

Returns to Education and Labor Market Experience in Israel

Michael Debowy, Gil Epstein, and Avi Weiss

Introduction

Estimating the relationship between human capital and earnings has been a focal point of economic research for many years. Since the studies by Mincer (1958; 1974) and Becker (1964), thousands of articles have dealt with the relationship between education and wage levels in different countries, including Israel, and estimated them in a variety of ways. The current study continues the tradition of investigating this relationship. The goal is to provide current estimates of the returns to education for different population groups in Israel's labor market, and to see whether the anticipated return has changed substantially due to major developments that have occurred in Israel, both in labor market participation rates and in the educational levels of numerous population segments. Additionally, the study looks at whether educational, employment, and wage disparities found in the past between Jews of different ethnic backgrounds have remained unchanged.

Unsurprisingly, education and experience play a key role in determining employment and wages. Both wage levels and the likelihood of being employed rise significantly with each rung on the educational ladder, meaning that the benefits from education are never exhausted at any stage. The positive impact of occupational experience on the probability of working and on expected earnings is exhausted after 22 and 31 years, respectively, and then diminishes.

We will show that these relationships between human capital factors, employment, and wages vary between workers of different ethnicities, sectors, and genders. The highest returns to years of experience are enjoyed by Mizrahi Jewish men and women, while non-Jewish men and women have to content themselves with a much more modest return.

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Literature review

Although this question has been explored thousands of times, it should be noted that the relationship measured in the various studies is not always causal. Finding a correlation between wage and education levels, for example, does not mean that education is what caused the high wages. Another explanation for this finding could have to do with unmeasurable factors that affect both education and earnings. For instance, a person who is highly talented and highly motivated may be more successful in his studies and earn more, but he would have earned more even without higher education. In other words, it may be that education only signals a person's ability level (Spence, 1973). Indeed, most of the articles on this topic note only a correlation, but there are also articles that estimate a causal relationship. It should be noted that the results of the causal and the non-causal studies are not essentially different. This finding justifies continued study of correlations only, even without causal evidence. In the current study we measure correlations only, while controlling for many other variables, but without determining causality.

In the Israeli context, Frish (2009) looked at both the relationship between education and wages, and the causal effect of education in Israel. Frish estimated the education-earnings relationship on the basis of 1995 population census data and household income surveys from 1996 to 2005. He focused on people from disadvantaged populations in age ranges affected by the 1979 amendment to the Compulsory Education Law, which expanded compulsory education to Grade 10, and free education to Grade 11. He found that there was no real difference between the various estimation findings, and that the returns to an average year of schooling, in wage terms, ranges from 9% to 12%. Frish also showed that the returns to the various levels of education rise until the master's degree (with the most significant jump occurring with the bachelor's degree), and that those with doctorates earn, on average, less than those with master's degrees.

Achdut et al. (2019) relied on administrative data to estimate the returns to education at various institutions of higher education. To isolate the causal effect of education, they employed three different methods: multi-factor analysis; two-stage analysis with the use of geographic proximity to the education institution as an instrumental variable; and the estimation of discontinuity arising from the various institutions' admissions processes. In general, the researchers found that higher education produces a handsome return compared with high school education only. It likewise emerged that

Israel's universities and private colleges give their graduates higher returns than do the country's public colleges, though in each discipline the institution types rank differently in terms of anticipated future wage levels.

Meltzer (2014) looked at returns to education based on 2008 population census data. She focused on a number of different populations, using both of Frish's methods (Frish, 2009) with the addition of the Heckman correction (which we employed in this study). Her findings showed that, in 2008, the average return per year of schooling was 10%, with Mizrahi Jews enjoying a higher return per year of schooling than Ashkenazi Jews, and men receiving a higher return than women. Meltzer also showed that the return from each additional year of schooling is positive through the doctoral level, in contrast with Frish's findings.

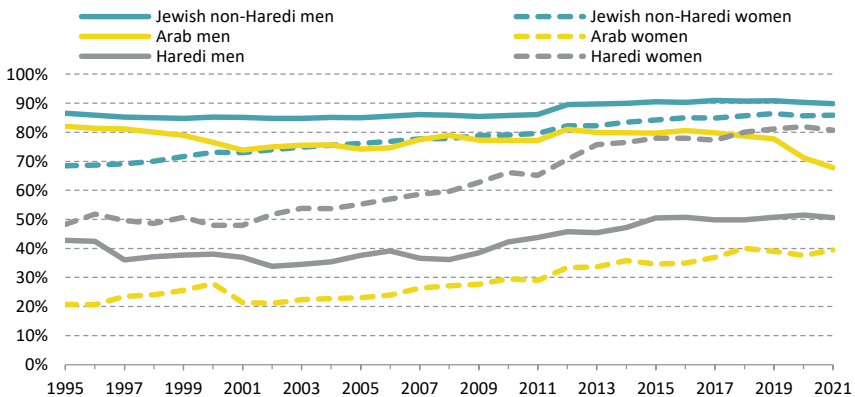
Internationally, Montenegro and Patrinos (2014) investigated the relationship between education and earnings across the globe. Relying on a huge dataset amassed by the World Bank, containing observations from household surveys around the world from the years 1970 to 2013 (75% of the observations are from after 2000), they found an average return of 10% per average year of schooling. When the findings were broken down, it emerged that a year of primary school has a return of 10%, a year of post-primary school has a return of 7%, and a year of study at an institution of higher education has a return of 15%. They also showed that the returns to a year of schooling at any level are slightly higher for women than for men.

Background data

The past two decades have witnessed major changes, both in labor market participation rates of some segments of Israel's population, and in education levels and academic study rates. These developments will likely alter returns to education in general, and returns from academic education in particular, but it is unclear in which direction. Israel's rising percentage of those pursuing university and college studies, for example, may stem from different sources. On the one hand, if more people are deciding to study without an increase in employer demands, then this may be expected to lead to a decline in the returns to academic education. On the other hand, if the higher academic study rate is being driven by demand for educated workers on the part of employers, then the expected outcome would be an increased return. The degree of change has been such that estimating the effect's direction and size may be critical for setting policy, as we shall see in the conclusions below.

We begin with the changes in labor market participation rates. Figure 1 displays the labor market participation rates of different segments of the population since 1995. As the graph shows, during the second half of the 2000s (from around 2003), there was a turnaround that may have stemmed from social benefit cutbacks, including child allowances, which forced many more people to enter the labor market. The trend change occurred primarily in the Arab and Haredi (ultra-Orthodox Jewish) populations, and among women more than men (in both populations). In the Arab population, the share of employed women doubled, from 20% to 40%, while in the Haredi sector there was a 60% increase in the number of working women — from 50% to nearly 80%. That massive penetration of new workers could clearly have a major impact on returns to education and experience.

