The Determinants of School Budgets:

Per Class and Per Student

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Abstract

This chapter examines the source of differences between budget allocations to official regular primary education schools (grades 1-6), and, more specifically, looks for evidence of preferential spending across the various education streams and supervisory authorities. The chapter examines the variables that are considered in per class and per student budgeting and how these considerations are reflected across education sectors and supervisory authorities. It then presents an empirical estimation of the influence of each variable on the budgetary differences (while controlling for other factors).

The findings show that the budgeting of schools is for the most part based on transparent formulas. The main difference between schools in the allocation of teaching hours per class and per student arises from these formulas, and stakeholders have little influence on these variables. Thus, most of the difference in allocation between the sectors and across types of supervisory authority can be explained by ideological, political decisions reflected in legislation and budgeting rules. In general, there is consensus on such issues as the division of the education system into educational sectors and streams based on religiosity, the need to prioritize populations with weak socioeconomic backgrounds, and the desire to reduce the number of students per class.

Differences are found in per student and per class budget allocations across the sectors and supervisory authorities, even after controlling for factors that distinguish them. The source of this difference is in the unique budgeting baskets where allocations are not set by a general formula, such as special grants, and supplements that are granted to specific sectors and supervisory authorities, such as prayer hours for State-religious education and budgets for a five-year plan in the Arab sector. These additions and baskets lead to the budgets being the highest in the Hebrew State-religious education system, and the lowest in the Arab education system.

Introduction

The Ministry of Education's budget is the second largest of all government ministries. In 2019, it is expected to reach almost NIS 60 billion (The Administration for Economics and Budgets, Ministry of Education). In the past few years, the budget has grown, with the rise reflected in a real increase in expenditure per student — in other words, in the amount allocated per student in the education system overall. This increase warrants an examination of the budget distribution across different parts of the system and how this distribution is determined. Is it primarily based on transparent budgeting rules, or is it based on undocumented, deliberate and covert preferences or biases that are harder to track and thus undermine transparency?

This chapter is the first part of a wider project analyzing and explaining trends in education expenditure (per class and per student) since 2014, and the factors that influence the budgetary differences seen throughout the system.[1] The current study examines budgeting per class and per student in 2017 from several perspectives: the level of the budget, the gaps between the sectors and supervisory authorities, and the variables that influence budget allocation.[2] The study focuses on official regular primary school education, in other words, excluding Special Education schools, Haredi education, and schools with the status of "recognized but not official." The data include only six-year primary schools, that is, schools that have students from first to sixth grade only.[3]

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1 Since only official regular primary education is being reviewed in this chapter, any conclusions drawn should not be used to generalize about other parts of the education system.

2 The education system is divided into Hebrew and Arab education sectors. The Arab sector is further divided into Arab, Druze and Bedouin education. Hebrew education has three streams: State, State-religious, and Haredi education.

When there is no reference to any specific kind of budget allocation (for instance, teacher work hours), the reference is to the total per student and per class budget, including teaching expenses, auxiliary services (maintenance and secretarial staff), training hours and so on. The budgetary level of expenditures not related to teachers' work is estimated at 15 percent of school budgets, such that these costs might also be sources of per class and per student budget differences between the sectors and supervisory authorities.

3 Schools that also have grades 7-9, or that include only some of the grades from 1-6, were not included in this study, to guarantee comparability. Calculations including all of the schools did not find significant differences compared to the results detailed in this chapter. See Appendix Tables 3a and 3b for these calculations.

The number of students in primary schools with first to sixth grades only in official regular education was 532,000, which is 76 percent of all students in grades 1-6 in official regular education in 2017. The total number of primary school students was 917,000, and the total in official regular education was 700,000.[4]

The study's data are limited to this student population for the following reasons:

- The budgetary data for this education level are available.

- This population comprises the vast majority of students in primary education.

- The budgeting of these schools adheres most closely to the budgeting formulas of the Ministry of Education.

1. The budgeting of primary education: General background

School budgeting usually follows clearly defined rules (Levačić 2006; 2008; Ross and Levačić 1999). These rules might be reflected by formulas or defined guidelines. At first glance, the clearer and more well-defined the budgeting formulas, the less free are the heads of the education system to show preferential treatment to a certain sector or to discriminate against another one.

The budgeting rules of the official primary education system in Israel have changed fundamentally three times since the founding of the State (Blass, Zussman, and Tsur 2016). Today the budgeting of schools is determined by a combination of three main budgeting sources:

A. The basic allocation ("the basic standard")

The basic allocation is meant to guarantee the appropriate number of teacher work hours (weekly teaching hours) necessary to cover the required curriculum.[5] The basic standard is the main component of the school budget and is determined by three factors:

4 Taken from *A Broad Perspective* (*B'Mabat Rahav*), the Online database of the Ministry of Education.

5 The Ministry of Education defines a weekly hour as the annual cost of one teaching hour.

- A minimum standard per class
- Number of students per class
- The school's Nurture Index[6]

B. Dedicated "baskets" — allocations according to a formula

These are budgets added to the basic standard based on the school's student profile. These budgets are automatically transferred to the schools according to fixed formulas. They are usually dedicated funds, and are "earmarked" for specific purposes. The main baskets of this type are:

- Nurture basket — intended to reduce education and academic gaps between population groups, based on socioeconomic criteria.

- Mainstreaming basket — for mainstreaming students with special needs in regular classes within regular schools. This basket, which is automatically allocated to official schools, can be considered part of the basic standard.

- Prayer time basket — specifically for Hebrew State-religious schools and schools with specialized Jewish studies to hold teacher-supervised prayer every morning.[7]

- Absorption basket — intended for new immigrants and returning residents.

C. Other allocations ("baskets")

There are additional discretionary baskets (such as those for road safety programs or life skills programs) based on a school's inclusion in specific projects, or that stem from a recognition of a special need. Allocation is at the discretion of the Ministry of Education (district heads, supervisors, and so on) and their relationships with principals, based on guidelines and directives by the Ministry administration, and/or through pressure from public entities.

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6 The school Nurture Index is a measurement of the socioeconomic standing of the school population. A ranking of 1 indicates the highest/strongest socioeconomic standing and 5 reflects the lowest or weakest standing.

7 Prayer time could be included in the basic standard, but since it is restricted to Hebrew State-religious education, it is listed here among the baskets allocated by formula.

Social–ideological principles reflected in budgetary elements

Budgeting also reflects social and ideological considerations. This section briefly examines how the three basic components of budgeting are affected by these considerations.

