Israel Economic Review Vol. 21, No. 2 (2023),1-56

THE EFFECT OF VOCATIONAL EDUCATION ON SHORT- AND LONG-TERM OUTCOMES

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Abstract

This study examines the effect of vocational education on the short- and long-term outcomes of students who attended the Arab education system in Israel during the 1990s. To avoid possible biases resulting from the selection of students for vocational education, the study exploits a reform that was implemented in the Arab education system. The reform led to the opening of new vocational tracks in localities that either did not have vocational studies beforehand or had such studies but only on a small scale (treatment localities). These localities are compared with similar localities in which no new tracks were opened (comparison localities).

Difference-in-differences estimates show a 4–5 percentage point decrease in the probability of dropping out of high school after the new tracks opened, which is about 35 (15) percent of the average dropout rate for girls (boys). The proportion of students taking matriculation exams increase but there was no effect on matriculation eligibility rate. Most of the beneficial effects of the vocational tracks become evident two years after the tracks open.

Opening the vocational tracks had no significant long-term effect on the likelihood of the students acquiring a tertiary academic education, on being employed, or on their earnings in adulthood. There was a significant increase in the number of women entering clerical occupations, consistent with the popularity of the new clerical tracks. There has also been a significant decrease in the proportion of girls marrying at a young age, probably due to the increase in the probability of their completing high school.

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We thank Benny Bental, editor of the Economic Quarterly, and two anonymous reviewers for their helpful comments.

We thank David Gordon, Hadas Yaffe, Anat Katz-Avraham, Adnan Mansur, and Orly Furman of the Central Bureau of Statistics for preparing the data and making it available for the Research Room. We would also like to thank Adi Brender, the participants of the Bank of Israel Research Department seminar and Shafia Al-Jamal from the Ministry of Education for their helpful suggestions.

The research was funded by the Sapir Forum for Economic Policy in memory of Pinhas Sapir. The paper is based on an MA thesis by Elad Demalach under the supervision of Dr. Analia Schlosser from the Eitan Berglas School of Economics at Tel Aviv University, published as Demalach and Zussman (2017) and available at http://www.boi.org.il/he/Research/DocLib/dp201711h.pdf.

1. INTRODUCTION

The optimal composition of vocational and general education is of great importance to policymakers because of its long-term impact on human capital, labor skills, welfare, and economic growth. Various countries around the world have education systems that differ in many ways, such as the level of separation between general and vocational education, the curriculum, and the age of tracking. In 2016, the share of high school students in vocational tracks was 40 percent in Israel and 44 percent in the OECD (OECD, 2018).

There is a longstanding controversy in the public arena as well as in the scientific community about the pros and cons of implementing a comprehensive vocational education system alongside a general one. Proponents of vocational education argue that it increases interest in studying among students whose skills are less academic, thereby reducing their chances of dropping out of school. Opponents of vocational education, however, claim that the skills acquired in vocational education are too specific and therefore incompatible with a modern labor market that is undergoing rapid technological change. Another argument raised by the opponents is that early vocational education tracking can significantly reduce the social mobility of students, many of whom come from weak socioeconomic backgrounds. However, the literature on the impact of vocational education on various outcomes (e.g., school dropout, academic achievement, higher education, employment, and wages) is mixed.

The main challenge facing studies of vocational education is the selection bias. Students are not randomly assigned to vocational or general education, but rather according to their preferences or to an external tracking system. These factors may be highly influenced by students' personal characteristics, which may also affect outcomes independently.

To address the selection bias, this study exploits a natural experiment: a broad opening of new vocational tracks in high schools in Arab localities in Israel. Most of these localities had either never offered vocational tracks before or offered it only on a very small scale ("treatment localities"). The reform was part of a five-year plan by the Ministry of Education to increase the availability of vocational studies in the Arab sector. The opening of the tracks took place in several Arab localities, while no vocational tracks were opened in other localities ("comparison localities").

The study uses the difference-in-differences methodology (DID): the change in outcomes of students who studied before and after the opening of the new vocational tracks in the treatment localities is examined and compared to such change in the comparison localities, while controlling for students' background characteristics, cohort, and place of residence. The identification assumption is that without the opening of the new vocational tracks, changes in student outcomes in the treatment localities during the study period would have been the same as changes in student outcomes in the comparison localities.

The data set is based on Ministry of Education's student files, which contain data on high school students, including track, from 1991 to 1998. The student files were merged with Ministry of Education's matriculation exam files, which contain information on students' high school graduation records and whether they were eligible for a matriculation certificate.

Student files were also merged with the Central Bureau of Statistics' data on salaried individuals, which provide information on students' subsequent employment and salary, and with the 2008 Census, which provides information on students' academic degrees, occupations, and demographics (such as age at marriage and number of children) in their adult lives.

The results show that the opening of vocational tracks in Arab high schools in the 1990s reduced the likelihood of dropping out of school between the tenth and twelfth grades by about 4–5 percentage points, equivalent to about 35 percent of the average dropout rate for girls during the study period and about 15 percent for boys.[1] There was also an increase in the proportion of students who took the matriculation exam but not in the matriculation eligibility rate, and some of the estimates even show a decrease in the proportion of boys who were eligible for matriculation certificate. The beneficial effects of the vocational tracks are evident from the second year after they opened, apparently due to the gradual adjustment period and lessons learned by the education system in the treatment localities.

No significant change was found in the acquisition of higher education, employment, or wage rates in adulthood for either boys or girls. For boys, on the other hand, the coefficients on the effects on employment and wage rates were always negative and sometimes not far from statistically significant. There was also a substantial increase in the proportion of women employed in clerical occupations, which is consistent with the popularity of the new tracks in bookkeeping and secretarial studies. The opening of vocational tracks also increased the marriage age of women by about half a year, probably due to the decrease in the school dropout rate.

This study contributes to the research literature in several ways. First, while the identification of vocational studies effects in similar studies around the world is based on differences in the availability of vocational education across localities, the current study is based on differences among students residing in the same locality and compares the periods before and after the opening of vocational tracks as a result of a nationwide reform. In addition, specific estimations also examine differences between siblings. In this way, the current study accounts for potential biases due to differences in unobserved variables among residents of localities with high/low availability of vocational studies and students. Second, the study explores the effect of vocational education not only on standard outcome variables such as higher education, employment, and wages, but also on outcome variables that have received little attention in the literature, such as dropout rates, age at marriage, number of children, and occupation. Third, this is one of the few studies in Israel that uses the DID method to examine student performance in vocational tracks and accounts for possible selection bias. Finally, this is the first study to conduct a causal exploration of the short- and

[1] The dropout rate before tenth-grade cannot be directly observed, but the estimations show that the number of tenth graders in the cohort did not change after the opening of the new tracks.

long-term effects of the expansion of vocational studies in the Arab sector in Israel, a process that was initiated in the 1990s and continues to this days.

The paper is organized as follows. Section 2 provides some background on the relative advantages and disadvantages of vocational education and includes a review of the literature. Section 3 describes the data, identification strategy, and sample. Section 4 explains the empirical methodology. Section 5 presents the results. Section 6 discusses possible biases and conducts several robustness tests, and Section 7 concludes.

2. THEORETICAL BACKGROUND AND LITERATURE REVIEW

The contribution of vocational education versus general education for secondary school students is a controversial topic in both the education policy debate and the research literature. Proponents of vocational education argue that it can be of great benefit to students with lower academic skills because it allows them to enter occupations that are in high demand in the labor market. In addition, vocational education can reduce school dropout rates and their negative effects (e.g., Kulik, 1998). In the Israeli context, vocational education provides a skilled labor for the military and compensates for the shortage of skilled manual labor in the Israeli economy, which may hinder growth (Nathanson et al., 2010; Goldstein, 2013).

Opponents of vocational education argue that general education is more valuable for overall human capital because it provides basic skills in a wide range of fields. Unlike vocational education, which focuses on more occupation-specific skills, general education helps individuals engage in a broad range of occupations in the labor market and to cope with rapid technological change (Krueger and Kumar, 2004). Moreover, to be effective, vocational education must predict the future needs of the labor market, which by itself is a complicated task. Moreover, in Israel, due to compulsory military service, a relatively long period elapses between graduation from high school and entry into the labor market.

Another criticism of vocational education is that students from weak socioeconomic backgrounds are integrated into vocational education at an early stage in their lives. This can harm their chances of later moving on to more general studies and acquiring academic education. As a result, tracking may reduce social mobility and increase economic inequality (Brunello and Checchi, 2007; Swirski and Dagan-Buzaglo, 2009).[2]

The effects of vocational education on the outcome variables of its graduates have been examined in numerous studies around the world, with mixed results. In Israel, Shavit (1984) and Tsur and Zussman (2010) found a negative effect of vocational education on a number of outcome variables (earning an academic degree, employment, and salary), while Neumann and Ziderman (1991, 1999) found that vocational education improved the employment status of some of their graduates who did not earn an academic degree.

[2] For a detailed literature review, see Demalach and Zussman (2017).

A common issue in the vocational education literature is how to deal with selection bias. The selection of a track is influenced not only by factors that the researcher observes, such as student place of residence and family background, but also by numerous additional unobserved factors, such as cognitive ability. These factors may affect the outcome variables, so that a comparison of the outcome variables of students in vocational and academic tracks that ignores selection may be biased.

To address the selection bias, many recent studies use quasi-experimental methods that exploit random or pseudorandom variation in the type of education the student receives. An example of such variation is an increase in the academic content of the vocational curriculum due to educational reform (Oosterbeek and Webbink, 2006; Hall, 2012) or the addition of years of general education at the expense of vocational years due to a reform that postpones the age of tracking (Meghir and Palme, 2005; Malamud and Pop-Eleches, 2010).

Another possible identification method is to use a regression discontinuity (RD) design based on a grade point cutoff that determines whether a student is admitted to the academic track (Tsur and Zussman, 2010; Sauermann and Stenberg, 2016) or a discontinuity in the age of school entry[3] (Dustmann et al., 2017). An additional method to address selection bias in tracking is to use geographic availability of vocational schools as an instrumental variable (Chen, 2009; Torun and Tumen, 2017). The current study also relies on variance in geographic availability and incorporates a methodological improvement that supports more reliable identification of vocational education effects.

First, previous studies used cross-sectional comparisons that directly compared student outcome variables in localities with high and low vocational education availability. This method is problematic because variance in the availability of vocational education may be correlated with unobserved variables of residents of the localities, which in turn may affect student outcome variables. In contrast, in our study, we compare differences in student outcomes over time in each locality, comparing students in the treatment and comparison groups (before and after the vocational tracks opened), thus taking into account potential locality fixed effects.

Second, unlike other studies, the current study is based on a reform in vocational education, as a result of which the opening of vocational tracks in a locality was not correlated with differences that occurred over time in treatment localities or with past trends (although the localities in which vocational tracks were opened were not randomly selected). This allows for a more compelling identification of the causal effects of opening vocational tracks in a locality using the DID method.

[3] Discontinuity in the age of entry into first grade is due to the child's date of birth. Children born after the cutoff date do not enter first grade until the next year and reach relatively high achievements in lower grades. As a result, their chances of entering academic tracks are higher, especially in countries like Germany in which tracking into academic and vocational tracks is performed at a young age.

The results of studies from around the world, as noted earlier, are mixed and depend on time and place. Most studies that used a natural experiment and effectively addressed possible selection biases in high school track found no statistically significant differences in the returns to academic and vocational education in terms of employment and wages of their graduates. One possible explanation is that these studies examine the marginal effect of the track on outcome variables: The effect is examined for students who were on the borderline of being accepted to an academic track (e.g., based on regression discontinuity), or for cases in which a marginal change was implemented in vocational education curricula or program duration (e.g., a slight deferral of the age at which tracking occurs).

3. DATA AND IDENTIFICATION STRATEGY

3.1 Data

The study links several datasets containing information on Israeli students, schools,[4] matriculation examinations, earnings, as well as data from the 2008 Census. The administrative files on upper secondary school students for the years 1991–98 contain information on the school, grade level, educational track (vocational/general) and curriculum. Finally, they contain information about schools' locality and type of school (general/vocational /comprehensive).

Three additional data sets were used to examine student outcomes. The first contains the test scores of matriculation exams (Bagrut) for the period 1992–98. The second dataset is the files of employees and self-employed for the years 1995–2014, which contain information on earnings and the number of months of employment for each employee. The third dataset

[4] Education in high schools, formerly under the supervision of the Ministry of Industry, Trade and Labor, can be interchangeable with vocational education in high schools under the Ministry of Education. Unfortunately, administrative records of students in Ministry of Industry schools prior to the 1998/99 school year (the end of the study period) are not available. Therefore, estimations of outcome variables may be biased. This is particularly true for dropout rates, which in this study are based solely on Ministry of Education records. Nonetheless, the bias is unlikely to be significant due to the following factors (figures are from Statistical Abstract of Israel 2003, Tables 8.16 and 8.17): (a) In the 1998/99 school year, Arab students in Ministry of Industry schools made only 7.5 percent of all Arab students in Israel; (b) Later, we find that the new vocational tracks had a stronger effect on reducing dropout rates among girls, and during this period, female Arab students in Ministry of Industry schools accounted for only 1 percent of all female Arab students in high-school students; (c) We measure dropout rates between the tenth and twelfth grades, while most students begin their education in the Ministry of Industry schools in the tenth-grade; (d) The interchangeability of school types should have affected dropout rates between the ninth and tenth grades in the Ministry of Education schools, but there is no evidence of this (Table 12 and Figure 8 below).

is the 2008 Census, which contains a wide range of student socioeconomic and demographic outcomes, including education, employment, occupation, income, marital status, and fertility.