Figure 1. Labor market participation rate for ages 25-64, by gender and sector



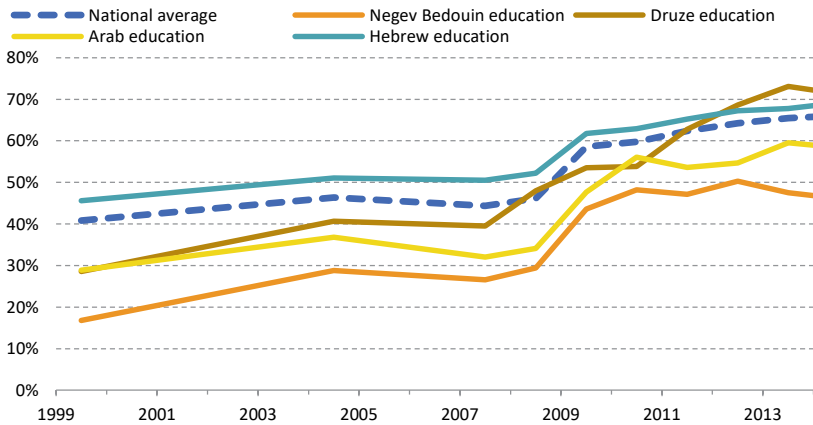
Note: 2021 figures refer to the first three quarters of the year.

Source: Michael Debowy, Gil Epstein, and Avi Weiss, Taub Center | Data: CBS

Additionally, Figure 1 shows a steep drop in Arab men's participation rates in recent years, a trend that started even before the Covid-19 pandemic and intensified during it. There are a number of social and economic explanations for this development, including the displacement of Israeli construction workers (the vast majority of whom are Arabs) by foreign and Palestinian workers (see Etkes & Adnan, 2021; Geva et al., 2021). With this, recent months have seen an increase in Arab men's employment rates.

A similar development can be seen in education levels. For example, since the beginning of the 21st century, the share of those eligible for a bagrut (matriculation) certificate has risen substantially, from less than half of 17-year-olds to 70% (Figure 2). This rise in the share of those eligible for a bagrut certificate has occurred in all sectors, but Druze students show the largest increase.

Figure 2. Share of those eligible for the bagrut certificate, by sector

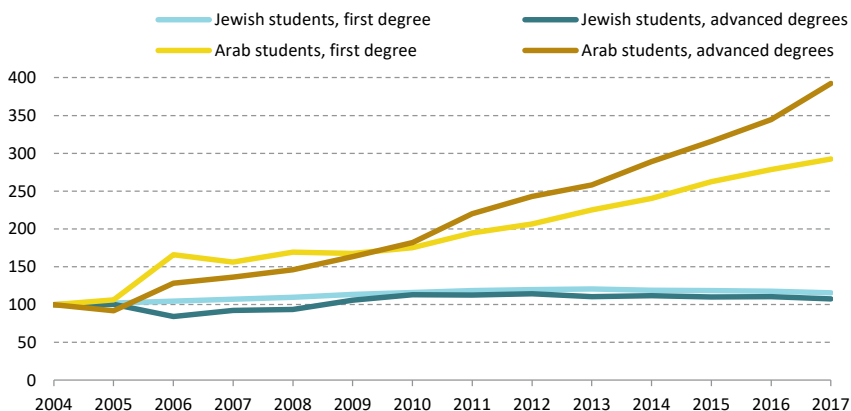


Source: Michael Debowy, Gil Epstein, and Avi Weiss, Taub Center | Data: Ministry of Education, Facts and Figures 2015; Facts and Figures 2019

A focus on higher education shows large differences between the Arab and Jewish populations. Ultimately, over the two decades that have passed since the turn of the century, the number of students studying for undergraduate degrees has grown by 50%, and the number of those pursuing graduate degrees by 80%. However, as shown in Figure 3, this increase all but bypassed the Jewish population (the share of those enrolled in academic programs was already high in that sector); it was concentrated, rather, in the Arab population. For example, between 2005 and 2017, the number of Arab undergraduate students tripled, while the number of Arab graduate students quadrupled.

Figure 3. Index of the number of students in the higher education system, by degree

2004 = 100



Source: Michael Debowy, Gil Epstein, and Avi Weiss, Taub Center | Data: The Council for Higher Education, Fidelman, 2009

Sources and methodologies

To analyze the wage distribution, we used data from Household Expenditure and Income Surveys conducted by the Israel Central Bureau of Statistics (CBS) for the years 2017 and 2018. This dataset includes information on employment, wages, and work hours, as well as background data at the individual level. Most of the data are based on self-reporting by survey respondents (notable exceptions in this regard are the data on income and employment, which are taken from pay slips). The dataset contains some 32,000 observations of individuals ages 17–67, of whom about 22,100 are salaried employees who reported working at least 10 hours a week, the same criterion we used for including the individual as employed in this study.¹

1 The descriptive and deductive findings presented here remain almost unchanged if the working hours criterion is lowered to just one hour per week, or if self-employed individuals are also included in the sample.

Since we also wanted to look at differences between Ashkenazim and Mizrahim, we divided the Jewish survey respondents as follows: those whose parents were both born in “Europe/America” were marked as Ashkenazim; those whose parents were both born in “Asia/Africa” were marked as Mizrahim; and all other Jews were designated as Israeli-born or as natives of different continents. Individuals whose nationality was “other” were included with those whose nationality was “Arab” (rather than with Jewish individuals, as is done in most other studies).

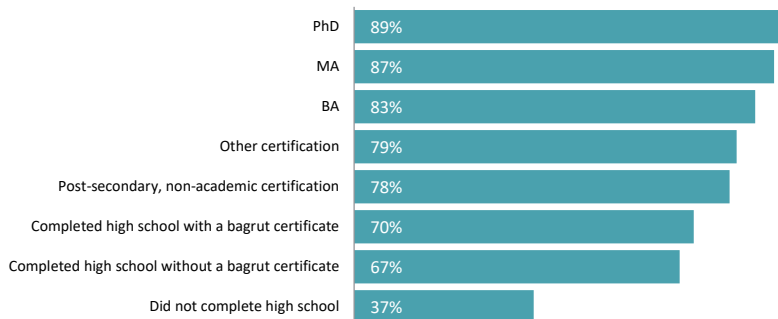
The estimation procedure used Mincer equations (Mincer, 1958; 1974) to examine the relationship between workers’ earnings and their characteristics, such as education (years of schooling or educational attainment), experience, occupation, and demographic background. In order to take into account the effect of these characteristics on the individual’s decision whether to work, a two-stage estimation model was used utilizing the Heckman correction (Heckman, 1974; 1976). Specifically, this model first estimates the effect of various factors on the probability that individuals will be employed, and then, taking the first stage results into account, estimates the effect of those same factors on earnings.

Description of the data

We start by presenting averages without controlling for other variables. The full analysis is in the next section.

Figure 4 shows the 2017–2018 employment rates by educational attainment. Employment rates rise consistently with education levels, but level off, of course, as full employment is approached. For those who did not complete high school, the labor market participation rate is less than 40%; the rate climbs to 70% for high school graduates, and to over 80% for those with academic degrees. The highest employment rate is for doctorate holders, nearly 90% of whom are employed. Employment rate differences also exist between different population groups, and between different geographic districts (see Appendix Figure 1 and Appendix Table 1).

