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The school system is the highly structured and specialized set of processes that is intended to (a) transmit a society's accumulated knowledge to, (b) inculcate its values in, and (c) develop the productive skills of the next generation, in order to enable its members to (i) understand the workings of and interact with the world at large, (ii) develop their individual characters and sustain the cohesion of the community,¹ and (iii) have the means for earning incomes and enhance the productive capacity of the economy. The school system is designed to facilitate learning efficiently and effectively. Its curriculum is time-bound and contrived,² organized by subject or discipline, systematically arranged for coherence of topics and concepts and by progressive levels of difficulty, and apportioned into focused activities such as lectures, field trips, discussions, drills and exercises, and tests. Moreover, to motivate lessons, questions are posed in hypothetical and highly stylized ways, and, rather than left to be figured out, solutions or answers are aggressively proposed and cogently presented for the student to master.

That in contemporary societies the school system is so ubiquitous and organized, involves large segments of the population, and employs massive resources are testaments to its importance to the social order. It is fair to say that given the societal roles and goals vested in it, in the school system are also invested a society's hopes and prospects for survival in the future.

Indeed, so invested are modern societies in the school system that considerations of its benefits invariably have a mythic and axiomatic, if not dogmatic, quality. The theme chapter of the *Philippine Human Development Report 2000*, for instance, describes the gains as follows. First, basic education is an empowering process that, to paraphrase Amartya Sen [1985 and 1999], *capacitates* the individual to function, to achieve, and to enjoy life. In other words, the claim is that the educated individual enjoys a higher level of welfare because his education complements other inputs (e.g., a book that is not simply owned but read or food that is not simply consumed but valued for its nutritional attributes), thereby enabling him to be more engaged, productive, and self-aware; in short, to lead a better quality of life. Second, basic education has positive external effects on the community at large since educated people tend to be law-abiding, participate intelligently in elections, and have a better sense of nation and community.

Given the stakes involved, the all-important question that ought to be posed periodically to the basic education sector is: Is the school system an effective and efficient agent for carrying out its objectives? To what extent is the school system able to transmit knowledge to, inculcate values in, and develop the productive skills of its target population? And at what cost does it do so?

To make this assessment, this paper takes stock of developments in basic education since *PHDR 2000*. It provides glimpses of various aspects of the sector that can be culled from data from the Basic Education Information System (BEIS), the Department of Education's (DepEd) administrative reporting system, as well as the household surveys of the National Statistics Office (NSO) such as the Annual Poverty Indicators Survey (APIS) of 2004 and 2007, the

Family Income and Expenditures Survey (FIES) of 2003 and 2006, and the Functional Literacy, Education, and Mass Media Survey (FLEMMS) of 2003.

Based on these statistical findings, the paper argues that a new perspective is needed in the sector—one that takes cognizance of the question posed above, recognizes the sectoral constraints, restructures the incentives of stakeholders to align them with sectoral goals and to inhibit adverse behavior, and organizes information systems and reporting mechanisms to provide regular feedback to constituents that then becomes the basis of further action.

Access, outcomes, and inputs and congestion

A telling statistic from APIS 2004 and 2007 provides a convenient backdrop for the data analyses that follow. Among six- to 17-year-old children who were reported to have dropped out before completing high school,³ the two most frequently cited reasons⁴ were the high cost of education or that parents cannot afford schooling expenses, 22.9 (± 0.714)⁵ percent in 2004 and 20.4 (± 0.661) percent in 2007, and lack of personal interest, 37.0 (± 0.790) percent in 2004 and 37.3 (± 0.711) percent in 2007. In other words, the primary self-reported causes for dropping out were poor access due to the unaffordability of schooling and the lack of relevance of the curriculum or the poor quality of educational content.

Access to basic education

PHDR 2000 reported a combined enrollment rate of 82 percent, a level that compares favorably with those of more advanced countries and suggests that the country's formal education system is highly accessible. In contrast, data from FLEMMS 2003 and APIS 2004 and 2007 indicate that 65.8 (± 0.337) percent, 67.7 (± 0.243) percent, and 68.3 (± 0.231) percent of the six- to 24-year-old population were reported to be attending school in 2003, 2004, and 2007, respectively. Whether these recent estimates are comparable to the earlier cited combined enrollment rate figure for 2000 is unclear, however, because *PHDR 2000* did not specify the age group of the reference population of its combined enrollment rate. Nonetheless, the trend is one of expanding accessibility, the estimates being statistically different from each other.