A. The basic standard

The basic standard formulas are intended to be universal and equal, but they actually express two very important policy decisions, with far-reaching implications: supplemental budgets according to class size and mandating reductions in the number of students per class.

The first is that most of the budget transferred to educational institutions depends on the number of classes and not on the number of students. This decision gives an advantage — at the budget per student level — to schools with small classes. The main reason for this decision is the need to ensure that small schools receive funding for at least the minimum number of teaching hours required for teaching the curriculum. This need arose out of the demographic and political reality in which the education system continues to operate. The system was divided into different streams — a reality that existed before the founding of the state, and the division was legally adopted by the 1953 State Education Law. This often resulted in small schools serving minority groups or located in small localities, with a smaller number of students per class. Consequently, the budget per student in these schools is likely to be higher.

This policy impacts the three aspects that determine the basic standard:

The minimum standard — the minimum number of work hours for teachers (in terms of weekly teaching hours) required to teach a full curriculum is not dependent on class size, but is dependent on the grade level.

The number of students per class — classes of at least 20 students are budgeted according to the basic standard. Recently, the Ministry of Education has been contending with the educational difficulties that arise from large classes through supplementary budgeting: each additional student beyond the twentieth (up to a determined maximum number of students for

budgeting needs) entitles the school to a supplementary budget.[8] When the number of students is less than 20 the class receives only half of the basic standard budget.

Figure 1 shows the significance of the per class budgeting method for students in the third grade (for illustration purposes only). The graph on the left shows the budget per student, and the one on the right presents the budget per class, (both in terms of weekly teaching hours). As expected, a rise in the number of students raises the budget per class, but in terms of budgeting per student it goes down the larger the class size.

Figure 1. Budget per class and per student
Including class size bonus, third grade

Weekly hours per student   Weekly hours per class

Number of students per class
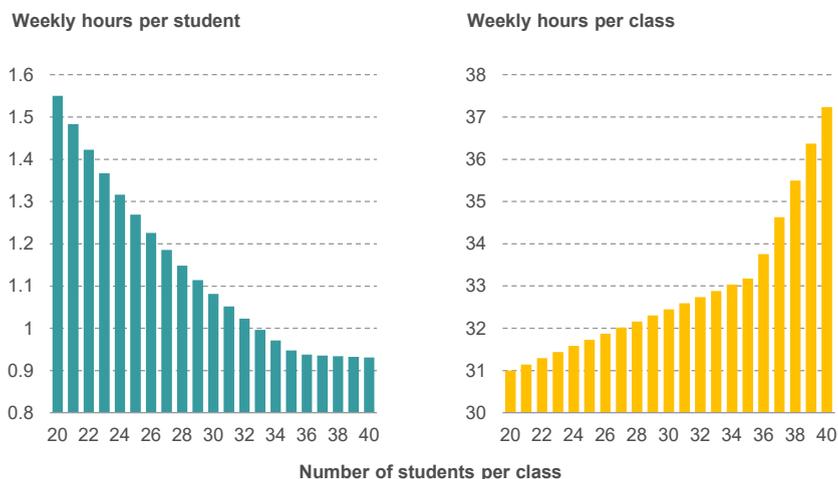
Source: Nachum Blass and Haim Bleikh, Taub Center | Data: Ministry of Education

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8 The compensation formula for class size changed in recent years. In 2016, the maximum supplement for a class of 40 students was 7.2 weekly teaching hours, in 2017, it was 6.2, and, in 2018, it was 5.2 weekly teaching hours (according to memos of the Director General on the standard in primary school education). The hours deducted from the class size bonus were used to increase the hours supplemented through the Nurture basket and should have strengthened affirmative action for schools with weaker populations (Ministry of Education 2014:35). In practice, in many schools, there was a decrease in the budget for large classes, with compensation for this decrease transferred to the school through the affirmative action budget.

Nurture Index — another principle of the basic standard is setting a differential class size schedule based on the socioeconomic background of the school's student population (the school Nurture Index). For a school whose students come from strong socioeconomic backgrounds, the minimum class size for budgeting for a large class is 40 students, whereas for a school with a weaker socioeconomic standing, it is 32.

There is a substantial difference between actual class size and the maximum size for budgeting purposes. In reality, although there is a fixed maximum class size, schools are not required to split large classes into smaller classes once that maximum is reached. This means that schools can receive budgeting for additional classes as determined by the number of students regardless of whether the large class is, in practice, divided into two smaller classes or not.[9] For instance, in a school with 80 students in the fourth grade (where the basic standard is 31 weekly teaching hours per class), the budget for a school at the strongest socioeconomic level would be 72.5 weekly teaching hours (62 for two classes + the maximum supplement for class size of 10.5 weekly teaching hours), and the average budget for each student would be 0.9 weekly teaching hours. On the other hand, in a school with a weak socioeconomic ranking, budgeting for a similar number of students would be based on three classes and would be 95.4 weekly teaching hours, even if the school actually has only two classes with 40 students each (93 weekly teaching hours for three classes plus the maximum supplement for class size of 2.4 weekly teaching hours). In this case, the budget per student would be 1.19 weekly teaching hours.

Along with the budget supplement for class size, there was an educational policy decision to gradually reduce the number of students per class to a maximum of 34 (the original decision made in 2008 was to reduce the number to 32). This decision applies to all students in grades 1-3 (as of the end of 2018).

Both steps — budgetary compensation for size and reducing class size — have potentially positive impacts on the quality of life and general climate within schools. The latter contributes to reducing class size while the former compensates for the difficulty of studying in large classes. These funding considerations are applied to schools serving all population groups, including those with strong socioeconomic populations, although this somewhat negates affirmative action intentions implicit in the original policy.

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9 This usually happens when dividing a class would result in classes of fewer than 20 students each or when the schools faces difficulties due to a shortage of classrooms.

B. Dedicated budgetary baskets — allocated by formula

Dedicated budgetary baskets are automatically transferred to schools according to a fixed formula. Each one of the baskets is meant to advance a specific objective of the Ministry of Education and reflects social and ideological principles.

The Nurture basket — the purpose of this basket is to improve the achievements of students from weak socioeconomic backgrounds and reduce the academic gaps between students from weaker and stronger backgrounds. The level of the nurture basket was about 6 percent of total teachers' work hours in primary school education in 2014 (Ministry of Education and Culture 2014:16). That same year, following a decision by then-Minister of Education Shai Piron, the nurture basket in primary school education was increased by 150,000 hours. However, for the most part, these did not represent additional teacher hours. The source of most of the supplement was the transfer of hours from other budgetary baskets, and at least some of the hours had already been dedicated to students from weak socioeconomic groups (Weissblei 2015).