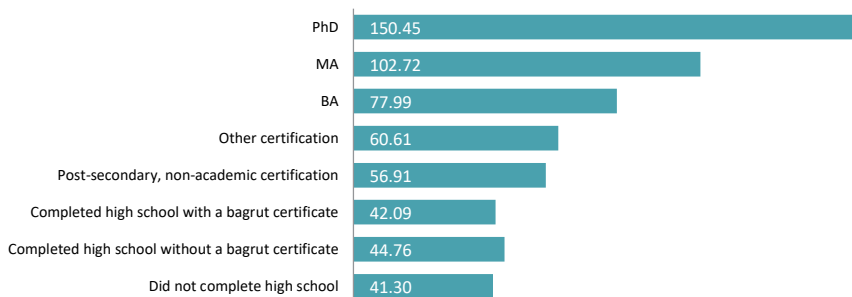
Figure 4. Employment rates for ages 17–62, by educational attainment, 2017–2018



Source: Michael Debowy, Gil Epstein, and Avi Weiss, Taub Center | Data: CBS

Similarly, average wages tend to rise with education levels. Figure 5 shows the average gross hourly wage for different levels of educational attainment, with the average wage increasing substantially with each degree beyond high school. However, for those with a high school education or less, the differences are small and not always monotonic. In this context, it is interesting to note that the average wage of those with a bagrut certificate is lower than that of high school graduates who did not earn the certificate, though the difference is not significant (the mean values lie in a range of less than one standard deviation from each other). This finding may indicate that the bagrut certificate has little value when unaccompanied by further study.

Figure 5. Average gross hourly wage, by educational attainment, 2017–2018 NIS

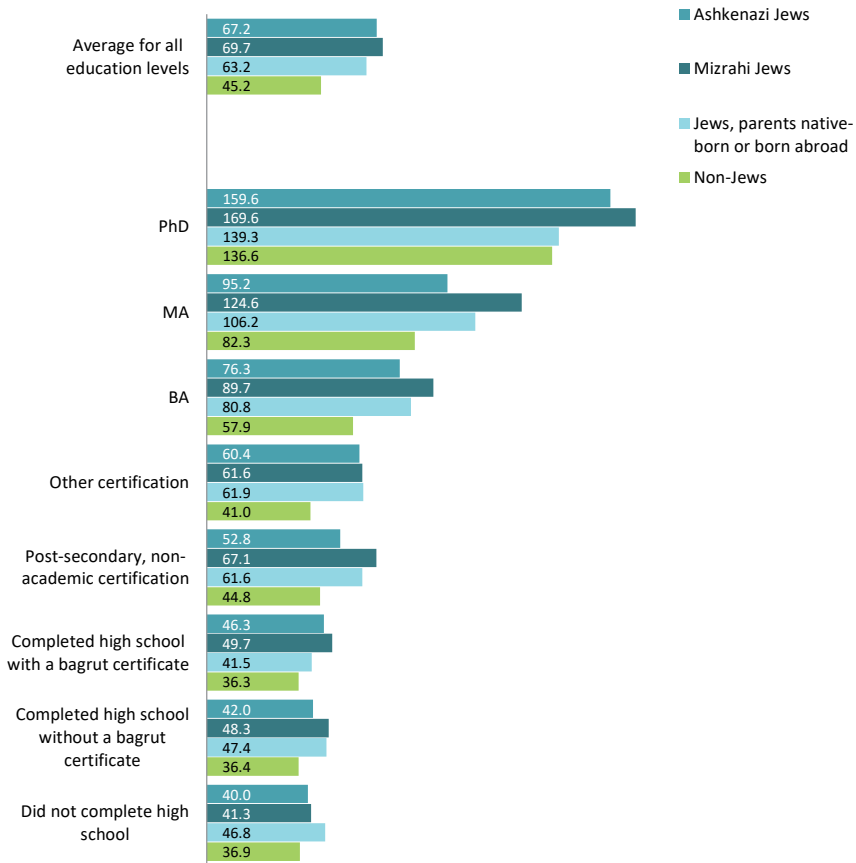


Source: Michael Debowy, Gil Epstein, and Avi Weiss, Taub Center | Data: CBS

The average wage of individuals with different degrees, broken down by ethnicity and sector, is shown in Figure 6. More complete information is provided in Appendix Table 2, which includes average wage, standard deviation, and number of observations for each degree-ethnicity-sector category.

Figure 6. Average gross hourly wage of workers, by ethnicity and sector, 2017–2018

NIS



Source: Michael Debowy, Gil Epstein, and Avi Weiss, Taub Center | Data: CBS

Firstly, at each education level, non-Jewish workers earn substantially less than their Jewish peers. This is even more true when we look at the average for the population as a whole, as the Arab sector's education level is lower on average (see the distribution in Appendix Table 2). Secondly, at most education levels Mizrahi Jews earn, on average, more than other Jews, especially Ashkenazi Jews, though the differences are not significant. The sole exceptions are workers without high school education, and Jews with "other degrees," the difference being minor for the latter group. All told, at least on the surface — before controlling for other variables — there seem to be no statistically significant wage differences between Jews of different ethnicities whose education levels are similar. In this context, it is interesting to note that the percentage of non-high-school-graduate workers among Mizrahi Jews is double that of non-Mizrahi Jews, and the percentage among the Arab population is almost double that of Mizrahi Jews (see Appendix Table 2).

However, earnings are not influenced solely by education level, ethnicity, and sector. The relationship between education and earnings is also affected by occupational choice, and by the economic employment sector. To examine this, workers were classified into occupation-economic-sector categories. The correlation between the share of workers with an academic degree and the average wage in each category is shown in Figure 7. As seen, there is a very close relationship between the two. A weighted least squares regression shows that the relationship is significant, with variance in the share of academic degree holders explaining 60% of the average hourly wage difference between occupation-economic-sector categories (see Appendix Table 3).

Figure 7. Average gross hourly wage and percentage of academic degree holders by occupation, 2017–2018



Note: Bubble size indicates the category share from the entire labor force.

Source: Michael Debowy, Gil Epstein, and Avi Weiss, Taub Center | Data: CBS

Results of the empirical investigation

To estimate the relationship between wages and their determinants while controlling for the other factors that affect earnings, a multiple regression analysis was conducted using a two-stage framework. In the first stage, the relationship between personal factors and the probability that the individual would work (at least 10 hours a week) was measured. The explanatory variables included were education, experience,² occupation, economic sector, geographic location, gender, family status, ethnicity, sector (including separate

2 The experience measured is potential experience, equal to age minus number of years of schooling, minus 6 (age of entry to Grade 1). For people with fewer than 10 years of schooling (only a small number of observations), potential experience equals age minus 16.

dummy variables for “others”³ and Arabs), and level of religious observance. All of these variables were also included in the second stage. Two additional variables were included in the first stage only as instrumental variables — the value of the home owned by the family, and the number of children under the age of 10 at home.⁴ The expected effect of these instrumental variables on the probability of working differs fundamentally from their effect on wage. The full findings of the model can be found in Appendix Table 4. The first column contains the basic model, while the second column contains interactions between potential experience and gender, between potential experience and a dummy variable indicating academic education, and between the education variables and gender. The third column contains interactions of ethnicity and sector with experience and education level.