The research population consists of approximately 21,000 tenth-grade students in 1989–1998.[5] Matriculation data are available for all students except those who were in tenth-grade in 1989. Therefore, it is possible to estimate the effect of vocational education on the matriculation outcomes of approximately 20,000 students. Data on students who dropped out of secondary school are only available for the cohorts who attended tenth-grade in 1991–97, i.e. about 16,000 students.[6] Data on all students who attended tenth through twelfth grades in 1991–98 are linked to data on individuals sampled in the 2008 Census. All students who appear in the census, as well as a random sample of half of the students who do not appear in the census, are linked to the 1995–2014 data on employees and the 1999–2014 data on the self-employed. Therefore, the effect of vocational education on labor market outcomes is estimated for approximately 12,000 students.

3.2 Identification Strategy: Opening of New Vocational Tracks as Part of an Education Reform

The scope of vocational education in the Arab sector has changed beyond recognition in recent decades. Until the early 1990s, less than 20 percent of Arab students received vocational education, whereas in 2015, this figure was almost 50 percent (Figure 1).[7] In the past, vocational education was not an important part of the Arab education system, mainly because there was a lack of resources and qualified manpower for teaching and supervision. In the mid-1980s, efforts to expand vocational education in the Arab sector began to increase. The Second Arab Education Conference, held in May 1984, recommended the expansion of the vocational education system to reduce the high secondary school dropout rate in the sector and encourage talented students to pursue prestigious technological professions. One year

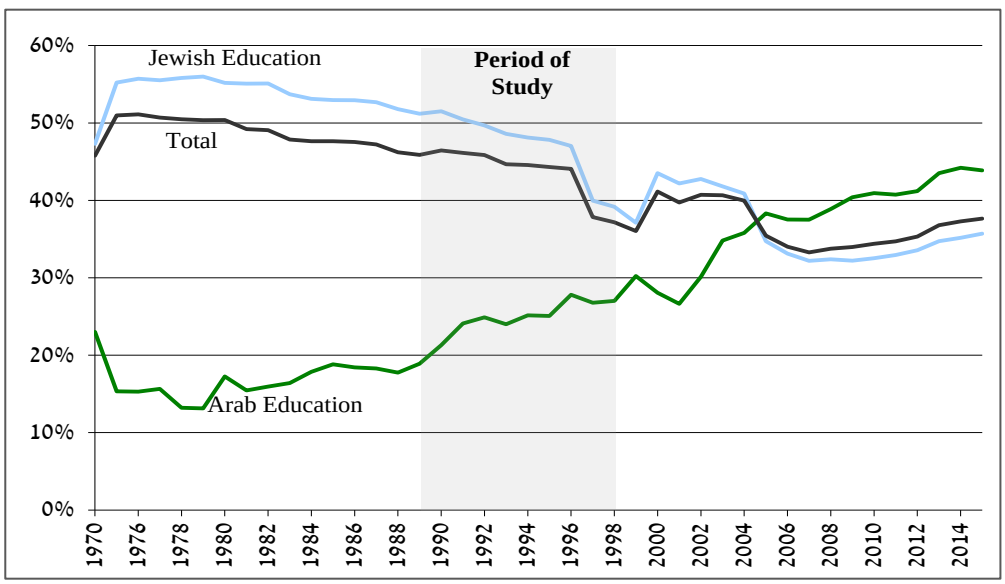
[5] Data on students is only available from 1991 onwards. Therefore, the tenth-grade cohorts in 1989 and 1990 are the students who entered eleventh and twelfth grades in 1991. Since the data on these cohorts do not include students who dropped out of school between tenth and twelfth grades, they are not included in the estimation of the effect of vocational education on the probability of dropping out.

[6] Student file for 1999 is available and enable to observe the dropout rate of students who attended tenth-grade in 1997 till twelfth-grade. However, the 1999 data lack many important characteristics, which is why they are not used further in this study.

[7] In contrast to the growing popularity of vocational education in the Arab sector, the share of Jewish students receiving vocational education has declined from about 55 percent in 1980 to about 36 percent in 2015 (Figure 1). This is partly due to the fact that the proportion of ultra-Orthodox students among all high school students studying in the Jewish education system has increased (from 4 percent in 1980 to 25 percent in 2015). Assuming that all students in ultra-Orthodox schools received a general education, the share of vocational students among non-ultra-Orthodox Jewish students fell from around 57 percent in 1980 to around 44 percent in 2015.

later, the Fund for the Advancement of Technological Education in the Arab Sector was established.

Figure 1
Share of Vocational Education Students by Sector, 1970-2015[1]



Source: Central Bureau of Statistics – Statistical Abstract of Israel (Various Years) and the authors' calculations.

(1) Jewish education includes the secular, Orthodox, and ultra-Orthodox education systems.

The process of expanding the vocational education system in the Arab sector reached its zenith in 1992, when the Ministry of Education began to allocate a substantial budget for the implementation of a five-year plan to promote vocational education in the Arab sector.

The plan was to increase the proportion of Arab students learning in vocational education to 35 percent of all secondary school students in the Arab sector within five years and to develop and establish new vocational tracks in Arab schools (Ministry of Education and Culture, 1992).

One of the main channels for implementing the reform was the extensive opening of new vocational tracks in many localities that previously offered only general tracks (hereafter referred to as "treatment localities"). As shown in Table A3, the first vocational tracks in the treatment localities were opened in different years, but in each locality the various vocational tracks were generally opened in the same year. The opening of the vocational tracks provided students with a convenient opportunity to acquire vocational education without having to bear the cost of attending a school outside the locality. Figure 2 shows the percentage of students enrolled in vocational and general education programs in all localities that

established vocational tracks between 1992 and 1998. The figure shows that the opening of the new tracks led to a significant increase in the proportion of students receiving vocational education.[8] The treated localities are compared to similar localities where there was a school but vocational tracks were not opened during the same period (hereafter: "comparison localities").

The group of localities consists of nine treatment localities where there was no vocational education until the opening of the new tracks and nine comparison localities where there was no vocational education during the entire period of this study (see Table A1 for the list of localities). We focus on these localities because they could be reliably categorized as either treatment or comparison localities.[9] It should be noted that it is not possible to clearly assign many Arab localities to either the treatment or comparison group, e.g. localities that had extensive vocational tracks prior to the study period or localities where vocational tracks was gradually expanded. Therefore, many localities in the Arab sector are not included in the sample.

Figure 3 shows the geographical distribution of the treatment and comparison localities. The study focuses on localities in the north and center of Israel, as many other developments took place in the (Bedouin) Arab localities in the south during the study period, making the estimates for this population less reliable. Most areas in northern and central Israel contain both treatment and comparison localities.

Figure 4 shows that an absolute majority of vocational students in the treatment localities were educated in low-tech tracks and only a minority in high-tech tracks (such as electronics and electricity). Furthermore, while a significant proportion of boys were enrolled in high-tech tracks, very few girls were enrolled in those tracks. Courses in bookkeeping and secretarial studies were the most popular new tracks.

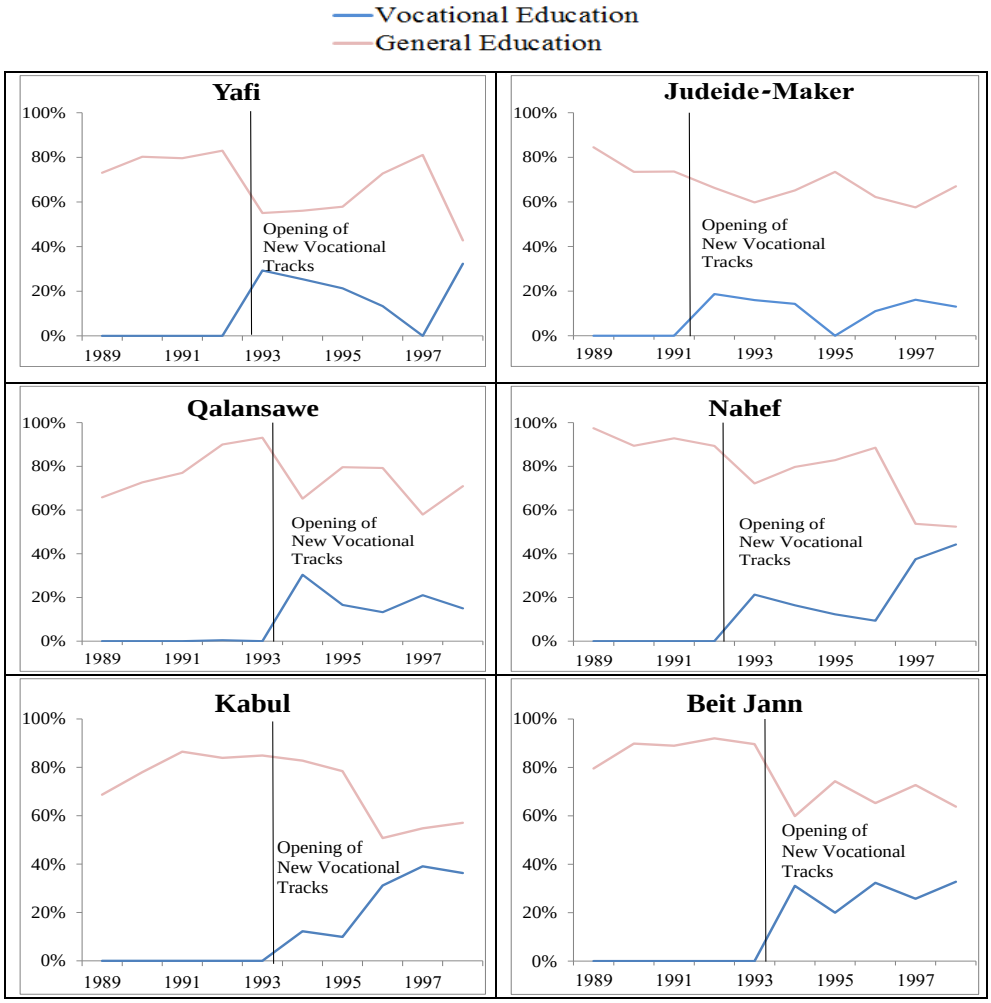
Table 1 shows the background characteristics of tenth-grade students in 1991 who received vocational and general education in the treatment localities in which vocational tracks were opened. The educational level of parents – and especially fathers – was lower among vocational track students. Therefore, it can be assumed that the students who studied in the newly introduced vocational tracks were on average weaker than the students who remained in the general education system in the treatment localities. However, in Section 4.1 we see that despite the differences in the socioeconomic profiles of the residents of the treatment and comparison localities, it is possible to examine the effect of the new vocational tracks because these differences across localities remained stable over time and the outcome

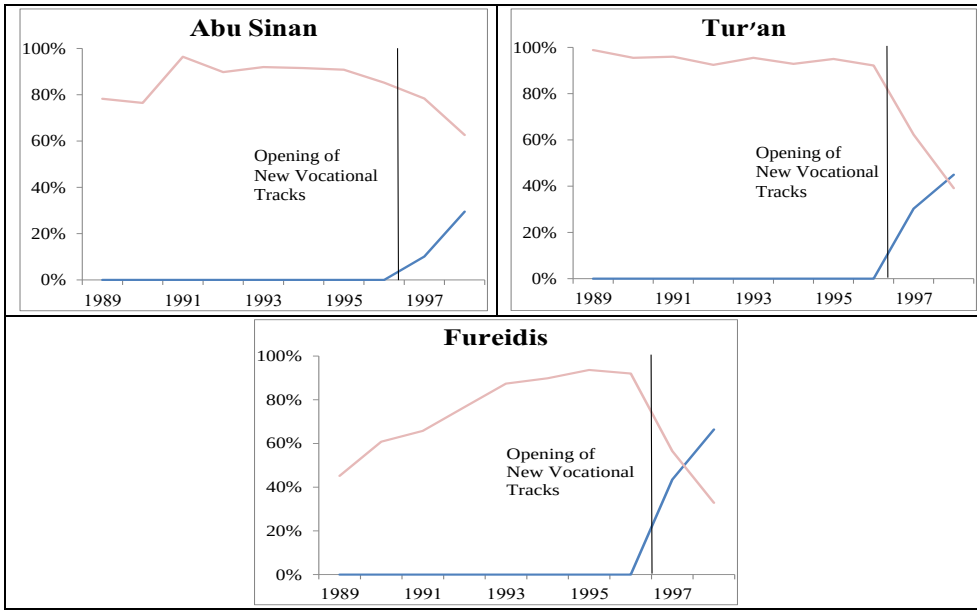
[8] A small proportion of the students studied outside their locality of residence.

[9] We also estimated the effects of the new vocational tracks in an extended group of localities (Demalach and Zussman, 2017). The treatment group included localities in which vocational studies were available to a limited extent prior to the opening of the new vocational tracks, while the comparison group included localities in which vocational education was available during the study period, but the number of students in vocational tracks and the number of vocational tracks changed little over the study period.

variables in the treatment and comparison localities show similar trends in the pre-reform period.

Figure 2
Share of Students in Vocational and General Education in the Treatment Localities





Source: Ministry of Education and the authors' calculations.

