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Equality of Opportunity and Achievement Gaps in the Israeli Education System

Yaakov Gilboa

Department of Applied Economics and Management, Sapir Academic College, Sderot, Israel

Email address:
yaakovg@sapir.ac.il

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Abstract: The Israeli government regularly uses the Educational Needs Index (ENI) to determine the resources needed to educate children growing up in less affluent environments. This paper investigates some results of this practice. By using data from children who were tested in nationwide exams at grades 5 and 8 we find that in Mathematics, at the school level, the negative correlation between the average test scores and the ENI is about 2.2 times higher in grade 8 than in grade 5 and that children from low index schools are more likely to improve their scores. OLS and quantile regressions of a value-added model on a subsample of the data emphasize the importance of parental education to children's educational attainment. It also shows a negative effect of the ENI on test scores. Our final conclusion is that the Israeli education policy fails to fully guarantee equality of opportunity to its students.

Keywords: Equality of Opportunity in Education, Achievement Gaps, Value-Added Model

1. Introduction

Although governments try to promote equality of opportunity in education, other factors such as differences in parents' education and occupation, the neighborhood, and the learning environment at school can thwart its efforts toward this end.[1] Thus without massive public intervention, such differences may lead to large gaps in achievements between children from different backgrounds. Despite the attempts of education systems to reduce these gaps by devoting more resources to children from less affluent homes, the results are often disappointing.

This paper focus on the Israeli education system and the extent to which it fulfills its obligation to promote equality of opportunity in education. In Israel, public expenditure on education of a student depends partially on the student's socioeconomic circumstances. The Ministry of Education allocates resources to schools according to an Education Needs Index.[2] Schools with a higher ENI get more public funds in order to compensate its students for the lack of educational resources at home. However, only 5% of the ministry's budget is set aside for this purpose. To investigate the effectiveness of this policy as a tool for promoting equality of opportunity we analyze changes in the gap in scores of children from different levels of the index between grades 5 and 8. A narrowing gap implies that the Israeli education system is moving towards achieving its objective.

Unfortunately, there is no general agreement on what exactly is meant by equality of opportunity in education. In an early work, Becker and Chiswick [4] defined equality of opportunity as equal opportunity to invest in human capital independent of parental wealth. This can be interpreted as differential public expenditure per student depending on parental socio-economic status. Equality of public expenditure per student is also a common definition of equality of opportunity in education. Over the last 40 years court orders act to reduce disparities in schools resources in

1 Various empirical studies have estimated the effect of parental characteristics on children's educational attainment in an attempt to distinguish between the effect of genetic factors and wealth factors e.g. Erikson [10]. One way to do it is by comparing identical twins separated at birth or by comparing identical twins to non-identical twins. Another way is to compare adopted siblings to biological siblings. In relation to twins and siblings see, e.g., Krapohl and Plomin [15], Ashenfelter and Rouse [1], Behrman, Rosenzweig and Taubman [5], and Miller, Mulvey and Martin [19]. In relation to adopted siblings see Plug [21] and Scarr and Yee [24].

2 The ENI takes into account parental education, family income, the school's distance from an urban metropolis, and country of origin. The index sorts students into deciles, most deprived children fall into the 10^{th} decile.

the U.S. Roemer [23] argued that equality of opportunity means equality of outcomes for those who make equal efforts independent of their circumstances. Another possible definition of equality of opportunity could be some threshold level of educational attainment that is considered adequate for the child's future life as an adult. According to this definition, schools would be obligated to make certain that every student obtains at least such a threshold and resources would be allocated correspondingly.

Recent empirical research on the effect of school resources on educational outcomes gives an indication of the impact of expenditures on educational attainment, especially in regard to class size. Nicoletti and Rabe [20] found a small effect of per pupil expenditure on test scores. Holmlund McNally and Viarengo [12] investigate the effect of primary school's resources on educational attainment of its students in England. The authors found a positive and significant effect of expenditure on test scores and the effect is higher for students from economically disadvantaged families. Krueger and Whitmore [16] found a positive effect of attending small classes in the early school years on educational outcomes at the end of high school. Rivkin, Hanushek and Kain [22] concluded that class size has a modest but statistically significant effect on Mathematics and Reading achievement growth that declines as students progress through the school years. They also emphasize the importance of teachers' experience to student achievements at the early stages of education. Gilboa [11] found that educational attainments of children in Israeli kibbutzim, where investment in education is relatively high compared to the general population and does not depend on parental traits, are about a quarter of a standard deviation higher than those of children in the general population. These results indicate that improvements in educational attainment can be attained by increasing public spending on lower achievers.

