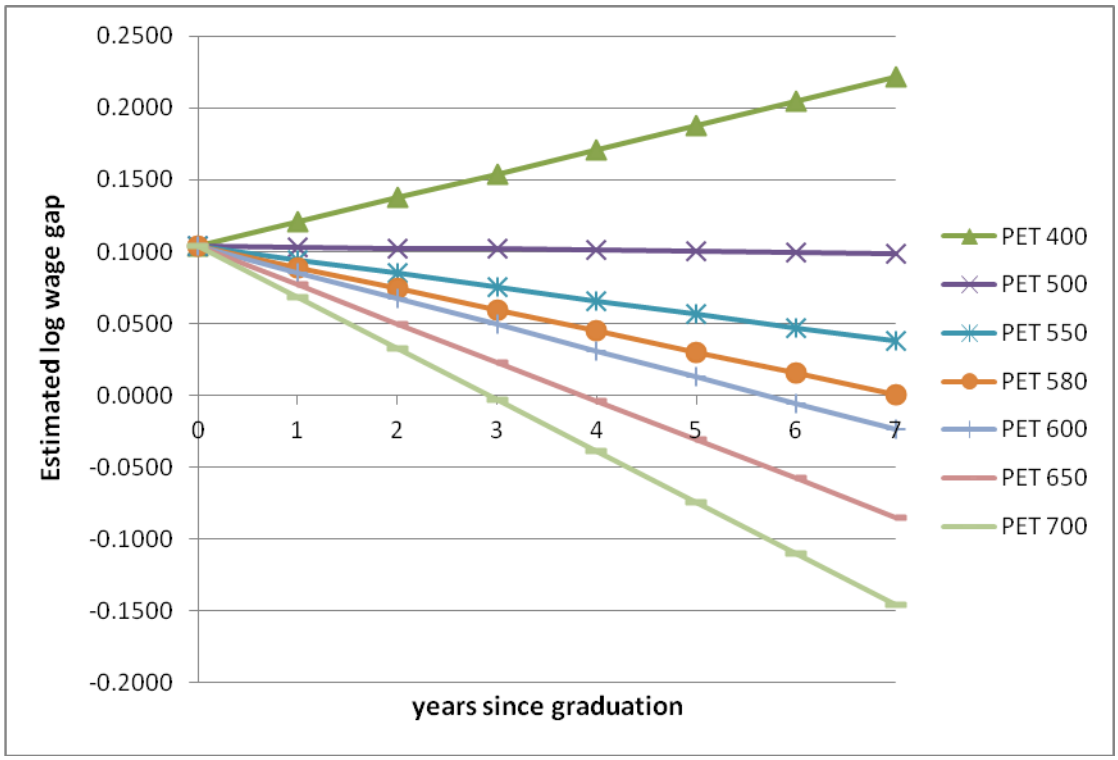


Figure 4b: Estimated log wage between Jews and Arabs by years since graduation and PET scores - women only



The estimated raw wage gap between Jewish women and Arab women (table IV, column IV) is 41.37 percent on graduation, which decreases by 0.28 percent annually to 39.41 percent after seven years. Controlling for background characteristics (table IV, column V) decreases the estimated initial gap to only 9.21 percent, which increases by 1.27 percent annually to 18.1 percent after seven years.

When the PET scores are included, thus capturing the level of skills rather than the human capital, the estimated initial gap increases slightly 10.38 percent and the effect of years since graduation on earnings becomes a function of the PET score. In the very low range of PET scores (score of 400) the wage gap grows to 22.14 percent after seven years. For a score 500, there is no change in the wage gap (9.89 percent). From that score upward, the wage gap decreases over time: For a score of 580, the wage gap disappears after seven years. For a score of 600, the gap reverses itself with Arab women earning more than Jewish women after five years. For a score 650, the gap reverses after only three years and for a score of 700 it reverses after only two.

As can be seen in table II, column VI only 13 percent of Arab female graduates have PET scores of over 600, with most of them (74 percent) being below 550.

4. Conclusion

Previous studies of the Jewish-Arab wage gap in Israel found that Israelis earn more than Arabs and that the difference grows with years in the labor market. These studies controlled for human capital characteristics but not for the worker's level of skills, as represented here by the PET score. Note that the PET score captures the level of skills of workers, rather than the human capital variables. When the PET score is not controlled for in the regression, we obtain similar results to those of previous studies. Similarly for the population as a whole, if one does not control for human capital, the Jewish-Arab wage gap during the first year following graduation is 36 percent, which increases to 46 percent after seven years in the labor market. If human capital is controlled for, then the initial wage gap is about 5 percent, increasing to about 21 percent after seven years.

If, in addition to human capital, one also controls for the PET score, then from a score of 600 and above the Jewish-Arab wage gap decreases with years in the labor market. In other words, among highly-skilled workers (with PET scores of over 600) who apparently have jobs that require a higher level of ability (and probably pay a higher wage) the wage gap narrows with years in the labor market. At this level of skill, the employer apparently cares more about ability and less about other aspects of the workers.

When the sample is differentiated by gender, the picture changes. For men, the initial wage gap is 33 percent when human capital and the PET score are not taken controlled for, which increases to 60 percent after seven years. When human capital is controlled for, the initial wage gap is close to zero and grows to 26 percent after seven years. When, in addition, the PET score is controlled for, the results are similar to those of Neal and Johnson (1996), according to which the initial wage gap is close to zero. In addition, the difference in return on experience in the labor market between

Jewish men and Arab men is not statistically significant. The results lead to the following conclusions: 1) The Jewish-Arab wage gap is a result of differences in skill levels which the workers bring to the labor market, rather than racial discrimination against Arab men. 2) There is no wage gap between Jews and Arabs with the same skill levels and the same human capital characteristics.

A different picture is obtained for women. Thus, if human capital and the PET score are not controlled for, then the wage gap is 41 percent during the first year following graduation, which is maintained over time. When human capital characteristics are controlled for, the initial wage gap is about 9 percent which increases to 18 percent after seven years in the labor market. When the PET score is also controlled for, the initial wage gap is about 10 percent. Among women with PET scores of less than 500, the wage gap grows to 22 percent after seven years in the labor market, in contrast to the wage gap among women with PET scores of above 580 which declines with years in the labor market. The higher is the PET score, the more rapidly the wage gap is closed.

We can conclude that the wage gap between Jewish women and Arab women is a result of statistical discrimination and that the labor market reveals the skills of Arab women with a high PET score faster than it does in the case of Arab women with a low PET score. The wage gap between Jewish women and Arab women with a PET score of 600 disappears after five years in the labor market; for a PET score of 650 it disappears after three years; and for a PET score of 700 it disappears after two years in the labor market.

Moreover, as we can see from the data (see table II, column I-II), the proportion of Israeli Arabs with high PET scores is lower than that of Israeli Jews. This may be the result of discrimination against Arabs in the allocation of public investment in education. The will have an impact on the quality of human capital and therefore on the ability to attain a high PET score and to succeed in the labor market.

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