Table 1

Sociodemographic Characteristics of Tenth-Grade Students from the Treatment Localities in the General and Vocational Education in 1998[1]

	General Education Students	Vocational Education Students	Difference[2]	t-statistic	p-value
Father's years of education	9.3	8.7	-0.6* (0.3)	-2.11	0.07
Mother's years of education	8.2	7.7	-0.4 (0.2)	-1.76	0.12
Number of siblings	5.0	5.1	0.1 (0.2)	0.70	0.50
Number of students	908	576			

Source: Ministry of Education and the authors' calculations.

*** Significant at the 1% level, ** significant at the 5% level, * significant at the 10% level.

(1) Standard errors in parentheses are clustered at the locality level.

(2) The difference in the table is not necessarily identical to the difference between the reported values of the general and vocational education students because of a rounding of digits.

Figure 3
Geographic Distribution of Treatment and Comparison Localities

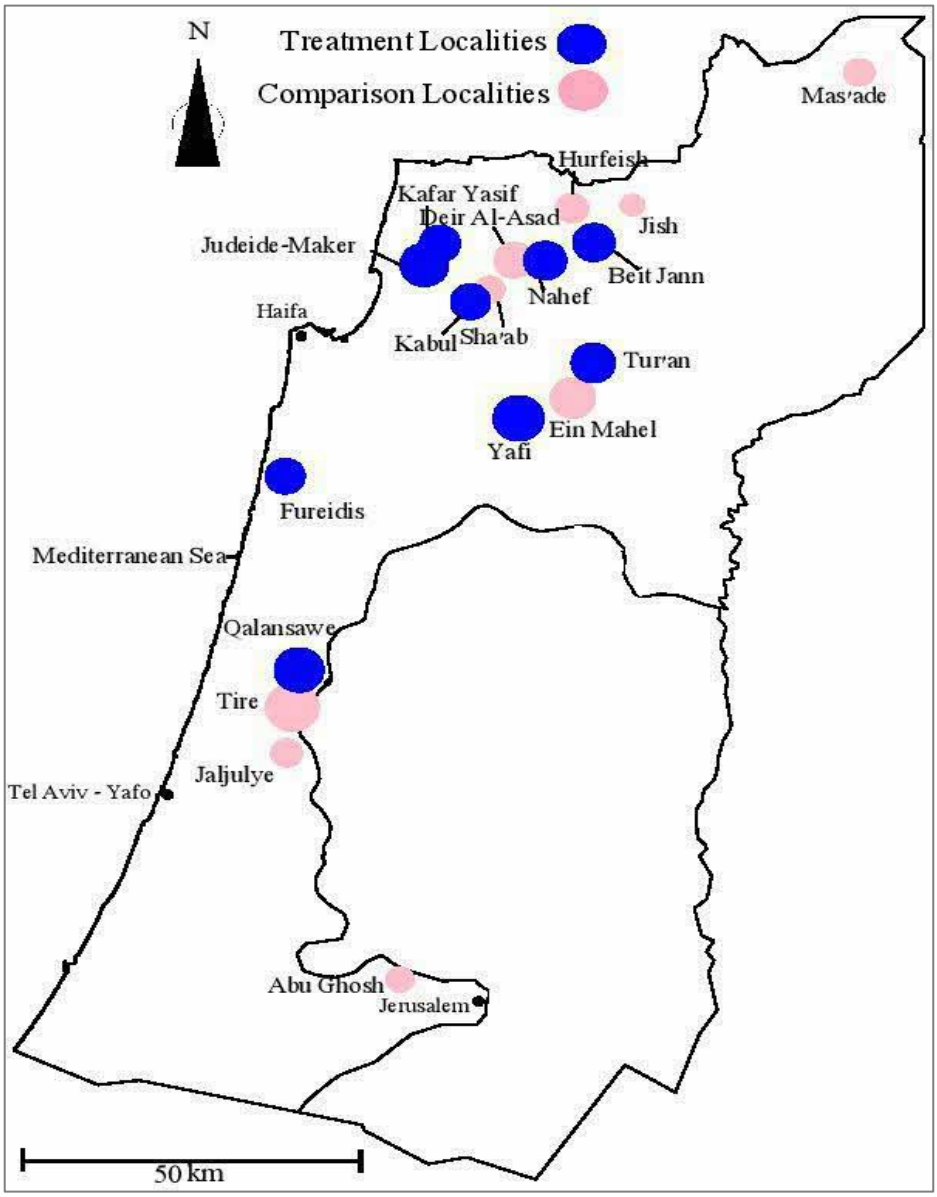
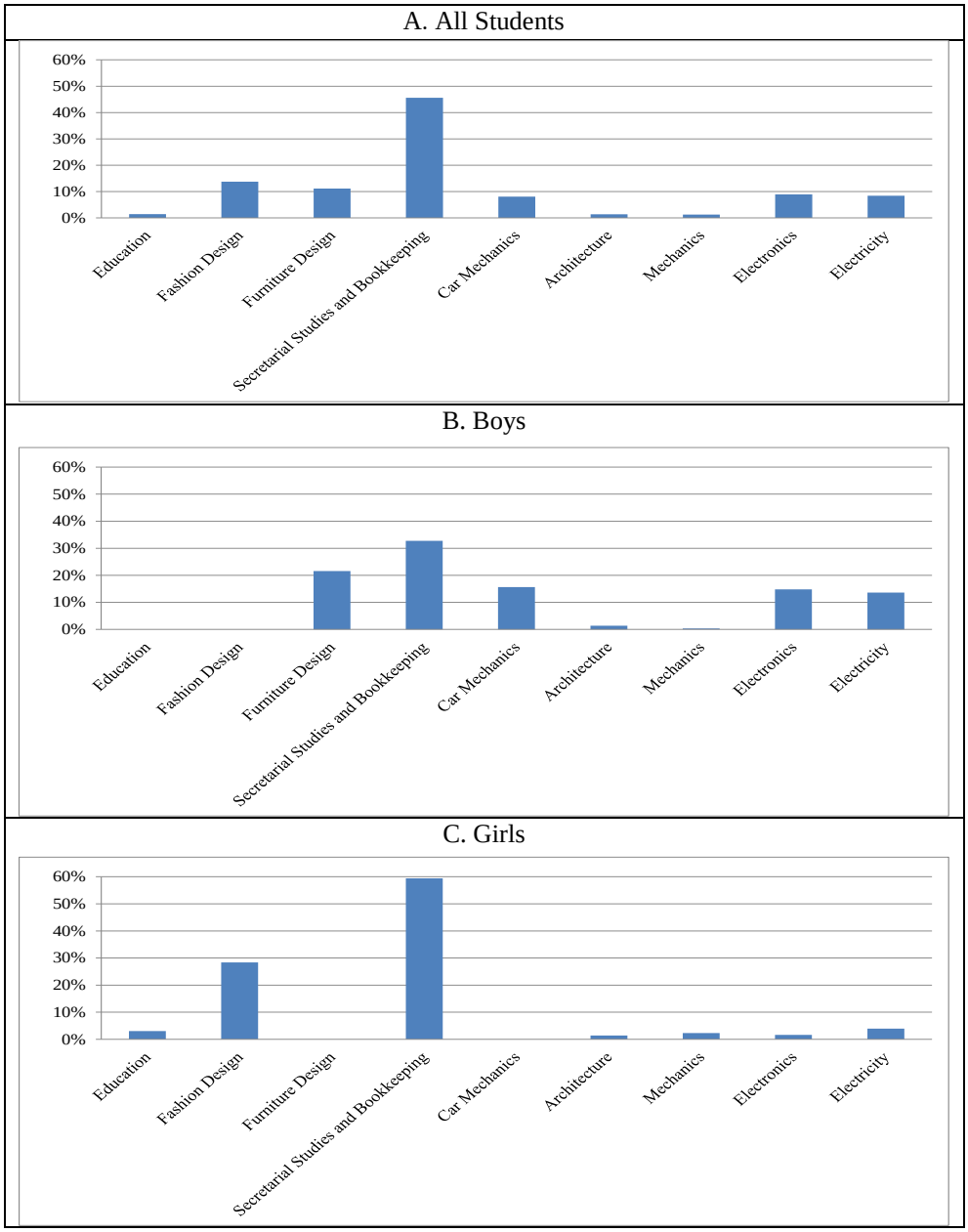


Figure 4
Distribution of Students in Newly Opened Vocational Tracks[1] by Gender



Source: Ministry of Education and the authors' calculations.

(1) Similar tracks were aggregated into a single category. For additional information, see Table A2.

4. RESEARCH POPULATION AND METHODOLOGY

4.1 Research Population

To examine possible differences between the socioeconomic and demographic characteristics of the treatment and comparison localities prior to the opening of the vocational tracks, balance tests were conducted (Table 2). The residents of the treatment localities have a lower socioeconomic index. However, looking at income levels, education, the share of vehicle owners and the share of income support recipients separately, it can be seen that the residents of the treatment localities have weaker characteristics, although not statistically significant. The treatment and comparison groups are balanced in terms of their religious composition.

The observed difference between the treatment and comparison localities suggests that the opening of the vocational tracks was not random, but was correlated with permanent differences in the characteristics of the localities. However, the identification assumption is that, apart from the opening of the vocational tracks, there were no differential changes in the treatment and comparison localities that could have affected the outcomes during the study period (parallel trends assumption). If the differences in the socioeconomic characteristics shown in Table 1 have indeed remained stable during the study period, it is possible to obtain an unbiased estimate of the effect of the opening of vocational tracks on the outcomes (DID methodology).

Figure 5 shows the trends in various socioeconomic characteristics in the treatment and comparison localities during the study period, namely the education of parents and the number of siblings of the tenth graders in the sample. The figure also shows trends in average monthly wage, the share of unemployment benefits recipients, and the share of vehicle ownership among the residents of the localities. The trends are very similar for all characteristics in the treatment and comparison localities, consistent with the assumption that no different changes have occurred in the treatment and comparison localities that would make it difficult to identify the effect of the opening of vocational tracks on the outcomes.

Figure 6 displays common trends in outcomes (in 2014) for cohorts of tenth graders living in the treatment and comparison localities in 1989–1991, before the opening of vocational tracks. Trends in employment rates, number of months employed, and monthly and annual wages are very similar in both treatment and comparison localities.[10]

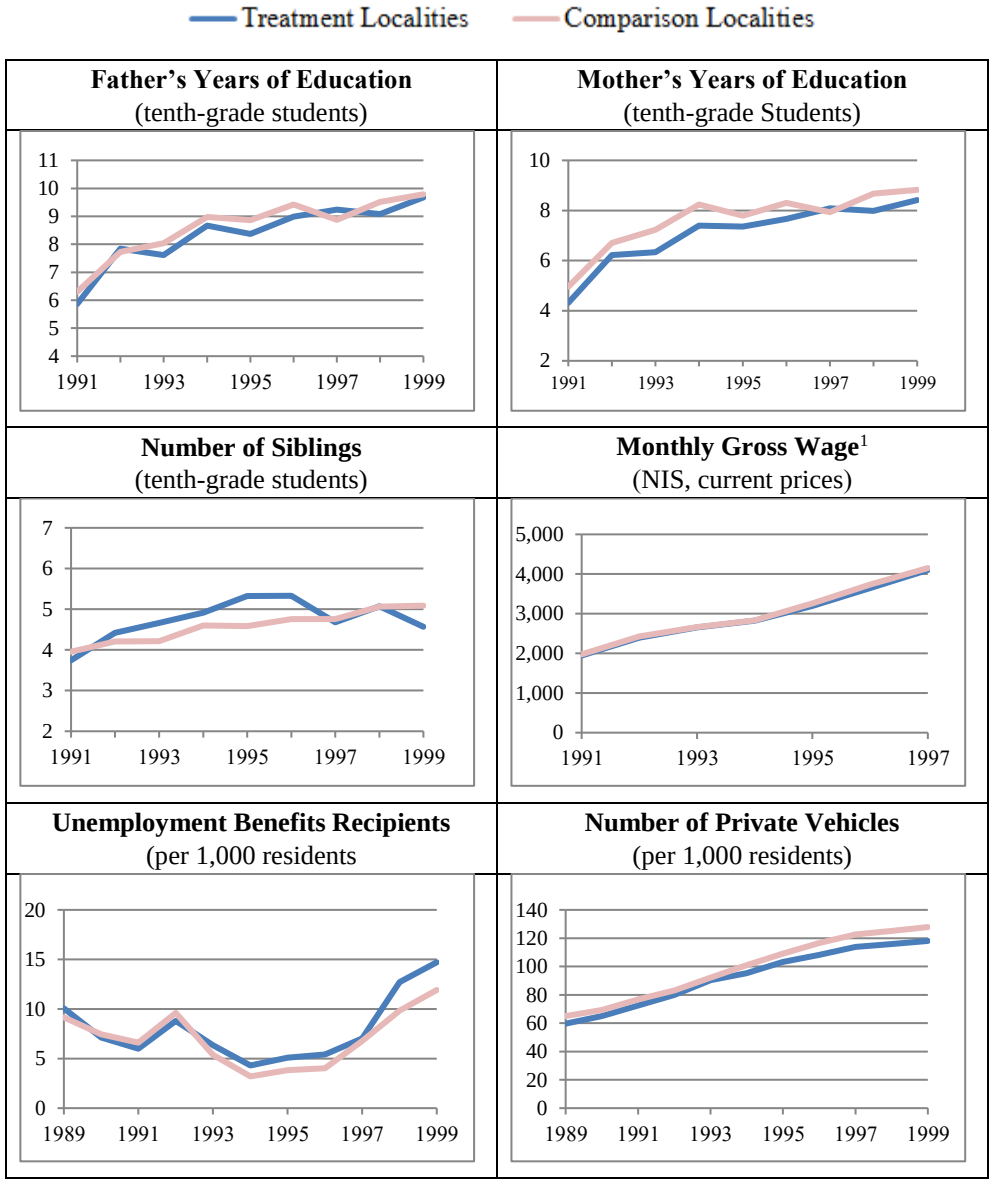
[10] For the definitions of employees and self-employed, see Demalach and Zussman (2017).