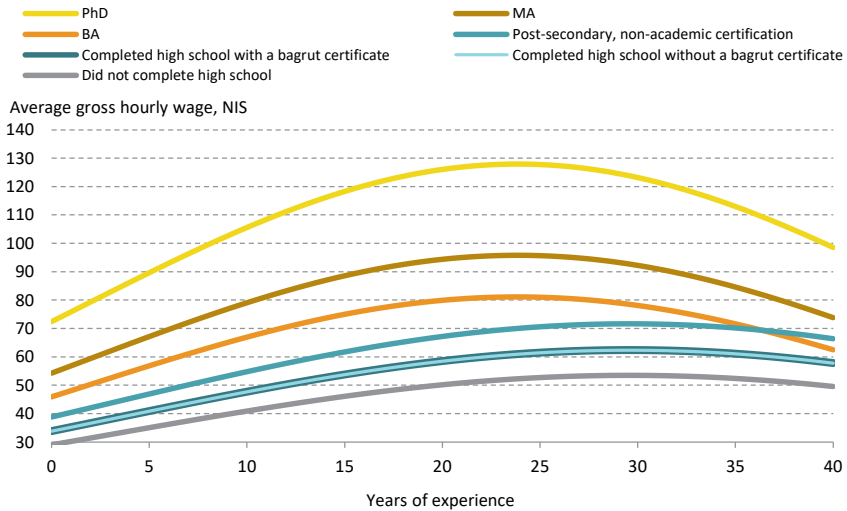
Overall, the model supports the descriptive findings and the predictions. Regarding employment and education, for example, most of the labor market participation differences described in Figure 4 are also valid when the remaining factors are taken into account. Thus, compared with those who did not finish high school, high school graduation raises the likelihood of working by 16%; the bagrut certificate increases it by 20%; a vocational certificate by 23%; a bachelor’s degree by 25%; a master’s degree by 27%; and a doctorate by 28%. Additionally, women work less than men even when controlling for the other variables, while Ashkenazim (and non-Jews even more so) work less than other Jews. By contrast, there is no substantial difference between the employment rates of Mizrahi Jews and mixed Jews or third-generation Israelis.

The main findings of this study are obtained in the second stage, which estimates the effect of the factors on hourly wage. These findings are shown in Appendix Table 5. The table’s three columns correspond to the columns in Appendix Table 4, which shows the probability of working results. Regarding the effect of education, there is a growing return to each level of educational attainment, but after controlling for the other variables, as well as for the probability of working, the differences are smaller than those shown in Figure 5. Compared with the lack of a high school diploma, high school

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- 3 The Arab population account for slightly more than three-quarters of the non-Jews, while “others” are slightly less than a quarter.
 - 4 Children are a commonly-used instrumental variable in this context, and home value has a specific advantage in that it is correlated with *lower* probability of working and *higher* earnings, while also serving its purpose as a source of occupational variance that *does not correspond with wage variance*.

graduation (without a bagrut) yields a 12% higher wage (8% in Figure 5); a non-academic vocational certificate — 26% (38%); a bachelor's degree — 45% (89%); a master's degree — 61% (149%); and a doctorate yields a 90% higher wage (264%). That is, the other variables, and in particular the likelihood of working given the individual's other characteristics, explain a substantial portion of the wage differences.

As many have shown, starting with Mincer (1974), experience has a strong effect on wage levels. The model indicates that the positive returns to each year of experience approach their limit after 31 years, while wages are 60%–70% higher at their peak than at the start of one's career. However, when we looked at academic degree holders separately, we found that they actually reach the limit in terms of returns to their experience after 24 years, with a similar rise in earnings. This may reflect their late career start due to additional years of schooling; alternatively, it may reflect depreciation of the human capital acquired through academic study, which happens more quickly than depreciation of the human capital acquired in high school (see Neuman & Weiss, 1995). Nevertheless, it should be emphasized that academic degree holders reach their peak earnings with less experience than do less-educated workers, and thus enjoy the same maximum return within a shorter time frame. Figure 8 shows the earnings anticipated over the course of workers' years of experience by education level, based on the findings of the multi-factor two-stage analysis.

Figure 8. Effect of years of experience on wage, by education level

Note: The figure shows the expected hourly wage per years of experience by highest degree, based on the Mincer two-stage model that accounts for the likelihood of the individual working.

Source: Michael Debowy, Gil Epstein, and Avi Weiss, Taub Center | Data: CBS

These findings differ from corresponding past estimations, though methodological differences make it hard for us to directly compare different studies. However, the changes in the estimates over the years may be interpreted as evidence of structural changes in the labor market. Table 1 presents estimations of the marginal returns to different degrees in wage terms, as indicated by this study and by flagship studies conducted in the field over the past few decades. Taken at face value, it would appear that the returns to high school education have declined over the years, but remained stable during the past decade. Likewise, the returns to a bachelor's degree have remained the same throughout the period. By contrast, the returns to a master's degree, and especially to a doctorate, have grown significantly. This description is consistent with the phenomenon of "education inflation," whereby credentials lose their *comparative* advantage as they are acquired by larger portions of the labor market. The dramatic decline in the number of citizens without a high school education at the end of the past century, along with the Israeli college revolution, inundated the labor market with high school graduates and undergraduate degree holders, and these education

levels in turn became the “starting point” for the Israeli worker. The major increase in the return enjoyed by doctorate degree holders testifies to the importance of a high level of expertise or to the growth of credentialism in the modern world.⁵

Table 1. Marginal rate of return for each additional level of educational attainment

Research study	Year of data	Completed high school	Bagrut certificate	Non-academic certificate	BA	MA	PhD
Frish 2009	1995	20%	15%	10%	29%	7%	-2%
Meltzer 2014	2008	12%	11%	12%	32%	9%	3%
Current study	2017–2018	12%	0%	13%	32%	16%	29%

Note: The marginal rate of return to the bachelor’s degree is computed relative to the bagrut certificate. Source: Michael Debowy, Gil Epstein, and Avi Weiss, Taub Center | Data: CBS; Meltzer, 2014; Frish, 2009

A gender breakdown does not significantly change the results (Appendix Table 5, Column 2), with similar returns expected for men and women at different education levels. It should be recalled, however, that women’s monthly wages are lower, on average, than those of men.⁶

With regard to ethnic and sector gaps, our findings correspond with the extensive body of literature produced by Israeli researchers over the years. Cohen et al. (2021) looked in depth at the education and income gaps between Ashkenazi and Mizrahi Jews of different immigrant generations in Israel, based on administrative data from the National Insurance Institute for 1.3 million people. They found that the significant education gaps that had existed between second-generation Mizrahim and Ashkenazim *did not diminish* in the third generation, but rather persisted. It was also found that Israeli-born Jews of “mixed” ethnicity more closely resemble Ashkenazim in their educational characteristics than they do Mizrahim. Moreover, with regard to income it was found that male Mizrahim in the younger age groups enjoy a slight advantage (due, apparently, to lower rates of post-secondary education and the acquisition of work experience at earlier stages), but that after age 30, Ashkenazim gain a continued advantage that approaches 20% by

5 Credentialism is the valuation (sometimes the overvaluation) of a person on the basis of the degrees they hold. For a review of the topic, see Bills & Brown, 2011.