The budgeting formula of the nurture basket is not available to the public, except for the general statement that "the school's relative share of the nurture budget (allocation score) is determined based on the school's Nurture Index, the number of students, and the percentage of schools who will enjoy the nurture resources according to the Ministry's decisions" (Ministry of Education 2010:5). A report by the Knesset Research and Information Center (2016) says that "all of the schools at these education levels, whether strong or weak, are entitled to a certain allocation of Nurture hours from the basket. According to a report by the inter-ministerial staff, schools classified as strong also receive Nurture hours because those schools also have weak students." Following the additional hours added to the basket in 2014, the ratio between the allocation to strong and weak schools changed from 1:3 to 1:6. This measure reinforces the affirmative action aspect of the basket, but the impact remains difficult to assess as long as the full formula is unknown.

The mainstreaming basket — the purpose of this basket is to allow regular schools to mainstream students with special needs in regular classrooms. Since it is allocated by a formula (5.4 percent of all students in all schools receive an addition of 1.85 weekly teaching hours each), it can also be viewed as part of the basic standard.[10]

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10 According to the Ministry of Education (2014), not all of the basket is transferred to the school. Some of it — in the past it stood at 0.3 weekly teaching hours — is transferred to the regional support center and, therefore, only 1.55 weekly teaching hours go to the school.

Students with special needs suffering from serious difficulties that cause low functionality (about 10 percent of all special needs students enrolled in regular schools who learn in regular classes) receive a supplement of another 2.7 weekly teaching hours (State Comptroller 2012; Weissblei 2015). This supplement is granted on an individual basis, following an evaluation of the student's particular disability. The number of students who receive it varies from school to school.

Prayer time — the supplement for prayer hours at the relevant schools is 1.22 weekly hours per standard class.

Absorption — the allocation formulas to assist with the integration of new immigrants and returning residents takes into account the student's country of origin and the length of the student's presence in Israel.

2. School variables and their influence on the school budget

A comparison between budget per class and per student in grades 1-6 in official regular education shows several key variables that may influence the budget allocation to schools.

A. **School Nurture Index**
B. **School size**
C. **Long school day**
D. **Special Education classes**
E. **Supervisory authority**
F. **Teacher profiles**

Some of these variables, as will be shown, explain a good deal of the differences in budget per student and per class between schools.

A. The School Nurture Index — the school's Nurture Index influences the number of hours the school receives from the nurture basket and also determines the class size minimum for supplementary budgeting. Thus, the Nurture Index plays an especially significant role in determining the level of budgetary allocation as part of the basic standard and other budgeting baskets, including in determining whether the school is included in the long school day program.

B. School size — the size of the primary school usually has to do with the number of children living in the district it serves. The division into districts is largely determined by Ministry of Education directives on the maximum walking distance permissible from the children's homes to the school and educational principles about desired school size (maximum, minimum and optimum). Introducing uniform rules about maximum walking distances would have an impact both on the size of schools and districts (it would reduce them where the population is dense and vice versa).[11]

School size is an important factor in determining budget per student and there is a direct correlation between school size and the number and size of classes — which are major considerations in budget allocation.

C. Long school day — some schools are part of the long school day program. As part of this project, 5-8 weekly teaching hours are added to each class — a sizable supplement relative to the minimum standard of approximately 30 weekly teaching hours.[12] Inclusion in this program is determined by a variety of factors. One of the main determinants is the school Nurture Index, but there are other important considerations, like the availability of the school's facilities, as well as the school's ability to run a successful long school day logistically and academically. Therefore, two schools might have the same Nurture Index ranking but only one of them will be eligible for inclusion in the program.

D. Special Education — some regular schools have separate Special Education classes. These classes are much smaller than regular classes and the standard budget allocated to them is higher.

E. Supervisory authority and sector —the Hebrew State-religious schools are smaller and on average have a higher Nurture Index level, which explains some of the budgeting differences between sectors. Furthermore, they receive unique baskets such as a prayer time basket, a basket for separating boys' and girls' classes, and rabbi hours. Schools in the Arab, Bedouin, and Druze sectors receive supplements as part of five-year plans to reduce educational gaps.

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11 School principals have little freedom to decide the number of classes in the school due to both physical constraints (number of classrooms) and budgetary constraints (number of classes approved for budgeting by the Ministry of Education). Attempts to divide classes when the number of students is borderline usually fail because of strict rules of the Ministry of Education with few exceptions.

12 Schools included in the long school day project are budgeted for a minimum of 37 weekly teaching hours per regular class. For grades 1-2 (minimum standard of 29 weekly teaching hours), the supplement for a long school day is 8 hours. For grades 3-4 (minimum standard of 31 weekly teaching hours), the supplement is 6 hours, and, for grades 5-6 (minimal standard of 32 weekly teaching hours), 5 weekly teaching hours are added as part of the program.

F. Teachers — the profile of the teaching personnel (teachers' level of education and seniority) has a major impact on the biggest item in the education budget: teachers' wages. These two variables are greatly affected by demographic trends: when the system is expanding due to an increase in the number of students, more young teachers are required, which has the effect of lowering the average seniority while improving the average education level (younger teachers tend to have higher education levels).

As shown in Table 1, in Hebrew education, the share of teachers who have graduate degrees is higher, and teachers' seniority varies between education sector and stream. Nonetheless, the cost of teachers' teaching hours is almost identical in schools of all sectors, supervisory authority types, and nurture levels. This figure contradicts the claim that teachers in schools serving stronger population groups usually enjoy higher salaries because they are better educated and have more seniority, thereby undermining the Ministry of Education's affirmative action policy (see also Blass 2008 for findings that are consistent with this claim).