Table 2
Demographic and Socioeconomic Characteristics of Treatment and Comparison Localities in 1991[1]

	Treatment Localities	Comparison Localities	Difference[2]	t-statistic	p-value
Socioeconomic index[3]	-0.90	-0.59	-0.31*** (0.10)	-3.11	0.01
Yearly wage (NIS)	1,939	1,998	-59 (81)	-0.73	0.47
Income support recipients (per 1,000 residents)	67.9	62.0	5.9 (8.6)	0.69	0.49
Unemployment benefit recipients (per 1,000 residents)	6.4	6.6	-0.3 (1.8)	-0.18	0.85
Number of vehicles (per 1,000 residents)	73.0	78.4	-5.3 (7.8)	-0.68	0.51
Father's years of education	5.8	6.3	-0.4 (1.0)	-0.45	0.66
Mother's years of education	4.3	4.9	-0.6 (-1.0)	-0.67	0.51
Number of siblings	3.7	3.9	-0.2 (0.6)	-0.38	0.71
Share of Muslims[4]	0.795	0.824	-0.029 (0.145)	-0.20	0.84
Share of Christians[4]	0.085	0.039	0.046 (0.050)	0.92	0.37
Share of Druze[4]	0.119	0.135	-0.017 (0.139)	-0.12	0.90
Number of localities	9	9			
Number of students (1991)	1,305	822			
Total number of students	12,814	8,377			

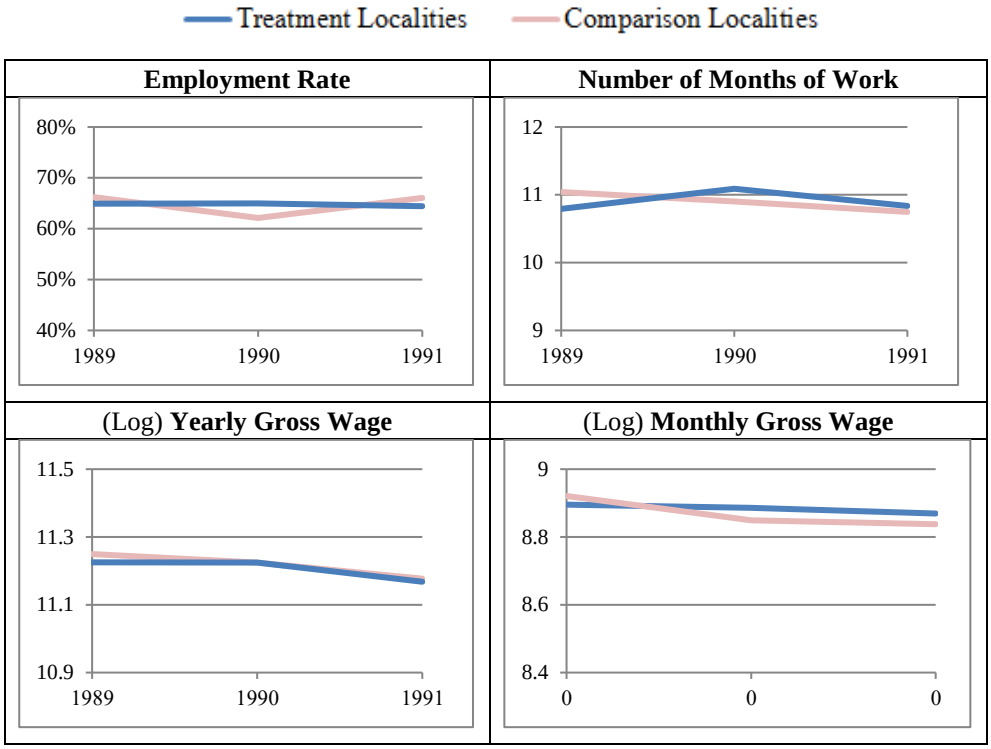
Source: Central Bureau of Statistics, Ministry of Education, and the authors' calculations.
*** Significant at the 1% level ** Significant at the 5% level, * Significant at the 10% level.
(1) Standard errors in parentheses are clustered at the locality level.
(2) The difference in the table is not necessarily identical to the difference between the reported values of the general and vocational education students because of a rounding of digits.
(3) The socioeconomic index according to the 1995 Census, calculated by the Central Bureau of Statistics. The continuous value of the index is its distance from the country's average in units of standard deviations.
(4) As of 1995.

Figure 5
Trends in Characteristics of Treatment and Comparison Localities during the Study Period



Source: Central Bureau of Statistics and the authors' calculations.
(1) CBS data for monthly gross wage (per month of work) is missing for some of the localities in 1998-1999.

Figure 6
Pre-Trends in Outcomes (2014) among Tenth-Grade Students in Treatment and Comparison Localities



Source: Central Bureau of Statistics and the authors' calculations.

It is now possible to conduct an initial analysis of the changes in outcomes following the opening of vocational tracks in the treatment localities. Figure 7 shows the dropout rates (between tenth and twelfth grade) before and after the opening of the vocational tracks in the treatment and comparison localities. For the comparison localities, a fictitious year was defined that is identical to the opening year in a similar treatment locality. The fictitious year was determined using the Nearest Neighbor Matching methodology.[11] The dropout rate decreased significantly in the treatment localities, much more than in the comparison localities (Figure 7A). However, when a similar test was conducted for a long-term outcome, such as student earnings in adulthood, no significant change was found after the opening of the new tracks in the treatment and comparison localities (Figure 7B).

[11] Table 2 reports the demographic and socioeconomic characteristics used to determine the nearest neighbor.

Figure 7
Students' Outcomes in Relation to the Timing of the Opening of the New Vocational Tracks in the Locality[1]

Source: Central Bureau of Statistics, Ministry of Education, and the authors' calculations.

(1) In order to examine the outcomes three years before and three years after the opening of the new vocational tracks, only localities in which new vocational tracks were opened between 1992 and 1995 were included. The comparison localities were matched according to the Nearest Neighbor Matching methodology.

(2) Dropout rate between the tenth and twelfth grades.

4.2 Methodology

The effect of the opening of the new vocational tracks on various student outcomes was estimated using a difference-in-differences reduced-form specification:

$Y_{isc} = \beta_0 + \boldsymbol{\beta_1 Post \times Treatment_{sc}} + \beta_2 X_{isc} + \beta_3 U_{sc} + \delta_s + \lambda_c + \varepsilon_{isc}$		(1)
Y_{isc}	-	Outcome of tenth-grade student *i* in locality *s* in cohort *c*. The outcomes are: Dropping out of secondary school between tenth and twelfth grade, taking the matriculation exams, eligibility for a matriculation certificate, obtaining an academic degree, employment, number of months of work, wage, probability of working in a given occupation, age at marriage, probability of having children, and number of children.
$\boldsymbol{Post \times Treatment_{sc}}$	-	Interaction variable that takes the value 1 if the student studied in the tenth-grade in a locality in which a new vocational track was opened, and 0 otherwise.
X_{isc}	-	Student's background characteristics: father's and mother's years of education, number of siblings, school sector (Arab/Druze).
U_{sc}	-	Number of recipients of unemployment benefits (per 1,000 residents) in the student's locality of residence in the year when the student was in the tenth-grade.
δ_s	-	Locality of residence fixed effect.
λ_c	-	Cohort fixed effect.
ϵ_{isc}	-	Idiosyncratic error.

The β_1 coefficient represents the effect of the opening of vocational tracks in the student's locality on outcomes in the short- and long-term. The estimations are conducted separately for males and females.

Furthermore, the causal effect of acquiring vocational education in comparison to a general education can be estimated in a 2SLS equation, where the opening of new vocational tracks in the locality is an exogenous instrumental variable for the acquisition of vocational education. Due to space limitations, these findings are presented in Demalach and Zussman (2017), and they are similar to the findings reported below.

5. RESULTS[12]

Table 3 shows the estimated effect of opening vocational tracks at the students' locality of residence on their probability of attending a vocational track. The opening of new vocational tracks increases this probability by about 20 percentage points. These results are consistent with Figure 2 above.

Table 3
Effect of Opening Vocational Tracks in the Locality on the Probability of Getting a Vocational Education, by Gender[1]

	Boys (1)	**Girls** (2)	**All** (3)
Post × Treatment	0.218***	0.194***	0.206***
	(0.022)	(0.032)	(0.025)
Student characteristics[2]	V	V	V
School sector	V	V	V
Share of unemp. benefits recipients	V	V	V
Locality fixed effect	V	V	V
Cohort fixed effect	V	V	V
Mean outcome	0.153	0.143	0.145
Number of localities	18	18	18
Number of observations	10,170	11,021	21,191
Adjusted R^2	0.264	0.278	0.263

Source: Central Bureau of Statistics, Ministry of Education, and the authors' calculations.
*** Significant at the 1% level, ** significant at the 5% level, * significant at the 10% level.
Standard errors in parentheses are clustered at the locality level.
(1) Results based on the specification in equation (2) at Demalach and Zussman (2017).
(2) Parents' years of education and number of siblings. Missing values are imputed according to Demalach and Zussman (2017), Appendix 1.

Tables 4–5 present the effect of opening vocational tracks on students' short- and long-term educational outcomes. Table 4 shows a statistically significant decrease of 4 percentage points in boys' dropout probability, which is about 15 percent of the average dropout rate for boys during the study period. There was a statistically significant decrease of 5 percentage points in the rate of eligibility for matriculation certificate among boys. Below we see that the negative effect on the matriculation certificate eligibility of boys (including students who did not take the matriculation exam) occurred only in the first year that the vocational tracks

[12] We have also performed DID estimations in the extended group of localities (see footnote 9 above). The results are presented in Demalach and Zussman (2017) and are similar to those reported below.

opened, which is likely due to the difficulties in the initial phase of implementation.[13] Although Table 4 shows no statistically significant effect on boys' chances to sit for matriculation exams, we will see below a positive effect on this outcome in the long run.

Table 4 shows a statistically significant decrease of 5 percentage points in the dropout rate for girls, which is about 35 percent of the average dropout rate during the study period. The probability of girls taking matriculation exam increased by about 8 percentage points (10 percent), although no significant change was observed in the eligibility for matriculation certificate among girls. The opening up of vocational tracks had no significant long-term effect on the probability of either gender obtaining an academic degree. It also had no significant effect on the probability of employment or wages of either gender in adulthood (in 2014) (Table 5). However, the negative estimate of the effect on men's wages was not far from being statistically significant (columns 3 and 4): The significance level was 17 percent for annual wages and 18 percent for monthly wages.

In addition, we conducted a joint estimation for boys and girls (the results are not presented due to space limitations) to confirm that the lack of statistical significance of several interaction variables was not due to the small sample size. The variables that were not statistically significant in the separate estimations (academic degree in Table 4 and labor market outcome variables in Table 5) also remained non-significant in the joint estimations.

Tables 6 and 7 show the effect of the reform as a function of the time elapsed since its implementation in the treatment localities. The positive effects of the new vocational tracks on the schooling outcome variables (reduced dropout rate and increased eligibility for a matriculation certificate; Table 6) are barely noticeable in the year in which the new vocational tracks were opened, but are noticeable in the following years. From the second year after the opening of the new tracks, the number of students sitting for matriculation exams increased for boys and not only for girls. Furthermore, the negative effect on boys' eligibility for a matriculation certificate is only statistically significant in the year in which the new tracks were opened. The gradual effect of the reform is apparently due to the reform integration and improvement efforts of the schools in the treatment localities. The estimated effects on the labor market outcome variables (Table 7) are largely not statistically significant.[14]

[13] We had data on matriculation grades, but we did not use them as outcome variables for the following reasons: (1) The matriculation grades are affected by the dropout rates: we can assume that the matriculation grades decrease as the dropout rates decreases. (2) Matriculation grades depend on the choice of subjects and the number of units in each subject. In addition, this selection may be affected by the availability of vocational education.

[14] The estimates of the interaction terms are negative and statistically significant (at the 10 % level) only for men's wages (Table 7, columns 3 and 4) in the second year after the opening of vocational tracks in the locality.