6 For in-depth analyses of gender wage gaps see Fuchs, 2017, and Fichtelberg-Barmatz, 2016.

age 43 — among third-generation as well as second-generation immigrants. These findings are consistent with earlier literature on the topic (e.g., Cohen & Habersfeld, 2003; Dahan et al., 2002; Friedlander et al., 2002).

Some of our findings (Appendix Table 5, Column 3) differ from those findings, while others are similar. Almost no significant differences were found between Jews of different ethnicities (though Mizrahim enjoy a higher return, on average, from vocational and doctoral degrees), nor were significant differences found between Jews and non-Jews in terms of returns to education; however, non-Jews' wage levels are substantially lower than those of Jews, though the earnings ratio is similar at all education levels.

With regard to experience-driven increases in earnings, there are major differences between the populations. Mixed and third-generation Jews enjoy a rise in earnings that continues over 30 years and peaks at 76%. By contrast, the experience of Mizrahi workers is exhausted only after 36 years, with a maximum rise of 78%, while Ashkenazim exhaust their experience after 37 years with a return of 105%. The return from experience of non-Jews reaches its apex after 25 years, with a maximum increase of just 25%. There is no significant difference in wage increase rates between women and men. Figure 9 shows the expected wage development for men and women from different groups and with different education levels. One can see that Jewish workers tend toward similar earnings throughout their careers, though Mizrahim accumulate higher returns from their experience and education (on average, as these are not statistically significant differences). It is also clear that among the less-educated (and the highest-educated), the initial situation of non-Jewish workers is actually better than that of their Jewish peers, but not among those with bachelor's and master's degrees.

Figure 9. Effect of years of experience on wages, by gender, education, ethnicity, and sector

NIS

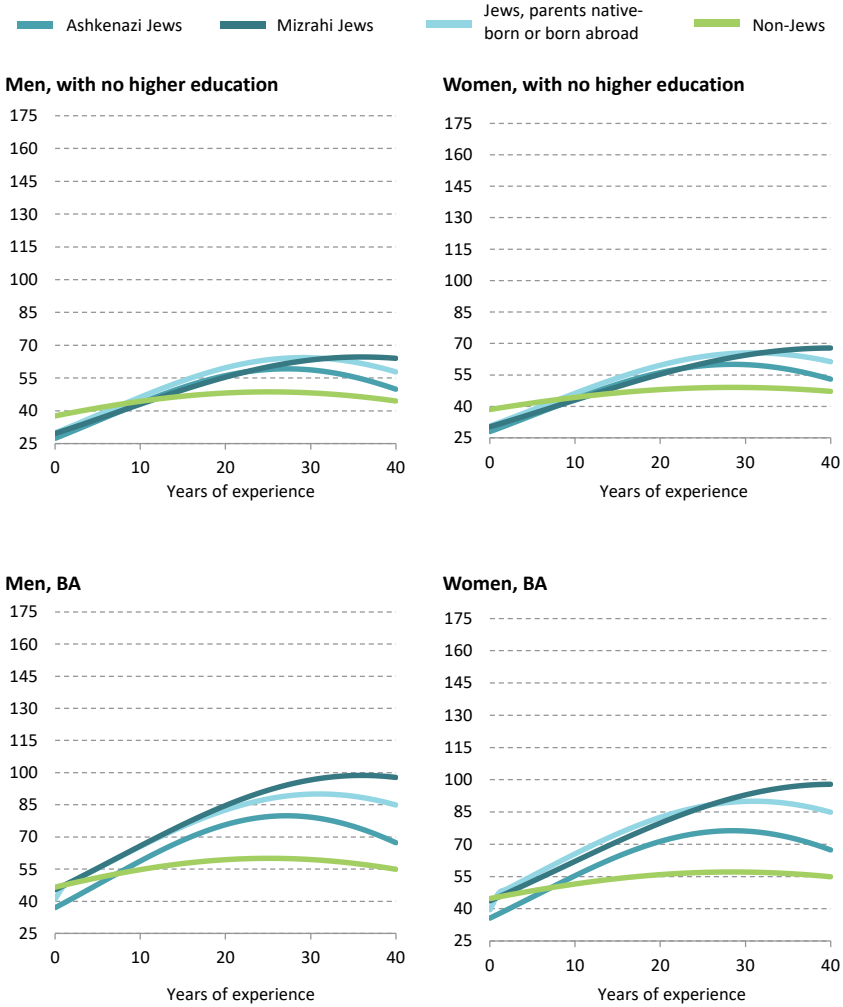
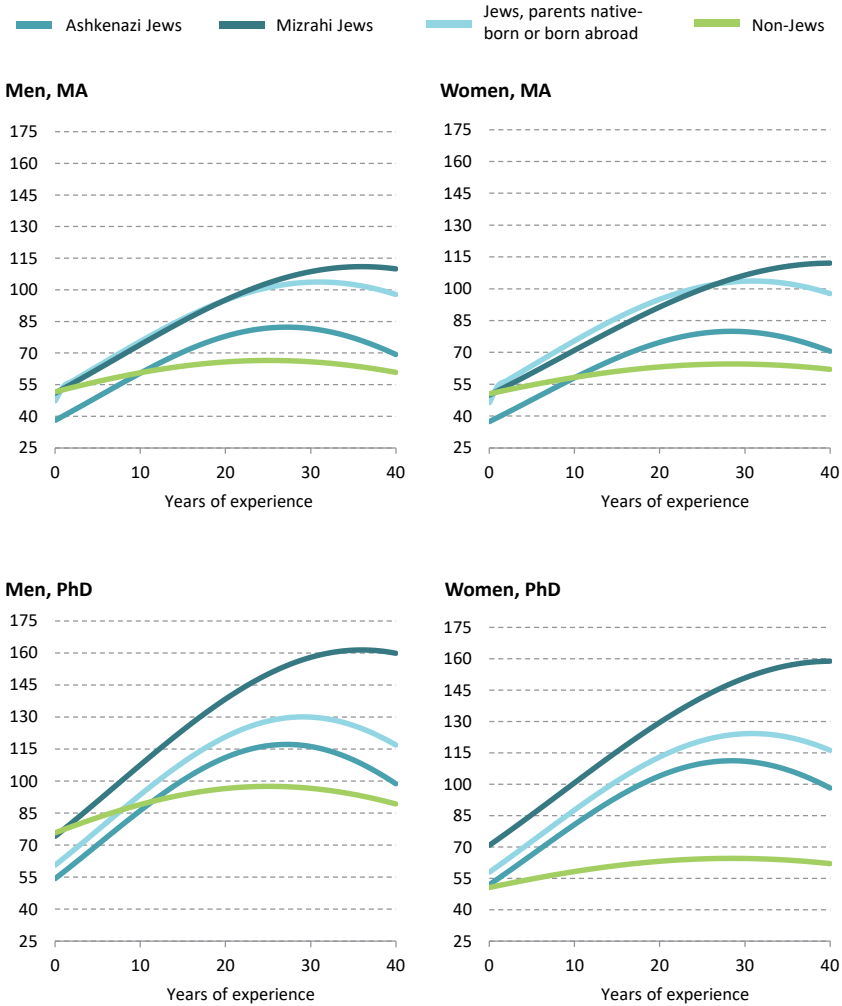


Figure 9 (continued). Effect of years of experience on wages, by gender, education, ethnicity, and sector

NIS



Note: The figures display the expected hourly wage by years of experience and by educational attainment, given occupation, geographic location, status (self-employed or wage earner), family status, sector, and level of religious observance, based on a two-stage model that accounts for the probability of the individual working.

