Inside the Black of Box of Ability Peer Effects: Evidence from Variation in High and Low Achievers in the Classroom*

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Abstract

In this paper, we estimate the extent of ability peer effects in the classroom and explore the underlying mechanisms through which these peer effects operate. We identify as high ability students those who are enrolled at least one year ahead of their birth cohort ("skippers") and as low ability students those who are enrolled at least one year behind their birth cohort ("repeaters"). We show that while there are marked differences between the academic performance and behavior of skippers/repeaters and the regular students, the status of skippers and repeaters is mostly determined by first grade; therefore, it is unlikely to have been affected by their classroom peers (and to suffer from the reflection problem). Using within school variation in the proportion of these low and high ability students across cohorts of middle and high school students in Israel, we find that the proportion of high achieving peers in class has no effect on the academic performance of most regular students but it does affect positively the outcomes of the brightest among the regular students. In contrast, the proportion of low achieving peers has a negative effect on the performance of regular students, especially those located at the lower end of the ability distribution. An exploration of the underlying mechanisms of these peer effects shows that, relative to regular students, repeaters report that teachers are better in the individual treatment of students and in the instilment of capacity for individual study. However, a higher proportion of low achieving students results in a deterioration of teachers' pedagogical practices has detrimental effects on the quality of inter-student relationships and the relationships between teachers and students, and somewhat increases the level of violence and classroom disruptions.

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1. Introduction

This paper studies peer effects in educational outcomes between classmates in high schools and in middle schools. It investigates the existence and magnitude of peer effects, and explores some of the potential mechanisms that may explain their emergence. Specifically, we investigate whether having unusually high or low-achieving classmates has any effect on the educational outcomes of regular pupils. We measure the average ability of students by whether they are enrolled in the appropriate grade implied by their exact date of birth and the rules governing the enrollment in first grade. We identify as potentially high ability students those who skipped at least one grade ("skippers") and as potentially low ability students those who repeated at least one grade ("repeaters").[1] We show that skippers have higher academic achievements and substantially higher enrollments in advanced math and science courses in high school relative to regular students. Repeaters, on the contrary, have substantially lower academic achievements.

It is well known that the estimation of peer effects entails a number of difficult econometric problems. First, we need to solve the obvious selection problem stemming from the fact that the proportion of a student's peers who are skippers or repeaters is not determined randomly; rather, repeater status is correlated with low socioeconomic status, while skipper status is correlated with high socioeconomic status. Therefore, repeaters typically cluster in low-achieving schools, and skippers in high-achieving schools. In order to overcome this selection problem, we exploit idiosyncratic variations in the proportion of repeating and skipping students across adjacent cohorts within the same schools.

By using multiple cohorts and conditioning on school fixed-effects and school specific time trends we are able to eliminate all the observable correlations that can confound the repeater and skipper peer effects in schools. We show that within schools, there is considerable cohort-to-cohort variation in the proportion of repeaters and skippers, and demonstrate that this within school variation is not related to variation in student background characteristics and is sufficiently large to allow precise estimation of peer effects. We are also able to enhance the credibility of this identification strategy by contrasting the estimated treatment effects to those based on two alternative "placebo" treatments (i.e., measuring the key treatment variable not in the cohort of interest, but in adjacent cohorts within the same school).

A second difficulty involves the measurement of peer ability. The direct approach that regresses own achievement on contemporaneous or lagged achievement of peers is problematic,

[1] The terms are used somewhat loosely: a large majority of skippers and repeaters never really skipped or repeated a grade, but rather entered first grade one year before or one year after their normative entry date. In a sense, they skipped or repeated the last year of kindergarten.

since these variables are determined simultaneously with own achievement (Manski, 1993). Therefore, the empirical evidence on ability peer effects in schools comes primarily from studies that examine the effect of average background characteristics, such as parental schooling, race, and ethnicity on student outcomes. A wide variety of approaches are used in these studies to identify peer effects. The papers closest in spirit to ours are the ones by Hoxby (2000) for the US, Ammermueller and Pischke (2006) for several European countries. Similarly to us, these papers rely on differences in the compositions of individual classes within a school, which come about by chance.[2] A limitation of these studies is that they do not measure directly the ability of students' peers but rely on socio-economic background characteristics as proxies for ability.

An advantage of our study is in the use of a direct measure of peers' ability, which we believe captures some of the most important dimensions of academic ability, and is unlikely to have been affected by own ability. As shown below, the status of being a repeater or a skipper is determined primarily during elementary school, usually as early as first grade, and it is highly correlated with academic achievements, especially in subjects that demand high levels of math.

The first part of the paper explores how classroom ability composition, as measured by the proportion of repeaters and skippers in the class, affects scholastic achievements of middle and high school students, as measured by test scores in English, Hebrew, math, and science (for middle schools), and students' performance in the matriculation exams completed by the end of 12^{th} grade (for high schools).

The second part of the paper identifies mechanisms by which the ability peer composition affects academic outcomes. Using a unique national survey administered to middle school students, we are able to identify whether peer composition affects the teachers' pedagogical methods in the classroom, the level of disruption and violence, and the quality of inter-student and student-teacher interactions. With the exception of Lavy and Schlosser (2007) who apply a similar research design to study the extent and mechanisms of gender peer effects in the classroom, we are not aware of other studies that have attempted to explore empirically the "black box" of peer effects.

The results show that the proportion of repeaters in class has a negative and significant effect on the academic achievements of regular middle and high school students. On the other hand, the proportion of skippers in class has no significant causal effect on most regular students

[2] A number of recent studies have also used explicit random or quasi-random assignment to classes or schools, or other natural experiments, for example, Sacerdote (2001), Zimmerman (2003), Angrist and Lang (2004), Arcidiacono and Nicholson (2005), Hanushek et al. (2003) and Gould, Lavy and Paserman (2005).

(except for a positive effect among the most able regular students), even though the simple correlation between the proportion of skippers and peers' achievement is large and positive. When we replace the actual treatment variable with two alternative "placebo" treatments – the proportion of skippers and repeaters in either the previous or the subsequent cohorts – we find no effect at all, for either skippers or repeaters. The lack of any discerned effects when using the placebo treatments strongly suggests that our estimates are not spuriously picking up any short term effects of unobserved confounders at the school level.

The exploration of the underlying mechanisms of these peer effects shows that, relative to regular students, repeaters report that teachers are better in the individual treatment of students and in the instilment of capacity for individual study. However, a higher proportion of such students results in a deterioration of teachers' pedagogical practices and the relationships between teachers and students, and somewhat increases the level of violence and classroom disruptions.

The rest of the paper is organized as follows. The next section reviews the relevant recent literature on peer effects and the following section describes the identification strategy. Section 4 discusses the data and the construction of the analysis samples, while section 5 presents the main OLS and school fixed effect estimates of ability peer effects on middle and high school students' achievements. Section 6 presents evidence on the possible mechanisms driving the negative peer effects of low ability students on other students' achievement. Section 7 concludes.

2. Related Literature on Peer-Effects

Social scientists have long recognized that peer effects may be among the most important determinants of student outcomes. However, it has been often difficult to convincingly isolate peer effects in empirical studies, because students from similar backgrounds typically tend to associate together, so that one's peer group is almost always self-selected. Recent years have seen a flurry of research that has attempted to use natural and quasi-experimental settings to identify peer effects in the classroom: these studies include Boozer and Cacciola (2001), Lefgren (2004), Vigdor and Nechyba (2004), Nechyba and Vigdor (2005), Burke and Sass (2004), Gibbons and Telhaj (2005), and Lavy and Schlosser (2007). Other closely related papers in the educational setting are those by Sacerdote (2001) and Zimmerman (2003), who study residential peer effects by exploiting the random assignment of college roommates; the literature on the effects of desegregation on the educational outcomes of white students (Angrist and Lang, 2004; Guryan,

2004); and the literature on the effects of immigrants on natives' educational outcomes (Betts, 1998; Hoxby, 1998; Borjas, 2004; Gould, Lavy and Paserman, 2005).[3]

The papers closest in spirit to ours are the ones by Hoxby (2000) and Ammermueller and Pischke (2006). Hoxby (2000) relies on the exogenous variation across cohorts in peer composition at the school grade-level in Texas elementary schools and finds evidence for the existence of gender and race peer effects. Ammermueller and Pischke (2006) estimate peer effects across classes within primary schools of six European countries and argue that classes within schools are formed randomly with respect to family background. They find strong positive effects of the student background measure of peer composition on reading test scores of fourth graders.

A limitation of the approaches taken by Hoxby and Ammermueller-Pischke is that they measure peer quality using fixed and exogenous demographic characteristics that are not necessarily an indicator of academic ability. This point is highlighted by Hoxby and Weingarth (2005) who find that, when properly accounting for the effects of peers' achievement, the race, ethnicity, parental income and education of one's peers have little or no effects on students' academic outcomes.

As an alternative strategy, other studies measure peer quality directly using lagged academic achievements (Lefgren, 2004; Burke and Sass, 2006; Nechyba and Vigdor, 2005). However, since a student's peer group usually does not change during his or her time in elementary school if not for mobility-related reasons, this approach may still suffer from the reflection problem. The reason for this is that a student in, say, 4th grade, will have already influenced her peers in 3rd grade: hence, using lagged achievement necessarily embodies the reflection problem. One advantage of our estimation approach is that we measure peer quality using a predetermined student characteristic, which is nonetheless very strongly correlated with academic ability.[4]

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[3] Other studies have instead looked at more broadly defined peer effects on a variety of children and adult outcomes (Katz, Kling and Liebman, 2001; Oreopoulos, 2003; Jacob, 2004; Weinberg, Reagan and Yankow, 2004). In a similar vein are also the works by Bayer, Pintoff and Pozen (2004), who study the effects of being in the same correctional facility on recidivism of young criminals, and Bayer, Ross and Topa (2005) who consider peer effects in place of employment for neighbors who live on the same residential block.

[4] This same point is made by Hoxby and Weingarth (2005) to justify their identification strategy. They instrument lagged achievement with the *initial* achievement of each peer in the "simulated" cohort that would have resulted solely from the random reassignment of students across Wake County districts (if any subsequent endogenous movements had not been allowed). Hoxby and Weingarth state that in this case "the reflection problem does not occur, because the reassigned peers had not experienced the student when their initial achievement was determined."

Finally, our paper is also related to the recent literature on the effect of age at school entry on later educational and labor market outcomes. Many studies have shown that being relatively older and more mature when entering the compulsory school system has long-lasting effects: this result has been found in the U.S. (Datar, 2006), in Sweden (Fredrikkson and Öckert, 2005), in Germany (Puhani and Weber, 2005), and in a cross-section of countries (Bedard and Dhuey, 2006).[5] None of these studies, however, investigates the effects of late school entrants on their peers, which is the focus of the current paper.

3. Empirical Strategy

Identification of Ability Peer Effects

The effect of ability composition is usually confounded by effects of unobserved correlated factors that affect students' outcomes. This correlation could result if self-selection and sorting of students across schools are affected by mean ability of students or if there is a correlation between average students' ability in school and other characteristics of the school that can affect students' outcomes. One can take care of both sources of confounding factors in the estimation of peer effects by relying on within school variations in the proportion of able or less able students across adjacent cohorts. Based on this approach we examine whether cohort-to-cohort changes in students' outcomes within the same grade and school are systematically associated with cohort-to-cohort changes in the proportion of high ability students (skippers) or low ability students (repeaters). The basic idea is to compare the outcomes of students from adjacent cohorts who have similar characteristics and face the same school environment, except for the fact that one cohort has a relatively high proportion of high ability or low ability students than the other due to purely random factors.

In implementing this methodology we use the proportion of repeaters and skippers measured at the grade and not at the class level because the latter might be endogenous, as parents and school authorities may have some discretion in placing students in different classes within a grade. This is not a very restrictive compromise because within a given school the proportion of repeaters and skippers in a grade is highly correlated with their proportions in a class.

Using repeated cross-sectional data we estimate the following equation for the sample of regular students (i.e. students who are neither skippers nor repeaters):

$$y_{igst} = \alpha_g + \beta_s + \gamma_t + X'_{igst}\delta_1 + S'_{gst}\delta_2 + \delta_3 LA_{gst} + \delta_4 HA_{gst} + \varepsilon_{igst} \qquad (1)$$

[5] Angrist and Krueger (1992), on the other hand, argue that young-for-grade children acquire more years of education because compulsory schooling laws induce them to stay in school an additional year.

where *i* denotes individuals, *g* denotes grades, *s* denotes schools, and *t* denotes time. y_{igst} is an achievement measure for student *i* in grade *g*, school *s*, and year *t*; α_g is a grade effect, β_s is a school effect, γ_t is a time effect, X_{igst} is a vector of student's covariates that includes gender, mother's and father's years of schooling, number of siblings, immigration status, ethnic origin, and indicators for missing values of these covariates, S_{gst} is a vector of characteristics of a grade *g* in school *s* and time *t* and includes a quadratic function of enrollment and set of variables for the average characteristics of the regular students in the grade;[6] LA_{gst} is the proportion of low ability (repeaters) students in grade *g*, school *s*, and year *t*, HA_{gst} is the proportion of high ability (skippers) students in grade *g*, school *s*, and year *t*, and ε_{igst} is the error term which is composed of a school-specific random element that allows for any type of correlation within observations of the same school across time and an individual random element. The coefficients of interest are δ_3 and δ_4 which capture the effects of having more repeaters or skippers as peers on students' achievement. Since the proportion of repeaters and skippers are not correlated we estimate their effect in separate regressions where each treatment indicator is used separately as a regressor.

For the estimates in equation (1) to have a causal interpretation, the unobserved determinant of achievement must be uncorrelated with the treatment variables. Including school fixed effects controls for the most obvious potential confounding factor – the endogenous sorting of students across schools based on socio-economic factors. However, one may be concerned that there are time-varying unobserved factors that are also correlated with the proportion of high achieving and low achieving students.[7] We address this concern by adding to equation (1) school-specific linear time trends. Hence, identification is achieved from the deviation in the proportion of high and low-achieving students from its long-term trend within a school.