Table 4
Effect of Opening Vocational Tracks on Educational Outcomes[1]

	Boys			
	Dropped out of High School	**Matriculation Examinations**	**Matriculation Certificate**	**Academic Degree**
	(1)	(2)	(3)	(4)
Post × Treatment	-0.039*	0.023	-0.052**	-0.019
	(0.022)	(0.026)	(0.019)	(0.041)
Student characteristics[2]	V	V	V	V
School sector	V	V	V	V
Share of unemp. benefits recipients	V	V	V	V
Locality fixed effect	V	V	V	V
Cohort fixed effect	V	V	V	V
Mean outcome	0.256	0.694	0.333	0.241
Number of localities	18	18	18	18
Number of observations[3]	7,576	9,455	9,455	1,380
Adjusted R^2	0.064	0.064	0.063	0.036
	Girls			
	Dropped out of High School	**Matriculation Examinations**	**Matriculation Certificate**	**Academic Degree**
	(1)	(2)	(3)	(4)
Post × Treatment	-0.054*	0.076**	-0.039	0.010
	(0.027)	(0.030)	(0.038)	(0.044)
Student characteristics[2]	V	V	V	V
School sector	V	V	V	V
Share of recipients of unemployment benefits	V	V	V	V
Locality fixed effect	V	V	V	V
Cohort fixed effect	V	V	V	V
Mean outcome	0.158	0.783	0.399	0.252
Number of localities	18	18	18	18
Number of observations[3]	8,079	10,225	10,225	1,547
Adjusted R^2	0.046	0.058	0.074	0.099

Source: Central Bureau of Statistics, Ministry of Education, and the authors' calculations.
*** Significant at the 1% level, ** significant at the 5% level, * significant at the 10% level.
Standard errors in parentheses are clustered at the locality level.

(1) Results are based on the specification in equation (1).
(2) Parents' years of education and number of siblings. Missing values are imputed according to Demalach and Zussman (2017), Appendix 1.
(3) Data on academic degrees is from the 2008 Census. Therefore, the number of observations is small.

Table 5
Effect of Opening of Vocational Tracks on Labor Market Outcomes (2014)[1]

	Men			
	Employment (1)	**Months of Work** (2)	(Log) **Annual Wage** (3)	(Log) **Monthly Wage** (4)
Post × Treatment	-0.008 (0.020)	-0.109 (0.098)	-0.065 (0.045)	-0.050 (0.035)
Student characteristics[2]	V	V	V	V
School sector	V	V	V	V
Share of recipients of unemployment benefits	V	V	V	V
Locality fixed effect	V	V	V	V
Cohort fixed effect	V	V	V	V
Mean outcome	0.749	10.863	11.281	8.952
Number of localities	18	18	18	18
Number of observations	5,849	4,380	4,380	4,380
Adjusted R^2	0.002	0.005	0.024	0.029
	Women			
	Employment (1)	**Months of Work** (2)	(Log) **Annual Wage** (3)	(Log) **Monthly Wage** (4)
Post × Treatment	-0.032 (0.027)	-0.110 (0.142)	-0.057 (0.073)	-0.029 (0.059)
Student characteristics[2]	V	V	V	V
School sector	V	V	V	V
Share of unemployment benefits recipients	V	V	V	V
Locality fixed effect	V	V	V	V
Cohort fixed effect	V	V	V	V
Mean outcome	0.561	10.536	10.913	8.626
Number of localities	18	18	18	18
Number of observations	6,297	3,531	3,531	3,531
Adjusted R^2	0.022	0.014	0.054	0.071

Source: Central Bureau of Statistics, Ministry of Education, and the authors' calculations.
*** Significant at the 1% level, ** significant at the 5% level, * significant at the 10% level.
Standard errors in parentheses are clustered at the locality level.
(1) Results are based on the specification in equation (1).
(2) Parents' years of education and number of siblings. Missing values are imputed according to Demalach and Zussman (2017), Appendix 1.

Table 6
Effects of Opening of Vocational Tracks in a Locality on Educational Outcomes, as a function of time elapsed since the tracks opened

	Boys			
	Droped out of high-school (1)	**Sat for matriculation exams** (%) (2)	**Eligible for a matriculation certificate** (3)	**Academic degree** (4)
Treatment locality × first year	0.020	-0.046	-0.083**	-0.010
	(0.022)	(0.030)	(0.030)	(0.032)
Treatment locality × second year	-0.098***	0.047*	-0.028	-0.075
	(0.025)	(0.026)	(0.022)	(0.052)
Treatment locality × third year +	-0.102***	0.088**	-0.036	0.023
	(0.032)	(0.037)	(0.036)	(0.063)
Student characteristics[2]	V	V	V	V
School sector	V	V	V	V
Share of unemployment benefit recipients in the locality	V	V	V	V
Locality fixed effect	V	V	V	V
Cohort fixed effect	V	V	V	V
Mean outcome	0.256	0.694	0.333	0.241
Number of localities	18	18	18	18
Number of observations[3]	7,576	9,455	9,455	1,380
Adjusted R^2	0.067	0.068	0.063	0.037
	Girls			
	Droped out of high-school (1)	**Sat for matriculation exams (%)** (2)	**Eligible for a matriculation certificate** (3)	**Academic degree** (4)
Treatment locality × first year	-0.037*	0.051	-0.027	-0.048
	(0.020)	(0.031)	(0.041)	(0.041)
Treatment locality × second year	-0.084*	0.076**	-0.060	-0.018
	(0.040)	(0.035)	(0.039)	(0.054)
Treatment locality × third year +	-0.063	0.108**	-0.034	0.102
	(0.039)	(0.038)	(0.057)	(0.064)

Student characteristics[2]	V	V	V	V
School sector	V	V	V	V
Share of unemployment benefit recipients in the locality	V	V	V	V
Locality fixed effect	V	V	V	V
Cohort fixed effect	V	V	V	V
Mean outcome	0.158	0.783	0.399	0.252
Number of localities	18	18	18	18
Number of observations[3]	8,079	10,225	10,225	1,547
Adjusted R^2	0.046	0.058	0.074	0.103

Source: Central Bureau of Statistics, Ministry of Education, and the authors' calculations.
***Significant at the 1% level **Significant at the 5% level *Significant at the 10% level.
Standard errors in parentheses are clustered at the locality level.

(1) Results are based on the specification in equation (1), where the fixed effect in the even-numbered columns is the parental fixed effect rather than locality fixed effect, and student and sector characteristics are omitted.

(2) Parents' years of education and number of siblings. Missing values were imputed as described in Demalach and Zussman (2017), Appendix 1.

(3) Data on academic degrees were taken from the 2008 Census. Therefore, the number of observations is small.

Table 7
Effects of Opening of Vocational Tracks in a Locality on Labor Market Outcomes, as a function of time elapsed since the tracks opened[1]

	Men			
	Employment (1)	**Months employed** (2)	(log) **Annual wages** (3)	(log) **Monthly wages** (4)
Treatment locality × first year	0.004	-0.038	-0.042	-0.036
	(0.025)	(0.124)	(0.053)	(0.036)
Treatment locality × second year	-0.019	-0.127	-0.115*	-0.099*
	(0.028)	(0.146)	(0.058)	(0.048)
Treatment locality × third year +	-0.013	-0.179	-0.046	-0.019
	(0.030)	(0.162)	(0.058)	(0.048)
Student characteristics[2]	V	V	V	V
School sector	V	V	V	V
Share of unemployment benefit recipients in the locality	V	V	V	V
Locality fixed effect	V	V	V	V
Cohort fixed effect	V	V	V	V
Mean outcome	0.749	10.863	11.281	8.952
Number of localities	18	18	18	18
Number of observations[3]	5,849	4,380	4,380	4,380
Adjusted R^2	0.002	0.005	0.024	0.030
	Women			
	Employment (1)	**Months employed** (2)	(log) **Annual wages** (3)	(log) **Monthly wages** (4)
Treatment locality × first year	-0.030	-0.083	-0.040	-0.022
	(0.033)	(0.239)	(0.091)	(0.061)
Treatment locality × second year	-0.052	0.026	-0.010	-0.017
	(0.048)	(0.167)	(0.073)	(0.064)
Treatment locality × third year +	-0.018	-0.253	-0.114	-0.048
	(0.035)	(0.171)	(0.088)	(0.071)
Student characteristics[2]	V	V	V	V
School sector	V	V	V	V

Share of unemployment benefit recipients in the locality	V	V	V	V
Locality fixed effect	V	V	V	V
Cohort fixed effect	V	V	V	V
Mean outcome	0.561	10.536	10.913	8.626
Number of localities	18	18	18	18
Number of observations[3]	6,297	3,531	3,531	3,531
Adjusted R^2	0.022	0.014	0.054	0.071

Source: Central Bureau of Statistics, Ministry of Education, and the authors' calculations.
***Significant at the 1% level **Significant at the 5% level *Significant at the 10% level. Standard errors in parentheses are clustered at the locality level.

(1) Results are based on the specification in equation (1), where the interaction term treatment locality × treatment period is replaced by treatment locality × number of years elapsed since the reform was implemented in the locality.

(2) Parents' years of education and number of siblings. Missing values were imputed as described in Demalach and Zussman (2017), Appendix 1.

Additional estimations were conducted to examine the effect of opening of vocational tracks on outcomes among same-sex siblings, using a parents fixed effect. Since siblings are similar in terms of their innate cognitive abilities[15] and the environment in which they grew up, estimations based on differences between siblings are better suited to address the selection bias described above. The results are shown in Tables 8 and 9 and are similar in sign to the previous results, and in most cases the significance is also similar.[16]

Another outcome that could be affected by vocational education is the occupation of students in adulthood. Occupational data is only available for students sampled in the 2008 Census, which is a representative sample of about 13 percent of the population. The effect of opening of vocational tracks was estimated for three groups of occupations. The first group comprises the "white collar" occupations of academics, engineers and managers; the second group comprises the "blue collar" occupations for which the new tracks provide training; the third group consists of clerical occupations. Table A4 in the Appendix provides a breakdown of the occupations in each category

Table 10 shows that the opening of vocational tracks did not significantly affect the likelihood of being in a "white collar" occupation and, surprisingly it did not significantly

[15] According to the literature, the correlation in IQ between siblings is about 0.44 (Sacerdote, 2010).

[16] The estimates that were not statistically significant in the separate estimations for women and men (academic degree and labor market outcome variables) remained non-significant in joint estimations for both genders.

affect the likelihood of being in a "blue collar" occupation for which the new vocational tracks provided training.[17] There was a significant increase of about 14 percentage points in the share of girls who turned to clerical occupations in the treatment localities. In contrast, the proportion of men who engaged in clerical occupations fell slightly.

Vocational education may also have an effect on demographic outcomes. For example, the decline in high school dropout rate may increase the age of marriage because people want to complete their investment in their human capital before becoming parents, or because social norms view high school graduation as a sign of the transition from childhood to adulthood (Blossfeld and Huinink, 1991).

Table 11 shows the estimated effect of opening vocational tracks on women's and men's ages at marriage, women's chances of having a child, and the number of children by the time of the 2008 Census.[18] The average age at marriage of women in the treatment localities increased by more than half a year after the opening of the new vocational tracks, and the probability of having a child before the age of 18 decreased by more than half a year. No significant effects were found on men's ages at marriage, women's chances of having children, or women's number of children. These results are consistent with other studies that have found that acquiring an education delays the age of marriage and the birth of the first child (Kirdar et al., 2011; Santow and Bracher, 1994). In particular, these findings are consistent with the tendency of Arab women in Israel to marry at a later age after they acquire higher education (Sabbah-Karkaby and Stier, 2017).[19]

[17] Joint estimation for women and men also shows a non-significant effect of opening of vocational tracks on "white collar" and "blue collar" occupations. Demalach and Zussman (2017) reveal that localities where vocational tracks were opened exhibit a statistically significant increase in men's probability of employment in "blue collar" occupations that do not match the vocational tracks that were opened, and a decline in women's probability of employment in jobs related to education and care.

[18] In the 2008 Census, the question about having children was posed only to women.

[19] Another relevant outcome variable is the age at the birth of the first child, but we did not have data to examine this variable.

Table 8

Effect of Opening New Vocational Tracks on Educational Outcomes: Locality and Parents Fixed Effects[1]

A. Boys								
	Dropped out of High School		**Matriculation Examinations**		**Matriculation Certificate**		**Academic Degree**	
	Locality Fixed Effect (1)	Parents Fixed Effect (2)	Locality Fixed Effect (3)	Parents Fixed Effect (4)	Locality Fixed Effect (5)	Parents Fixed Effect (6)	Locality Fixed Effect (7)	Parents Fixed Effect (8)
Post × Treatment	-0.039*	-0.056**	0.023	0.019	-0.052**	-0.098***	-0.019	-0.075
	(0.022)	(0.022)	(0.019)	(0.030)	(0.019)	(0.021)	(0.041)	(0.058)
Student characteristics[2]	V		V		V		V	
School sector	V		V		V		V	
Share of unemp. benefits recipients	V	V	V	V	V	V	V	V
Cohort fixed effect	V	V	V	V	V	V	V	V
Mean outcome	0.256	0.248	0.694	0.705	0.333	0.336	0.241	0.226
Number of localities	18	18	18	18	18	18	18	18
Number of observations[3]	7,576	3,402	9,455	4,875	9,455	4,875	1,380	592
Adjusted R^2	0.064	0.004	0.064	0.006	0.063	0.020	0.036	0.023
B. Girls								
	Dropped out of High School		**Matriculation Examinations**		**Matriculation Certificate**		**Academic Degree**	
	Locality Fixed Effect (1)	Parents Fixed Effect (2)	Locality Fixed Effect (3)	Parents Fixed Effect (4)	Locality Fixed Effect (5)	Parents Fixed Effect (6)	Locality Fixed Effect (7)	Parents Fixed Effect (8)
Post × Treatment	-0.054*	-0.037	0.076**	0.068**	-0.039	0.016	0.010	0.018
	(0.027)	(0.031)	(0.036)	(0.029)	(0.038)	(0.054)	(0.044)	(0.080)
Student characteristics[2]	V		V		V		V	
School sector	V		V		V		V	
Share of unemp. benefits recipients	V	V	V	V	V	V	V	V

Cohort fixed effect	V	V	V	V	V	V	V	V
Mean outcome	0.158	0.152	0.783	0.789	0.399	0.407	0.252	0.247
Number of localities	18	18	18	18	18	18	18	18
Number of observations[3]	8,079	3,961	10,225	5,681	10,225	5,681	1,547	328
Adjusted R^2	0.046	0.023	0.058	0.018	0.074	0.017	0.099	0.049

Source: Central Bureau of Statistics, Ministry of Education, and the authors' calculations.