Table 1. Teacher profiles

By education stream, supervisory authority, and school Nurture Index quintile, official regular education, schools with grades 1-6 only

	Hebrew State	Hebrew State-religious	Arab	Druze	Bedouin	Overall
Median years of seniority	13.8	16.3	16.1	16.6	11.1	14.7
Percent with higher degree	33%	32%	26%	25%	21%	31%
NIS, cost per yearly teaching hour, by school Nurture Index quintile						
Strongest	8,117	8,080	—	—	—	8,112
2	8,131	8,098	8,154	—	—	8,121
3	8,151	8,101	8,128	8,157	—	8,132
4	8,148	8,088	8,148	8,151	8,124	8,137
Weakest	8,152	8,093	8,144	8,153	8,095	8,129
Overall	8,133	8,093	8,142	8,152	8,097	8,125

Note: In the school Nurture Index, the strongest (highest) socioeconomic quintile is 1, the weakest is 5.
Source: Nachum Blass and Haim Bleikh, Taub Center | Data: Ministry of Education

Variables affecting budgets — descriptive statistics

Table 2 presents the differences between official primary schools by their sector and supervisory authorities according to factors that determine budget.[13] The data indicate a marked difference between sectors and supervisory authorities on these determinants.

Table 2. Distribution of students by school characteristics, 2017
Official regular education, schools with grades 1-6 only

	Hebrew State	Hebrew State-religious	Arab	Druze	Bedouin	Overall
School Nurture Index quintile						
Strongest	45%	22%	—	—	—	28%
2	23%	33%	1%	—	—	18%
3	15%	25%	18%	10%	—	16%
4	10%	15%	29%	56%	7%	16%
Weakest	7%	5%	52%	34%	93%	22%
School size						
Small	2%	7%	1%	0%	1%	2%
Small-medium	20%	42%	18%	37%	15%	23%
Medium-large	40%	32%	46%	47%	44%	40%
Large	39%	19%	36%	15%	40%	34%
Long school day						
Has long day	17%	31%	26%	100%	86%	28%
Does not have	83%	69%	74%	—	14%	72%
Special Education						
Has Special Ed students	36%	45%	11%	16%	18%	31%
Does not have	64%	55%	89%	84%	82%	69%

Note: In the school Nurture Index, the strongest (highest) socioeconomic quintile is 1, the weakest is 5. Small schools have up to 180 students; Small-medium schools have between 181 and 360 students; Medium-large schools have between 361 and 540 students; Large schools have over 540 students.
Source: Nachum Blass and Haim Bleikh, Taub Center | Data: Ministry of Education

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13 Data on the distribution of schools including grades 1-6 only appear in Appendix Table 1.

The School Nurture Index — in Hebrew State education, 68 percent of the students are in the two strongest quintiles, in the State-religious schools, 55 percent, while in Arab education most of the students are in the weakest quintiles (more than 80 percent).

School size — in Hebrew and Arab State and Bedouin education most of the students (between 79 and 84 percent) go to large or medium-large schools, while in Druze education it is only 62 percent, and in Hebrew State-religious education, only 51 percent.[14] As seen in Figure 2, classes in large schools tend to be larger.

Figure 2. Average number of students per class by school size
Official regular education, by sector and supervisory authority, schools with grades 1-6 only

■Small ■Small-medium ■Medium-large ■Large

Note: Arab education includes Druze and Bedouin. Small schools have up to 180 students; Small-medium schools have between 181 and 360 students; Medium-large schools have between 361 and 540 students; Large schools have over 540 students.
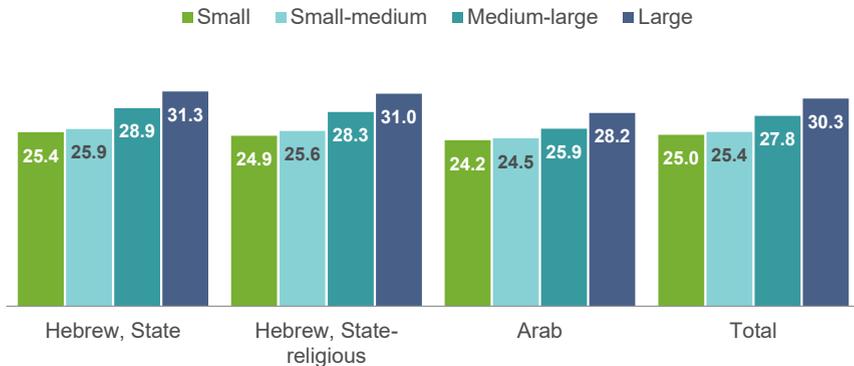Source: Nachum Blass and Haim Bleikh, Taub Center | Data: Ministry of Education

The data also show that the effect of school size on the average number of students per class changes depending on the education sectors. In particular, in the Arab education system (including Druze and Bedouin education), classes are smaller compared to schools of the same school size in the Hebrew sector. For instance, in a large school in Hebrew State education an average class has 31.3 students, while a class in a large school in the Arab sector has 28.2 students, on average. These data reflect an improvement in the relative situation of the Arab education system in recent years (Blass 2017).

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14 The distribution is based on the average number of students (27-28 students) in the regular class in the relevant age groups, plus students in Special Education.

Long school day — all of the students in the Druze sector, and almost all of the students in the Bedouin sector, benefit from a long school day, compared to only 26 percent in the rest of Arab education. In the Hebrew education system, 16 percent of the students in State schools, and 31 percent of those in State-religious schools, have a long school day. Druze and Bedouin schools for the most part are included in the long school day program by virtue of the low socioeconomic status of their populations and their location in the northern and southern districts of the country, where this program is more widespread.

Special Education — the vast majority of students in the Arab education system are in schools that have Special Education classes, compared to 64 percent in general Hebrew State education and only 55 percent in Hebrew State-religious education.

Tables 3a and 3b present the budget per student and per class on the basis of data published by the Ministry of Education on its Administration for Economics and Budgets' website. The data do not include budgets transferred to schools by local authorities, parents, and non-profit organizations.

The data show the influence of these school variables (as presented in Table 2) on the actual expenditure. For instance, it is clear that a rise in the Nurture Index increases the budget expenditure per class and per student, and that the supplemental hours for a long school day increases the budgets of the schools participating in the program. The table also shows that the influence of Special Education on the budget is especially felt at the budget per student level, whereas, at the level of budget per class, the differences between schools that have Special Education classes and those that do not have such classes are not noticeable.

The comparison between education systems indicates that the average budget allocation in the Druze and Bedouin sector is the highest, and in Hebrew State education is the lowest. It is very important to emphasize that these are averages, and when a school's Nurture Index is taken into account, it emerges that in all quintiles, the Hebrew State-religious education system is funded at the highest level both per student and per class, while Arab education is funded at the lowest level.

In addition, there appears to be a correlation between the factors that influence budgeting — Appendix Figure 1 shows that the share of schools with a long school day increases with the rise in Nurture Index. Due to this correlation, caution should be used when drawing conclusions about the specific influence of individual variables on budgeting per class and per student. For more accurate assessments of the direct influence of the explanatory factors on expenditure, the following section presents a multivariate analysis.