Even though public investment in education can increase attainment, applying Roemer's definition of equality of opportunity to children's educational achievements at elementary and junior high schools is somewhat problematic. Children cannot be held responsible for their efforts. At these ages, such efforts are determined more by a child's circumstances than by any rational and intelligent decision. Therefore, equality of opportunity would have to mean equality of outcomes. This, however, is not a realistic goal because for one thing it is too costly[3] and therefore not politically feasible, and second because some differences in attainment cannot be eliminated by public funding.[4] On the other hand, equal public spending per student is feasible but is not politically acceptable. For this reason, governments, including the Israeli government, regularly invest more money in educating children from low income families. However, In Israel, there is no clear formula how much money should be allocated to student with specific background which make it harder to evaluate the effectiveness of the Israeli policy.[5]

The rest of the paper is organized as follows. In the next section we briefly describe the Israeli education system. Section three presents the data and the statistical methods. In Section four we discuss the results of the analysis and Section five concludes.

2. The Israeli Education System

Education for children in Israel is compulsory and free of charge for thirteen years (from five to eighteen years of age). Most schools are public and are financed through the government. The Ministry of Education also finances part of the budget of private institutions. Due to the heterogeneity of the Israeli population, the public education system is divided into Jewish education supervision (75% of the children in the population) and Arab education supervision (25%). The schools under Jewish supervision are grouped into three sectors: 60% under state supervision, 20% under state-religious supervision and the rest under ultra-orthodox supervision. The Ministry of Education is responsible for the curriculum of the three sectors and to a large extent it is the same for all students under Arab, state and state-religious supervision. The curriculum for the ultra-orthodox schools is different. At the end of the 6th grade, students move from elementary school to junior high school and at the end of 9th grade to senior high school.

Equality of opportunity in the Israeli education system was established by law in February 2000. To fulfill this goal the Israeli Ministry of Education adapts an affirmative action policy. As mentioned earlier, for each elementary and high school student it calculates an "Education Needs Index" (ENI). The index represents both the degree of deprivation of the student in education inputs and a supportive educational environment.[6] The school budget depends partially on the average ENI of its students. Schools with children from less affluent homes generally receive more public funds to be spent on more schooling hours per week or smaller classes, etc. For example, Balas [3] found that for Jewish students in elementary schools under state supervision, the ministry

3 According to Roemer's definition, equality of opportunity is very costly. This has been supported by numerous works. Waltenberg and Vandenberhe's [25] study on the Brazilian educational system calculates that to achieve equality of opportunity in education, spending per student on a child of a mother with less than upper primary education should be about six times higher than that on a student whose mother has a college degree. Betts and Roemer [6] indicate that for the US, full origin independence of educational outcomes would require spending about ten times as much on the education of children born into low income families compared to those born into the highest income families. These two studies compute the desired allocation of resources but do not examine an actual policy that tries to equalize educational opportunities.

4 See Gilboa [11] and Justman and Gilboa [13].

5 Levacic and Ross [18] have argued that funding schools according to a need-based formula "requires a prior specification of the kind of educational provision that schools are expected to provide for students with particular characteristics" (Ross and Levacic 1999, p. 26).

6 The Education Needs Index takes into account four elements: education of the more educated parent (40%), living in the periphery (20%), family income (20%), and immigration from under-developed country (20%). For more information on the Education Needs Index see Worgan [26].

budgets 1.43 weekly schooling hours per child from the lower 1/3 of the index which means that for a class with 25 students the school gets a budget for 35.5 teaching hours per week. The budget for a student from the middle 1/3 is 1.73 weekly schooling hours per week (43.25 hours a week for class with 25 students), and 2.04 weekly schooling hours for the most needed children (51 hours per week for class with 25 students). It means that schools with high ENI gets extra money to spend of about 43% than school with low ENI, holding the number of students constant. Schools choose how to spend the money: more class hours, smaller classes, assistant teachers, etc. This differential budgeting reflects the commitment of the state to equality of opportunity in education. However, there are no formal or clear rules to determine how many more hours should be allocated at every level of the index.