*** Significant at the 1% level, ** significant at the 5% level, * significant at the 10% level. Standard errors in parentheses are clustered at the locality level.

(1) Results are based on the specification in equation (1), the fixed effect in the even-numbered columns is the parental effect rather than the locality effect, and student and sector characteristics were omitted.

(2) Parents' years of education and number of siblings. Missing values are imputed according to Demalach and Zussman (2017), Appendix 1.

(3) Data on academic degrees is from the 2008 Census. Therefore, the number of observations is small.

Table 9
Effect of Opening New Vocational Tracks on Labor Market Outcomes: Locality and Parents Fixed Effects[1]

	Employment		**Months of Work**		(Log) **Annual Wage**		(Log) **Monthly Wage**	
	Locality Fixed Effect (1)	Parents Fixed Effect (2)	Locality Fixed Effect (3)	Parents Fixed Effect (4)	Locality Fixed Effect (5)	Parents Fixed Effect (6)	Locality Fixed Effect (7)	Parents Fixed Effect (8)
A. Men								
Post × Treatment	-0.008	0.004	-0.109	-0.063	-0.065	-0.008	-0.050	-0.007
	(0.020)	(0.055)	(0.098)	(0.199)	(0.045)	(0.070)	(0.035)	(0.052)
Student characteristics[2]	V		V		V		V	
School sector	V		V		V		V	
Share of unemp. benefits recipients	V	V	V	V	V	V	V	V
Cohort fixed effect	V	V	V	V	V	V	V	V
Mean outcome	0.749	0.750	10.863	10.979	11.281	11.330	8.952	8.981
Number of localities	18	18	18	18	18	18	18	18
Number of observations	5,849	3,167	4,380	1,332	4,380	1,332	4,380	1,332
Adjusted R^2	0.002	0.007	0.005	0.011	0.024	0.014	0.029	0.024
B. Women								
	Employment		**Months of Work**		(Log) **Annual Wage**		(Log) **Monthly Wage**	
	Locality Fixed Effect (1)	Parents Fixed Effect (2)	Locality Fixed Effect (3)	Parents Fixed Effect (4)	Locality Fixed Effect (5)	Parents Fixed Effect (6)	Locality Fixed Effect (7)	Parents Fixed Effect (8)
Post × Treatment	-0.032	0.004	-0.110	0.036	-0.057	-0.033	-0.029	-0.041
	(0.027)	(0.051)	(0.142)	(0.442)	(0.073)	(0.146)	(0.059)	(0.091)
Student characteristics[2]	V		V		V		V	
School sector	V		V		V		V	

Share of unemp. benefits recipients	V	V	V	V	V	V	V	V
Cohort fixed effect	V	V	V	V	V	V	V	V
Mean outcome	0.561	0.563	10.536	10.804	10.913	11.052	8.626	8.726
Number of localities	18	18	18	18	18	18	18	18
Number of observations	6,297	3,609	3,531	990	3,531	990	3,531	990
Adjusted R^2	0.022	0.003	0.014	0.020	0.054	0.013	0.054	0.006

Source: Central Bureau of Statistics, Ministry of Education, and the authors' calculations.

*** Significant at the 1% level, ** significant at the 5% level, * significant at the 10% level.

Standard errors in parentheses are clustered at the locality level.

(1) Results are based on the specification in equation (1), the fixed effect in the even-numbered columns is the parental effect rather than the locality effect, and student and sector characteristics were omitted.

(2) Parents' years of education and number of siblings. Missing values are imputed according to Demalach and Zussman (2017), Appendix 1.

Table 10
Effect of Opening New Vocational Tracks on Probability of Pursuing Various Occupations, by Gender[1,2]

	"White Collar" Occupations (academics, engineers, and managers)		**"Blue Collar" Occupations**[3] (compatible with new vocational tracks)		**Clerical Occupations**	
	Men (1)	**Women** (2)	**Men** (3)	**Women** (4)	**Men** (5)	**Women** (6)
Post × Treatment	-0.003 (0.036)	0.042 (0.066)	-0.032 (0.022)	-0.002 (0.012)	-0.042* (0.024)	0.139** (0.055)
Student characteristics[4]	V	V	V	V	V	V
School sector	V	V	V	V	V	V
Share of unemp. benefits recipients	V	V	V	V	V	V
Locality fixed effect	V	V	V	V	V	V
Cohort fixed effect	V	V	V	V	V	V
Mean outcome	0.130	0.133	0.099	0.003	0.066	0.150
Number of localities	18	18	18	18	18	18
Number of observations	1,151	573	1,151	573	1,151	573
Adjusted R^2	0.042	0.005	-0.001	-0.011	0.001	0.003

Source: Central Bureau of Statistics, Ministry of Education, and the authors' calculations.
*** Significant at the 1% level, ** significant at the 5% level, * significant at the 10% level.
Standard errors in parentheses are clustered at the locality level.

(1) Occupations at the time of the 2008 Census.
(2) Results are based on the specification in equation (1). The full breakdown of occupations is shown in Table A4 in the Appendix.
(3) Occupations that match the non-clerical vocational tracks that were opened in the treatment localities.
(4) Parents' years of education and number of siblings. Missing values are imputed according to Demalach and Zussman (2017), Appendix 1.

Table 11
Effect of Opening New Vocational Tracks on Age of Marriage and Fertility[1,2]

	Men	**Women**			
	Age of Marriage (1)	**Age of Marriage** (2)	**Married until Age 18** (3)	**Have Children** (4)	**Number of Children** (5)
Post × Treatment	0.102	0.591*	-0.048**	0.010	-0.141
	(0.309)	(0.324)	(0.020)	(0.046)	(0.217)
Student characteristics[3]	V	V	V	V	V
School sector	V	V	V	V	V
Share of unemp. benefits recipients	V	V	V	V	V
Locality fixed effect	V	V	V	V	V
Cohort fixed effect	V	V	V	V	V
Mean outcome	26.182	21.647	0.047	0.795	2.263
Number of localities	18	18	18	18	18
Number of observations	950	1,313	1,313	1,543	1,543
Adjusted R^2	0.073	0.022	0.013	0.006	0.107

Source: Central Bureau of Statistics, Ministry of Education, and the authors' calculations.
*** Significant at the 1% level, ** significant at the 5% level, * significant at the 10% level.
Standard errors in parentheses are clustered at the locality level.
(1) At the time of the 2008 Census.
(2) Results are based on the specification in equation (1).
(3) Parents' years of education and number of siblings. Missing values are imputed according to Demalach and Zussman (2017), Appendix 1.

6. ROBUSTNESS TESTS

Several robustness tests were conducted to rule out possible biases in the estimations. First, it could be argued that the opening of vocational tracks reduced the dropout rate before high school, i.e. between ninth and tenth grade (rather than the dropout rate between tenth and twelfth grade, which was examined in the previous section), which led to an increase in the proportion of high-school students from weaker backgrounds in the treatment localities and biased the estimation results. Unfortunately, no data on ninth-grade students are available for the study period, so the argument that the dropout rate decreased from ninth to tenth grade cannot be tested directly. However, it is possible to follow the number of tenth-grade students in each cohort. If the opening of vocational tracks significantly reduced the dropout rate before tenth-grade, then it should also have significantly increased the number of tenth-grade

students appearing in the sample (beyond the natural increase). Figure 8 and column 1 in Table 12 show that the number of students in tenth-grade did not change significantly after the opening of vocational tracks.

Second, the opening of new vocational tracks may have led to the opening of new classes and thus to a decrease in the average number of students per class. It is worth noting that the literature shows that academic achievement may be better in smaller classes (for a literature review, see Chingos, 2013). Figure 9 shows that after the opening of vocational tracks, the average class size decreased only slightly. Furthermore, a DID estimate of the effect of opening of vocational tracks on average class size in the locality (Table 12, column 2) is negative (2.5 students per class), but not statistically significant.

Third, the estimates in the previous section may have reflected unobserved differential changes that may have occurred in the treatment and comparison localities during the study period, rather than reflecting the effect of the opening of vocational tracks. To test this possibility, two placebo tests were conducted using estimations that are nearly identical to the estimations in the previous section, with the following small change: the actual timing of the opening of the vocational tracks was replaced by a fictitious placebo timing. In the first test, the estimations were made only for the early years 1989–1994 (because in later years many of the treatment localities already had vocational tracks), and a fictitious opening year was set at 1992. In the second test, the estimations were run for the entire study period and the fictitious opening year of the vocational track was set to two years before the actual treatment year. The coefficients of the placebo estimation for all outcomes were mostly non-significant and close to zero (Tables 13 and 14). Therefore, it is unlikely that the estimates in the previous section reflect unobserved trends unrelated to the vocational tracks.

A limitation of the estimations in the previous section is that the sample was not always identical, but varied depending on the availability of data on the outcome variables.[20] Table A5 in the Appendix shows an estimates for a uniform sample in which information on all outcome variables is available. The results are similar to those in the previous section, except for the effect on the boys' dropout rate, which remains negative but is now slightly insignificant at the 10% level.

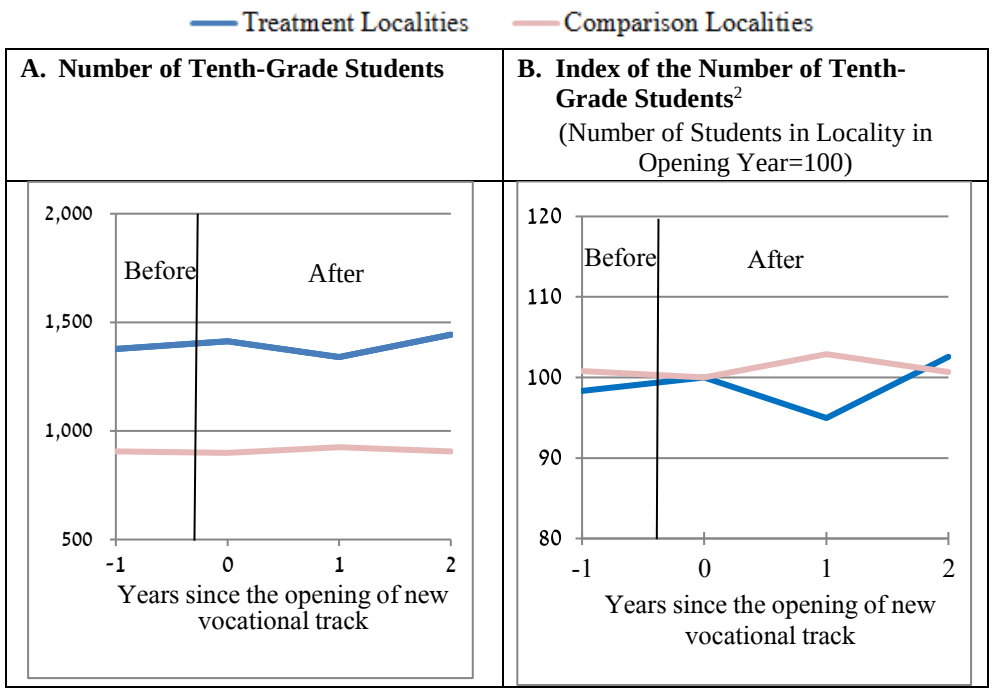
Finally, the estimations in the study use clustered standard errors at the locality level to account for the correlation between observations in the same locality. However, the number of localities is relatively small (18). In a situation where the number of clusters is relatively small, the standard errors may be biased downwards (see e.g. Green and Vavreck, 2007). Therefore, to check the robustness of the results shown in the previous section, wild cluster

[20] For example, there is no data on the dropout rate for tenth-grade students in 1989–1990, matriculation data are only available from 1992 onward (i.e., for tenth graders from 1990 onward), and wage data are only available for slightly more than half of the population. In addition, some of the outcome variables are only available for people who were surveyed in the 2008 Census.

bootstrap t method (Cameron et al., 2008) is used. Tables A6 to A8 in the Appendix show the results of the estimations.

The results show that the coefficients remain statistically significant in most cases where they were significant in the estimations in the previous section. In a few cases, however, their significance has dropped to just over 10%, whereas they were previously significant at a level of 5–10% (see, for example, the case of boys' early school leaving rate in column 1 of Table A6).

Figure 8
Number of Tenth-Grade Students in Treatment Localities Before and After Opening of Vocational Tracks[1]

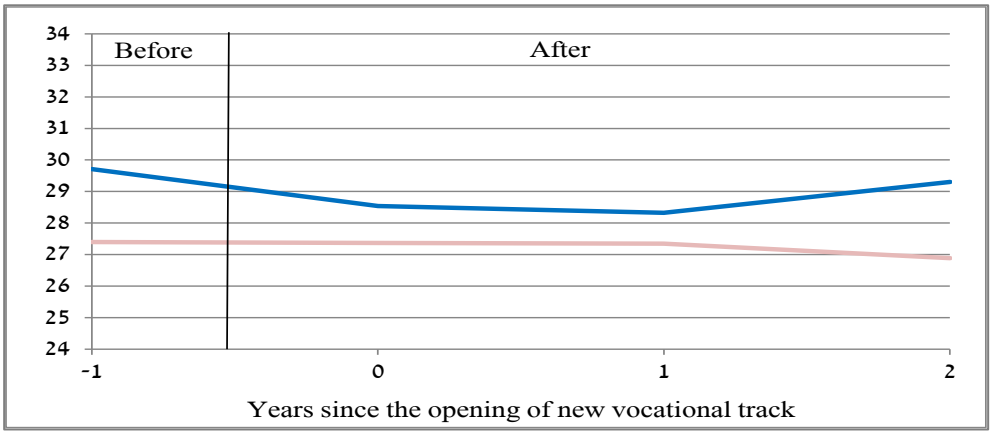


Source: Ministry of Education and the authors' calculations.