At the basic education level, however, there may be cause for some concern. **Figure 1a** presents the enrollment levels in public elementary schools between SY 2002-2003 and SY 2007-2008 and their annual growth rates that are obtained from the DepEd's BEIS. The chart indicates that enrollment levels were significantly lower in SY 2004-2005 and SY 2005-2006 and that their annual growth rates exhibited a rather wide range, from the -4.4 percent of SY 2004-2005 to the 6.1 percent of SY 2006-2007.

A problem with **Figure 1a**, though, is that the picture it presents is distorted by the fact that data from the Autonomous Region in Muslim Mindanao (ARMM) are unavailable during the two low-enrollment years. Removing the data from ARMM altogether results in the graph presented in **Figure 1b**.

As may be gleaned from the second chart, public elementary enrollment levels in the rest of the country apparently exhibited no significant changes over the six-year period; indeed, the annual growth rates kept to within a rather modest range, neither lower than the -1.3 percent of

SY 2005-2006 nor higher than the 1.2 percent of SY 2006-2007. Stated differently, between SY 2002-2003 and SY 2007-2008 the average annual growth rate of public elementary enrollment was only 0.2 to 0.3 percent, which is way below the annual population growth rate of six- to 13-year-old children.⁶ Taken together with the fact that private elementary enrollment is nowhere near the level of public elementary enrollment, this means that an increasing proportion of children did not have access to elementary education between 2002 and 2008.

Figures 2a and 2b present the ARMM-inclusive and ARMM-exclusive levels of enrollment in public secondary schools between SY 2002-2003 and SY 2007-2008 and the implied annual growth rates. Even when SY 2004-2005 and SY 2005-2006 data are excluded, **Figure 2a** still paints a dismal picture: Public high school enrollment in SY 2006-2007 (5,026,823) was actually slightly lower than in SY 2003-2004 (5,027,847), and the average annual growth rate over the six school years registered only 1.4 percent, which again is way lower than the population growth rate of 12- to 17-year-olds.⁷

Excluding the data from ARMM, the situation was even worse [**Figure 2b**]. Annual growth rates fell from 4.3 percent in SY 2003-2004 to 0.5 percent in SY 2004-2005 and -2.0 percent in SY 2005-2006, before rising to 1.3 percent in SY 2006-2007 and 1.9 percent in SY 2007-2008. In effect, the average annual growth rate of public high school enrollment outside of ARMM was 1.2 percent between SY 2002-2003 and SY 2007-2008. Again, given the relatively small share of private secondary enrollment and the high growth rate of the client population, this means that increasing numbers and proportions of children did not find secondary education accessible over the period under analysis.

Where do students falter? Is school accessibility deteriorating because the growth rate of entrants into the school system has not kept pace with that of its client population or because students have been increasingly unable to complete their “tours of duty”?

Table 1 presents enrollment in Grade 1 and grade-to-grade dropout rates for Grades 2 to 6 from SY 2002-2003 to SY 2007-2008. It shows that the public school system’s intake of Grade 1 pupils has not been growing significantly. Indeed, the average annual growth rate of Grade 1 enrollment in public elementary schools during the period has been less than 1 percent, with and without ARMM. Thus, to the lackadaisical intake of Grade 1 pupils relative to the increasing population of such children may be attributed the deteriorating accessibility of public elementary schools.

Nonetheless, from the structure of dropout rates [**Table 1**], the following additional observations may be made: The low intake of Grade 1 pupils notwithstanding, even among those who do enroll, many apparently are ill-prepared for school, which is why they account for the largest grade-to-grade dropout rate every year. The estimated rate then declines until Grade 5, but increases in Grade 6.

Accordingly, policymakers should be concerned with (1) why the public elementary school system has been unable to increase Grade 1 enrollment significantly in recent years, (2) how the Grade 1 to Grade 2 dropout rate can be reduced, and (3) how Grade 5 students can be persuaded not to drop out one year before graduating from grade school.

On the public secondary level, the year-to-year dropout rates are more evenly distributed, but are much higher than those of Grades 2 to 6 [**Table 2**].⁸ Comparing **Tables 1 and 2**, one may also infer that the elementary-to-high-school transition rate is a problem. On average, 1.7 million

students graduated from public elementary schools every year between SY 2002-2003 and SY 2007-2008, but only 1.4 million enrolled annually in public high schools.

The problem of accessibility at the secondary level thus boils down to (1) why 0.3 million elementary school graduates, on average, do not proceed to high school and (2) why year-to-year dropout rates are so high.