Source: Michael Debowy, Gil Epstein, and Avi Weiss, Taub Center | Data: CBS

Summary of findings and socioeconomic implications

In this chapter, we saw that there is a significant and steady relationship between human capital factors and employment and earnings. Our findings indicate that the marginal returns to education rise at all education levels, that is, that the completion of an additional educational stage correlates with a rise in wages at any given stage, except for a bagrut certificate, which does not correlate with a higher income than does a high school diploma. In this context, it seems that the contribution of high school graduation or the completion of the bagrut certificate is marginal if not followed by investment in the next stage — higher, academic education. In particular, there is a high premium conferred in the modern world to advanced degrees, especially a doctorate, which was formerly perceived as non-lucrative.

Years of experience also make a major contribution to earnings, though their marginal return diminishes over time. Earnings peak after 31 years on average, with academic degree holders reaching their peak wage after fewer years than the rest of the working population. The likelihood of working also rises with years of experience, whose peak contribution to employment arrives after 22 years on average. These findings are robust in a multi-factor analysis that takes a variety of background variables into account.

As is well known, there are gaps in employment rates and wages among different population groups. Accordingly, we show how education narrows gaps: when education levels are similar, Jews from different population groups resemble their peers in employment and wage levels (that is, the wage and employment disparities between the groups stem from education gaps). Nevertheless, we show the moderate returns to education received by non-Jewish men; for them, the wage gaps remain the same even when they are better-educated, and they are widest precisely for those with post-secondary education (vocational or academic), except for those with doctorates.

It is thus clear that, for many Israelis of working age, the path to employment and to an occupation that makes optimal use of one's skills runs through formal higher education. The greater the weight accorded to academic degrees in terms of the options available to the Israeli worker, the more worthwhile it becomes to increase access to higher education for all those who wish to pursue it. Given education's externalities, and the economic, geographic, and other conditions that make it hard for certain populations to acquire academic education, it is worth considering ways to support disadvantaged populations and to focus on solutions in the area of economic and geographic accessibility,

while also addressing language and cultural difficulties. In the meantime, it is important to increase access to studies in the geographic periphery, whether by opening new institutions (or branches of existing institutions), or by expanding online learning (while investing in broadband infrastructures).

Regarding the non-Jewish population, our findings are not encouraging. The returns on education for non-Jewish men and women are lower than those enjoyed by their Jewish peers, particularly for vocational, undergraduate, and graduate degrees. The Arab and Jewish populations' economic separateness — which makes it difficult for non-Jewish workers to realize the full potential of their education and experience — provides at least a partial explanation for this finding. It is reasonable to assume that additional background factors (that lie beyond the scope of this article) play a role as well, especially given our findings regarding labor market gender differences among Arabs. One way or another, policies designed to draw different populations into the labor market will benefit the economy and improve the utilization of human capital within it.

References

English

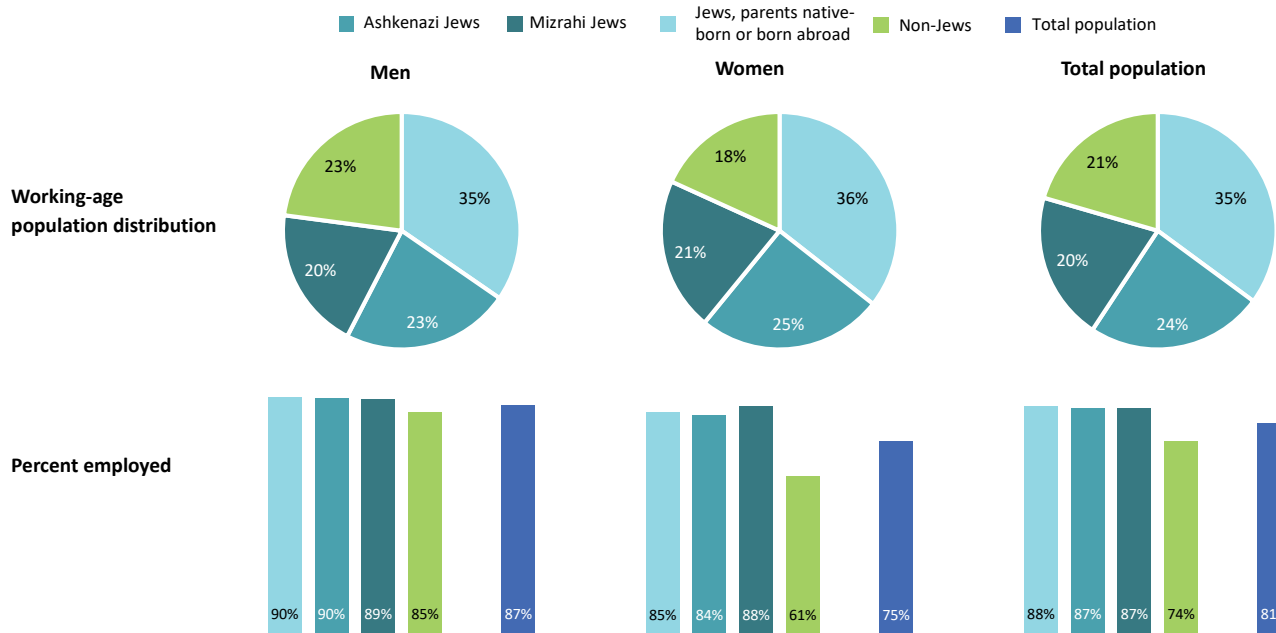
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Appendix

Appendix Figure 1. Employment rate and share of working age in total population, by gender, ethnicity, and sector



Source: Michael Debowy, Gil Epstein, and Avi Weiss, Taub Center | Data: CBS

Appendix Table 1. Employment rate by geographic district and gender

District/ Employment rate	Jerusalem	North	Haifa	Center	Tel Aviv	South	Judea/ Samaria
Total	72%	72%	81%	88%	87%	79%	83%
Men	78%	86%	90%	95%	91%	88%	84%
Women	67%	60%	75%	83%	84%	72%	83%

Source: Michael Debowy, Gil Epstein and Avi Weiss, Taub Center | Data: CBS

Appendix Table 2. Average gross hourly wage, by educational attainment, ethnicity, and sector