(1) For each comparison locality, we defined a fictitious opening year that was identical to the opening year in a matched treatment locality. The matched treatment locality was selected using the Nearest Neighbor Matching method based on the variables that appear in Table 2.

(2) The index is not weighted by the number of students in the localities.

Figure 9
Average Class Size in Tenth-Grade in Treatment Localities Before and After Opening of Vocational Tracks[1]



Source: Ministry of Education and the authors' calculations.
(1) For each comparison locality, we defined a fictitious opening year that was identical to the opening year in a matched treatment locality. The matched treatment locality was selected using the Nearest Neighbor Matching method based on the variables that appear in Table 2.

Table 12
Effect of Opening Vocational Tracks in a Locality on Number of Tenth-Grade Students and on Average Class Size

	Number of Students in Tenth-Grade (1)	**Average Class Size in Tenth-Grade** (2)
Post × Treatment	1.878 (6.754)	-2.531 (1.467)
Share of unemp. benefits recipients	V	V
Locality fixed effect	V	V
Cohort fixed effect	V	V
Mean outcome	147.439	28.542
Number of localities	18	18
Number of observations	144	144
Adjusted R^2	0.110	0.034

Source: Ministry of Education and the authors' calculations.
*** Significant at the 1% level, ** significant at the 5% level, * significant at the 10% level.
Standard errors in parentheses are clustered at the locality level.

Table 13
Effect of Opening New Vocational Tracks on Educational and Labor Market Outcomes: Placebo Test – Setting Opening Year to 1992 and Study Period to 1989–1994[1]

	A. Men							
	Dropped out of High-School	**Matriculation Examinations**	**Matriculation Certificate**	**Academic Degree**	**Employment**	**Months of Work**	(Log) **Annual Wage**	(Log) **Monthly Wage**
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Post × Treatment	0.023	-0.000	0.023	0.057	0.024	0.188	0.075	0.046
	(0.050)	(0.067)	(0.048)	(0.069)	(0.028)	(0.203)	(0.070)	(0.048)
Student characteristics[2]	V	V	V	V	V	V	V	V
School sector	V	V	V	V	V	V	V	V
Share of unemp. benefits recipients	V	V	V	V	V	V	V	V
Locality fixed effect	V	V	V	V	V	V	V	V
Cohort fixed effect	V	V	V	V	V	V	V	V
Mean outcome	0.280	0.670	0.318	0.243	0.730	10.977	11.323	8.977
Number of localities	18	18	18	18	18	18	18	18
Number of observations[3]	4,350	5,107	5,107	659	3,328	2,428	2,428	2,428
Adjusted R^2	0.078	0.070	0.059	0.036	0.000	0.003	0.021	0.025

	B. Women							
	Dropped out of High-School	**Matriculation Examinations**	**Matriculation Certificate**	**Academic Degree**	**Employment**	**Months of Work**	(Log) **Annual Wage**	(Log) **Monthly Wage**
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Post × Treatment	0.052 (0.045)	0.016 (0.052)	0.039 (0.055)	-0.060 (0.065)	-0.025 (0.050)	-0.092 (0.241)	0.020 (0.077)	0.036 (0.061)
Student characteristics[2]	V	V	V	V	V	V	V	V
School sector	V	V	V	V	V	V	V	V
Share of unemp. benefits recipients	V	V	V	V	V	V	V	V
Locality fixed effect	V	V	V	V	V	V	V	V
Cohort fixed effect	V	V	V	V	V	V	V	V
Mean outcome	0.186	0.746	0.361	0.218	0.553	10.702	10.955	8.647
Number of localities	18	18	18	18	18	18	18	18
Number of observations[3]	4,455	5,286	5,286	712	3,479	1,924	1,924	1,924
Adjusted R^2	0.053	0.050	0.059	0.097	0.014	0.005	0.045	0.061

Source: Central Bureau of Statistics, Ministry of Education, and the authors' calculations.
*** Significant at the 1% level, ** significant at the 5% level, * significant at the 10% level.
Standard errors in parentheses are clustered at the locality level.

(1) Results are based on the specification in equation (1). The fictitious year of treatment (opening of the vocational tracks) is 1992 for all the treatment localities, while the estimation for the tenth-grade students was for the years 1989–1994.
(2) Parents' years of education and number of siblings. Missing values are imputed according to Demalach and Zussman (2017), Appendix 1.
(3) Data on academic degrees is from the 2008 Census. Therefore, the number of observations is small.

Table 14
Effect of Opening New Vocational Tracks on Educational and Labor Market Outcomes: Placebo Test – Setting an Arbitrary Opening Year[1]

	A. Men							
	Dropped out of High-School	**Matriculation Examinations**	**Matriculation Certificate**	**Academic Degree**	**Employment**	**Months of Work**	(Log) **Annual Wage**	(Log) **Monthly Wage**
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Post × Treatment	-0.001	-0.024	-0.025	0.080	0.004	0.100	0.027	0.006
	(0.030)	(0.036)	(0.030)	(0.051)	(0.016)	(0.110)	(0.039)	(0.029)
Student characteristics[2]	V	V	V	V	V	V	V	V
School sector	V	V	V	V	V	V	V	V
Share of unemp. benefits recipients	V	V	V	V	V	V	V	V
Locality fixed effect	V	V	V	V	V	V	V	V
Cohort fixed effect	V	V	V	V	V	V	V	V
Mean outcome	0.256	0.694	0.333	0.241	0.749	10.863	11.281	8.952
Number of localities	18	18	18	18	18	18	18	18
Number of observations[3]	7,576	9,455	9,455	1,380	5,849	4,380	4,380	4,380
Adjusted R^2	0.063	0.064	0.062	0.039	0.002	0.005	0.024	0.029

	B. Women							
	Dropped out of High-School	**Matriculation Examinations**	**Matriculation Certificate**	**Academic Degree**	**Employment**	**Months of Work**	(Log) **Annual Wage**	(Log) **Monthly Wage**
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Post × Treatment	0.019	0.002	-0.026	0.063	-0.009	-0.067	-0.006	0.003
	(0.027)	(0.038)	(0.032)	(0.044)	(0.027)	(0.148)	(0.067)	(0.050)
Student characteristics [2]	V	V	V	V	V	V	V	V
School sector	V	V	V	V	V	V	V	V
Share of unemp. benefits recipients	V	V	V	V	V	V	V	V
Locality fixed effect	V	V	V	V	V	V	V	V
Cohort fixed effect	V	V	V	V	V	V	V	V
Mean outcome	0.158	0.783	0.399	0.252	0.561	10.536	10.913	8.626
Number of localities	18	18	18	18	18	18	18	18
Number of observations [3]	8,079	10,225	10,225	1,547	6,297	3,531	3,531	3,531
Adjusted R^2	0.044	0.055	0.074	0.039	0.022	0.014	0.054	0.071

Source: Central Bureau of Statistics, Ministry of Education, and the authors' calculations.
*** Significant at the 1% level, ** significant at the 5% level, * significant at the 10% level.
Standard errors in parentheses are clustered at the locality level.

(1) Results are based on the specification in equation (1). The fictitious year of treatment (opening of the vocational tracks) was set two years after the actual treatment year.
(2) Parents' years of education and number of siblings. Missing values are imputed according to Demalach and Zussman (2017), Appendix 1.
(3) Data on academic degrees is from the 2008 Census. Therefore, the number of observations is small.

7. CONCLUSIONS

The effect of vocational and general education on various outcomes is a debated topic in both public policy and the literature. Obtaining an unbiased estimate of the effect is challenging due to the selection problem: students who receive vocational education have different characteristics than students who receive general education. To overcome the selection problem, the study exploits the implementation of an educational reform in Israel's Arab sector in the 1990s, which led to a comprehensive opening of vocational education tracks in localities where vocational education had previously not been offered or had been offered only to a very limited extent (treatment localities).

Using a difference-in-differences methodology, changes in the outcome variables over time are estimated for students in the treatment localities compared to students in similar Arab localities in which vocational tracks were not opened (comparison localities).[21] The study uses administrative files from the Ministry of Education (containing data on students, schools, and matriculation exams), which were then linked to income data and data from the 2008 Census.

Girls in the treatment localities found to be 5 percentage points less likely to drop out of school between tenth and twelfth grades (i.e., a 35 percent decrease in the average dropout rate in the treatment localities) and 4–7 percentage points more likely to attend matriculation exams. For boys, the probability of dropping out of school decreased by 4 percentage points (i.e. a decrease of 15 percent), the share of students who took the matriculation exams increased, but the matriculation certificate rate was stable.

Opening vocational tracks had no statistically significant effect on acquisition of higher education, employment and earnings for either gender, although the coefficient estimates for men were mostly negative and not far from significance. The likelihood of girls engaging in clerical occupations in adulthood increased considerably, in line with the popularity of the new clerical tracks among girls. However, the opening of the "blue collar" track had no statistically significant effect on the likelihood of employment in these occupations for either gender. Finally, women's age at marriage increased while their likelihood of marrying before the age of 18 decreased, apparently due to the decrease in high school dropout rates.

The study has several drawbacks. First, it focuses only on the Arab education system, as there was no similar comprehensive opening of vocational tracks in the Jewish education system. There are considerable differences in the characteristics of vocational education tracks in the Jewish and Arab education systems, making it difficult to draw conclusions about the Jewish vocational education system from this study. Second, the number of Arab localities included in the study is limited because it is difficult to classify many Arab localities as treatment or comparison localities. Third, the number of vocational tracks opened under the reform was limited, so the results cannot necessarily be generalized to tracks that were

[21] We also conducted estimations using the instrumental variable method, and the results were similar to those reported here.

not examined in the current study. Fourth, Israeli vocational education has undergone many changes since the 1990s to replace traditional low-tech tracks with high-tech ones (Blank et al., 2016). As a result, the current format of vocational education differs significantly from the vocational tracks examined in the study. Fifth, the opening of new vocational tracks led to peer effects among students in the treatment localities. In particular, the opening of new vocational tracks attracted students with less educated parents ("treatment compliers"), which led them to have weaker peers, while the students who remained in general education ("treatment non-compliers") had relatively stronger peers.

Despite these limitations and the differences between the vocational education system in Israel and other countries, the results of the current study are consistent with findings from worldwide studies based on natural experiments, which suggest that vocational education (compared to general education) has no impact on the acquisition of higher education, employment and wages.

The study concludes that the introduction of vocational education in the Arab sector in the 1990s reduced the high school dropout rate and increased the number of girls who took the matriculation exams. However, despite these positive outcomes, the question arises as to whether the high cost of vocational education per student, which is about 50 percent higher than the cost of general education,[22] is justified, as the introduction of vocational education in the Arab sector has not helped graduates to obtain matriculation certificate, acquire higher education, find employment, increase their wages or pursue one of the “blue-collar” occupations for which they were trained.

[22] The Ministry of Education's annual budget per student in general education for 2000, based on the cost of instruction time and materials, amounted to approximately NIS 10,100 (not adjusted for inflation), while the budget per student in vocational education (weighted according to the distribution of students among the various tracks in 1998) amounted to about NIS 15,100.