Identification of Mechanisms

The parameters δ_3 and δ_4 in equation (1) measure ability peer effects that could operate through various channels. This could include effects through changes in the pedagogical methods

[6] It is worth noting that when controlling the average background characteristics of the student cohort we include only the average characteristics of the regular students since by including also the average characteristics of the skippers and repeaters we would be over-controlling.

[7] These concerns are particularly relevant for the high school outcomes equation because we have a longer panel and also because secular trends in school proportion of repeaters and skippers are more likely to exist in high schools since there is school choice at this level of education.

used by teachers, the classroom climate, the quality of interactions among students and between students and teachers, and the level of motivation and self confidence of students. To assess the importance of each of these mechanisms we estimate models identical to equation (1) where the dependent variables are constructed based on students' responses to a school questionnaire related to teachers' pedagogy and the classroom learning environment. The questionnaire is described more in detail in the data section.

4. Data and Descriptive Statistics

The empirical analysis is based on two samples that include high and middle school students, respectively. We limit the analysis to samples that include only the Jewish state run schools in Israel. Below we describe the samples.

The high school data

We use administrative records collected by the Israel Ministry of Education for 7 consecutive cohorts (from 1994 to 2000) of 10^{th} grade students. The data are based on annual reports submitted by school authorities to the Ministry of Education at the beginning of the school year. Each record contains an individual identifier, a school and class identifier, and detailed demographic information on the student: date of birth, gender, parental education, number of siblings, year of immigration (where relevant), and ethnicity. We use 10^{th} grade to define the base population because it is the first year of high school and the last year of compulsory schooling. The measure of treatment in high school, in terms of the proportion of repeaters and skippers peers, is also based on 10^{th} grade enrollment because any later change in this rate is endogenous. The sample is restricted to students in non-special education schools that have a matriculation track.[8] As a further restriction, we drop all schools that experienced a change in enrollment of 80 percent or more between two consecutive years of the analyzed period to avoid changes in school repeaters and skippers' composition that might be originated by structural changes of the school. Finally, we only keep schools that appear in all 7 years, and omit schools with extremely small reported grade size.

Israeli high school students are enrolled either in an academic track leading to a matriculation certificate (*Bagrut* in Hebrew) or in an alternative track leading only to a high

[8] This step leads to a small reduction in the sample since there are few special education high schools.

school diploma.[9] The *Bagrut* is completed by passing a series of national exams in core and elective subjects taken by the students between 10^{th} and 12^{th} grade. Students choose to be tested at various levels of proficiency, with each test awarding from one to five credit units per subject, depending on difficulty. Some subjects are mandatory, and for many the most basic level is three credit units. Advanced level subjects are those subjects taken at a level of 4 or 5 credit units. A minimum of 20 credit units is required to qualify for a matriculation certificate. We link the students' file with administrative records that include the results (test scores) of these matriculation exams.

We focus on the following matriculation outcomes that are available for all the years: the average score in the matriculation exams, matriculation status (equals 1 if the student was awarded the matriculation diploma, and 0 otherwise), the number of credit units, the number of advanced level subjects in math and science, and a matriculation status that meets university entrance requirements (at least 4 credits in English and another subject at a level of 4 or 5 credits, in addition to being awarded with the diploma).[10] We also constructed indicator variables for student enrollment in advanced courses in math, physics, computer science, biology, and chemistry.

The middle school data

Data for middle schools is based on the GEMS (Growth and Effectiveness Measures for Schools - *Meizav* in Hebrew) datasets for the years 2002-2005. The GEMS includes a series of tests and questionnaires administered by the Division of Evaluation and Measurement of the Ministry of Education.[11] The GEMS is administered at the mid term of each school year to a representative 1-in-2 sample of all elementary and junior high schools in Israel, so that each school participates in GEMS once every two years.

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[9] The matriculation certificate is a prerequisite for university admission and receiving it is one of the most economically important educational milestones. Similar high school matriculation exams are found in many countries and in some states in the United States. Examples include the French Baccalaureate, the German Certificate of Maturity (Reifezeugnis), the Italian Diploma di Maturità, and the New York State Regents examinations.

[10] Roughly, 10 percent of the students in the sample did not take any of the matriculation exams. These students get zero values in the average score. None of the other four matriculation outcomes that we use require such imputation since the zero values that these students get for these outcomes, for example, number of credit units, is a real and not an imputed measure of their achievements.

[11] The GEMS are not administered for school accountability purposes and only aggregated results at the district level are published. For more information on the GEMS see the Division of Evaluation and Measurement website (in Hebrew):
http://cms.education.gov.il/educationcms/units/rama/odotrama/odot.htm.

The GEMS student data include tests scores of 8th graders in math, science, Hebrew and English, as well as the responses of 7th through 9th grade students to questionnaires. In principle, all students except those in special education classes are tested and administered the questionnaires. The rate of tested students is above 90 percent and the rate of questionnaire completion is roughly 91 percent. Student test scores are originally in a 1 to 100 scale and we transformed them into standardized z-scores to facilitate the interpretation of the results.

The student questionnaire includes 71 questions addressing various aspects of the school and the learning environment. We focus on two sections of the questionnaire which address issues related to teaching pedagogy and the school learning environment. In these two sections students are asked to rate the extent to which they agree with a series of statements on a 6-point scale ranging from *"strongly disagree"* to *"strongly agree"*. We transformed students' responses to these items into standardized z-scores.

The student questionnaire data and test scores for the years 2002-2005 were linked to student administrative records collected by the Israeli Ministry of Education (identical in structure to the data used for high school students). The administrative records include student background characteristics and are used to construct the peer composition variables.

A large proportion of religious middle schools have separate classes by gender. Since we are unable to observe whether the students study in single-sex or mixed- sex classes in these schools we cannot measure the proportion of skippers or repeaters accurately. In addition, a large proportion of religious boys leave the public school system to attend Yeshiva institutions during middle school grades. This creates more measurement error and instability in the treatment variables within the religious schools. We therefore, drop all religious schools from the middle school sample.

Since we have multiple grades for each school in the student's questionnaire data, we exploit within school variation in the proportion of repeaters and skippers across years and grades to gain more variability in this variable. To get a more stable population within schools across years, we further restrict our sample to a balanced panel keeping only schools that have complete data for the 3 grades (7th, 8th and 9th) at least two years. We therefore have six observations of the same school for middle schools (7th, 8th and 9th grade for two years). The analysis on students tests scores for middle schools has more limited power since only 8th graders were tested leaving us with only two observations per school.

Measuring the Treatment Variables

In Israel, children roughly enter first grade in September of the calendar year in which they turn six years old. We say "roughly" because the relevant threshold date is based on the Hebrew calendar. For example, the first grade class of September 2007 is composed of children born between the 1st of Tevet 5761 (December 27th, 2000) and the 30th of Kislev 5762 (December 15th, 2001).[12] However, parents have some discretion in deciding when to send their children to first grade. The parents of a gifted child who can already read and write may decide to have her skip the last class of kindergarten, or make her enter school directly in second grade. More commonly, some parents who think that their child is not cognitively and emotionally mature enough for first grade, may decide to hold their child back and delay entry into first grade.

For children born between September 1st and the cutoff date, the process of delaying entry into first grade has a relatively low cost: all that is needed is a written request by the parents, accompanied by a letter from the kindergarten teacher in support of delayed entry. On the other hand, children born before September 1st, whose parents would like to delay their entry into first grade, need also a certification by an external counselor that the child is not ready for first grade.

Therefore, we define as "repeaters" children who are enrolled in a grade that is one year below their expected grade *and* were born before September 1st, as well as children who are enrolled in a grade that is two or more years below their expected grade. Similarly, we define as "skippers" all children who are enrolled in a grade that is one year or above their expected grade. Note that we do not define as repeaters children who are one year behind but were born between September 1st and the cutoff date. As a result, we are confident that our sample of repeaters includes primarily children with low cognitive or emotional maturity, rather than children who are maybe deliberately kept one additional year in kindergarten to obtain a competitive advantage in school.[13] We also exclude from the count of repeaters students who are new immigrants, since the proportion of new immigrants who are repeaters is very high, and it is unclear whether repeater status among new immigrants indeed reflects low academic ability.[14]

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[12] For conversion between Hebrew dates and Gregorian dates, see http://www.hebcal.com.

[13] In Israel, as elsewhere, there have been reports in the popular press that an increasing number of parents delay their children's entry into the school system, and that this phenomenon is particularly common among affluent parents.

[14] We also exclude from the count of skippers 130 Ethiopian students who were born abroad. These students have significantly lower academic outcomes compared to other skippers or to regular students. We suspect that these students were incorrectly classified as skippers because they have erroneous date of birth. This is a likely assumption given that the Ethiopian calendar is different from the Gregorian calendar. Nevertheless, since the group of Ethiopians classified as skippers is only 4 percent of the skippers population, the results are not sensitive to the exclusion of this group.

The "repeater" or "skipper" status is determined primarily while in primary school, even before entering first grade. Our data does not allow following a student from first grade to the end of high school, so we cannot determine for each student the exact timing of becoming a repeater or a skipper. However, we can assemble some evidence in support of the claim of early determination of these indicators. In Table 1a we trace back the repeater/skipper status in each of the middle school grades for three cohorts of 10th graders (1997-1999). The evidence in this table suggests that around 90% of repeaters and skippers are already in this status by 7th grade. For, example, in the cohort of 10th grade in 1997, 91.2% of the repeaters were already repeaters by the beginning of 7th grade and only 2.4% became repeaters while repeating 10th grade. Among 1997 10th grade skippers, 90% were already skippers in the beginning of 9th grade and 10% of them became skippers while skipping 9th grade. This may seem a high average but note that in 1998 and 1999 cohorts the respective skipping rate is only 2%-3%.

More evidence about the early determination of the repeater and skipper status is seen in Table 1b which presents the mean proportion of repeaters and skippers in each grade (from 1st to 10th grade) based on cross section data of grade enrollment in 1996, 2002 and 2003. The proportion of repeaters is 4.4% in 2nd grade and it does not change at all until 10th grade. The proportion of skippers rises with grade in a stepwise manner: it is very low in the beginning, then rises moderately towards the end of the elementary school, and then jumps somewhat abruptly in the transition from middle school (9th grade) to high school (10th grade).

Table 2 shows descriptive statistics for student outcomes in high school by ability group and cohort, along with the sample sizes and the mean proportion of repeaters and skippers. This sample includes 309 high schools and 378,930 students from seven cohorts. The average proportion of repeaters is 3.2 percent and that of skippers is 1.6 percent and none of them seem to have an obvious time trend.

It is immediately apparent that repeaters have much lower mean outcomes than regular students, while skippers have much higher mean outcomes. For example, on average for the whole sample period, 60.9% of regular students in the sample were awarded a matriculation certificate, versus only 23.9% among repeaters and 71.8% among skippers. Skippers accumulated, on average, 23.6 credit units while repeaters accumulated only 12.7 and regular students accumulated 21.5. The achievement gap is much larger in science and math: skippers' matriculation curriculum includes 0.95 advanced level subjects in math and science while repeaters had only 0.12 such subjects. Regular students stand, as usual, between the skippers and repeaters with 0.62 advanced level subjects in math and science.

A more specific illustration of the large gap between these groups is presented in the lower panel of Table 2. The enrollment rate of skippers in advanced level math classes in high school is 29.0%, double the rate of regular students while the respective rate of repeaters is extremely low (1.6%). Similarly, the enrollment rate in advanced physics is 19.1% for skippers, 9.7% among regular students, and 1.6% among repeaters. A similar pattern is seen in advanced computer science and chemistry classes while the gaps in biology are somewhat smaller. These findings provide strong support for our working hypothesis that skippers are indeed high ability students, while repeaters are low ability.

5. Evidence on the Validity of the Identification Strategy in the High School Sample

A. Is there sufficient variation in the proportion of skippers and repeaters?

The identification strategy outlined in section 3 raises a number of concerns. The first is related to precision: since identification relies on within school variation in the proportion of repeaters and skippers, sufficient variation in peer composition across cohorts within schools is needed to obtain precise estimates. Table 3 shows that, despite the low average proportion of skippers and repeaters, there is substantial variation in peer composition, which can be exploited in the empirical analysis. The top panel of the table shows the variance decomposition of the proportion of repeaters and skippers in high schools. The within school variation for repeaters and skippers is 34% and 58% respectively.

Figures 1-2 show that this variation is evident not only in small schools but also in medium and large schools as well as in large and medium sized towns. Figure 1 displays the within school standard deviation in the proportion of repeaters (panel A) and skippers (panel B) by the average cohort size of the schools for the high school sample. In both panels it is evident that the within school variation is larger in small schools but there is significant variation in larger schools as well. Figure 2 shows that there are schools with significant within school variation in large and in small towns. The evidence in figures 1-2 is important because it suggests that the identification of the ability peer effects will not rely solely on variation in small schools and towns, which are mainly situated in the periphery of the country, but will rely also on variation from medium and large schools and towns, including the large metropolitan areas in the center of the country.

B. Is observed within school variation consistent with a random process?

As an alternative way to assess whether the observed within school variation in the proportion of skippers and repeaters was consistent with a random process, we performed Monte Carlo simulations. For each school, we randomly generated the repeater and skipper status of the students in each cohort and computed the within school standard deviation of the proportion repeaters and skippers.[15] We repeated this process 1,000 times to obtain an empirical 95 percent confidence interval for the standard deviation for each school.[16]

To illustrate this procedure we plotted in Figure 3 the actual standard deviation in the proportion of repeaters and the 95 percent confidence interval computed for each school. It is clear from the figure that most of the standard deviations fall within the confidence interval. Overall, 93% percent of the high schools had a standard deviation in the proportion of repeaters that fell within the 95% confidence interval. The standard deviation in the proportion of skippers fell within the 95% confidence interval in 90% of the cases. We further re-estimated all models by restricting the samples to schools that had a standard deviation within the confidence interval and obtained virtually identical results to those based on the full sample and reported below.