Table 3a. Budget per student, 2017
Official regular education, schools with grades 1-6 only, NIS thousands

	Hebrew State	Hebrew State-religious	Arab	Druze	Bedouin	Overall
School Nurture Index quintile						
Strongest	13.3	14.9	—	—	—	13.5
2	14.9	16.8	14.1	—	—	15.5
3	16.8	18.6	15.1	18.5	—	16.9
4	18.0	19.6	16.2	18.9	16.8	17.7
Weakest	20.4	23.8	17.2	18.9	19.0	18.6
School size						
Small	21.2	22.6	20.1	—	20.6	21.9
Small-medium	19.0	18.6	18.1	19.3	19.7	18.8
Medium-large	15.0	16.9	16.9	18.6	19.2	16.1
Large	13.2	14.7	15.2	18.3	18.2	14.2
Long school day						
Has long day	19.3	20.9	18.5	18.8	19.1	19.4
Does not have	14.4	16.1	15.8	—	17.1	15.0
Special Education						
Has Special Ed students	13.5	16.7	15.4	17.4	18.0	14.6
Does not have	16.2	18.3	16.6	19.1	19.0	16.9
Overall	15.2	17.6	16.5	18.8	18.9	16.2

Note: In the school Nurture Index, the strongest (highest) socioeconomic quintile is 1, the weakest is 5. Small schools have up to 180 students; Small-medium schools have between 181 and 360 students; Medium-large schools have between 361 and 540 students; Large schools have over 540 students.
Source: Nachum Blass and Haim Bleikh, Taub Center | Data: Ministry of Education

Table 3b. Budget per class, 2017
Official regular education, schools with grades 1-6 only, NIS thousands

	Hebrew State	Hebrew State-religious	Arab	Druze	Bedouin	Overall
School Nurture Index quintile						
Strongest	391	420	—	—	—	395
2	406	442	410	—	—	417
3	432	466	395	462	—	433
4	449	479	411	446	428	439
Weakest	480	549	423	452	469	453
School size						
Small	493	535	440	—	486	511
Small-medium	445	449	421	451	446	443
Medium-large	410	456	415	448	460	423
Large	396	433	410	451	482	411
Long school day						
Has long day	483	518	456	450	477	480
Does not have	400	425	400	—	403	404
Special Education						
Has Special Ed students	402	452	413	458	469	420
Does not have	421	457	415	448	465	429
Overall	415	455	415	450	466	427

Note: In the school Nurture Index, the strongest (highest) socioeconomic quintile is 1, the weakest is 5. Small schools have up to 180 students; Small-medium schools have between 181 and 360 students; Medium-large schools have between 361 and 540 students; Large schools have over 540 students.
Source: Nachum Blass and Haim Bleikh, Taub Center | Data: Ministry of Education

3. School variables and the budget: A multivariate analysis

The data presented so far present only a partial picture of the possible reasons for the variance seen in the budgets of different sectors and supervisory authorities. This section takes a closer look and examines the influence of

each one of the variables on budgeting per class and per student: the Nurture Index, school size, whether the school is part of the long school day program or not, the presence or absence of Special Education classes, the education sector and school supervisory authority, the median seniority of teachers, and the share of teachers with graduate degrees.

The results of separate multivariate analyses of budgeting per class and per student are presented here with a focus on two main aspects:

• the marginal effect of each variable on budgeting assuming that the other variables remain fixed;

• the importance of each variable in the model's explanatory power. In the case of a linear regression, the contribution of each variable to the explained variance is calculated.[15]

The results of the analysis are presented in Appendix Tables 2a and 2b. These tables present four equations for the factors that influence budgeting per class and per student. The first equation refers to all sectors and supervisory authorities, and the other three present the results separately for the Hebrew State, State-religious, and the Arab education systems (including Druze and Bedouin). The separate calculations for each sector and supervisory authority allow for a more accurate understanding of the direction and strength of the influence of the explanatory variables for each group separately. The explained variable is the natural logarithm of budgeting per class and per student.

The analyses confirm the results presented above regarding the influence of school variables on the per class and per student budget. Since the class is the basic budgeting unit, findings regarding budgeting per class will be presented first, followed by findings for budgeting per student.

Budget per class

The Nurture Index — the higher the Nurture Index (which means the school serves students from weak socioeconomic backgrounds), the higher the per class budget throughout the system. On the other hand, separate calculations by sector and supervisory authority show that the main source of the variance is restricted to Hebrew education, since most students in Arab education are in the weakest two quintiles (4 and 5).

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15 Adjusted R^2 appears in Appendix Tables 2a and 2b.

It was also found that additional budget per class for those students from the weakest socioeconomic background is substantially higher in Hebrew State-religious education relative to other streams. In Arab education, the additions based on the Nurture Index (beginning from the fourth quintile) are closer to those observed in Hebrew State education.

School size — in the smallest schools (up to 180 students), the per class budget is the highest, with large differences as schools get larger. The differences between small-medium schools and larger schools, on the other hand, are not significant. This was found both in the calculations by sector and supervisory authority and for the system as a whole. It is important to note that the share of small schools in the total system is very small, and their high budgets are the exception, not the rule. It is possible that the results have to do with so-called "economies of scale" — wherein, in larger schools, some of the expenditure elements that are not directly dependent on institution size are divided between a greater number of classes.

Long school day — this program raises the per class budget by an average of 14 percent in the system at large. In practical terms, this is a significant increase in teacher work hours: and increase from 16 to 28 percent of the minimum standard for each grade level. Separate calculations by sector and supervisory authority show that schools with a long school day have an increased per student budget of 15.5 percent in the Hebrew State-religious stream and by 13.5 percent in Hebrew and Arab State education.

Special Education — Special Education classes are not correlated with per class budget when it comes to the total system. A separate calculation by sector and supervisory authority shows that only in the Hebrew State education system is the rise in the rate of students with special needs positively correlated with per class budget (and, even in this case, the influence is very small). The data do not allow us to isolate direct budgeting for Special Education classes. Since their share is low at only 12 percent of school classes in those schools with Special Education classes (9 percent of the total classes in the system), it is likely that the budgetary supplement they bring does not substantially raise the average per class budget relative to schools without such classes.

Sector and supervisory authority — after controlling for school characteristics, the highest average per class budgets are in Hebrew State-religious schools, and the lowest are in the Arab education sector.