Recalling the self-reported reasons for dropping out that were cited earlier, one may also throw in these questions: To what extent are the poor elementary-to-secondary transition rate and the (Grade 5 to Grade 6 and high school) dropout rates due to high (direct and indirect) costs of schooling? To what extent are they due to the lack of relevance of the curriculum? Based on an empirical evaluation of the net social benefits of basic education, what interventions can be designed to mitigate schooling costs? How can the basic education curriculum be made more relevant, so that school attendance can be raised to socially optimal levels?

Outcomes in basic education

Outcomes in basic education apparently did not improve since 2000. The adult basic literacy rate,⁹ as estimated from the FLEMMS 2003 data, declined to 93.2 (± 0.196) percent from the 94.6 percent figure that was cited in *PHDR 2000*. Moreover, no inroads against education deficits seemed to have been made.

Figures 3a and 3b present for 2004 and 2007, respectively, the mean years of schooling implied by the highest grade that seven- to 17-year-old children were reported to have completed, conditional on the educational attainment not exceeding the grade-level ceiling for the child's age.¹⁰ The following remarks may be made: First, the graphs of the two years are generally similar. Indeed, as indicated by **Table 3** on which the diagrams are based, the sample means between the two years are statistically different only for seven-, 15-, and 16-year-old girls as well as seven-year-old children.

Second, the education deficits (as measured by the vertical distance between the line of no deficit and ceiling-imposed mean years of schooling at a given age) tend to be larger the older the children are. As early as seven years old, children are already about half a year behind;¹¹ by 11 years old, they are a full year behind.

The deficit becomes smaller for 12- to 13-year-olds and for 14-year-old children only because the expected years of schooling for both 12- and 13-year-old children are set to 6 to accommodate the minority of private school students who attend Grade 7. (Effectively, this lowers the grade-level ceilings and thus the deficits of children who are 13 years and older by one year.) Still, the deficit widens again after age 14, possibly because of the pressure on the children to participate in the workforce once they reach the minimum legal age (15 years old) to do so. By age 17, when children are supposed to have graduated from high school, the deficit stands at 1.5 years.

Third, the gender difference in the education deficit generally increases with age. At 14 years, boys are only about three months behind (assuming a 10-month school year); at age 16, they are more or less six months behind.

Estudillo et al. [2001] offers a hypothesis for this gender difference in educational investments: Because parents in rural areas perceive sons (daughters) to enjoy a comparative advantage in farm (nonfarm) activities, they bequeath land holdings to sons and invest in the schooling of daughters. Their apparent objective: to carry out intergenerational transfers such that sons and daughters would have equal overall lifetime wealth. Alternatively, Alba [2001] suggests that the gender difference in educational investments may be because women use education as a compensating factor for the gender wage differential and for the lower wages in female-dominated occupations and industries.

School inputs

Arguably, schools and teachers are the two most crucial inputs in the school system. The school is the *organizing principle* of the formal educational system and encompasses not only the physical infrastructure (school buildings, classrooms, and other physical facilities), but also the organizational setup (i.e., the administrative and functional structure of personnel, the arrangement and schedule of the curriculum) and standards and processes (such as the instructional, testing, and evaluation technologies) that support learning. As for teachers, it suffices to quote from *PHDR 2000*: “Teachers remain the single indispensable input in all categories of schools. Their importance is magnified by the system’s adherence to a traditional pedagogical technology that emphasizes the individual teacher’s personal and transformative role and social example.”

Growth rate of schools

Figures 4a and 4b present the number and annual growth rates of public elementary schools from SY 2002-2003 to SY 2007-2008, with the first chart including and the second excluding data from ARMM. **Figure 4a** shows the number of schools rising from 36,600 and 37,000 in SY 2002-2003 and SY 2003-2004, respectively, to 37,700 in SY 2006-2007, before falling to 37,300 in SY 2007-2008.¹² The trend was more or less similar without ARMM [**Figure 4b**]. The number of public elementary schools in the rest of the country increased at a decreasing rate until SY 2005-2006, grew at a slightly higher rate in SY 2006-2007, but contracted by 1.1 percent in SY 2007-2008. In sum, both with and without ARMM, the average annual growth rate of public elementary schools during the period was a mere 0.4 percent.