C. Does variation in the proportion of repeaters and skippers affect school mobility?

Another concern is whether the within school variation in the proportion of repeaters and skippers affect the mobility of students. We address this concern by checking whether the likelihood that a student leaves a school (by moving to another school or dropping out) is associated with the proportion of repeaters and skippers in his/her initial grade. Using the sample of 10^{th} grade students (which is the first grade of high school) we constructed a dummy variable that equals to one if the student left the school in the following year.[17] Using this indicator as a dependent variable, we estimated models similar to (1) to asses the effects of the proportion of

[15] The repeater and skipper status of each student were randomly generated by a binomial distribution function with *p* equal to the average proportion of repeaters and skippers, respectively in the school across all years.

[16] Since the models at the high school level control also for school specific time trends, the within school standard deviations in the proportion of skippers and repeaters were computed based on the residuals from a regression of the proportion of skippers and repeaters on school fixed effects and school specific time trends.

17 In order to avoid classifying as school movements or drop-outs those cases that arise from structural school changes (closures, merges, etc.) or from data collection problems, we follow Hanushek et al. (2004) and exclude from school leavers those cases where the student moved to a school attended by more than 30 percent of the students of his/her former grade. We further excluded from school leavers those cases were 100 percent of the students in the grade left the school. Less than half percent of the sample's observations are affected by these two adjustments.

skippers and repeaters in the grade on the likelihood that a 10th grade student leaves his/her initial school.

Table A1 in the appendix reports the regression results along with the outcome means. The first thing to note is that the rate of students' mobility is relatively low. Roughly, 2.7 percent of the students left their school at the transition between 10th and 11th grade. This relatively low mobility rate (in comparison, for example, to the US) makes the implementation of an identification strategy based on within school variation in repeaters and skippers especially appealing in the Israeli context.[18] The estimates of the effects of the proportion repeaters on the likelihood of leaving the initial high school are small and insignificant. Overall, they suggest that the likelihood that a student leaves his/her initial school is unrelated to the proportion of repeaters and skippers in his/her cohort.

D. Is the variation in proportion skippers and repeaters random?

Finally, we test directly whether the within school variation in the proportion of repeaters and skippers is indeed random. It could be that variations in these proportions in a school are correlated with unobserved determinants of student outcomes. The lack of school choice at the middle school level and the very limited scope of private schooling in Israel diminish significantly the possibility of such selection. Such selection could occur in high schools, though it is very unlikely since, while parents may know the average repeaters and skippers' proportion at a school, it will be difficult for them to predict in advance these proportions for a specific cohort.

Nevertheless, to address this issue, we checked whether the proportion of repeaters and skippers within a school is correlated with students' background variables like parental education, family size, and proportion of new immigrants. Table 4 provides evidence on these balancing tests and presents the estimated coefficients from regressions of various student characteristics on the proportion of repeaters and skippers in high school. We present estimates from three specifications: simple OLS regressions, a specification with a full set of school fixed effects, and a specification with both school fixed effects and school-specific time trends.[19]

18 A US national study reports that 40 percent of third graders have changed schools at least once since 1st grade (US General Accounting Office, 1994). Hanushek et al. (2004) report an annual rate of student mobility of 24% in Texas elementary schools. Similar annual rates are reported for Ohio by Rhodes (2005) and for Florida (personal communication with David Figlio).

[19] Balancing tests for middle schools are reported in the next section.

The OLS estimates show strong associations between the proportions of the two ability groups and student background characteristics. These correlations are negative for the proportion of repeaters and positive for skippers. However, these correlations are much smaller and become insignificant in most of the within school regressions, where some of the estimates even change signs. The addition of school specific linear time trends wipes away almost all associations. For example, the coefficient of mother's years of schooling on the proportion of repeaters is -26.919 (s.e. 2.337) in the OLS regression. It drops to -0.607 (s.e. 1.403) in the within school regression and it is further reduced to -0.152 (s.e. 1.411) when adding school specific linear time trends.

Overall, by conditioning on school fixed effects and school specific linear time trends we are able to eliminate most of the observed associations between the proportion of skippers/repeaters and family background characteristics. There are some imbalances for students' ethnicity, but they are relatively small, only marginally significant and are of inconsistent signs. For example, the coefficient of Asia/Africa ethnic origin on the proportion of repeaters (in the full specification) is 0.129 (s.e. 0.069) and the coefficient of Europe and America ethnic origin is 0.100 (s.e. 0.051). This means that a change in the proportion of repeaters is positively associated with a change in the proportion of students from Asia/Africa, which is a relatively disadvantaged group, but it is also positively associated with a change in the proportion of students from America or Europe ethnic origin, which is a relatively privileged group. It is also worth noting that the magnitude of the estimates is very small relative to the magnitude of the independent variable. For example, a one standard deviation increase in the proportion of repeaters (0.03) is associated with a 0.3 percentage points increase in the proportion of students with Asian/African ethnic origin and with a similar increase in the proportion of students whose parents were born in America or Europe. In any case, in the outcome regressions, we will control for the student background covariates and for the average background characteristics of the regular students. The proportion of skippers is not significantly correlated with any of the background characteristics, including the ethnic origin indicators.

6. Results in the High School Sample

A. Effects on High School Students' Achievement

Table 5 reports the effects of the proportions of repeaters and skippers on the high school achievements of regular students. Each cell in the table shows the estimated coefficient on the proportion of repeaters or skippers in a grade from a separate regression. Column 1 presents the outcome means for regular students. Columns 2-5 report the results for the effect of the

proportion of repeaters and columns 6-9 the results for the effect of the proportion of skippers. The estimates presented are based on four different specifications. Columns 2 and 6 report OLS estimates when only year dummies are included as controls. In columns 3 and 7 school fixed effects are added, in columns 4 and 8 individual and school time varying controls are added and in columns 5 and 9 school specific time trends are added as controls.

We see a common pattern for the effect of repeaters for most outcomes, as we move from the first to the fourth specification. Adding school fixed effects dramatically reduces the negative point estimates obtained from simple OLS regressions, though they remain negative and statistically significant. This decline, by about a factor of ten, suggests that selection and sorting play a large role in these OLS correlations. Adding the individual and school time varying controls leaves the estimates almost unchanged, suggesting that the school fixed effects eliminate essentially all the effect of the observables characteristics on the outcomes. This pattern is consistent with the findings reported in Table 4 that suggested that the proportion of repeaters is not correlated with observable students- characteristics. Adding the school specific time trends, though, leads to a further decline in the point estimates, with standard errors staying roughly unchanged. For example, the simple OLS estimate for the effect of the proportion repeaters on the average score is -194.485, it declines to -19.335 when school fixed effects are added, then it is changed to -22.641 when student and school characteristics are added, and finally drops to -8.333 when the school specific trends are added.

Four out of the five point estimates are significantly different from zero (at 10% level of significance) in the fourth and most complete specification (column 5). The only estimate that becomes non-significant is the coefficient of the number of advanced level subjects in science. This evidence suggests that having a larger proportion of low ability students in class harms the achievements of the regular students. These negative effects are, however, moderate. For example, increasing the proportion of repeaters in class from 0 to 5 percent will lead to a decline of 1 percent in the matriculation rate of the regular students.

The pattern of the results for the effect of skippers is less regular. The OLS simple estimates are all positive and highly significant but adding school fixed effects drives towards zero all the estimates and even leads to some sign changes. Adding the pupil characteristics and the school time varying controls does not lead to any measurable changes in the estimates. For example, the simple OLS estimate for the effect on the average score is 111.796, it declines to 0.032 when school fixed effects are added, rises to 6.053 when student's and school characteristics are added and then drops to 3.025 when the school specific trends are added;

however, the standard errors are always large and the coefficients are not statistically different from zero. Based on these estimates we can conclude that the proportion of skippers in class does not have any effect on the outcomes of other regular students, a result in sharp contrast to the effect of the low ability students. However, we will see below that skippers do have some positive effects on the most able among the regular students.

B. Falsification tests

To check the internal validity of the estimates presented above against threats of an omitted variable or selection bias we replace the measure of treatment with the proportion of repeaters or skippers in an older or younger cohort. If the omitted variable bias is due to any short term time trend effect that is not captured by the school specific linear time trend, then it is appropriate to use as a placebo treatment the proportion of skippers or repeaters in adjacent cohorts, the younger cohort (*t-1*) and the older cohort (*t+1*).

The evidence on these falsification tests is presented in Table 6: in columns 3-4 we show the effect on outcomes when we use as the measure of peer quality the proportion of repeaters in cohorts *t-1* and *t+1* respectively. In columns 6-7 we use as the placebo treatment the proportion of skippers in cohorts *t-1* and *t+1*. For the purpose of comparison, we reproduce in this table the results from the full specification using the actual treatment reported in columns 5 and 9 of Table 5.

The results based on the *t-1* or *t+1* measure of treatment show no effect at all on any of the outcomes, for both types of the placebo treatment. Moreover, the sign of the estimates does not have a consistent pattern. For example, all the estimates for the effect of repeaters when the *t-1* measure is used are positive while the sign of all the estimates obtained with the true treatment measure are negative. When the *t+1* measure is used, two of the point estimates are negative and three are positive and none of them is significantly different from zero. Moreover, when using the proportion of skippers in the cohort of *t+1* (column 7) the estimate of the matriculation rate is 0.099 (s.e. 0.113) while the estimate when using the correct measure (cohort t) is -0.123 (s.e. 0.114). The lack of any discernible effects when the placebo treatments are used is also an indication that the estimated effects of the correct measure of treatment are not biased due to omitted unobservable confounders of the effect of interest.

C. Allowing for Heterogeneous Effects by Students Cognitive Ability

We now test for the presence of heterogeneous effects: specifically, we look at whether skippers or repeaters differently affect students with different academic ability. For identifying student's ability we rely on students' enrollment in advanced level math and science study programs. It is recognized that these programs attract the most able students and indeed this perception is supported by our data as these students have the highest mean high school outcomes. Based on this idea, we divided the non-repeaters/non-skippers sample based on the number of advanced level math and science programs (biology, chemistry, computer science and physics) that a student was enrolled in. We consider four different groups: the first group includes students with no enrollment in any of these programs and it accounts for about two thirds of the overall sample. The second group is the complement of the first group and includes students enrolled in at least one advanced level course (a third of the sample). The third and fourth groups are subsets of the second group: the third group includes only students enrolled in at least two programs (a sixth of the sample) while the fourth (less than a tenth of the sample) includes students enrolled in three or more programs.

Table A2 presents evidence from balancing tests based characteristics in each of the four ability groups. The table shows coefficients from regressions of various student characteristics on the proportion of repeaters and skippers. The estimates are from the full specification that includes both school fixed effects and school-specific time trends. Overall, after conditioning on school fixed effects and school specific linear time trends there are no observed associations between the proportion of skippers/repeaters and family background characteristics in each of the four subsamples.

In Table 7, columns 4, 7, 10 and 13, we present the mean outcomes for each of the four groups, respectively. The mean of each of the outcomes increases sharply and monotonically as we move from the first to the fourth group. For example, the mean matriculation rate in the fourth group is 0.973, more than twice the respective rate (0.463) in the first group. This pattern strongly supports the notion that the number of advanced programs in math and science that students are enrolled in is a good criterion for ranking students by cognitive ability.

Though enrollment in such programs is determined relatively early in high school, it could still be affected by the proportion of repeaters and skippers in the grade. If this is the case, estimation based on stratified samples by the number of advanced math and science study programs may involve a selection bias. In the first row of Table 7 we present evidence on this issue by reporting the effect of the proportion of repeaters/skippers on students' enrollment in advanced math and science programs. All these estimates are small and not statistically different

from zero, suggesting that there is no significant association between the number of math and science advanced programs that a student is enrolled in and the proportion of repeaters and skippers in his/her grade. These results imply that we can stratify the sample by number of math and science advanced programs without a concern about potential selection bias.

The second panel in Table 7 presents the estimates of the effect of repeaters and skippers on each of the five high school outcomes for the four groups we defined above. In columns 2-3 we present again, for convenience of comparison, the estimates based on the full sample. The results in columns 5, 8, 11 and 14 are quite striking: the proportion of repeaters affects negatively only the lowest ability group, that of students who are not enrolled in any math and science advanced program. The estimates in column 5 are all negative and statistically significant from zero and they are larger (in absolute terms) than the respective estimates based on the full sample presented in column 2. In contrast, the effect of the proportion of repeaters on students who are enrolled in some math and science programs are not significantly different from zero and some even have a positive sign, especially in the high ability groups. This evidence indicates that a higher proportion of low ability students tends to harm in particular regular students who are relatively weak academically and do not enroll in advanced programs in math and science.[20] These students are mostly affected by repeaters because they are exposed to them most as they share with them the same classes in the compulsory and basic level courses in math, English and Hebrew and most likely also some of the elective courses.

Columns 6, 9, 12 and 15 present the effect of the proportion of skippers on outcomes for the four ability groups. The estimated effects on the lowest ability group are very small, inconsistent in sign, and imprecisely estimated. Similar mixed results are obtained in column 9, where we estimate the effect of skippers on all students enrolled in at least 1 advanced math or science program. However, when the sample is limited to the most able students, those with enrollment in 2+ or 3+ advanced programs in math and science, we find positive estimates for two outcomes, the average score and the number of advanced math and science subjects with a passing score. Some of these estimates are marginal or even significant. For example, the estimated effect on the average score for the 2+ sample is 7.828 (s.e. 5.314) and the estimated

[20] We also stratified the sample by parental schooling splitting the sample into two groups as follows: students whose parents both have 12 or more years of schooling (60% percent of students) and the rest. Based on this more conventional stratification, we find that the effect of repeaters is estimated to be negative in both samples, as seen in columns 3 and 4 of Table A3, though it is much larger and more precise for students whose parents have low education. Overall, the results reported in this table suggest that the low ability peers have a negative impact mainly on students from low socio-economic background, consistent with the results presented in Table 7.

effect on the number of advanced subjects in science for the 3+ sample is 1.442 (s.e. 0.557). It is striking that we find some effect for these two outcomes, since they are the only ones that are still unbounded from above. The means of the other three outcomes are almost at the maximum possible, and it is not surprising that the proportion skippers have no positive effect on them. For example, the mean matriculation rate in the 3+ group is 0.973, only slightly below the maximum of 100 percent.