Teacher profile — the share of teachers with graduate degrees and their level of seniority have no influence on per class budget when all groups are taken together. Only in Arab education was a slight negative influence found with regard to seniority.

Budget per student

The Nurture Index — as the Nurture Index rises, so, too, does budgeting per student in the system at large. Separate calculations for each sector and supervisory authority show that the marginal budgeting supplement for Nurture quintiles 1-4 is similar for the different supervisory authorities in Hebrew education (State and State-religious). On the other hand, the marginal supplement for the weakest quintile is significantly higher in State-religious education.

As in the findings for per class budgeting, it appears that, in the Arab education system, the degree of differentiation by the Nurture Index (from the third quintile and up) is similar to the figures for Hebrew state education.

School size — generally, per student budget decreases steadily as school size increases. A possible explanation is that in larger schools the classes are bigger on average (Figure 2 above), and therefore according to the budgeting mechanism per student budgeting is lower. Separate calculations by sector and supervisory authority show, for instance, that, in the transition from medium-large to large schools, coefficients dropped by 7 percentage points in all of the groups. This is consistent with the fact that the number of students per class in the largest schools is 2.5 students higher than in the medium-large schools.

All and all, in Hebrew education, the per student budget in the smallest schools was 23-25 percentage points more than in the medium-large schools. On the other hand, in Arab education, the difference between the two sizes was 16 percentage points. This result has a lot to do with the fact that, when looking at increases in the number of students in relation to school size, the increases going from small to medium-large schools in Hebrew education are larger than in Arab education (Figure 2 above). In other words, it is likely that the sharper drop in per student budget as school size rises in Hebrew education has to do with the larger rise in class size (that goes along with the rise in school size).

Long school day — long school day programs raise per student budgeting by an average of 15 percent. In Hebrew State-religious education the increase is 17 percent, and in Hebrew and Arab State education it is 14-15 percent.

Special Education — in contrast to the lack of influence of separate Special Education classes on per class budget, the existence of such classes in a school increases the per student budget. The rise comes mainly from the impact of class size: Special Education classes are smaller, and as a result the average number of students per class drops.

Separate calculations by educational sectors and supervisory authority show between-group variance. This could be due to differences in student populations based on diagnostic differences, leading to budgeting variance.

Supervisory authority — as in per class budget, after controlling for the effects of school variables, the average per student budget in Hebrew State-religious education is the highest, and in Arab education it is the lowest.

Teacher profile — the share of teachers with graduate degrees and seniority has no influence on per student budgeting in the system at large. In Hebrew education, a positive correlation was found between per student budget and the share of teachers with graduate degrees, but at relatively low level of statistical significance. In Arab education, a small negative influence was found with regards to seniority, also at a relatively low significance level.

The contribution of the explanatory variables to the model's ability to explain budgeting differences

Table 4 shows the results of a statistical method that allows us to quantify the contribution of variables that influence the explained variance in the model.[16] The results indicate that a large part of the explained variance between schools in level of per student and per class budgeting has to do with variables over which stakeholders have little influence — (school size, Nurture Index, participation in the long school day program, and the presence of Special Education classes).

Overall, the contribution of these factors to the model's ability to explain budget differences is estimated at 87 percent for per class budgeting and 92 percent for per student budgeting. On the other hand, the contribution of sector and supervisory authority is much smaller (13 percent for per class budgeting and 8 percent for per student budgeting). As the last line in the table shows, the multivariate analysis explains 65 percent of the differences of per class budget and 80 percent of per student budget differences.

The estimation for budgeting per student and per class provides a broader picture of the influence of certain variables. For instance, this perspective illustrates the importance of the budget provided for the long school day and Nurture Index. In contrast, the influence on budgeting of separate classes for Special Education or school size depends to a large extent on how the budget is calculated: these variables' level of influence changes when examined per class or per student.

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16 For the use of this procedure, see Huettner and Sunder 2012.

Table 4. Contribution of explanatory variables

By budget type, as a percentage of the explained variance

	Budget per student	Budget per class
Supervisory authority/sector	7.5%	13.3%
School size	28.9%	16.5%
School Nurture Index	23.5%	20.5%
Long school day	23.4%	48.4%
Special Education	15.8%	1.0%
Teacher profile	0.9%	0.5%
Percent of explained variance	79.9%	65.1%

Source: Nachum Blass and Haim Bleikh, Taub Center | Data: Ministry of Education

Conclusion

This chapter examined the variables influencing differences in per student and per class budgeting in the official regular primary education system (excluding Haredi education). The data indicate that budget differences depend on several key school variables: Nurture Index, school size, inclusion in the long school day program, number of Special Education classes, supervisory authority, and teacher profile. According to the multivariate analysis, the first three variables (Nurture Index, school size, and inclusion in the long school day program) have the most explanatory value in understanding differences in budgeting between schools.

The multivariate analysis also found that most of the explained variance in budget per student (87 percent of the explained variance per class and 92 percent per student) arises from factors determined by fixed budgetary formulas, over which stakeholders have only limited influence, while those variables that are not determined by a budgetary formula (the supplementary baskets and special supplements) are limited to about 10 percent of the explanatory power.

It appears that a significant part of the variance in level of per student budget originates from objective factors, and the direct impact of the sector and supervisory authorities is relatively small. It is important to note, however, that even the objective factors reflect political and ideological views; for instance, the decision to maintain separate sector education systems (Hebrew and Arab) and the decision to allow for different

supervisory authorities in the education system by level of religiosity are political-ideological decisions. The seemingly clear-cut decision to base school districts on areas within walking distance of students' homes is not a necessity; this constraint could be resolved by busing policies. Even the decision to use the class as the basic budgetary unit is controversial and evidence shows that there are instances where the budgeting unit is actually per student, including the budget expenditure system for high school education in Israel. All of these decisions are based on social realities, ideological views, and educational philosophies, and changes in these decisions may have potentially far-reaching consequences for budgeting.

Even after controlling for school characteristics, there appears to be a hierarchy of budget expenditures among the sectors and supervisory authorities: Hebrew State-religious education comes first, followed by Hebrew State education, and finally Arab education. This finding is fully consistent with the data that appear on the Ministry of Education's budgetary transparency website. This bias can also be understood from Table 5. This table shows the ratio between the standard weekly teaching hours by three budgeting levels (by the minimum standard, by the minimum standard plus class size bonus, and by the minimum standard plus class size bonus and a bonus for a long school day). The lower the ratio, the higher the rate of the allocation not explained by transparent and equally applied standards, allowing a bias towards a given sector or supervisory authority.