Since public elementary schools expanded at a slower rate than enrollment, average school size (i.e., the pupil-to-school ratio) increased during the last two school years, although, as **Figures 5a and 5b** indicate, the values (at just under 330) are a shade below what they were in SY 2002-2003. Nonetheless, these developments raise the following question: To what extent is the slow growth rate of enrollment in public elementary schools due to the even slower growth rate of the schools?

In contrast, developments at the secondary level were somewhat brighter. **Figures 6a and 6b** show that the number of public high schools expanded annually between SY 2002-2003 and SY 2007-2008, so that the average annual growth rates were 3.3 percent for the whole country and 3.1 percent when ARMM is excluded. As these rates were much higher than those of public secondary enrollment for the corresponding geographic coverage, the average sizes of public high schools in SY 2007-2008 (with and without ARMM) were well below their levels in SY 2002-2003 [**Figures 7a and 7b**]. At just under 800, however, the student-to-public-high-school

ratios were still more than twice the values of the pupil-to-public-elementary-school ratio. Given that high values of the ratio suggests congestion or multiple shifts (which amounts to the same thing) and more complex administrative requirements at the school level, this implies that there is scope for policy interventions that effect further reductions in the size of public high schools.

Note that the enrollment-to-school ratio is simply mean enrollment.¹³ In other words, average school size is a summary measure that locates where the distribution of enrollment is centered. The mean, however, says nothing about the variation in the distribution, so that it is worthwhile to explore at least the scatter and range of enrollment values in each level of schooling.

Table 4a and 4b report the descriptive statistics of enrollment in public elementary schools from SY 2002-2003 to SY 2007-2008. The tables suggest that the distribution of enrollment is quite dispersed, as indicated by the standard deviations; enrollment in a public elementary school can be as low as zero¹⁴ and as high as 12,900.

Not surprisingly, the same story is told by **Tables 5a and 5b**, which present the descriptive statistics of enrollment in public secondary schools from SY 2002-2003 to SY 2007-2008. Again, the standard deviations are large, and the range of enrollment values goes from zero to 13,100.

The unexpected results then are that some schools did not even have students and that the extent of congestion in some elementary schools was probably as bad as that in some high schools. Given the younger ages of grade school children and their need for closer supervision, this latter finding does not bode well for the quality of schooling in grade schools with the highest enrollment levels.

Types of teachers

Categorized by funding source, public school teachers may be one of two types. Nationally funded teaching personnel occupy regular DepEd positions, draw salaries from the national government, and work in the school to which their salary items are assigned.¹⁵ Locally funded teaching personnel are financially supported¹⁶ by local sources, such as local government units and parent-teacher associations, or are volunteers.¹⁷

Figures 8a and 8b graph the numbers and growth rates of nationally funded and of all teaching personnel in public elementary schools from SY 2002-2003 to SY 2007-2008. Two observations may be made on the charts. First, the locally funded teaching staff has been at least as large as the nationally funded teaching workforce in public elementary schools; the ratio of locally- to nationally-funded teachers ranges from 1 in SY 2002-2003 to 1.1 in SY 2007-2008. Second, the number of teacher positions did not expand substantially. Between SY 2002-2003 and SY 2007-2008, the average annual growth rates of nationally funded and of all teaching personnel were 0.3 percent and 0.7 percent, respectively.

Tables 6a and 6b report the enrollment-to-teacher and teacher-to-school ratios for public elementary schools from SY 2003-2004 to SY 2007-2008. Since the average annual growth rates of all the variables for the period did not exceed 1 percent, the ratio values did not change much. The pupil-to-nationally-funded-teacher ratio remained at 36, while enrollment-to-teacher (both nationally and locally funded) ratio hovered at 17. On average, there were 19 teachers per school, nine of whom were nationally funded.

The number of teachers in public high schools from SY 2002-2003 to SY 2007-2008 and the annual growth rates implied by these are presented in **Figures 9a and 9b**. Comparing them with **Figures 8a and 8b**, one may make the following remarks: First, unlike at the elementary level, nationally funded secondary school teachers constituted the majority of the faculty. On average, only three locally funded teachers complemented every 10 of their nationally funded peers.

Second, as may be expected, the secondary level teaching workforce has been considerably smaller than the elementary level's. Nationally funded secondary school teachers have been only about a third of their elementary school counterparts, and the size of the entire teaching staff at the public secondary level has been only a fifth of that of the public elementary level.

Third, buoyed up by its 3.5 percent growth rate in each of the last two school years, the size of the nationally funded secondary level teaching staff grew at an average annual rate of 1.9 percent over the entire period, which just exceeded that of public secondary school enrollment (1.4 percent). This implies that the enrollment-to-nationally-funded-teacher ratio fell, though not by much.