At the end of the 12th grade, students take matriculation exams which are one of the formal requirements for admission to higher education. Unfortunately, only 50% of all students matriculate. One explanation for this outcome is the highly positive correlation between the results of these exams and parental income or education (Statistical Abstract of Israel [8], Table 8.24). Since 2002, nationwide exams have been administered to students in the 2nd, 5th, and 8th grades. About 25% of schools are tested each year. The goal of these exams is to give educators and policy makers a tool for evaluating the progress in children's knowledge and changes in the learning environment.[7] This paper uses the results of these exams to evaluate the effectiveness of the Israeli affirmative action policy. We prefer, for our research, to use these tests that students took while they are still in schools and there is time for changes and improvements, and not those of the matriculation exams that only part of students took at the end of their compulsory education.

3. Data and Statistical Methods

The data consist of tests scores from nationwide exams on two subjects: Mathematics and the Hebrew language of all 5th grade students for the year 2003 and all 8th grade students for 2006. Test scores are on a scale between 0-100. All the students are Jewish and learn in schools under state and state-religious supervision[8] (referring to this group as the full sample). Only about 25% of a cohort takes the tests each year, and the selection of schools for the test each year tries to ensure that every child will take the test only once during her schooling years. It means that student who was tested at the 2nd grade will not be tested again at the 5th grade if she stays at the same school during these years. However, the transition of students from elementary school to junior high school at the end of 6th grade, make it impossible for the ministry to ensure that students will not be tested twice. Therefore, 3,580 children from the data (referring to them as the restricted sample) took at least one of the tests twice. The results might have been biased if the students who were tested twice are not a representative sample of the student body. However, a logit estimate (presented in the appendix) of the probability of a child to be tested twice and some other statistics show that there is no selection bias in our sample. In order to make comparison of scores meaningful, all test scores were transformed into standard scores. However, at table 1 and figures 1 and 2, we use the raw scores to emphasize the differences in average test scores of children in schools from different levels of the socio-economic index. The data includes information on student's gender, country of origin, and date of immigration (for non-native born students and parents), as well as parents' education[9] and number of siblings. We also have information on schools and classes including type of supervision, location (urban, rural, and population size in the district where the school is located), number of students in each class and school, the average ENI for each school, and the averages of fathers' and mothers' education of the examinees in each school. For convenience and simplicity, the ENI index was transformed to a socio-economic index (SEI): SEI = 10 – ENI. That way those who are most deprived has the lowest socio-economic index and vice versa.

To examine the achievements in Mathematics at grades 5 and 8, like many other researchers[10], we estimate the change in scores between ages 10 to 13 and estimate the following value-added model:

$$A_{it+1} = X_i\alpha + Y_{ij}\beta + \delta A_{it} + \varepsilon_i \qquad (1)$$

where A_{it+1} is the score at time t+1, X_i is a vector of individual and family characteristics, and Y_{ij} is a vector of school j characteristics (including its SEI) where student i studied. A_{it} is the score at time t, α, β, and δ are unknown parameters and ε_i is a stochastic error.

The parameters of an OLS estimate of the above model estimate the average marginal effect of an independent variable on the test score since it assumes that the effect is constant over the distribution of the dependent variable. To check this assumption, we estimate the model also by quantile regression. In contrast to the interpretation of the OLS coefficients, the estimated $\hat{\beta}_{\theta j}$, which is the estimated coefficient for the j independent variable at the θ^{th} quantile, is the marginal change in the θ^{th} conditional quantile due to the marginal change in the independent variable.[11]

Next, the probability that student will improve its score in

7 The exams are called "Exams of Growth and Effectiveness Measures for Schools" (GEMS).

8 We decided not to include Arab students in the sample in order to avoid dealing with cultural differences. We also did not include ultra-religious Jewish children because their curriculum is different from that of the other groups.

9 The variable 'parental education' is a categorical variable with six categories: 8 years of schooling or less, 9-11 years of schooling, full secondary education, post secondary education, bachelor's degree and graduate studies is the higher category.

10 See for example Atkinson et al [2], Clotfelter ladd and Vigdor [9], Rivkin Hanushek and Kain [22] and Ladd and Walsh [17].