It can be seen that in Hebrew and Arab State education there is a similarity in the ratio between the basic standard, explained by budgeting according to the formulas, and the actual standard, whereas in Hebrew State-religious education the ratio is 4-5 percentage points lower. Some of the seemingly preferential budget, and perhaps even all of it, is explained by the special budgetary baskets for Hebrew State-religious education: prayer time, separate classes for boys and girls, and rabbi hours. All of these factors are meant to maintain the special character of the Hebrew State-religious education system.

Table 5. Basic minimum teaching hours

	Minimum weekly teacher hours	Minimum weekly teacher hours + class size bonus	Minimum weekly teacher hours + class size bonus + long school day bonus
Hebrew State	62%	65%	68%
Hebrew State-religious	58%	60%	64%
Arab	61%	63%	69%
Overall	61%	64%	67%

Note: The estimate's calculation can be understood through the example of a first grade cohort, where the basic minimum is 29 weekly hours. In the first stage, the total number of hours is calculated at the minimum level, that is, 29 weekly class hours multiplied by the number of first grade classes. In the second stage, the bonus for class size is added according to Ministry of Education data, and according to the average number of students in the first grade cohort in a given school. This figure is also multiplied by the number of first grade classes in the system. In the third stage, 8 weekly hours are added for those schools in the long school day program (with a basic minimum of 37 weekly hours, before any addition for class size). A similar calculation is performed for other grades according to the basic minimum standard for their budget.
Source: Nachum Blass and Haim Bleikh, Taub Center

Obviously, there are ideological and political decisions at play; it could just as easily have been decided to give the entire State education supplements at a similar level so that they could express the differences that distinguish them from State-religious education. The determination whether the level of preference that arises from these needs is high or low is left to the reader to decide.[17]

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17 We should note that as part of the current study we did not examine whether the situation described above existed in the past as well or whether it reflects a change (for better or worse). It should also be noted that Table 5, unlike the rest of this study, focuses on teacher work hours and does not refer to the total budget (for instance, special projects and budgetary transfers to local authorities, training hours and auxiliary services). It should be stressed again that this chapter is only about part (although a central part) of the education system, and it is possible that the conclusions would change to some extent if the analysis also included the recognized but unofficial schools and other educational levels.

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Appendix

Appendix Figure 1. Share of schools participating in the long school day program by school Nurture Index
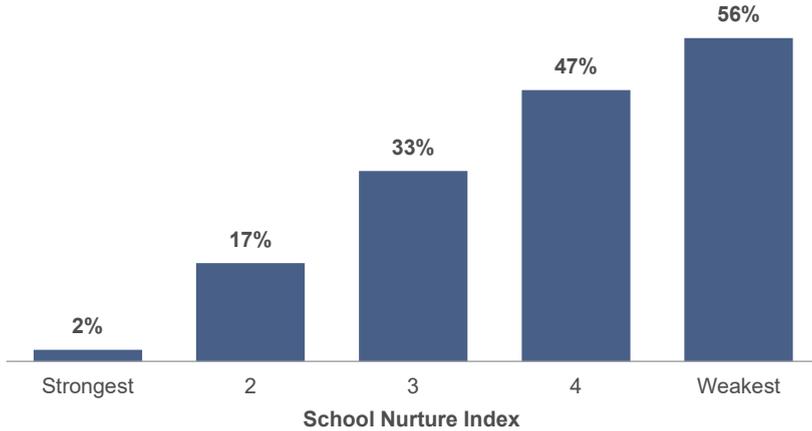
Note: In the school Nurture Index, the strongest (highest) socioeconomic quintile is 1, the weakest is 5.
Source: Nachum Blass and Haim Bleikh, Taub Center | Data: Ministry of Education

Appendix Table 1. Distribution of schools by school profile, 2017
Official primary schools with grades 1-6 only

	Hebrew State	Hebrew State-religious	Arab	Druze	Bedouin	Overall
School Nurture Index quintile						
Strongest	37%	16%	—	—	—	22%
2	23%	30%	1%	—	—	18%
3	16%	27%	17%	12%	—	18%
4	13%	17%	27%	60%	8%	18%
Weakest	11%	9%	55%	29%	92%	24%
School size						
Small	5%	17%	3%	0%	3%	7%
Small-medium	31%	50%	27%	48%	24%	34%
Medium-large	38%	24%	46%	43%	46%	37%
Large	26%	9%	24%	10%	27%	22%
Long school day						
Has long day	21%	34%	27%	100%	81%	31%
Does not have	79%	66%	73%	—	19%	69%
Special Education						
Has Special Ed students	34%	49%	13%	17%	21%	32%
Does not have	66%	51%	87%	83%	79%	68%

Note: In the school Nurture Index, the strongest (highest) socioeconomic quintile is 1, the weakest is 5. Small schools have up to 180 students; Small-medium schools have between 181 and 360 students; Medium-large schools have between 361 and 540 students; Large schools have over 540 students.
Source: Nachum Blass and Haim Bleikh, Taub Center | Data: Ministry of Education

Appendix Table 2a. Multivariate analysis, official schools with grades 1-6 only

Estimates for overall groups by sector and supervisory authority, with separate estimates for each regression group for expenditure per class

Per class

	Overall	Hebrew State	Hebrew State-religious	Arab
Education sector: State education *Reference group*				
Hebrew State-religious	0.0552***			
Arab	-0.0684***			
School Nurture Index: Strongest quintile *Reference group*				
2	0.012*	0.012*	0.011	—
3	0.058***	0.046***	0.059***	—
4	0.077***	0.071***	0.078***	-0.001
Weakest	0.114***	0.109***	0.183***	0.023**
School size				
Small	0.110***	0.082***	0.129***	0.068*
Small-medium *Reference group*				
Medium-large	-0.013***	-0.025***	0.015	-0.018**
Large	-0.012**	-0.029***	0.013	-0.004
Long school day	0.141***	0.134***	0.156***	0.135***
Special Education: No Special Education *Reference group*				
Up to 5%	0.00269	0.0109*	-0.0143	-0.000988
Over 5%	0.00619	0.0179**	-0.0228	0.000165
Teacher characteristics				
Percentage of teachers with MA and PhD degrees	0.017	0.054	0.027	-0.016
Median seniority	-0.000301	-0.000132	0.0000228	-0.00221***
Intercept	12.88***	12.87***	12.91***	12.94***
Number of observations	1257	643	266	348
Adjusted R²	0.651	0.608	0.623	0.719