Overall, these results suggest that skippers have a positive effect on the students who are most similar to them in terms of ability. This could be because skippers are enrolled in classes mostly (and perhaps only) with these peers so even though the proportion of skippers in a grade is very small, their proportion in advanced math and science classes represents a higher intensity of treatment. Alternatively, it might be the case that students are only affected by peers who are most similar to them. The same two arguments could also explain why the negative effects of the repeaters are mostly found among the lowest ability students.

D. Heterogeneous Effects by School Size

Table 8 presents the results for samples stratified by school size: up to 200 (190 schools) and over 200 students (119 schools) in an average grade. The first group includes small and medium schools (up to 6 regular-sized classes in a grade) and the second includes very large schools.

Contrasting columns 3 and 4 we see that the negative effect of repeaters is evident only in the sample of small to medium schools and in the sample of large schools the signs of the effect are mostly negative but they are small and imprecise. This result is most likely due to the lower variation of treatment in very large schools which does not allow estimating precisely the treatment effect in this sample. It is also possible that larger schools are able to allocate resources and students more efficiently across classes so as to offset the detrimental effects of an unusually large proportion of repeaters in a cohort. The effect of the proportion of skippers is negligible and not precise in essentially all of the samples.

7. The Middle School Sample

For our analysis of middle school samples, we start by presenting balancing tests of the covariates in Table 9. Once again, we observe that the coefficients on the treatment variable drop by a substantial amount when we control for school fixed effects and all of them become insignificantly different from zero. Some of the coefficients even change sign. The proportion of

repeaters is negatively correlated with parents' education, even after controlling for school fixed effects, but the point estimates are very small and imprecise. All of the other correlations also become insignificant. In any case, in the outcome regressions, we will control linearly for the background covariates, and this to some extent will alleviate the concerns that there may still be selection issues, but some caution in the interpretation of the results is still warranted.

The samples we have for middle schools test scores pool together only two cohorts of 8th grade. Therefore, the within school estimation of the effect of the proportion of repeaters and skippers is less powerful in this sample, as we are precluded from controlling for school specific time trends. However, panel B in table 3 shows us that within-school variation in the proportion of skippers and repeaters still accounts for a substantial fraction of the total variance: within-school variation in the proportion of repeaters represents 49% of the total variance, and within-school variation in the proportion of skippers represents 76% of the total variance.

Columns 1-2 in Table 10 present the mean of standardized test scores for repeaters and skippers in each of the four subjects. As expected, repeaters have lower mean test scores, about 0.6-0.7 standard deviation lower than the regular students. Skippers, on the other hand, have a higher mean test score in each subject, about 0.4-0.5 of a standard deviation higher than the regular students.

Columns 4-9 present the estimated effect of the proportion of repeaters and skippers based on three different specifications. Columns 4 and 7 report OLS estimates when only year dummies are included as controls. In columns 5 and 8 school fixed effects are added, and in columns 6 and 9 individual and school time varying controls are added. Despite the reduced power of our empirical strategy, we do find negative effects of the proportion of repeaters on math, Hebrew and English test scores but not on science test scores and the estimates are less precise than the effect we estimate on high school outcomes.

We note that the OLS estimates for the effect of repeaters are negative and highly significant but drop by a factor of four or five once the school fixed effects are added and they do not change much with the addition of individual and school varying controls. This robustness of the estimates to controls is an indication that indeed the proportion of repeaters is not correlated with observed students' characteristics. The most comprehensive specification (column 6) tells us that a 10 percentage point increase in the proportion of repeaters reduces test scores in math (by 0.121 of a standard deviation), in Hebrew (by 0.101 of a standard deviation), and in English (by 0.077 of a standard deviation). However, only the math coefficient is relatively precisely

measured. We also report in the table the effect on the average score of the four subjects: again, the estimate is negative and only marginally significant.

The pattern of the estimates for the effect of skippers is different. The OLS results are positive but not significant, except for the English test score. The within school estimates become negative but none of them is statistically significant, even though the coefficients are of similar magnitude to the estimated effect of repeaters. Overall the pattern of middle school results resembles very much the pattern of the estimated effects of repeaters and skippers on high school outcomes, even though they are less precise.

8. Identifying Mechanisms of Ability Peer Effects

The results reported above show that the proportion of low ability students in class lowers the scholastic achievements of regular students while no such negative or positive effects are observed for the proportion of high ability students (except for a positive effect on the most able students). In this section we attempt to explore the mechanisms through which repeaters in class impact their peers. One obvious mechanism is simply the spillover of the lower achievements of repeaters to their classmates. We examine here other possible channels using a rich set of behavioral outcomes among middle school students. We report the results for a pooled sample of 7^{th} through 9^{th} graders.

We grouped the individual items of the student questionnaire under eight categories. The first five describe teachers' pedagogical practices in the classroom: (1) instilment of knowledge and enhancement of comprehension; (2) instilment of applicative, analytical and critical skills; (3) transparency, fairness and feedback; (4) individual treatment of students; and (5) instilment of capacity for individual study. These categories of teacher's pedagogical practices are common and accepted terminology in the literature of educational psychology. The remaining three categories describe the classroom environment: (6) classroom disruption and violence; (7) teacher-student relationships; and (8) inter-student relationships.

A. Overall Pattern of Differences between Repeaters, Skippers and Regular Students

Table 11 reports the differences in means (in standard deviation units) of the eight categories between repeaters and regular students and between skippers and regular students. These statistics permit assessing how the three different groups of students perceive their learning and classroom environment. Columns 1 and 3 report the differences after controlling for year and grade dummies and columns 2 and 4 report the controlled differences after adding individual

controls, as well as grade, year, and school-grade-year fixed effects. The controlled differences for the individual questionnaire items included in each category are reported in columns 1 and 2 of Table A4.

First, it is seen from columns 1-2 that repeaters appreciate more their teachers' pedagogical methods relative to regular students. These differences in the teachers' assessment by repeaters and by regular students remain almost unchanged even after controlling for the full set of individual covariates and for school-grade-year fixed effects. Repeaters give to their teachers higher scores on their teaching methods (category 1 and 2), and they also perceive their teachers as being more fair and transparent (category 3). In addition, there are striking differences between repeaters and other students in the items grouped under the categories of "individual treatment of students" and "instilment of capacity for individual study" (categories 4 and 5). In sharp contrast to this pattern of differences between repeaters and regular students, skippers do not assess their teachers differently than regular students. Practically skippers award their teachers the same mean score as their regular classmates in every one of the 8 categories.

More insight about these differences is gained from the differences in the individual questionnaire items reported in columns 1-2 of Table A4. There are large differences in items 17, 21, 22 and 23, which all relate to whether teachers adapt their teaching methods and pace to individual student needs. Repeaters value highly their teachers' individualized attention while skippers assign lower scores to their teachers relative to regular students when assessing their capabilities of individual treatment of students. We conclude from this pattern of differences that teachers pay more attention and time to underachieving students (repeaters), perhaps at the expense of time and attention given to regular and high achieving students. This crowding out of instruction time from regular students will be shown to be intensified as the proportion of repeaters rises.

The differences in category 6 (*Discipline and lack of violence*) reveal that repeaters have a worse behavior and are exposed more to violence than other students.[21] This is seen more explicitly in items 34-36 of table A4. Repeaters are more likely to report being involved in physical fights, they report a higher incidence of fights among their classmates, and they are more intimidated and often scared to go to school because there are violent students. This pattern is reversed for skippers as they are less likely to be involved in physical fights and less exposed to violent behaviors relative to regular students.

[21] In constructing the mean of the grouped item, all variables are transformed so that high values indicate a more disciplined and less violent learning environment.

In contrast to the worse behavior of repeaters, it is interesting that we find that they report better student teacher-relationships relative to the regular students. In particular, repeaters are more likely to report that they can turn to their teachers and a counselor if they have a problem at school (item 41 in table A4) while that feeling is not shared by skippers who actually are less likely than regular students to say that they can turn to the teaching staff if they have a problem at school. Furthermore, unlike repeaters, skippers are similar to regular students in terms of other aspects of teachers-students relationships.

Overall, the pattern of differences between repeaters, skippers, and regular students regarding their relationships with teachers is consistent with the pattern of differences in the perception of teaching methods. It seems that teachers give more attention to the special needs of repeaters while overlooking the attention demanded by other students in the class. No similar diversion of attention from regular students is caused though by the skippers in class.

There is one category in which repeaters and skippers appear to be similar. Both groups of students report a lower quality of inter-student relationships compared to regular students. Both, repeaters and skippers, seem to be less socially adjusted and to have a lower level of satisfaction with school than regular students, with repeaters reporting lower scores than skippers.

B. Effects of Repeaters and Skippers on Learning and Classroom Environment

We now turn to the analysis of the effects of repeaters and skippers on the learning and classroom environment faced by the regular students. We report within school estimates of the proportion of repeaters/skippers for each of the categories (Table 12) as well as for individual items of the student questionnaire (Table A4) using the sub-sample of the regular students.[22] Following Kling et al. (2007) we compute the average effect τ_c for each category c by averaging across the standardized effects of the individual outcomes included in that category. That is, the average effect of the proportion of repeaters (or skippers) for category c is defined as $\tau_c = \frac{1}{K_c}\sum_{k=1}^{K_c}\frac{\pi_{kc}}{\sigma_{kc}}$ where K_c is the number of outcomes included in category c, π_{kc} is the effect on outcome k included in category c, and σ_{kc} is the standard deviation of the outcome. To calculate the variance of τ_c it is necessary to estimate the covariance matrix of the individual effects within

[22] We have also estimated falsification or placebo regressions for all students' questionnaire items similarly to the respected models estimated for the high school outcomes reported in Table 6. The results for these tests are not reported here but they indicate that the estimates of the placebo treatment measures are always small, have sometimes the wrong sign, and are not significantly different from zero.

each category. We do so by estimating a system of seemingly unrelated regressions for the outcomes in each category.[23] By averaging across the effects on different outcomes within a category, we implicitly attribute equal weight to all outcomes. Since there is no prior information to justify a particular weighting, we assign equal weight to all outcomes as it provides a more transparent interpretation.[24] For each of the categories, we also report the ratio of the elasticity of the repeaters' effect relative to the elasticity of the skippers' effect, both evaluated at the sample means.

Focusing first on the effects on teachers' pedagogical methods, we see that the sign of the repeaters' estimates is always negative while for the skippers it is always positive. The coefficients for the effect of repeaters are almost always significant at the 5 percent level; on the other hand, only the effect of skippers on the instilment of analytical skills (item 2) is statistically significant, while the others have t-statistics between 0.61 and 1.63. These results support the conjecture that a high proportion of low or high achieving students lead teachers to modify their pedagogy and their personalized attention to students. For example, a higher proportion of repeaters causes teachers to focus less on real comprehension and more on memorizing the material; and it induces less focus on developing analytical skills and more effort on instilling technical understanding of concepts. A higher proportion of repeaters also induces teachers to devote less time to the individual support of the regular students and less emphasis on teaching them the skills needed for individual study.

The symmetry, though of opposite sign, in the effect of skippers and repeaters on teachers' practices in the classroom as viewed by other students is somewhat puzzling, given that the effects of skippers on test scores was almost inexistent as opposed to the negative effects of repeaters. However, when looking at the relative elasticities evaluated at the sample means (column 3) we see that the effect of repeaters is three to four times larger than the effects of skippers. Even more dramatic is the elasticity gap in the effect on individual attention and instruction which for repeaters is almost *seven* times larger than for skippers. The differences in

[23] This method treats the standard deviation of the outcomes (σ_{kc}) as known. It is possible to account for the sampling variance of σ_{kc} by applying the delta method or bootstrapping. Kling and Liebman (2004) show that the estimates that result from the delta method or bootstrapping are similar to those obtained under the assumption of known σ_{kc} in a study that evaluates the effects of the Moving to Opportunity program on youth outcomes. Based on their results and given the large sample size of our study, we treat σ_{kc} as known.

[24] As an alternative strategy, we also constructed aggregate outcomes by averaging across the standardized outcomes included in each category and estimated the effects of the proportion of repeaters (skippers) on these aggregate outcomes. The results for these averaged outcomes (not reported here to save space) are virtually identical to the average effects for each category reported in Table 11. In practice, both methods provide identical estimates when there are no missing values in item responses and the model has no additional covariates besides the treatment variable.

the elasticities of the two different treatments is mainly because the proportion of skippers in a grade is, on average, only a fifth of the proportion of repeaters in a grade. Therefore, even if skippers have a positive effect on teachers' pedagogical methods, these effects are highly diluted. As shown above, it seems that the special attention given to repeaters by their teachers crowds out time and attention devoted to regular and high ability students.

The analysis on classroom violence and discipline shows that a higher proportion of repeaters increases the level of disruption. This result is consistent with the descriptive statistics from table 11 that showed that repeaters are more likely to be involved in physical fights. The estimate on "Discipline and lack of violence" is -0.291 (s.e 0.167). This effect summarizes the negative estimates of all the seven items that are included in this group (shown in table A4) though none of them are precise enough to be statistically significant. The sign of the estimated effect of the proportion of skippers on the aggregate measure of the classroom violence and discipline and on each of the respective items is positive but none of them is significantly different from zero.