11 See Koenker and Bassett [14] and Buchinsky [7].

Mathematics as she progress in school was estimated by logistic model.

$$\log(\frac{P_i}{1-P_i}) = X_i\lambda + Y_i\eta + v_i \quad (2)$$

where P_i is the probability to get a better score, X_i and Y_i are as defined earlier, λ and η are unknown parameters and v_i is a stochastic error.

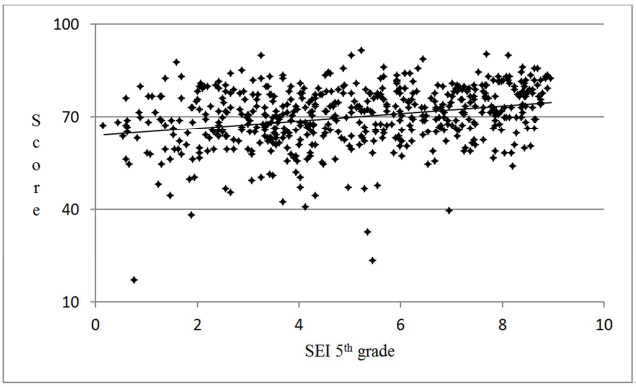

Figure 1. *Average Math score by school's SEI – 5th grade.*

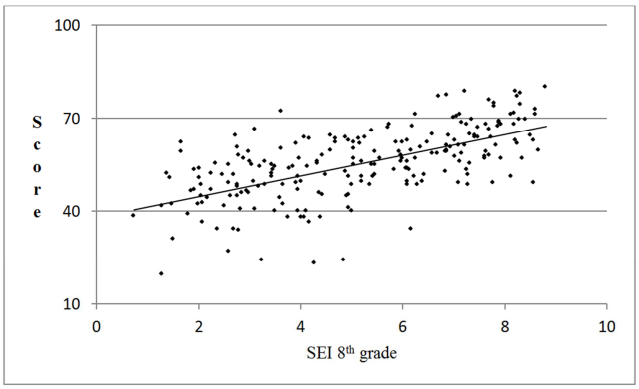

Figure 2. *Average Math score by school's SEI – 8th grade.*

4. Results

A look at the data (Figures 1 and 2) reveals that the correlation between school's average test score and the socioeconomic index is smaller at grade 5 than at grade 8 (0.288 and 0.621 respectively) suggesting that equality of opportunity is far way. On average, children from privileged schools have higher grades. Thus, we analyze the influence of home characteristics on children's achievements.

Table 1 shows the correlation coefficients between test scores and parental education. It can be seen that the correlations between Math scores and parental education are about 50 percentage points higher at grade 8 than at grade 5 which implies that the achievement gaps in test scores tend to expand during these years.

Table 1. *Correlation between test scores and parental education (individual data).*

	Math score	**Hebrew score**	**Father's education**	**Mother's education**
Math score	-----	0.484	0.201	0.209
Hebrew score	0.638	-----	0.244	0.251
Father's education	0.31	0.264	-----	0.687
Mother's education	0.306	0.28	0.681	-----

The correlations at age 10 are above the diagonal and those at age 13 are below it. All correlations are significant at 1%.

In order to quantify the effects of parental education on test scores, estimations of test score (normalized scores) as function of family and school characteristics were done. The results of these estimates appear in Tables 2. At grade 5, the expected Math score of a child whose parents have more than 12 years of schooling is about 0.4 of a standard deviation higher than the expected score of a child of high school graduated parents.

Table 2. *Math test scores.*

	5th grade	**8th grade**
Mother's education: more than high school	0.222[a] (0.020)	0.323[a] (0.019)
Father's education: more than high school	0.229[a] (0.021)	0.364[a] (0.022)
Education of both parents is more than high school	-0.055[c] (0.029)	-0.120[a] (0.029)
School's average score	0.110[a] (0.014)	0.936[a] (0.020)
Female	-0.046[a] (0.012)	0.078[a] (0.012)
State-religious school	-0.254[a] (0.015)	-0.052[a] (0.017)
SEI – 5th grade	-0.002 (0.003)	-0.049[a] (0.004)
Number of students in school – 5th grade	0.00007[c] (0.00004)	0.00002 (0.00002)
R^2	0.07	0.22
N	21,911	21,087

a – significant at 1%, b – significant at 5%, c – significant at 10%.
Estimations also include indicators for where the student and parents were born as well as a constant.