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APPENDICES

Table A1: Localities of the Study

Treatment Localities	**Comparison Localities**
Abu Sinan	Abu Ghosh
Beit Jann	Jaljulye
Judeide-Maker	Jish (Gush Halav)
Tur'an	Deir Al-Asad
Yafi	Hurfeish
Kabul	Tire
Nahef	Mas'ade
Fureidis	Ein Mahel
Qalansawe	Sha'ab

Table A2: Classifying the Vocational Tracks

Original Name of the Track (Ministry of Education)	**Name of the Track in the Study**
Electronic Systems	Electronics
Education	Education
Power Systems Command and Control Systems	Electricity
Woodworking Furniture Manufacturing and Design	Furniture Design
Computerized Secretarial Management Computerized Bookkeeping	Secretarial Studies and Bookkeeping
Car Mechanics Systems	Car Mechanics
Plumbing and Building Systems	Plumbing and Building
Manufacturing and Design Systems	Mechanics
Fashion Design Clothing Systems	Fashion Design

Table A3: Vocational Tracks Opened in the Study Localities, by Year

Locality name	Professional study	Year opened
Judeide-Maker	Power systems (electricity)	1992
	Computerized secretarial management	1992
Nahef	Computerized bookkeeping	1993
Beit Jann	Command and Control systems	1994
	Computerized bookkeeping	1994
Kabul	Computerized bookkeeping	1994
Yafi	Fashion design	1994
	Furniture manufacturing and design	1994
Qalansawe	Auto mechanical systems	1994
	Fashion design	1994
Kabul	Computerized secretarial management	1996
Nahef	Clothing systems	1996
Abu Sinan	Electronic systems	1997
Tur'an	Computerized bookkeeping	1997
	Computerized bookkeeping	1997
Nahef	Furniture manufacturing and design	1997
Fureidis	Command and Control systems (electricity)	1997
	Computerized bookkeeping	1997
Abu Sinan	Computerized bookkeeping	1998

Source: Ministry of Education, and data processed by the authors**.**

Table A4: Occupation Classification

Occupation Group	CBS Occupation Classification (2 Digits)[1]
"White Collar" Occupations (academics, managers, and engineers)	Biologists, Pharmacologists and Related Professionals
	Chemists, Physicists, Mathematicians and Related Professionals
	Directors General and Chief Executives
	Economists, Psychologists, Accountants and Related Professionals
	Engineers and Architects
	Humanities Professionals
	Judges and Lawyers
	Legislators and Executives
	Managers
	Medical Doctors, Pharmacists and Veterinarians
	Post-Secondary and Post-Primary Teaching
	Religious Sciences Professionals
	Secretaries of Local Authorities and Other
	Senior Managers
"Blue Collar" Occupations (compatible with the new vocational tracks**)**	Electrical, Electronic, Mechanical and Other Engineering
	Electrical and Electronics Equipment Mechanics
	Engineering Technicians n.s.[2]
	Machinery Mechanics and Fitters
	Power Production and Water Treatment Plant
	Plumbers and Pipe Workers
	Skilled Workers n.s.[2]
	Technicians and Associate Professionals
Additional "blue Collar" Occupations	Articles Foremen
	Builders and Construction Workers
	Chemical Processing Plant Operators (except plastic and rubber)
	Civil Engineering Technicians and Associate Professionals
	Communications and Medical Equipment
	Concrete Casters and Non-Metal Mineral Products
	Diamond Workers
	Drivers
	Earth Moving, Paving and Lifting Plant Operators
	Food Processing and Related Workers
	Goldsmiths
	Medical Laboratory Workers, Nurses and Other
	Miners and Quarry Workers

	Natural Sciences Technicians and Associate Professionals
	Operators
	Operators and Photographers
	Packing Machine Operators
	Painters
	Paper and Carton and Their Products Production
	Paramedical clinics
	Paramedical Professionals
	Plastic, Rubber and Their Products Processors
	Potters, Glass Makers and Related Workers
Clerical Occupations	Auditors and Bookkeepers
	Accounts Workers
	Cashiers, Bank Clerks and Credit Company Clerks
	Clerks n.s.[2]
	Customer Service Clerks and Office Equipment
	Customs, Tax and Licensing Clerical Workers
	Mail Clerks
	Operators
	Other Clerks
	Religious Associate Professionals
	Secretaries and Keyboard Operating Clerks
Fashion Occupations	Shoemakers and Other Leather Production
	Spinners, Weavers, Knitters and Fiber Preparers
	Tailors and Dressmakers
Education and Care Occupations	Personal Care Workers
	Teaching Associate Professionals in Primary Schools and in Kindergartens, and Social Counselors
Trade and Sales Occupations	Agents n.s.[2]
	Financial and Business Services Agents
	Salespersons and Models
	Tour Guides and Stewards
	Wholesalers and Trade Dealers
	Workers in Lodging and Restaurant Services
Unskilled Workers	Domestic and Related Helpers, Cleaners and
	Janitors, Caretakers and Other Cleaners
	Launderers
	Other Unskilled Workers

	Porters and Dockers
	Sorting and Goods Arranging
	Street Vendors and Other Street Services
	Unskilled Agricultural Laborers and Road
	Unskilled Workers in Fruit Picking, Packing, and Sorting and Goods Arranging
Agricultural Occupations	Animal Producers
	Crop and Animal Producers, and Others
	Crop Growers
	Fishery and Hunting Workers
	Skilled Forestry Workers
Other Occupations	Journalists and Workers in Arts and Sports
	Other Services Workers
	Protective Workers

(1) According to Central Bureau of Statistics (1994).

(2) The abbreviation "n.s." (not specified) indicates that the occupation is not completely defined, or the description is not complete and the occupation cannot be classified with certainty.

Table A5: Effect of Opening New Vocational Tracks on Educational and Labor Market Outcomes: Uniform Sample[1]

A. Men							
	Dropped out of High-School	**Matriculation Examinations**	**Matriculation Certificate**	**Employment**	**Months of Work**	(Log) **Annual Wage**	(Log) **Monthly Wage**
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Post × Treatment	-0.034	0.023	-0.045*	0.005	-0.144	-0.083	-0.061
	(0.026)	(0.031)	(0.024)	(0.024)	(0.142)	(0.058)	(0.039)
Student characteristics[2]	V	V	V	V	V	V	V
School sector	V	V	V	V	V	V	V
Share of unemp. benefits recipients	V	V	V	V	V	V	V
Locality fixed effect	V	V	V	V	V	V	V
Cohort fixed effect	V	V	V	V	V	V	V
Mean outcome	0.256	0.675	0.335	0.752	10.857	11.280	8.953
Number of localities	18	18	18	18	18	18	18
Number of observations	4,343	4,343	4,343	4,343	3,266	3,266	3,266
Adjusted R^2	0.060	0.057	0.053	0.000	0.002	0.018	0.023
B. Women							
	Dropped out of High-School	**Matriculation Examinations**	**Matriculation Certificate**	**Employment**	**Months of Work**	(Log) **Annual Wage**	(Log) **Monthly Wage**
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Post × Treatment	-0.062*	0.076**	-0.039	-0.011	-0.077	-0.056	-0.032
	(0.033)	(0.030)	(0.038)	(0.023)	(0.188)	(0.072)	(0.056)
Student characteristics[2]	V	V	V	V	V	V	V
School sector	V	V	V	V	V	V	V
Share of unemp. benefits recipients	V	V	V	V	V	V	V

Locality fixed effect	V	V	V	V	V	V	V
Cohort fixed effect	V	V	V	V	V	V	V
Mean outcome	0.158	0.775	0.400	0.547	10.562	10.913	8.621
Number of localities	18	18	18	18	18	18	18
Number of observations	4,620	4,620	4,620	4,620	2,528	2,528	2,528
Adjusted R^2	0.046	0.059	0.075	0.023	0.011	0.048	0.065

Source: Central Bureau of Statistics, Ministry of Education, and the authors' calculations.
*** Significant at the 1% level, ** significant at the 5% level, * significant at the 10% level.
Standard errors in parentheses are clustered at the locality level.

(1) Results are based on the specification in equation (1). Consists all of the individuals that appear in the data without any missing values in all the observed outcomes. Columns (5)-(7) consist all of the individuals who meet this condition and are also employed.

(2) Parents' years of education and number of siblings. Missing values are imputed according to Demalach and Zussman (2017), Appendix 1.

Table A6: Effect of Opening New Vocational Tracks on Educational and Labor Market Outcomes: Wild Cluster Bootstrap-t Hypothesis Testing[1]

	A. Men							
	Dropped out of High-School (1)	**Matriculation Examinations** (2)	**Matriculation Certificate** (3)	**Academic Degree** (4)	**Employment** (5)	**Months of Work** (6)	(Log) **Annual Wage** (7)	(Log) **Monthly Wage** (8)
Post × Treatment	-0.039	0.023	-0.052**	-0.019	-0.008	-0.109	-0.065	-0.050
	p-value= 0.112	p-value= 0.449	p-value= 0.020	p-value= 0.605	p-value= 0.914	p-value= 0.293	p-value= 0.164	p-value= 0.189
Student characteristics[2]	V	V	V	V	V	V	V	V
School sector	V	V	V	V	V	V	V	V
Share of unemp. benefits recipients	V	V	V	V	V	V	V	V
Locality fixed effect	V	V	V	V	V	V	V	V
Cohort fixed effect	V	V	V	V	V	V	V	V
Mean outcome	0.256	0.694	0.333	0.241	0.749	10.863	11.281	8.952
Number of localities	18	18	18	18	18	18	18	18
Number of observations[3]	7,576	9,455	9,455	1,380	5,849	4,380	4,380	4,380
Adjusted R^2	0.064	0.064	0.063	0.036	0.002	0.005	0.024	0.029
Baseline estimations p-value	0.095	0.388	0.015	0.659	0.684	0.281	0.167	0.178

	B. Women							
	Dropped out of High-School (1)	**Matriculation Examinations** (2)	**Matriculation Certificate** (3)	**Academic Degree** (4)	**Employment** (5)	**Months of Work** (6)	(Log) **Annual Wage** (7)	(Log) **Monthly Wage** (8)
Post × Treatment	-0.054*	0.076**	-0.039	0.010	-0.032	-0.110	-0.057	-0.029
	p-value= 0.084	p-value= 0.044	p-value= 0.349	p-value= 0.866	p-value= 0.281	p-value= 0.409	p-value= 0.449	p-value= 0.623
Student characteristics[2]	V	V	V	V	V	V	V	V
School sector	V	V	V	V	V	V	V	V
Share of unemp. benefits recipients	V	V	V	V	V	V	V	V
Locality fixed effect	V	V	V	V	V	V	V	V
Cohort fixed effect	V	V	V	V	V	V	V	V
Mean outcome	0.158	0.783	0.399	0.252	0.561	10.536	10.913	8.626
Number of localities	18	18	18	18	18	18	18	18
Number of observations[3]	8,079	10,225	10,225	1,547	6,297	3,531	3,531	3,531
Adjusted R^2	0.046	0.058	0.074	0.075	0.022	0.014	0.054	0.071
Baseline estimations p-value	0.060	0.022	0.320	0.824	0.241	0.449	0.447	0.625

Source: Central Bureau of Statistics, Ministry of Education, and the authors' calculations.

*** Significant at the 1% level, ** significant at the 5% level, * significant at the 10% level. p-values are calculated according to the Wild Cluster bootstrap-t procedure (Cameron et al., 2008) with 499 repetitions.

(1) Results are based on the specification in equation (1).

(2) Parents' years of education and number of siblings. Missing values are imputed according to Demalach and Zussman (2017), Appendix 1.

(3) Data on academic degrees is from the 2008 Census. Therefore, the number of observations is small.

Table A7: Effect of Opening New Vocational Tracks on Probability of Engaging in Various Categories of Occupations[1,2] Wild Cluster Bootstrap-t Hypothesis Testing

	"White Collar" Occupations (Academics, Engineers, and Managers)		**"Blue Collar" Occupations**[3] (Compatible with the New Vocational Tracks)		**Clerical Occupations**	
	(1)	(2)	(3)	(4)	(5)	(6)
	Men	**Women**	**Men**	**Women**	**Men**	**Women**
Post × Treatment	-0.003	0.042	-0.032	-0.002	-0.042*	0.139*
p-value	0.846	0.681	0.172	0.950	0.052	0.052
Student characteristics[4]	V	V	V	V	V	V
School sector	V	V	V	V	V	V
Share of unemp. benefits recipients	V	V	V	V	V	V
Locality fixed effect	V	V	V	V	V	V
Cohort fixed effect	V	V	V	V	V	V
Mean outcome	0.130	0.133	0.099	0.003	0.066	0.150
Number of localities	18	18	18	18	18	18
Number of observations	1,151	573	1,151	573	1,151	573
Adjusted R^2	0.042	0.005	-0.001	-0.011	0.001	0.003
Baseline estimations p-value	0.930	0.534	0.174	0.889	0.090	0.021

Source: Central Bureau of Statistics, Ministry of Education, and the authors' calculations.

*** Significant at the 1% level, ** significant at the 5% level, * significant at the 10% level. p-values are calculated according to the Wild Cluster bootstrap-t procedure (Cameron et al., 2008) with 499 repetitions.

(1) Occupations at the time of the 2008 Census.

(2) Results are based on the specification in equation (1). The full breakdown of the occupations in shown in Table A4 in the Appendix.

(3) Occupations that match the non-clerical vocational tracks that were opened in the treatment localities.

(4) Parents' years of education and number of siblings. Missing values are imputed according to Demalach and Zussman (2017), Appendix 1.

Table A8: Effect of Opening New Vocational Tracks on Age of Marriage and Fertility[1,2] Wild Cluster Bootstrap-t Hypothesis Testing

	Men	**Women**			
	Age of Marriage	**Age of Marriage**	**Married Until Age 18**	**Have Children**	**Number of Children**
	(1)	(2)	(3)	(4)	(5)
Post × Treatment	0.102	0.591	-0.048*	0.010	-0.141
p-value	0.798	0.160	0.072	0.822	0.269
Student characteristics[3]	V	V	V	V	V
School sector	V	V	V	V	V
Share of unemp. benefits recipients	V	V	V	V	V
Locality fixed effect	V	V	V	V	V
Cohort fixed effect	V	V	V	V	V
Mean outcome	26.182	21.647	0.047	0.795	2.263
Number of localities	18	18	18	18	18
Number of observations	950	1,313	1,313	1,543	1,543
Adjusted R^2	0.073	0.022	0.013	0.006	0.107
Baseline estimations p-value	0.745	0.086	0.030	0.832	0.524

Source: Central Bureau of Statistics, Ministry of Education and the authors' calculations.

*** Significant at the 1% level, ** significant at the 5% level, * significant at the 10% level. p-values are calculated according to the Wild Cluster bootstrap-t procedure (Cameron et al., 2008) with 499 repetitions.

(1) At the time of the 2008 Census.

(2) Results are based on the specification in equation (1).

(3) Parents' years of education and number of siblings. Missing values are imputed according to Demalach and Zussman (2017), Appendix 1.