The good relationship between repeaters and their teachers stands in sharp contrast to the negative effects of repeaters on the relationship between regular students and their teachers. The estimated effect for repeaters is -0.492 (s.e. 0.216). The negative influence of the repeaters on student-teacher relationships is manifested in particular in how often students are perceived to be rude to their teachers (item 37 in Table A3, estimate -0.708, s.e. 0.426) and on the lack of respect between teachers and students (estimate. -0.693, s.e. 0.301). Such 'bad blood' between students and teachers is reflected also in the negative effect of repeaters on the overall relationship between teachers and students (estimate -0.675, s.e. 0.316). Overall, we can conclude that while repeaters have good relationships with their teachers, they seem to be crowding out teachers' attention to regular students. Again we see in the results the symmetry with respect to the effect of skippers: a higher proportion of skippers has a positive effect on student-teacher relationship as seen in all the five items that make this group.

Lastly, we find that a higher proportion of repeaters in class has a detrimental effect on inter-students relationships but the effect is not significant. The effect on the average of these items is -0.179 (s.e. 0.192). On the other hand, the effect of the proportion of skippers on the grouped outcomes is positive and marginally significant although none of the individual items is significant). The estimate of the skippers on the average is 0.691 (s.e. 0.424).

9. Conclusions

In this paper we have estimated the effects of being in school with a high proportion of high-ability or low-ability peers on the outcomes of regular students and on the learning environment. We view our main contribution as twofold: first, we are able to measure peer ability using a variable that is strongly related to academic ability but that is determined before school entry, so that it is relatively unlikely to suffer from the reflection problem; second, by means of a unique survey on the schooling environment, we are able to explore the "black box" of the educational production function, and investigate the mechanisms that underlie the estimated peer effects.

We find that an unusually high concentration of low ability students lowers the academic achievements of regular students.[25] In particular, this negative impact is concentrated among the students located at the left tail of the ability distribution. The schooling environment survey reveals that a high proportion of low ability students has a significant detrimental effect on teachers' pedagogical practices, on teacher-student relationships, and somewhat raises the level of disruption and violence within the classroom. These results are quite striking, since low ability students generally report a *higher* level of satisfaction with their teachers' pedagogical practices and with the quality of teacher-student relationships. These findings, combined, suggest that one of the main channels through which low-achieving students negatively affect their peers is by diverting teacher attention from regular to struggling students.

On the other hand, we find no effect of a high proportion of high-achieving students on the educational outcomes of their peers, except for a positive effect among the most able regular students. We do find also that skippers generally have a positive effect on the learning environment but the impact on outcomes is not felt because the proportion of this group in class is very small, implying very small treatment intensity. In high school in particular the skippers' treatment is diluted even more as the interaction between the high-ability students and the regular students is minimal due to tracking. Consistent with this interpretation we did find some positive effect of skippers on the most able among the regular students who are enrolled with them in advance math and science programs. Overall, our results enhance our understanding of the

[25] We should keep in mind, though, that the peer-treatment of these two groups may reflect not only cognitive ability, but also non-cognitive skills. First, repeaters (skippers) are relatively older (younger) than regular students. Therefore, the treatment effects identified in this paper include in part the effects of peers' age. Second, repeater status reflects mostly late entry to first grade, rather than actual grade repetition. Late entry may occur because the child is not ready for first grade, either cognitively or emotionally, at the end of kindergarten. Hence, a high proportion of repeaters may indicate a high proportion of children that are emotionally immature rather than academically weak.

operation of peer effects in educational settings, and can have important implications for the design of many educational policies.

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Figure 1: Within School Standard Deviation in the Proportion of Repeating and Skipping Students by School Size

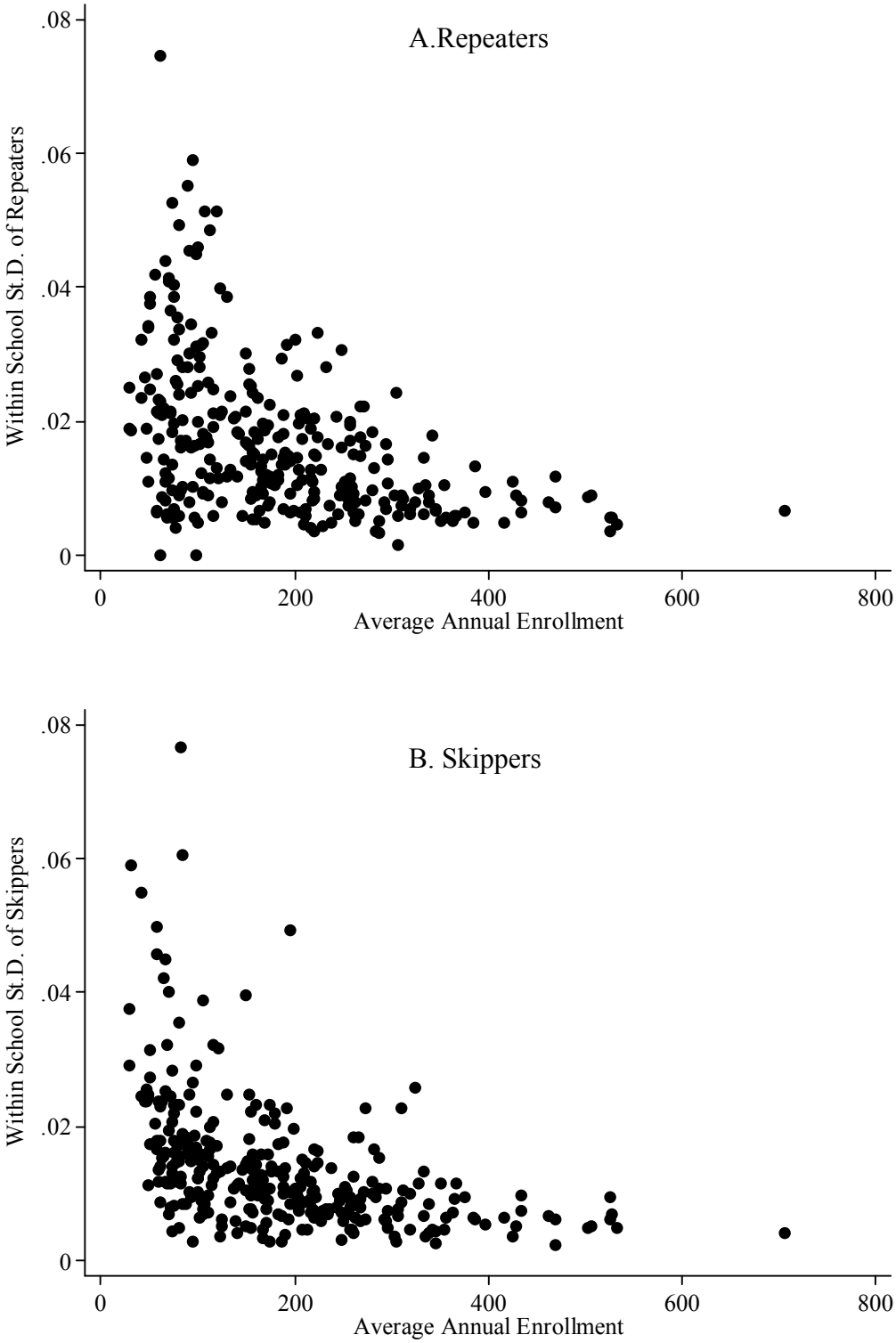
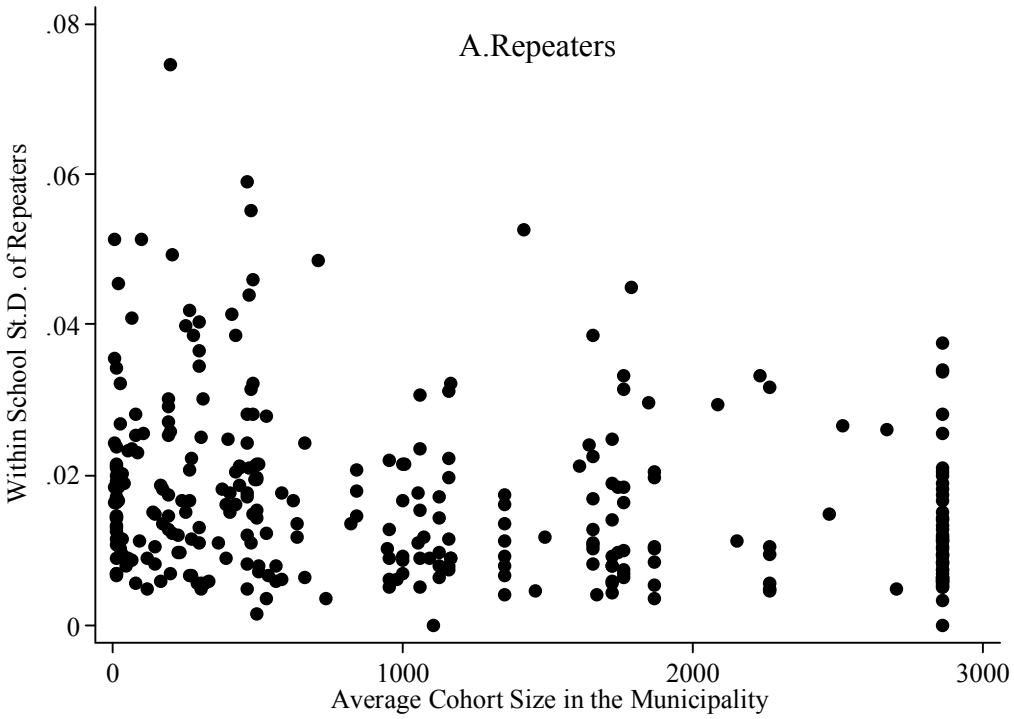


Figure 2: Within School Standard Deviation in the Proportion of Repeating and Skipping Students by Town Size



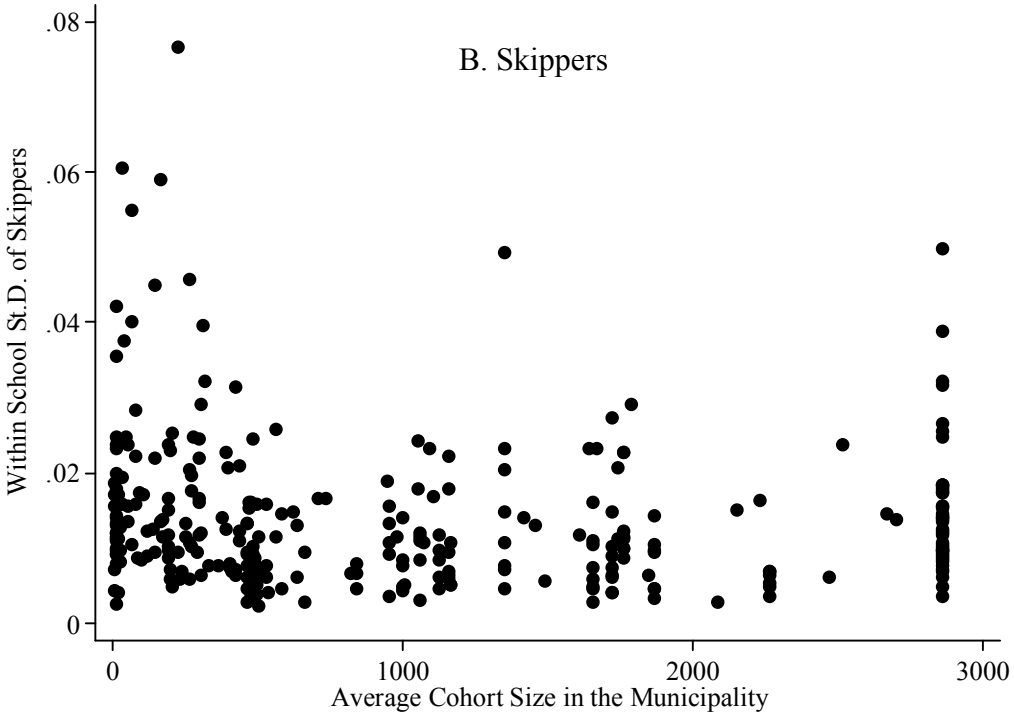


Figure 3. Monte Carlo Simulations for the Within School Standard Deviation in the Proportion of Repeaters in High Schools

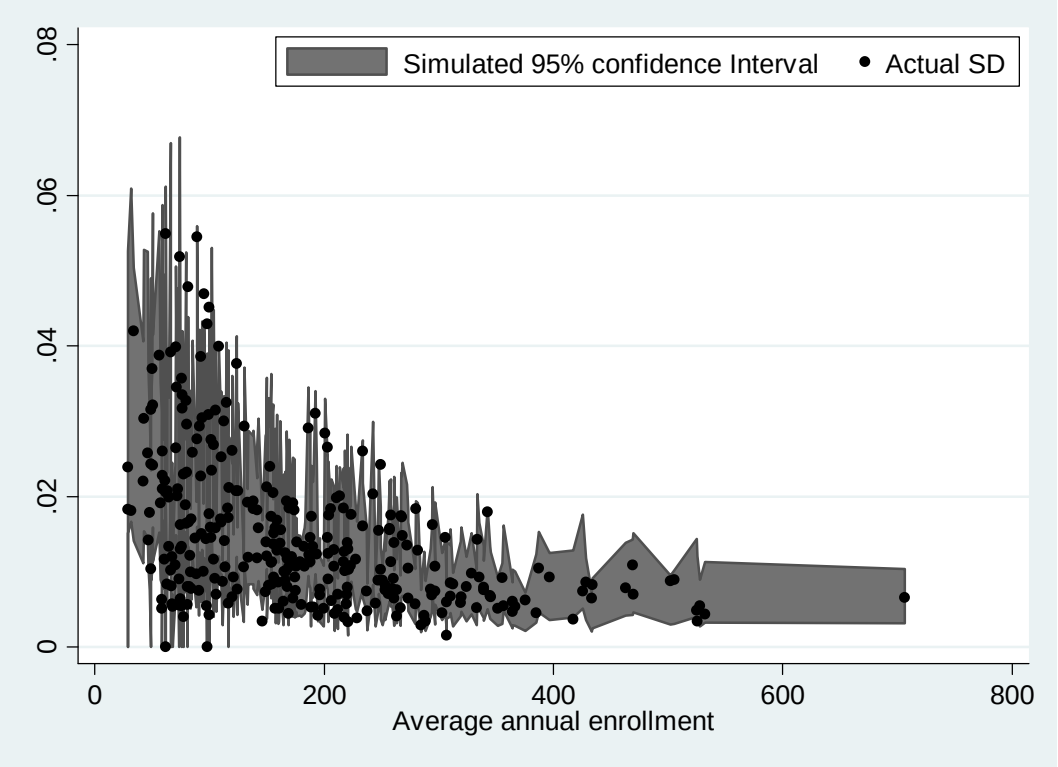


Table 1a: Repeaters and Skippers in 10th Grade:
Tracing their Previous Years Enrollment

	Cohort	In Grade 7, 3 Years earlier	In Grade 8, 2 Years earlier	In Grade 9, 1 Year earlier
Proportion of Repeaters	1997	0.912	0.905	0.976
	(2,081)	(1,788)	(1,973)	(2,013)
	1998	0.886	0.891	0.978
	(2,001)	(1,840)	(1,898)	(1,872)
	1999	0.892	0.899	0.984
	(2,129)	(2,036)	(1,710)	(2,001)
Proportion of Skippers	1997	N/A*	0.850	0.900
	(791)		(638)	(711)
	1998	N/A*	0.933	0.981
	(1,092)		(916)	(945)
	1999	0.923	0.943	0.973
	(1,306)	(1,163)	(900)	(1,200)

(1) The figures represent the proportions of students who studied in grade (10-x) x years before 10th grade, out of the students who were detected x years ago. This is an indication of whether the repeater/skipper status has been acquired more than x years ago.