At the 8th grade the differences grow to 0.567 of a standard deviation. After controlling for all the other variables in the equation, the SEI coefficient is negative but not significant at grade 5. At grade 8 the coefficient is negative and significant. A negative coefficient of the SEI variable means that, ceteris paribus, students from schools with low SEI are doing better than students from schools with high SEI. In other words, the differential budgeting scheme is preforming as expected.

4.1. The Change in Scores

Figures 1 and 2 demonstrate that test scores depend on the school's SEI which is partially determined by parental education. This dependence means that children from schools with lower SEIs will most probably do worse on exams than children from schools with higher SEIs. This raises two questions. First, does the gap in scores grows or narrows with parental education? And second, do junior high schools do a better job in improving the achievements of disadvantaged

children than elementary schools?

To address these issues we estimated a value-added model which allows us to quantify the marginal contribution of different inputs to changes in test scores between grades 5 and 8. We are especially interested in the coefficient of the SEI variable since a negative coefficient means that additional funding of schools with low SEIs is an effective policy. A positive coefficient, on the other hand, implies that the budget is either ineffective or insufficient. However, this latter effect should be separated from peer effect and neighborhood influences among others.

Table 3. *Math score (value added).*

	OLS	**0.10 q**	**0.2 q**	**0.3 q**	**0.4 q**	**0.5 q**	**0.6 q**	**0.7 q**	**0.8 q**	**0.9 q**
Math score (grade 5)	0.426[a]	0.403[a]	0.489[a]	0.452[a]	0.477[a]	0.465[a]	0.464[a]	0.423[a]	0.406[a]	0.383[a]
	(0.023)	(0.053)	(0.037)	(0.035)	(0.030)	(0.029)	(0.029)	(0.034)	(0.030)	(0.034)
Hebrew score (grade 5)	0.159[a]	0.158[a]	0.122[a]	0.175[a]	0.156[a]	0.153[a]	0.178[a]	0.158[a]	0.149[a]	0.100[a]
	(0.023)	(0.054)	(0.033)	(0.034)	(0.031)	(0.029)	(0.028)	(0.032)	(0.029)	(0.036)
Mother's education: more than high school	0.311[a]	0.285[c]	0.358[a]	0.362[a]	0.350[a]	0.367[a]	0.315[a]	0.242[a]	0.239[a]	0.144
	(0.068)	(0.152)	(0.100)	(0.103)	(0.095)	(0.089)	(0.083)	(0.074)	(0.084)	(0.098)
Father's education: more than high school	0.351[a]	0.732[a]	0.619[a]	0.498[a]	0.506[a]	0.446[a]	0.325[a]	0.276[a]	0.213[a]	0.047
	(0.079)	(0.167)	(0.103)	(0.094)	(0.081)	(0.077)	(0.078)	(0.080)	(0.079)	(0.082)
Education of both parents is more than high school	-0.241[b]	-0.380[c]	-0.358[b]	-0.321[b]	-0.349[a]	-0.379[a]	-0.264[b]	-0.218[b]	-0.198[c]	-0.068
	(0.105)	(0.217)	(0.145)	(0.137)	(0.117)	(0.108)	(0.105)	(0.103)	(0.113)	(0.125)
School's average Math score	0.739[a]	0.674[a]	0.843[a]	0.795[a]	0.866[a]	0.838[a]	0843[a]	0.754[a]	0.615[a]	0.529[a]
	(0.066)	(0.120)	(0.088)	(0.073)	(0.075)	(0.073)	(0.084)	(0.108)	(0.104)	(0.130)
Female	0.001	0.038	0.061	-0.015	0.009	0.012	-0.021	-0.043	-0.039	-0.0003
	(0.040)	(0.082)	(0.058)	(0.055)	(0.051)	(0.049)	(0.047)	(0.046)	(0.046)	(0.054)
State-religious school	0.066	0.181[c]	0.156[b]	0.099	0.085	0.072	0.012	-0.075	-0.100	-0.092
	(0.049)	(0.099)	(0.072)	(0.064)	(0.053)	(0.050)	(0.050)	(0.053)	(0.055)	(0.066)
SEI – 5th grade	0.044[a]	0.040[c]	0.035[c]	0.065[a]	0.052[a]	0.050[a]	0.047[a]	0.043[a]	0.052[a]	0.030
	(0.012)	(0.024)	(0.018)	(0.017)	(0.014)	(0.013)	(0.013)	(0.014)	(0.013)	(0.019)
SEI – 8th grade	-0.096[a]	-0.045	-0.109[a]	-0.100[a]	-0.110[a]	-0.115[a]	-0.123[a]	-0.111[a]	-0.103[a]	-0.080[a]
	(0.018)	(0.031)	(0.024)	(0.022)	(0.022)	(0.021)	(0.024)	(0.022)	(0.021)	(0.029)
Number of students in school – 5th grade	0.0001	0.0002	0. 00002	0.00005	0.00006	0.00006	0.0002	0.0002	0.0002	0.0002
	(0.0001)	(0.0002)	(0.0002)	(0.0002)	(0.0001)	(0.0002)	(0.0002)	(0.0002)	(0.0002)	(0.0002)
Number of students in school – 8th grade	-0.0001[b]	-0.0002[c]	-0.0002[c]	-0.0001	-0.00004	-0.00005	-0.00009[c]	-0.00009[c]	-0.0001[a]	-0.0001
	(0.00005)	(0.00009)	(0.00008)	(0.00008)	(0.00006)	(0.00005)	(0.00005)	(0.00005)	(0.00005)	(0.00006)
R^2	0.48									
N	1,429									