NIS

	Jews			Non-Jews
	Ashkenazim	Parents native-born or born abroad	Mizrahim	
Primary or middle school	40.0 (27.0) [185, 4.9%]	46.8 (38.2) [663, 5.7%]	41.3 (45.4) [324, 11.6%]	36.9 (69.7) [777, 19.8%]
High school without bagrut	42.0 (28.7) [395, 10.5%]	47.4 (33.9) [2,045, 17.6%]	48.3 (43.3) [536, 19.2%]	36.4 (19.4) [735, 18.7%]
Bagrut certificate	46.3 (33.7) [686, 18.3%]	41.5 (54.6) [3,327, 28.6%]	49.7 (92.6) [618, 22.1%]	36.3 (21.9) [956, 24.4%]
Non-academic certificate	52.8 (41.0) [602, 16.0%]	61.6 (36.0) [1,085, 9.3%]	67.1 (47.0) [310, 11.1%]	44.8 (25.2) [471, 12.0%]
BA	76.3 (67.6) [953, 25.4%]	80.8 (57.3) [2,746, 23.6%]	89.7 (80.4) [576, 20.6%]	57.9 (30.8) [643, 16.4%]
MA	95.2 (106.1) [749, 20.0%]	106.2 (58.8) [1,357, 11.7%]	124.6 (89.3) [315, 11.3%]	82.3 (70.5) [295, 7.5%]
PhD	159.6 (247.9) [98, 2.6%]	139.3 (83.5) [139, 1.2%]	169.6 (115.3) [54, 1.9%]	136.6 (135.4) [27, 0.7%]
Other diploma	60.4 (36.9) [83, 2.2%]	61.9 (47.0) [282, 2.4%]	61.6 (36.0) [63, 2.3%]	41.0 (25.1) [21, 0.5%]

Appendix Table 2 (continued). Average gross hourly wage, by educational attainment, ethnicity, and sector

NIS

	Jews			Non-Jews
	Ashkenazim	Parents native-born or born abroad	Mizrahim	
Total	67.2 (79.0) [3,751, 100.0%]	63.2 (55.9) [11,644, 100.0%]	69.7 (78.3) [2,796, 100.0%]	45.2 (46.0) [3,925, 100.0%]

Note: Each cell in the second row contains the average value for the group, with the standard deviation in parentheses below it, and below that the number of observations in the sample (as number and as percentage of the group) in brackets.

Source: Michael Debowy, Gil Epstein and Avi Weiss, Taub Center | Data: CBS

Appendix Table 3. Results of weighted least squares model, percentage of academic degree holders by occupation and economic sector

Dependent variable: Natural logarithm of average hourly wage

Percent with a higher degree in the occupation	1.146*** (0.111)
Intercept	3.572*** (0.046)
R ²	0.577
Number of observations	126

Note: Standard deviation in parentheses.

Significance level: ***p < 0.01.

Source: Michael Debowy, Gil Epstein, and Avi Weiss, Taub Center | Data: CBS

Appendix Table 4. Results of the multi-factor analysis, probability of working

	(1)	(2)	(3)
High school (without a bagrut certificate)	0.4550*** (0.02690)	0.4684*** (0.03798)	0.5605*** (0.03804)
Bagrut certificate	0.6141*** (0.02636)	0.6255*** (0.03754)	0.7911*** (0.03716)
Non-academic certificate	0.6946*** (0.03354)	0.6786*** (0.05234)	0.7719*** (0.04559)
BA	0.7791*** (0.03020)	0.8573*** (0.06360)	0.8971*** (0.04095)
MA	0.8414*** (0.03878)	0.8748*** (0.07870)	0.9169*** (0.04902)
PhD	0.9235*** (0.09913)	0.9222*** (0.14822)	0.9976*** (0.11932)
Other diploma	0.8801*** (0.06974)	0.5061*** (0.09949)	0.9733*** (0.08037)
Potential experience	0.0826*** (0.00226)	0.0956*** (0.00351)	0.0993*** (0.00389)
Potential experience squared	-0.0019*** (0.00005)	-0.0021*** (0.00007)	-0.0022*** (0.00008)
Potential experience X Academic degree		0.0129* (0.00565)	
Potential experience squared X Academic degree		-0.0007*** (0.00012)	
Potential experience X Female		-0.0229*** (0.00447)	-0.0191*** (0.00438)
Potential experience squared X Female		0.0005*** (0.00009)	0.0004*** (0.00009)
Potential experience X Ashkenazi			0.00917 (0.00480)
Potential experience squared X Ashkenazi			-0.00034** (0.00011)
Potential experience X Mizrahi			-0.00340 (0.00661)
Potential experience squared X Mizrahi			0.00005 (0.00013)
Potential experience X Non-Jew			-0.02197*** (0.00470)
Potential experience squared X Non-Jew			0.00026 (0.00011)

Appendix Table 4 (continued). Results of the multi-factor analysis, probability of working

	(1)	(2)	(3)
Female	-0.0931*** (0.02445)	0.5963*** (0.13301)	0.0084 (0.03148)
High school without bagrut X Female		-0.6693*** (0.13534)	-0.66522*** (0.13154)
Bagrut certificate X Female		-0.6510*** (0.13491)	-0.62107*** (0.13081)
Non-academic certificate X Female		-0.6076*** (0.13404)	-0.58932*** (0.13737)
BA X Female		-0.6080*** (0.14083)	-0.46249*** (0.13337)
MA X Female		-0.4622*** (0.13693)	-0.29555* (0.14085)
PhD X Female		-0.3351* (0.14546)	-0.25322 (0.21844)
Ashkenazi	-0.1203*** (0.02620)	-0.0766** (0.02680)	0.50411*** (0.08438)
High school without bagrut X Ashkenazi			0.15972 (0.09974)
Bagrut certificate X Ashkenazi			0.13790 (0.09222)
Non-academic certificate X Ashkenazi			0.19456 (0.09980)
BA X Ashkenazi			0.20664* (0.09489)
MA X Ashkenazi			0.12153 (0.10270)
PhD X Ashkenazi			0.31569 (0.19748)
Other diploma X Ashkenazi			0.04327 (0.17928)
Mizrahi	0.0146 (0.02751)	0.0386 (0.02747)	0.4878*** (0.07714)
High school without bagrut X Mizrahi			0.25169** (0.08062)
Bagrut certificate X Mizrahi			0.37500*** (0.08046)
Non-academic certificate X Mizrahi			0.39192*** (0.10431)
BA X Mizrahi			0.16198 (0.09022)

Appendix Table 4 (continued). Results of the multi-factor analysis, probability of working