(2) The Numbers of non-missing observations are in parentheses

* These figure are missing, because due to data limitations we can only see students who did NOT skip in the past 3 years.

Table 1b: Average Proportions of Repeaters and Skippers by Grade*

Grade	Proportion of Repeaters	Proportion of Skippers
1	4.16%	0.53%
2	4.41%	0.85%
3	4.62%	0.91%
4	4.48%	0.69%
5	4.56%	1.14%
6	4.31%	1.12%
7	4.51%	1.02%
8	4.42%	1.06%
9	4.50%	1.07%
10	4.34%	1.42%

* The proportions are out of *potential treaters* in the grade, and not out of the grade size. The figures for grades 1-9 report the non-weighted average of the 3 years where enough data is available for all 9 grades: 1996, 2002 and 2003. The figures for 10th grade report the non-weighted average of 1996 and 2002 only.

Table 2: Descriptive Statistics: Student's Achievements in High Schools

	Repeaters (1)	Skippers (2)	Others (3)
Main matriculation outcomes			
Average score	50.9	72.8	69.2
Matriculation status	0.239	0.734	0.609
Number of credit units	12.7	23.8	21.5
Number of advanced level subjects in math and science	0.115	0.992	0.617
Matriculation diploma that meets university requirements	0.165	0.690	0.544
Enrollment in advanced classes			
Math	0.016	0.305	0.140
Physics	0.016	0.201	0.097
Computers	0.039	0.190	0.125
Biology	0.031	0.132	0.111
Chemistry	0.017	0.150	0.098
Number of students	11,971	5,619	351,101

Notes: The table reports descriptive statistics for students outcomes by group for the years 1994 through 2000. The sample includes all public Jewish high schools that have a matriculation track.

Table 3: Variation in the Proportions of Skipping and Repeating Students

	Proportion of Repeaters			Proportion of Skippers		
	Sum of squares	Share of total	DF	Sum of squares	Share of total	DF
	(1)	(2)	(3)	(4)	(5)	(6)
			A. High Schools			
Between	1.418	64%	309	0.367	42%	309
Within	0.756	34%	1,860	0.503	58%	1,860
Total	2.211		2,169	0.870		2,169
			B. Secular Middle Schools			
Between	0.537	51%	278	0.059	24%	278
Within	0.520	49%	1,469	0.184	76%	1,469
Total	1.057		1,747	0.243		1,747

Notes: Panel A reports the variance decomposition for the sample of middle schools and Panel B reports the variance decomposition for the sample of high schools.

Table 4. Balancing Tests for the Proportions of Repeaters and Skippers.

	High School								
	Outcome means			Treatment: Proportion of Repeaters			Treatment: Proportion of Skippers		
	Repeaters	Skippers	Others	OLS	FE	Detrend	OLS	FE	Detrend
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Boy	0.584	0.409	0.472	0.911	0.002	-0.013	-1.337	0.113	0.102
	[12.919]	[-5.580]		(0.299)	(0.071)	(0.070)	(0.620)	(0.091)	(0.088)
Father's years of schooling	10.130	13.476	12.155	-30.426	-1.064	-0.494	29.854	2.158	1.430
	[-20.155]	[13.262]		(2.494)	(1.335)	(1.324)	(4.909)	(1.762)	(1.826)
Mother's years of schooling	10.140	13.499	12.256	-26.919	-0.607	-0.152	24.219	1.981	1.233
	[-21.319]	[14.696]		(2.337)	(1.403)	(1.411)	(4.305)	(1.699)	(1.821)
Number of siblings	2.848	2.447	2.427	4.092	0.939	-0.111	7.143	0.749	-0.386
	[11.831]	[0.407]		(1.242)	(0.741)	(0.594)	(2.319)	(0.952)	(0.845)
Immigrant	**	0.217	0.105	0.616	-0.446	-0.150	0.755	0.271	0.145
		[10.054]		(0.145)	(0.125)	(0.076)	(0.277)	(0.126)	(0.094)
Ethnic Origin:									
Israel	0.372	0.372	0.424	-1.550	0.100	-0.070	-0.117	-0.126	-0.127
	[-7.664]	[-6.206]		(0.178)	(0.097)	(0.077)	(0.260)	(0.102)	(0.097)
Asia or Africa	0.402	0.177	0.279	1.968	0.259	0.129	-1.561	-0.155	0.003
	[15.976]	[-14.591]		(0.183)	(0.075)	(0.069)	(0.251)	(0.086)	(0.080)
Europe, the Americas or Oceania	0.171	0.230	0.193	-1.203	0.090	0.100	0.987	0.027	-0.014
	[-3.752]	[4.912]		(0.111)	(0.050)	(0.051)	(0.206)	(0.061)	(0.066)
Ethiopia	0.054	0.009	0.009	0.310	-0.075	-0.052	0.013	-0.062	-0.036
	[6.241]	[-0.353]		(0.065)	(0.030)	(0.028)	(0.062)	(0.030)	(0.026)
Soviet Union	**	0.168	0.085	0.525	-0.405	-0.150	0.329	0.233	0.111
		[8.834]		(0.140)	(0.122)	(0.069)	(0.280)	(0.118)	(0.085)
Other	**	0.044	0.011	-0.050	0.030	0.043	0.349	0.083	0.063
		[4.512]		(0.023)	(0.016)	(0.016)	(0.062)	(0.040)	(0.032)
Number of students	11,971	5,619	351,101						

Notes: the table reports means of the dependent variables in columns 1-3, and T-statistics for repeaters and skippers differences in means from the other students, clustered at the school level, are reported in squared brackets. Columns 4-9 report OLS and school fixed effects estimates from separate regressions of the relevant dependent variable on the proportions of skippers and repeaters. All regressions include year dummies. Regressions in columns 5 and 8 include also school fixed effects. Regressions in columns 6 and 9 include school fixed effects and school specific linear time trends. Standard errors are adjusted for clustering at the school level.

**: By definition, immigrants are never repeaters

Table 5: Estimates of the Effects of the Proportions of Repeaters and Skippers on General Bagrut Outcomes

	Outcome means	Proportion of Repeaters				Proportion of Skippers			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Average Score	69.249	-194.485	-19.335	-22.641	-8.333	111.796	0.032	6.053	3.025
		(13.266)	(6.304)	(5.779)	(4.567)	(24.857)	(6.911)	(6.744)	(5.972)
Matriculation status	0.609	-4.692	-0.554	-0.519	-0.178	3.350	-0.083	-0.065	-0.144
		(0.268)	(0.134)	(0.121)	(0.100)	(0.509)	(0.142)	(0.144)	(0.113)
Number of credit units	21.510	-88.077	-12.762	-12.415	-4.294	70.744	-0.611	-0.124	-0.203
		(6.682)	(3.469)	(2.831)	(1.895)	(11.580)	(3.170)	(3.041)	(2.506)
Number of advanced level subjects in science	0.617	-7.024	-0.651	-0.581	-0.127	4.692	0.129	0.043	0.040
		(0.504)	(0.203)	(0.185)	(0.135)	(1.004)	(0.208)	(0.192)	(0.174)
Matriculation diploma that meets university requirements	0.544	-5.343	-0.460	-0.463	-0.139	3.358	-0.263	-0.247	-0.214
		(0.288)	(0.126)	(0.112)	(0.080)	(0.592)	(0.132)	(0.131)	(0.115)
Year Fixed-Effects		✓	✓	✓	✓	✓	✓	✓	✓
School Fixed Effects			✓	✓	✓		✓	✓	✓
Enrollment (2nd Poly.)				✓	✓			✓	✓
Individual Pupil Controls				✓	✓			✓	✓
Cohort Mean Controls				✓	✓			✓	✓
School Time Trend					✓				✓
Number of students	351,101								
Number of schools	310								

Notes: The table reports means of the dependent variables (columns 1), OLS (columns 2 and 6) and school fixed effects (columns 3-5 and 7-9) estimates of the effects of the proportions of skipping and repeating students in a grade on their peers' achievements in high school. Proportions are measured in 10th grade. Individual controls include: a female dummy, both parents' years of schooling, number of siblings, immigration status, ethnic origin, and indicators for missing values in these covariates. Cohort mean controls include students individual controls averaged by school and year. Robust standard errors clustered at the school level are reported in parentheses.

Table 6: Falsification Tests for the Effects of the Proportions of Repeaters and Skippers on Matriculation Outcomes

		Proportion of Repeaters			Proportion of Skippers		
	Outcome means	In year t (actual)	In year t-1 (placebo)	In year t+1 (placebo)	In year t (actual)	In year t-1 (placebo)	In year t+1 (placebo)
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Average Score	69.2	-8.333	0.167	4.845	3.025	-4.558	7.504
		(4.567)	(4.922)	(4.908)	(5.972)	(6.469)	(5.935)
Matriculation status	0.609	-0.178	0.053	-0.025	-0.144	0.091	0.099
		(0.100)	(0.094)	(0.093)	(0.113)	(0.115)	(0.113)
Number of credit units	21.5	-4.294	0.884	1.032	-0.203	1.172	2.153
		(1.895)	(2.055)	(2.016)	(2.506)	(2.628)	(2.393)
Number of advanced level subjects in science	0.617	-0.127	0.037	0.133	0.040	-0.108	0.123
		(0.135)	(0.128)	(0.133)	(0.174)	(0.185)	(0.187)
Matriculation diploma that meets university requirements	0.544	-0.139	0.060	-0.028	-0.214	0.044	0.114
		(0.080)	(0.094)	(0.082)	(0.115)	(0.116)	(0.121)
Number of students	351,101						
Number of schools	310						

Notes: The table reports means of the dependent variables (columns 1) and school-specific time trends estimates (columns 2-7) of the actual and placebo effects of the proportions of skipping and repeating students in the actual and adjacent grades on students achievements in high school. Columns 2 and 5 report the effects the of actual treatments. Columns 3 and 6 report the effects of previous year's treatments at the same school (where the earliest cohort is assigned with the treatment of the latest cohort). Columns 4 and 7 report the effects of next year's treatments at the same school (where the latest cohort is assigned with the treatment of the earliest cohort). The regressions control for students background characteristics and school time varying controls detailed in table 5. The regressions include school and year fixed effects and school specific time trends and control also for a quadratic function of enrollment. Robust standard errors clustered at the school level are reported in parentheses.

Table 7: Estimates of the Effects of the Proportions of Repeaters and Skippers on General Bagrut Outcomes, by Groups Defined on Enrollment in Advanced Science Courses

	All sample			0 advanced science courses			1+ advanced science courses			2+ advanced science courses			3+ advanced science courses		
	Outcome means	Prop. of Repeaters	Prop. of Skippers	Outcome means	Prop. of Repeaters	Prop. of Skippers	Outcome means	Prop. of Repeaters	Prop. of Skippers	Outcome means	Prop. of Repeaters	Prop. of Skippers	Outcome means	Prop. of Repeaters	Prop. of Skippers
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)
Effect on Probability to Enroll in Advanced Science Courses															
Repeaters/Skippers					0.024	-0.013		-0.024	0.013		-0.020	0.020		-0.014	0.071
					(0.083)	(0.107)		(0.083)	(0.107)		(0.055)	(0.074)		(0.033)	(0.053)
Outcomes:															
Average Score	69.249	-8.333	3.025	63.233	-9.631	5.150	81.358	-4.760	-1.310	84.408	0.910	7.828	86.467	0.080	6.993
		(4.567)	(5.972)		(5.557)	(7.662)		(3.457)	(4.200)		(4.262)	(5.314)		(5.455)	(6.662)
Matriculation status	0.609	-0.178	-0.144	0.463	-0.224	-0.186	0.903	-0.085	-0.064	0.954	0.081	-0.157	0.973	0.086	-0.025
		(0.100)	(0.113)		(0.114)	(0.141)		(0.136)	(0.114)		(0.128)	(0.112)		(0.176)	(0.170)
Number of credit units	21.510	-4.294	-0.203	18.205	-5.760	0.021	28.161	-0.091	-0.490	29.763	1.329	-0.380	31.360	2.204	0.787
		(1.895)	(2.506)		(2.173)	(3.114)		(2.150)	(2.025)		(2.738)	(2.604)		(3.421)	(3.316)
Number of advanced level subjects in science	0.617	-0.127	0.040	0.125	-0.068	0.107	1.608	-0.382	0.253	2.051	-0.289	0.602	2.322	-0.343	1.442
		(0.135)	(0.174)		(0.064)	(0.104)		(0.370)	(0.371)		(0.344)	(0.415)		(0.454)	(0.557)
Matriculation diploma that meets university requirements	0.544	-0.139	-0.214	0.381	-0.196	-0.205	0.874	0.014	-0.222	0.943	0.122	-0.284	0.968	0.131	0.038
		(0.080)	(0.115)		(0.084)	(0.117)		(0.159)	(0.160)		(0.145)	(0.155)		(0.181)	(0.173)
Number of students in group	351,101			234,562			116,539			58,492			23,760		
Number of schools in group	310			310			307			289			254		

Notes: The table reports means of the dependent variables (columns 1,4,7,10,13) and estimates (other columns) of the effects of the proportion of skipping and repeating students on matriculation outcomes. Columns 1-3 report the estimates on the whole sample. Columns 4-6 report the estimates for students who were not enrolled in any advanced science course. Columns 7-9 report the estimates for students enrolled in least one advanced science course. Columns 10-12 report the estimates for students enrolled in at least two courses and columns 13-15 report the estimates for students enrolled in at least three. The regressions control for students background characteristics and school time varying controls detailed in table 5. The regressions include school and year fixed effects and school specific time trends and control also for a quadratic function of enrollment. Robust standard errors clustered at the school level are reported in parentheses.