a – significant at 1%, b – significant at 5%, c – significant at 10%. Estimations also include indicators for where the student and her parents were born as well as a constant.

The estimated parameters of the value-added model quantify the marginal effect of the explanatory variables during grades six to eight. Table 3 presents the results of the OLS and The quantile regressions of the model. The OLS results show that the change in scores of children whose parents have more than 12 years of schooling is about 0.42 of a standard deviation higher than that of children with less educated parents. The quantile regression suggests that the effect of educated parents on test scores decreases throughout the score's distribution. At the 20th percentile, the marginal effect of parents with more than 12 years of schooling is 0.62, 0.43 at the median, and 0.27 at the 80th percentile. While the effect of mother's education is almost constant up to the 70th percentile (about 0.35 of a standard deviation) and then falling (to about 0.24 0f a standard deviation), the effect of father's education decreases from 0.73 at the 10th percentile to 0.21 at the 80th percentile.

Some of the variables capture the influence of school and neighborhood's environment on educational achievements. One is the type of supervision (state supervision or state-religious supervision). We found a positive (but not significant) effect of state-religious schools on the change in test scores, which implies that even though, on average, the achievements of students at these schools are lower than those of students in non-religious schools, the progress in achievements is higher. The quantile regression reveals that the effect is marginally significant for low and average achieving children. There is also a small negative effect of the number of students in junior high school on test scores and no such effect in elementary school. Another variable is the school's average score which captures the peer effect and other school characteristics that the SEI does not reveal. We find a positive and significant coefficient indicating that given one's Math score at grade 5, the expected score at grade 8 is higher by about 0.7 of a standard deviation for increase of one standard deviation of school's average score.

The qunatile regression reveals that the effect is higher at the lower deciles of the scores distribution.

The SEI also represents the educational environment of a school. The OLS coefficient of an elementary school's SEI in Table 3 is positive and that of the junior high school is negative and about twice in magnitude (both of them are significant at 1% level). The quantile regression shows that the coefficients are almost constant. These results imply that, on average, even though junior high schools do not succeed to close the gap in attainment between children from different SEIs, they do succeed to partially compensate children from lower SEIs. On the other hand, elementary schools fail to do so.

The results lead to the conclusion that although, on average, educational attainment is positively correlated with SEI, the extra budget of junior high schools with a low SEI has a positive effect on students' achievements. The picture for elementary schools is not as optimistic. The coefficient is positive and significant suggesting that between the time of test at grade 5 and the end of grade 6 (the end of elementary school) the gap in test scores between children from different socioeconomic status tends to widen.

4.2. Equality of Opportunity

We estimated the probability of a child to improve her scores between grades 5 and 8. The results of these logit estimates are presented in Table 4.