	(1)	(2)	(3)
MA X Mizrahi			0.15896 (0.11420)
PhD X Mizrahi			0.48898* (0.24056)
Other diploma X Mizrahi			0.15526 (0.17220)
Non-Jew	-0.6186*** (0.02754)	-0.6001*** (0.02782)	-0.1450** (0.05562)
Sector "Other"	0.4541*** (0.05138)	0.4678*** (0.05229)	0.4792*** (0.05280)
High school without bagrut X Non-Jew			-0.18202** (0.06197)
Bagrut certificate X Non-Jew			0.34337*** (0.05284)
Non-academic certificate X Non-Jew			0.31544*** (0.05007)
BA X Non-Jew			0.62314*** (0.06935)
MA X Non-Jew			0.66816*** (0.06464)
PhD X Non-Jew			0.72544*** (0.09563)
Other diploma X Non-Jew			0.51313 (0.27740)
Number of children under age 10 in the household	-0.0457*** (0.00635)	-0.0459*** (0.00651)	-0.0440*** (0.00647)
Value of home owned (NIS million)	-0.0099*** (0.00068)	-0.0004** (0.00003)	-0.0021* (0.00069)
Intercept	-0.3237*** (0.04197)	-0.4237*** (0.04581)	-0.5927*** (0.04696)
Additional variables: occupation, industry sector, residential district, family status, level of religious observance, survey year	Yes	Yes	Yes
Number of observations	31,820	31,820	31,820
Working individuals out of total	22,103	22,103	22,103

Significance level: *p < 0.10; **p < 0.05; ***p < 0.01.

Source: Michael Debowy, Gil Epstein, and Avi Weiss, Taub Center | Data: CBS

Appendix Table 5. Results of the multi-factor analysis, wage equation

	(1)	(2)	(3)
High school without bagrut	0.1195*** (0.01704)	0.1528*** (0.02080)	0.0569* (0.02597)
Bagrut certificate	0.1275*** (0.01889)	0.1540*** (0.02262)	0.0558* (0.02835)
Non-academic certificate	0.2623*** (0.01928)	0.2913*** (0.02340)	0.1766*** (0.02803)
BA	0.4458*** (0.02003)	0.4594*** (0.03340)	0.3709*** (0.02853)
MA	0.6100*** (0.02250)	0.6254*** (0.03718)	0.5127*** (0.03024)
PhD	0.8955*** (0.04171)	0.9148*** (0.06055)	0.7607*** (0.05125)
Other diploma	0.3156*** (0.03302)	0.3158*** (0.05232)	0.2616*** (0.03945)
Potential experience	0.0435*** (0.00156)	0.0414*** (0.00212)	0.0524*** (0.00233)
Potential experience squared	-0.0007*** (0.00003)	-0.0007*** (0.00004)	-0.0009*** (0.00005)
Potential experience X Academic degree		0.0063* (0.00254)	
Potential experience squared X Academic degree		-0.0003*** (0.00006)	
Potential experience X Female		-0.0011 (0.00224)	-0.0030 (0.00225)
Potential experience squared X Female		0.0000 (0.00005)	0.0001 (0.00005)
Potential experience X Ashkenazi			0.00413 (0.00234)
Potential experience squared X Ashkenazi			-0.0004* (0.00005)
Potential experience X Mizrahi			-0.0092** (0.00315)
Potential experience squared X Mizrahi			0.0003*** (0.00006)
Potential experience X Non-Jew			-0.0323*** (0.00256)
Potential experience squared X Non-Jew			0.0005*** (0.00006)
Female	-0.1264*** (0.01481)	-0.1064 (0.06097)	-0.0933*** (0.02183)

Appendix Table 5 (continued). Results of the multi-factor analysis, wage equation

	(1)	(2)	(3)
High school without bagrut X Female		-0.0547 (0.05980)	0.11193 (0.07785)
Bagrut certificate X Female		-0.0295 (0.05992)	0.00363 (0.07385)
Non-academic certificate X Female		-0.0516 (0.06041)	0.03638 (0.07366)
BA X Female		-0.0020 (0.05907)	0.05428 (0.07524)
MA X Female		0.0058 (0.06119)	0.07224 (0.07340)
PhD X Female		-0.0035 (0.09138)	0.04795 (0.07498)
Other diploma X Female		0.0504 (0.06261)	0.04483 (0.10308)
Ashkenazi		-0.0919*** (0.01133)	-0.0815*** (0.01127)
High school without bagrut X Ashkenazi			-0.00601 (0.06253)
Bagrut certificate X Ashkenazi			0.14695* (0.05974)
Non-academic certificate X Ashkenazi			-0.08118 (0.06074)
BA X Ashkenazi			-0.02199 (0.05986)
MA X Ashkenazi			-0.13457** (0.06091)
PhD X Ashkenazi			-0.02801 (0.10757)
Other diploma X Ashkenazi			0.16442 (0.09733)
Mizrahi	0.0208 (0.01230)	0.0246* (0.01223)	-0.0158 (0.04893)
High school without bagrut X Mizrahi			0.00523 (0.05219)
Bagrut certificate X Mizrahi			0.13016* (0.05417)
Non-academic certificate X Mizrahi			0.11911* (0.05751)

Appendix Table 5 (continued). Results of the multi-factor analysis, wage equation

	(1)	(2)	(3)
BA X Mizrahi			0.11522 (0.05903)
MA X Mizrahi			0.09082 (0.06204)
PhD X Mizrahi			0.21652* (0.10999)
Other diploma X Mizrahi			0.07557 (0.09165)
Non-Jew	-0.1131*** (0.01695)	-0.0912*** (0.01666)	0.2043*** (0.03804)
Sector "Other"	-0.0689** (0.02542)	-0.0814** (0.02498)	-0.0120 (0.02511)
High school without bagrut X Non-Jew			0.02598 (0.04533)
Bagrut certificate X Non-Jew			0.05419 (0.04736)
Non-academic certificate X Non-Jew			-0.02581 (0.05396)
BA X Non-Jew			-0.07840 (0.04787)
MA X Non-Jew			-0.11684 (0.06032)
PhD X Non-Jew			0.01750 (0.13632)
Other diploma X Non-Jew			-0.28652 (0.18773)
Intercept	3.3645*** (0.06120)	3.3680*** (0.06363)	3.3444*** (0.06735)
Additional variables: occupation, industry sector, residential district, family status, level of religious observance, survey year	Yes	Yes	Yes
Additional variables: adjusted probability of working	Yes	Yes	Yes
ρ^s	0.3931*** (0.05465)	0.2931*** (0.05200)	0.3203*** (0.06664)
σ^s	-0.5733*** (0.01002)	-0.5876*** (0.00880)	-0.5898*** (0.01039)

Appendix Table 5 (continued). Results of the multi-factor analysis, wage equation

	(1)	(2)	(3)
χ	14,515.47	14,806.09	14,660.09
(p-value)	0.00000	0.00000	0.00000
Number of observations	22, 103	22,103	22,103

Significance level: *p < 0.10; **p < 0.05; ***p < 0.01.

§ The statistics displayed are a Fisher transformation of ρ , the correlation between the residuals of the first and second stages of the estimation, and the natural logarithm of σ , the standard deviation of the second-stage residuals. The product of these two is the coefficient of the “non-selection hazard” in the second-stage (commonly interpreted as the effect of the choice to work on the wage).

Source: Michael Debowy, Gil Epstein, and Avi Weiss, Taub Center | Data: CBS