Table 8: Estimates of the Effects of the Proportions of Repeaters and Skippers on Bagrut Outcomes Estimated Separately for Small and Large Schools

	Outcome means		Proportion of Repeaters		Proportion of Skippers	
	Small Schools	Large Schools	Small Schools	Large Schools	Small Schools	Large Schools
	(1)	(2)	(3)	(4)	(5)	(6)
Treatment Means			0.036	0.031	0.019	0.014
Average Score	67.7	70.2	-15.978	-2.513	1.201	7.064
			(6.233)	(7.368)	(6.636)	(10.965)
Matriculation status	0.580	0.627	-0.248	-0.126	-0.185	0.033
			(0.117)	(0.192)	(0.112)	(0.287)
Number of credit units	21.627	21.436	-7.179	-1.022	-0.001	-0.639
			(2.279)	(3.613)	(2.723)	(5.147)
Number of advanced level subjects in math and science	0.510	0.681	-0.374	0.214	-0.074	0.270
			(0.158)	(0.261)	(0.179)	(0.448)
Matriculation diploma that meets university requirements	0.493	0.575	-0.223	-0.074	-0.332	0.024
			(0.094)	(0.156)	(0.116)	(0.290)
Number of students			129,716	220,882	129,716	220,882
Number of schools			190	119	190	119

Notes: The table reports means of the dependent variables (columns 1 and 2) and estimates (columns 3-6) of the effects of the proportion of skipping and repeating students on matriculation outcomes. Columns 3 and 5 report the estimates in small schools, where the average yearly enrollment in 10th grade is less than 200. Columns 4 and 6 report the estimates in large schools, where the average yearly enrollment in 10th grade is at least 200. The regressions control for students background characteristics and school time varying controls detailed in table 5. The regressions include school and year fixed effects and school specific time trends and control also for a quadratic function of enrollment. Robust standard errors clustered at the school level are reported in parentheses.

Table 9. Balancing Tests for the Proportions of Repeaters and Skippers in Secular Middle Schools (7th through 9th grades)

	Outcome means			Proportion of Repeaters		Proportion of Skippers	
	Repeaters	Skippers	Others	OLS	School fixed effects	OLS	School fixed effects
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Male	0.648	0.380	0.496	0.066	0.082	0.042	-0.141
	[20.155]	[-8.697]		(0.078)	(0.080)	(0.142)	(0.148)
Father's years of schooling	11.934	14.291	13.008	-14.123	-0.476	23.283	-1.227
	[-20.258]	[13.282]		(2.393)	(0.621)	(5.359)	(1.060)
Mother's years of schooling	12.106	14.471	13.184	-12.778	-0.774	24.175	0.049
	[-22.230]	[14.310]		(2.216)	(0.594)	(5.134)	(0.956)
Number of siblings	2.460	2.115	2.212	2.496	-0.463	-2.151	-0.512
	[10.397]	[-3.138]		(0.824)	(0.551)	(1.566)	(1.232)
Immigrant	**	0.140	0.140	0.309	-0.075	-0.518	-0.040
		[-0.034]		(0.240)	(0.070)	(0.668)	(0.105)
Ethnic origin from Israel	0.490	0.494	0.498	-0.743	-0.012	0.812	0.079
	[-1.221]	[-0.314]		(0.275)	(0.077)	(0.639)	(0.137)
Ethnic origin from Asia or Africa	0.258	0.143	0.180	0.789	0.016	-0.961	-0.135
	[10.308]	[-3.955]		(0.194)	(0.067)	(0.314)	(0.109)
Ethnic origin from Europe, the Americas or Oceania	0.227	0.220	0.174	-0.404	0.068	0.899	0.090
	[6.315]	[4.366]		(0.159)	(0.064)	(0.281)	(0.132)
Ethnic origin from Ethiopia	0.025	0.004	0.014	0.083	0.002	-0.389	0.006
	[4.774]	[-5.148]		(0.045)	(0.025)	(0.085)	(0.030)
Ethnic origin from the former Soviet Union	**	0.114	0.120	0.326	-0.058	-0.408	-0.007
		[-0.525]		(0.233)	(0.067)	(0.673)	(0.097)
Immigrant from country other than Ethiopia or former Soviet Union nations	**	0.026	0.014	-0.049	-0.015	0.048	-0.033
		[3.159]		(0.026)	(0.018)	(0.042)	(0.034)
Number of students	8,499	1,854	240,478		240,478		
Proportion of students in grade	0.0337	0.0073					

Notes: The table reports means of the dependent variables in columns 1-3. The numbers in brackets in columns 1 and 2 are the t-statistics (clustered at the school level) for the difference in the mean of the relevant variable between skippers/repeaters and the other students. Columns 4 and 6 report the OLS and columns 5 and 7 report the school fixed effects estimates of the proportions of repeaters and skippers on students background characteristics, where the repeaters and skippers themselves are excluded from the sample. In addition, controls are included for grade fixed effects and year fixed effects. Standard errors clustered at the school level are reported in parentheses.

**: By definition, immigrants are never repeaters

Table 10: Estimates of the Effects of Proportions of Repeaters and Skippers on Test Scores of 8th Graders in Secular Middle Schools

	Outcome means			Treatment: Proportion of					
	Repeaters	Skippers	Others	Repeaters			Skippers		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Math	-0.666	0.457	0.018	-4.392	-1.140	-1.210	0.215	-2.039	-2.038
	[-30.639]	[12.775]		(0.644)	(0.693)	(0.686)	(1.487)	(1.721)	(1.758)
Science and Technology	-0.568	0.389	0.017	-2.572	-0.277	-0.106	1.273	0.728	0.236
	[-22.266]	[11.040]		(0.607)	(0.766)	(0.755)	(1.401)	(1.671)	(1.687)
Hebrew	-0.645	0.404	0.021	-3.324	-0.998	-1.005	1.594	-1.018	-1.439
	[-28.554]	[10.724]		(0.600)	(0.653)	(0.646)	(1.702)	(1.667)	(1.634)
English	-0.675	0.427	0.018	-4.447	-0.840	-0.774	3.497	-0.564	-0.812
	[-28.742]	[12.901]		(0.674)	(0.553)	(0.561)	(1.890)	(1.190)	(1.222)
Mean of Four Subjects				-3.722	-0.854	-0.831	1.663	-0.776	-1.049
				(0.561)	(0.543)	(0.546)	(1.490)	(1.408)	(1.429)
Common Time Trend				✓	✓	✓	✓	✓	✓
School Fixed Effects					✓	✓		✓	✓
Enrollment (2nd Poly.)					✓	✓		✓	✓
Individual Pupil Controls						✓			✓
Cohort Mean Controls						✓			✓
Number of students	3,456	830	96,779						
Proportion of students in grade	0.0330	0.0080							
Number of schools			354						

Notes: The table reports means of the dependent variables in columns 1-3, and T-statistics for repeaters and skippers differences in means from the other students, clustered at the school level, are reported in squared brackets. Columns 4 and 7 report the OLS and Columns 5-6 and 8-9 report the school fixed effects estimates of the proportion of repeaters and skippers on students standardized tests scores in 8th grade. Repeaters and skippers themselves are excluded from the sample. Individual controls include: a female dummy, both parents' years of schooling, number of siblings, immigration status and ethnic origin. Cohort mean controls include students individual controls averaged by school and year. The sample varies slightly between items. Robust standard errors clustered at the school level are reported in parentheses.

Table 11. Differences Between Repeaters/Skippers and Other Students in their Perception of the Learning and Classroom Environment in Secular Middle Schools (7th through 9th grades)

		Repeaters relative to others		Skippers relative to others	
		Raw diffs (1)	Individual controls + school-grade-year FE (2)	Raw diffs (3)	Individual controls + school-grade-year FE (4)
Pedagogy					
1	Instilment of knowledge and enhancement of comprehension	0.023 (0.009)	0.036 (0.009)	0.024 (0.015)	0.012 (0.015)
2	Instilment of analytical and critical skills	0.005 (0.004)	0.014 (0.004)	0.002 (0.008)	0.000 (0.007)
3	Transparency, fairness and feedback	0.041 (0.010)	0.028 (0.010)	-0.041 (0.018)	-0.023 (0.018)
4	Individual treatment of students	0.151 (0.009)	0.121 (0.008)	-0.040 (0.018)	-0.024 (0.017)
5	Instilment of capacity for individual study	0.109 (0.010)	0.106 (0.010)	-0.008 (0.020)	-0.014 (0.019)
Classroom environment					
6	Discipline and lack of violence	-0.048 (0.007)	-0.017 (0.007)	0.040 (0.013)	0.018 (0.012)
7	Student-teacher relationships	0.062 (0.009)	0.075 (0.008)	0.016 (0.017)	0.000 (0.016)
8	Inter-student relationships	-0.027 (0.010)	-0.029 (0.009)	-0.012 (0.019)	-0.025 (0.018)

Notes: the table reports controlled differences between repeaters or skippers and the other students on their views on the classroom environment. The estimates in columns 1 and 3 are from regressions that control for year and grade effects. The estimates in columns 2 and 4 are from regressions that control for individual background characteristics and include grade, year and school-grade-year fixed effects. Robust standard errors clustered at the school level are reported in parentheses.

Table 12. Estimates of the Effects of Proportion of Repeaters and Skippers on the Learning and Classroom Environment in Secular Middle Schools (7th through 9th grades)

		Treatment: Proportion of		Elasticity ratio (repeaters /skippers)
		Repeaters (1)	Skippers (2)	(3)
Pedagogy				
1	Instilment of knowledge and enhancement of comprehension	-0.420 (0.188)	0.556 (0.389)	-3.500
2	Instilment of analytical and critical skills	-0.159 (0.067)	0.339 (0.142)	-2.171
3	Transparency, fairness and feedback	-0.376 (0.203)	0.460 (0.372)	-3.793
4	Individual treatment of students	-0.361 (0.184)	0.245 (0.402)	-6.843
5	Instilment of capacity for individual study	-0.641 (0.212)	0.703 (0.429)	-4.225
Classroom environment				
6	Discipline and lack of violence	-0.291 (0.167)	0.343 (0.310)	-3.923
7	Student-teacher relationships	-0.492 (0.246)	0.911 (0.474)	-2.502
8	Inter-student relationships	-0.179 (0.192)	0.691 (0.424)	-1.202
	Number of students	240,478		
	Proportion of students in grade	0.034	0.007	
	Number of schools	279		

Notes: Columns 1 and 2 report the school fixed effects estimates of the proportion of repeaters and skippers on classroom environment. The estimates are for the average effects of the individual items reported in table A4. The regressions control for student background characteristics (a female dummy, both parents' years of schooling, number of siblings, immigration status, ethnic origin and indicators for missing values in these covariates), cohort mean characteristics (students individuals controls averaged by school and year), a quadratic function of enrollment, year and grade dummies, and school fixed effects. The sample varies slightly between items. Robust standard errors clustered at the school level are reported in parentheses. Column 3 reports the ratio of the elasticities of the effects of repeaters and skippers evaluated at the sample means.

Table A1: Estimates of the Effects of the Proportions of Repeaters and Skippers on Other Students Moving Out of School

	Mean Rate	Proportion of Repeaters				Proportion of Skippers			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Moving out rate	0.027	0.164	0.039	0.049	-0.018	0.420	0.101	0.074	0.079
		(0.115)	(0.066)	(0.062)	(0.056)	(0.162)	(0.081)	(0.076)	(0.062)
Year Fixed-Effects		✓	✓	✓	✓	✓	✓	✓	✓
School Fixed Effects			✓	✓	✓		✓	✓	✓
Enrollment (2nd Poly.)				✓	✓			✓	✓
Individual Pupil Controls				✓	✓			✓	✓
Cohort Mean Controls				✓	✓			✓	✓
School Time Trend					✓				✓

Notes: The table reports means of the dependent variable (column 1), OLS (columns 2 and 6) and school fixed effects (columns 3-5 and 7-9) estimates for the effects of the proportions of skipping and repeating students in a grade on the likelihood that a regular student leaves the school in the following year. Proportions are measured in 10th grade. Individual controls include: a female dummy, both parents' years of schooling, number of siblings, immigration status, ethnic origin and indicators for missing values in these covariates. Cohort mean controls include students individual controls averaged by school and year. Robust standard errors clustered at the school level are reported in parentheses.