Fourth, since the number of public secondary schools increased at an average annual rate of 3.3 percent between SY 2002-2003 and SY 2007-2008, at the end of the period there were fewer nationally funded teachers in each public high school, and it was the locally funded teaching staff that took up the slack (due in large part to the momentum provided by the 69.2 percent growth rate of locally funded teachers between SY 2002-2003 and SY 2003-2004).

These last two points are confirmed by **Tables 7a and 7b**, which report the enrollment-to-teacher and teacher-to-school ratios for public secondary schools from SY 2003-2004 to SY 2007-2008. As inferred, the enrollment-to-teacher ratio fell from 37.9 to 33.9 (since the total teaching staff expanded at a faster pace than enrollment), while the enrollment-to-nationally-funded-teacher ratio declined by one student (from 44.6 to 43.3). On the other hand, the number of nationally funded teachers in each school dropped from 19.5 to 18.2, but the total number of teachers in each school increased by a whisker from 23.0 to 23.3.

Two issues remain to be discussed. First, as in the enrollment-to-school ratio, it is useful to explore how spread out (about the mean) the values of teacher-to-school ratios are to get a sense of the extent of variation in the distribution. Second, in exploring the enrollment-to-teacher ratio, it is instructive to consider what the appropriate formula or equation is and then explore its distributional statistics.

The enrollment-to-teacher ratio is calculated in **Tables 6a to 7b** simply as total enrollment N divided by total number of teachers T , i.e., by the formula

$$\frac{N}{T} \equiv \frac{\sum_{i=1}^S n_i}{\sum_{i=1}^S t_i},$$

where n_i and t_i are, respectively, the enrollment level and number of teachers in the i th school, for $i = 1, \dots, S$. This indicator answers the question: If they are to be evenly divided over teachers *in the school system*, how many students would there be per teacher? The question of interest to policy makers, however, is more probably: What is the average class size across schools? That is, on average, how many students per teacher are there *in a school*? If so, the appropriate formula is

$$\frac{1}{S} \sum_{i=1}^S \frac{n_i}{t_i}$$

Only when $n_i/t_i = N/T$ for all schools, i.e., when all schools have identical student-to-teacher ratios, would the same value be obtained from both formulas.

To address the first issue, **Tables 8a and 8b** report the descriptive statistics of teacher-to-school ratios for public elementary schools and **Tables 9a and 9b** for public high schools. The tables suggest that the standard deviations are somewhat large: For public elementary (secondary) schools they are at least 1.3 (1.4) times the sample means. Moreover, in public elementary schools the range of values go from zero¹⁸ to well in excess of 200 if only nationally funded teachers are counted and to more than 400 if all teachers are included. In the case of public secondary schools, the ranges for the entire country in SY 2007-2008 were [0, 314] for nationally funded teachers and [0, 511] for all teachers.

Thus, just like the distribution of enrollment, the distribution of teachers exhibits a fair amount of variation. Indeed, the data readily reveal the extreme cases of (1) schools with positive enrollment, but which had neither nationally nor locally funded teachers, and (2) schools with hundreds of teachers, which must be administrative challenges for their school heads.

As for the enrollment-to-teacher ratios in schools, **Tables 10a and 10b** report the descriptive statistics of the indicator for public elementary schools and **Tables 11a and 11b** for public high schools. In the case of public elementary schools, comparing the sample means in **Tables 10a and 10b** with the corresponding enrollment-to-teacher ratio (in the school system) reported in **Tables 6a and 6b**, one finds that the estimates are not that far apart, which indicates that teachers are more or less evenly divided into pupils. Moreover, estimates of the standard deviation are fairly small; they are never larger than 0.5 of their corresponding sample mean. The ranges of values of the ratio, however, are still quite wide: In SY 2007-2008, the largest magnitudes were at least 300 pupils per teacher.¹⁹ This suggests that the distribution of average class size across schools is positively skewed.