Note: Arab education includes Druze and Bedouin. In the school Nurture Index, the strongest (highest) socioeconomic quintile is 1, the weakest is 5. Division of schools by number of students: Small — up to 180 students; Small-medium — 181-360 students; Medium-large — 361-540 students; Large — more than 540 students. Analysis includes only those observations with full data; 22 observations were outliers and were omitted. Significance levels: * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$ (based on robust standard error).
Source: Nachum Blass and Haim Bleikh, Taub Center

Appendix Table 2b. Multivariate analysis, official schools with grades 1-6 only

Estimates for overall groups by sector and supervisory authority, with separate estimates for each regression group for expenditure per student
Per student

	Overall	Hebrew State	Hebrew State-religious	Arab
Education sector: State education *Reference group*				
Hebrew State-religious	0.0750***			
Arab	-0.0233***			
School Nurture Index: Strongest quintile *Reference group*				
2	0.031***	0.032***	0.018	—
3	0.088***	0.083***	0.073***	—
4	0.117***	0.107***	0.103***	0.024**
Weakest	0.169***	0.151***	0.207***	0.069***
School size				
Small	0.140***	0.115***	0.160***	0.087*
Small-medium *Reference group*				
Medium-large	-0.100***	-0.120***	-0.093***	-0.074***
Large	-0.169***	-0.190***	-0.167***	-0.142***
Long school day	0.156***	0.149***	0.171***	0.147***
Special Education: No Special Education *Reference group*				
Up to 5%	0.0758***	0.0875***	0.0476***	0.0662***
Over 5%	0.166***	0.186***	0.149***	0.133***
Teacher characteristics				
Percentage of teachers with MA and PhD degrees	0.0377	0.0911*	0.0447	-0.0105
Median seniority	-0.000516	-0.000784	0.000452	-0.00199*
Intercept	9.568***	9.564***	9.634***	9.677***
Number of observations	1257	643	266	348
Adjusted R²	0.799	0.803	0.746	0.743

Note: Arab education includes Druze and Bedouin. In the school Nurture Index, the strongest (highest) socioeconomic quintile is 1, the weakest is 5. Division of schools by number of students: Small — up to 180 students; Small-medium — 181-360 students; Medium-large — 361-540 students; Large — more than 540 students. Analysis includes only those observations with full data; 22 observations were outliers and were omitted. Significance levels: * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$ (based on robust standard error).
Source: Nachum Blass and Haim Bleikh, Taub Center

Appendix Table 3a. Multivariate analysis, official primary schools

Estimates for overall groups by sector and supervisory authority, with separate estimates for each regression group for expenditure per class
Per class

	Overall	Hebrew State	Hebrew State-religious	Arab
Education sector: State education *Reference group*				
Hebrew State-religious	0.0496***			
Arab	-0.0650***			
School Nurture Index: Strongest quintile *Reference group*				
2	0.015**	0.015**	0.015	
3	0.0537***	0.042***	0.051***	
4	0.069***	0.062***	0.078***	-0.005
Weakest	0.110***	0.105***	0.182***	0.018*
School size				
Small	0.115***	0.080***	0.133***	0.085*
Small-medium *Reference group*				
Medium-large	-0.016***	-0.023***	0.007	-0.021***
Large	-0.0185***	-0.028***	-0.006	-0.011
Long school day	0.146***	0.143***	0.147***	0.144***
Special Education: No Special Education *Reference group*				
Up to 5%	0.00880**	0.0197***	-0.0077	-0.00415
Over 5%	0.0149***	0.0344***	-0.0156	-0.00193
Teacher characteristics				
Percentage of teachers with MA and PhD degrees	0.0269	0.0828**	0.0211	-0.0278
Median seniority	-0.00032	-0.0000556	-0.0000917	-0.00231***
Intercept	12.87***	12.85***	12.92***	12.95***
Number of observations	1714	862	416	436
Adjusted R²	0.626	0.583	0.575	0.711

Note: Arab education includes Druze and Bedouin. In the school Nurture Index, the strongest (highest) socioeconomic quintile is 1, the weakest is 5. Division of schools by number of students: Small — up to 180 students; Small-medium — 181-360 students; Medium-large — 361-540 students; Large — more than 540 students. Analysis includes only those observations with full data; 22 observations were outliers and were omitted. Significance levels: * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$ (based on robust standard error).
Source: Nachum Blass and Haim Bleikh, Taub Center

Appendix Table 3b. Multivariate analysis, official primary schools

Estimates for overall groups by sector and supervisory authority, with separate estimates for each regression group for expenditure per student
Per student

	Overall	Hebrew State	Hebrew State-religious	Arab
Education sector: State education *Reference group*				
Hebrew State-religious	0.0786***			
Arab	-0.0210***			
School Nurture Index: Strongest quintile *Reference group*				
2	0.032***	0.028***	0.031*	
3	0.088***	0.076***	0.086***	
4	0.113***	0.105***	0.103***	0.024**
Weakest	0.166***	0.147***	0.222***	0.061***
School size				
Small	0.150***	0.118***	0.174***	0.090*
Small-medium *Reference group*				
Medium-large	-0.093***	-0.110***	-0.078***	-0.073***
Large	-0.164***	-0.183***	-0.161***	-0.140***
Long school day	0.159***	0.160***	0.154***	0.154***
Special Education: No Special Education *Reference group*				
Up to 5%	0.0834***	0.0978***	0.0582***	0.0603***
Over 5%	0.179***	0.206***	0.160***	0.133***
Teacher characteristics				
Percentage of teachers with MA and PhD degrees	0.0439	0.1000**	0.0424	-0.0176
Median seniority	-0.000835*	-0.000707	-0.000255	-0.00246***
Intercept	9.562***	9.547***	9.635***	9.693***
Number of observations	1714	862	416	436
Adjusted R²	0.784	0.788	0.713	0.72

Note: Arab education includes Druze and Bedouin. In the school Nurture Index, the strongest (highest) socioeconomic quintile is 1, the weakest is 5. Division of schools by number of students: Small — up to 180 students; Small-medium — 181-360 students; Medium-large — 361-540 students; Large — more than 540 students. Analysis includes only those observations with full data; 22 observations were outliers and were omitted. Significance levels: * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$ (based on robust standard error).
Source: Nachum Blass and Haim Bleikh, Taub Center