Table A2. Balancing Tests for the Proportions of Repeaters and Skippers, by Enrollment in Advanced Science Courses

	No extended science subjects		1 or more advanced science subjects		2 or more extended science subjects		3 or more extended science subjects	
	Proportion Of		Proportion Of		Proportion Of		Proportion Of	
	Repeaters	Skippers	Repeaters	Skippers	Repeaters	Skippers	Repeaters	Skippers
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Boy	-0.002	0.107	-0.048	0.088	-0.133	0.073	0.051	-0.577
	(0.082)	(0.106)	(0.148)	(0.150)	(0.218)	(0.198)	(0.341)	(0.330)
Father's years of schooling	0.142	1.358	-2.183	1.555	-0.918	2.630	1.566	-0.730
	(1.242)	(1.809)	(2.109)	(2.478)	(2.604)	(2.887)	(3.375)	(4.387)
Mother's years of schooling	0.074	1.311	-0.628	0.985	1.899	4.038	5.263	3.614
	(1.270)	(1.821)	(2.334)	(2.397)	(2.966)	(2.715)	(3.995)	(4.001)
Number of siblings	0.174	-0.617	-0.950	0.092	-0.868	-0.067	-0.274	-0.476
	(0.611)	(0.957)	(0.818)	(0.964)	(0.899)	(1.125)	(1.147)	(1.495)
Immigrant	-0.139	0.172	-0.176	0.086	-0.281	0.199	-0.557	0.721
	(0.088)	(0.115)	(0.108)	(0.126)	(0.173)	(0.182)	(0.272)	(0.282)
Ethnic Origin:								
Israel	-0.032	-0.221	-0.202	0.078	-0.123	0.070	-0.137	0.099
	(0.088)	(0.113)	(0.141)	(0.170)	(0.205)	(0.240)	(0.328)	(0.329)
Asia or Africa	0.077	0.084	0.296	-0.170	0.324	-0.250	0.334	-0.297
	(0.081)	(0.096)	(0.121)	(0.139)	(0.168)	(0.183)	(0.289)	(0.273)
Europe, the Americas or Oceania	0.118	0.004	0.045	-0.056	0.039	-0.045	0.314	-0.511
	(0.059)	(0.083)	(0.104)	(0.131)	(0.178)	(0.207)	(0.276)	(0.316)
Ethiopia	-0.074	-0.071	0.019	0.041	0.024	-0.020	0.059	-0.035
	(0.036)	(0.036)	(0.033)	(0.022)	(0.026)	(0.014)	(0.041)	(0.019)
Soviet Union	-0.128	0.123	-0.212	0.083	-0.273	0.223	-0.557	0.695
	(0.081)	(0.104)	(0.102)	(0.121)	(0.164)	(0.177)	(0.269)	(0.289)
Other	0.039	0.080	0.055	0.025	0.008	0.023	-0.013	0.048
	(0.020)	(0.041)	(0.023)	(0.046)	(0.037)	(0.049)	(0.054)	(0.076)

Notes: The table reports the school specific estimates of the proportions of repeaters and skippers on background characteristics, where the repeaters and skippers themselves are excluded from the sample. In addition, controls are included for school specific time trends. Standard errors clustered at the school level are reported in parentheses.

Table A3: Estimates of the Effects of Proportion of Repeaters and Skippers on Matriculation Outcomes Estimated Separately for Students with Low and High Education Parents

	Outcome means		Proportion of Repeaters		Proportion of Skippers	
	Low Educ. Parents	High Educ. Parents	Low Educ. Parents	High Educ. Parents	Low Educ. Parents	High Educ. Parents
	(1)	(2)	(3)	(4)	(5)	(6)
Average Score	63.5	73.3	-13.947	-8.992	17.561	-4.757
			(7.176)	(4.701)	(9.793)	(7.050)
Matriculation status	0.472	0.705	-0.291	-0.115	-0.120	-0.190
			(0.136)	(0.118)	(0.190)	(0.115)
Number of credit units	18.681	23.478	-7.497	-2.876	6.003	-3.756
			(2.794)	(2.213)	(4.638)	(2.565)
Number of advanced level subjects in math and science	0.357	0.799	-0.209	-0.114	0.202	-0.087
			(0.133)	(0.220)	(0.235)	(0.218)
Matriculation diploma that meets university requirements	0.382	0.659	-0.248	-0.077	-0.284	-0.183
			(0.102)	(0.115)	(0.158)	(0.133)
Number of students			142,339	207,300	142,339	207,300
Number of schools			300	305	300	305

Notes: The table reports means of the dependent variables (columns 1 and 2) and school specific time trends estimates (columns 3-6) of the effects of the proportion of skipping and repeating students on matriculation outcomes. Columns 3 and 5 report the estimates on students with low-education parents (one of their parents has less than 12 years of schooling). Columns 4 and 6 report the estimates on students with high-education parents (both their parents have at least 12 years of schooling). The regressions control for students background characteristics and school time varying controls detailed in table 5. The regressions include school and year fixed effects and school specific time trends and control also for a quadratic function of enrollment. Robust standard errors clustered at the school level are reported in parentheses.

Table A4: Estimates of the Effects of Proportions of Repeaters and Skippers on the Learning and Classroom Environment in Secular Middle Schools (7th through 9th grades)

		Controlled difference in means relative to regular students		Treatment: Proportion of	
		Repeaters (1)	Skippers (2)	Repeaters (3)	Skippers (4)
Instilment of knowledge and enhancement of comprehension					
1	The teachers give exercises and assignments that help memorize the material	0.044 (0.012)	0.031 (0.021)	-0.569 (0.247)	0.805 (0.488)
2	The teachers ask many questions in class that check whether we know the material well	0.046 (0.013)	0.000 (0.022)	-0.630 (0.246)	0.814 (0.446)
3	The teachers commend students who know the material well	0.053 (0.014)	-0.001 (0.027)	-0.222 (0.239)	-0.084 (0.449)
4	The teachers provide many examples that help understand the material	0.070 (0.013)	-0.010 (0.024)	-0.467 (0.238)	0.428 (0.480)
5	The teachers hold discussions in class that help understand the material	0.060 (0.013)	-0.017 (0.024)	-0.441 (0.242)	0.418 (0.556)
6	During lessons, the teachers ask many questions that check whether we understand the material well	0.026 (0.013)	0.017 (0.026)	-0.473 (0.248)	0.601 (0.443)
7	I understand the teachers' scholastic requirements well	-0.046 (0.013)	0.075 (0.022)	-0.112 (0.223)	0.859 (0.479)
Instilment of analytical and critical skills					
8	The teachers give exercises and assignments whose answers have not been studied in class and are not in the textbooks	-0.013 (0.019)	-0.010 (0.033)	0.587 (0.314)	-0.575 (0.601)
9	The teachers require that we use what we have studied to explain various phenomena	0.041 (0.012)	-0.020 (0.026)	-0.289 (0.227)	0.603 (0.410)
10	The teachers ask that we find new examples by ourselves for the material we have studied	0.084 (0.019)	0.057 (0.036)	-0.468 (0.295)	0.107 (0.518)
11	The teachers ask that we try to find several ways to solve a certain problem	0.057 (0.013)	-0.009 (0.024)	-0.460 (0.193)	0.316 (0.439)
12	The teachers teach us to find a single common explanation for different phenomena	0.072 (0.017)	0.007 (0.035)	-0.462 (0.267)	-0.017 (0.566)
13	The teachers give assignments where it is required to analyze material and to relate it to other things we have studied	0.052 (0.013)	0.060 (0.026)	-0.279 (0.230)	0.469 (0.405)
14	When there are several ways to solve a problem, the teachers require that we check them all and find the best one	0.083 (0.012)	-0.016 (0.024)	-0.293 (0.219)	0.166 (0.442)
15	The teachers expect us to ask ourselves whether what we have learned is correct	0.176 (0.019)	-0.037 (0.041)	-0.082 (0.324)	-0.590 (0.705)
16	The teachers teach us how to know whether information we have found is important, relevant and can be used	0.103 (0.013)	-0.002 (0.025)	-0.403 (0.216)	0.780 (0.447)

Table A4: Estimates of the Effects of Proportions of Repeaters and Skippers on the Learning and Classroom Environment in Secular Middle Schools (7th through 9th grades) (cont.)

		Controlled difference in means relative to regular students		Treatment: Proportion of	
		Repeaters (1)	Skippers (2)	Repeaters (4)	Skippers (5)
Transparency, fairness and feedback					
17	The teachers explain to me exactly what I have to do to improve my studies	0.109 (0.013)	-0.042 (0.025)	-0.549 (0.234)	0.587 (0.429)
18	The teachers explain according to what they determine the grades / assessments	-0.058 (0.013)	-0.007 (0.022)	-0.247 (0.267)	0.285 (0.514)
19	The teachers often tell me what my situation is regarding schoolwork	0.032 (0.013)	-0.020 (0.025)	-0.317 (0.249)	0.487 (0.462)
Individual treatment of students					
20	The teachers know what the educational difficulties of each student are	0.078 (0.013)	-0.029 (0.023)	-0.459 (0.252)	0.713 (0.462)
21	When a student has difficulty with a certain topic the teachers give him more time to study it	0.118 (0.012)	-0.012 (0.024)	-0.318 (0.223)	0.238 (0.486)
22	The teachers give every student homework according to his place in the material	0.222 (0.014)	-0.016 (0.022)	-0.180 (0.224)	-0.408 (0.431)
23	The teachers help every student to learn topics interest him	0.175 (0.014)	-0.031 (0.025)	-0.146 (0.210)	-0.043 (0.454)
24	The teachers give me a feeling that if I make an effort I will succeed more at studies	0.088 (0.013)	-0.048 (0.024)	-0.437 (0.246)	0.752 (0.550)
25	When a student fails, the teachers encourage him to try again and again	0.096 (0.012)	-0.030 (0.025)	-0.430 (0.257)	0.043 (0.570)
26	The teachers always assist me when I need help with studies	0.078 (0.012)	-0.009 (0.025)	-0.517 (0.256)	0.390 (0.508)
Instilment of capacity for individual study					
27	The teachers teach us how to learn new topics by ourselves	0.121 (0.012)	0.035 (0.027)	-0.589 (0.225)	0.682 (0.511)
28	The teachers require students to utilize many and varied sources of information (newspapers, books, databases etc.)	0.071 (0.012)	-0.040 (0.024)	-0.825 (0.290)	1.254 (0.542)
29	The teachers teach us to observe our environment and to follow phenomena that occur in it	0.129 (0.013)	-0.037 (0.025)	-0.491 (0.234)	0.154 (0.445)

Table A4: Estimates of the Effects of Proportions of Repeaters and Skippers on the Learning and Classroom Environment in Secular Middle Schools (7th through 9th grades) (cont.)

		Controlled difference in means relative to regular students		Treatment: Proportion of	
		Repeaters	Skippers	Repeaters	Skippers
		(1)	(2)	(4)	(5)
Violence and discipline					
30	I know what behavior is allowed or forbidden in school	0.032	0.018	-0.362	0.467
		(0.012)	(0.024)	(0.221)	(0.424)
31	Student discipline is strictly maintained at school	0.056	-0.040	-0.485	0.586
		(0.013)	(0.022)	(0.281)	(0.578)
32	The classroom is frequently noisy and non-conducive to learning	-0.031	-0.003	0.468	-0.281
		(0.015)	(0.028)	(0.359)	(0.582)
33	Students are frequently late or truant	-0.013	-0.058	-0.015	-0.894
		(0.017)	(0.032)	(0.385)	(0.719)
34	There are many fights among students in my class	0.058	-0.095	0.636	0.451
		(0.018)	(0.030)	(0.486)	(0.825)
35	I was involved in violence many times this year (physical fights)	0.105	-0.048	0.211	-0.662
		(0.016)	(0.026)	(0.264)	(0.497)
36	Sometimes I am scared to go to school because there are violent students	0.125	0.015	0.192	-0.165
		(0.016)	(0.030)	(0.240)	(0.533)
Student-teacher relationships					
37	Students are frequently rude to the teachers	-0.012	-0.111	0.708	-0.898
		(0.016)	(0.032)	(0.426)	(0.761)
38	Sometimes the teachers treat me in an insulting or hurtful way	-0.084	-0.083	0.458	-1.055
		(0.021)	(0.039)	(0.428)	(0.812)
39	There are good relationships between the teachers and the students	0.113	-0.027	-0.675	1.307
		(0.013)	(0.024)	(0.316)	(0.612)
40	There is mutual respect between the teachers and the students	0.102	-0.021	-0.693	1.083
		(0.013)	(0.023)	(0.301)	(0.594)
41	When I have a problem I have whom to turn to at school (teachers, advisor)	0.100	-0.079	-0.247	0.771
		(0.011)	(0.024)	(0.296)	(0.535)
Inter-student relationships					
42	I feel well adjusted socially in my class	-0.107	-0.024	-0.005	0.443
		(0.013)	(0.023)	(0.193)	(0.385)
43	Students in my class help each other	0.049	-0.028	-0.374	0.765
		(0.011)	(0.023)	(0.255)	(0.527)
44	I am generally well off at school	-0.026	-0.026	-0.150	0.831
		(0.013)	(0.023)	(0.241)	(0.572)
	Number of students	8,499	1,854	240,478	
	Proportion of students in grade	0.0337	0.0073		
	Number of schools	279			

Note: Columns 1 and 2 report the controlled differences between repeaters or skippers and the other students on their reports about the classroom environment. The estimates come from regressions that control for the full set of individual covariates detailed in table 11 and include also year, grade, school-grade-year fixed effects. Columns 3 and 4 report the school fixed effects estimates of the proportions of repeaters and skippers on classroom environment where repeaters and skippers themselves are excluded from the sample. The regressions control for students background characteristics and school time varying controls detailed in table 11. The regressions also include school fixed effects and grade and year dummies. The sample varies slightly between items. Robust standard errors clustered at the school level are reported in parentheses.