Table 4. *Probability to improve Math score (logit estimate).*

	Math
Math score (grade 5)	-1.108[a] (0.087)
Hebrew score (grade 5)	0.332[a] (0.076)
Mother's education: more than high school	0.644[a] (0.215)
Father's education: more than high school	0.700[a] (0.249)
Education of both parents is more than high school	-0.361 (0.328)
School's average Math score	2.267[a] (0.229)
Female	-0.049 (0.128)
State-religious school	0.045 (0.157)
SEI – 5th grade	0.167[a] (0.039)
SEI – 8th grade	-0.307[a] (0.058)
Number of students in school – 5th grade	--0.0004 (0.0005)
Number of students in school – 8th grade	-0.0002 (0.0001)
McFadden R^2	0.195
N	1429

a – significant at 1%, b – significant at 5%, c – significant at 10%.
Estimations also include indicators for where the student and parents were born as well as a constant.

The odds ratio of the probability of children of academically educated parents to improve their Math score is about 2.7 times higher than that of children of parents who are only high school graduates. The coefficient of the SEI at grade 5 is positive and significant while that of grade 8 is negative. This implies that the odds ratio is increasing by 18 percentage points for every level of elementary school's SEI and decreasing by about 26 percentage points for every level of junior high school's SEI. The odds ratio of the probability of children of academically educated parents to improve their Hebrew score is about 1.5 times higher than that of children of parents who are only high school graduates. Likewise, for the Hebrew score we also find that elementary schools do not compensate children from less affluent homes while junior high schools do so. The odds ratio of the probability to improve the language score is increasing about 15 percentage points for every level of elementary school's SEI. The coefficient for high school's SEI suggests that the odds ratio decreases about 19 percentage points for every level of the index.

5. Discussion and Conclusion

This paper analyzed the efforts of the Israeli education system to close the gaps in achievements between children from families of different socioeconomic status. The results show that, despite its efforts, the Israeli school system does not succeed to improve the educational attainment of children from less affluent homes. On average, the scores of children from schools with a high SEI level are higher than the scores of children from schools with a low SEI and the gap is not diminishing.

We found parental education to be the main factor that determines children's achievements, and that children of more educated parents tend to improve their scores. The quantile regression revealed that parental education is important for low achievers as well as for high achievers at the early levels of schooling. The improvement in scores of the low achieving children between grades 5 and 8 was higher for children of academically educated parents than for children of less educated parents. At the same time, children of less educated parents who get a high score at grade 5 are more likely to end up in a lower quartile of the score's distribution at grade 8 than children of more educated parents with similar achievements. This result implies that schools do not maintain their achievements.

These patterns of relations between test scores and parental education, and test scores and educational environment (peers, school, neighborhood, etc) cast doubt on the value of the Israeli affirmative action education policy. Nonetheless, we did find that given the educational attainment at the end of elementary school and the different environmental characteristics, the achievement gap in junior high schools did not continue to grow. This positive result indicates that schools can cultivate deprived children and perhaps the reason the government has not had more success is because the budget for compensatory educational programs is too small. Obviously, one way to remedy this situation would be to allocate more resources to students from less affluent homes to ensure equality of opportunity.

Appendix: Selection into the Sample

A selection bias could be a problem if students are not selected randomly to be tested. In order to check this, we estimate the probability to be tested twice. The results are presented in table A1.

Table A1. *Logit estimate of the probability to be tested twice.*

	coefficient	std. error
Mother's years of schooling	0.006	0.011
Father's years of schooling	-0.00001	0.010
Education of both parents is more than high school	-0.010	0.062
Female	0.002	0.037
State-religious school	0.052	0.037
SEI – 5th grade	0.020[c]	0.010
Municipality: up to 10,000 residents	0.016	0.100
Municipality: between 10,000 and 20,000 residents	0.216[b]	0.103
Municipality: between 20,000 and 50,000 residents	0.201[b]	0.084
Municipality: between 50,000 and 100,000 residents	0.116	0.093
Municipality: between 100,000 and 200,000 residents	0.244[a]	0.079
Municipality: Tel-Aviv	0.231[b]	0.115
Municipality: rural	0.101	0.090
Number of students in school	0.00001	0.0001
Constant	-2.012[a]	
McFadden R^2	0.001	
LR statistic	19.326	
Prob (LR statistic)	0.153	
N	21,661	

a – significant at 1%, b – significant at 5%, c – – significant at 10%. Omitted municipality – Jerusalem.

The estimation shows that the probability to be tested twice is somehow higher in other urban communities compared to parents who live in Jerusalem. However, the pseudo R^2 is less than 1% and the probability of the likelihood ratio test is 0.153 so we can conclude that there is no selection bias in our restricted sample.

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