In contrast, at the public secondary level, the estimates of the sample means [**Tables 11a and 11b**] and of the total enrollment-to-teacher ratios [**Tables 7a and 7b**] are further apart. Moreover, the standard deviations are larger; they are at least 0.9 of their sample mean. The ranges are also generally wider: In SY 2007-2008, at least one school had four students per nationally funded teacher (three students per teacher), but another had as many as 1459 (2105).²⁰

In sum, the problems with school inputs have to do with (1) the slow rates at which public elementary schools and nationally funded teachers in both levels of schooling have been expanding, which may be factors in the low growth rates of enrollment in public schools, (2) the large average size (or enrollment) of public high schools despite the 3.3 percent average annual growth rate of the schools, (3) the large dispersions of school enrollment, with extreme values of zero and tens of thousands of students, and of school teachers, with ranges of zero and several hundreds, and (4) the apparently increasing reliance on locally funded teachers at the high school level.

Congestion in public high schools

An unsatisfying aspect of a statistical analysis of traditional input ratios, such as the one undertaken in the previous section, is that it does not provide a sense either of the extent of congestion in schools, given the dispersed and skewed distribution of enrollment levels and inputs, or of the resources needed to address the problem. This section presents a programming exercise²¹ that, using BEIS data for SY 2007-2008, estimates the numbers of public high students who are underprovided with school inputs and the schools they attend as well as the resource gaps that need to be filled. It is intended as an example of an activity that DepEd planners and policymakers can do on a regular basis to improve the internal efficiency of the public school system (in the sense of aligning school inputs with the enrollment level).

Suppose that a public high school can have at most two shifts.²² Let single-shift schools remain with one shift, and restrict all other schools to a double shift. Require each student to have a seat, i.e., a desk, armchair, or table-chair set. Consider the following as classrooms: academic classrooms, science laboratories, home economics rooms, workshops, computer laboratories, and rooms not currently being used. Assume that each classroom can accommodate 45 students. Adopt a 7:4 subject specialization ratio. In other words, seven specialized teachers (in English, Filipino, Mathematics, Biological Science, Physical Science, *Makabayan/Heograpiya*, *Kasaysayan*, *Sibika*, and Physical Education) are needed to teach one section in each of the four year levels of high school. For the high (low) estimate, count only (both) the nationally funded (and locally funded) teachers and exclude (include) rooms that are not currently in use.

Let capacity (in terms of number of students that can be accommodated) in school i be determined by

$$k_i^* = \min \{t_i^*, c_i^*, r_i^*\},$$

where t_i^* , c_i^* , and r_i^* are, respectively, the (different) enrollment levels implied by the size of the teaching staff, the number of seats, and the number of classrooms of school i . In other words, the capacity of a school is set to the lowest enrollment level that its resources can handle. Define congestion by

$$d_i^e = \max \{n_i - k_i^*, 0\},$$

where n_i is the enrollment level in the i th school. That is, congestion is simply the number of students in excess of a school's capacity or zero, whichever is larger.

Table 12, which summarizes the results of the exercise, reports that under the high (low) set of estimates some 2.1 (1.7) million students or 41.8 (34.1) percent of the high school student population were underprovided with school inputs and these involved 6,102 (5,796) or 94.1 (89.3) percent of public high schools. But at the same time there were 0.1 (0.2) million unsubscribed slots in 386 (692) public high schools.

Figure 10 presents the regional distribution of these excess students. Central Luzon (III), Calabarzon (IV-A), and Central Visayas (VII) had the most number, while the Cordillera

Administrative Region (CAR), Cagayan Valley (II), Mimaropa (IV-B), and Caraga (XIII) had the least.

Figure 11 shows the regional distribution of oversubscribed public high schools. Regions with the most number of these schools included Ilocos (I), Central Luzon (III), Calabarzon (IV-A), Bicol (V), Western Visayas (VI), and Eastern Visayas (Region VIII), while those with the least number of these schools were the National Capital Region (NCR) and CAR.

The regional distribution of empty seats is graphed in **Figure 12**. It turns out that the unsubscribed slots in public high schools were preponderantly in NCR.

Regions with the most number of undersubscribed schools consisted of NCR, Calabarzon (IV-A), and Western Visayas (VI), while regions with the least number of these schools included Eastern Visayas (VIII), Northern Mindanao (X), SOCCSKARGEN (XII), and ARMM [**Figure 13**].

The following inferences may be drawn from these results: First, public high schools were generally oversubscribed. Stated another way, from a third to two-fifths of public high school students were underprovided with inputs.

Second, some regions were apparently more favored than others. For instance, NCR had the largest numbers of empty slots and undersubscribed public high schools and the fewest oversubscribed schools. Compared to other regions, CAR had relatively few excess students and oversubscribed schools. In contrast, Central Luzon (III) and Calabarzon (IV-A) had among the largest numbers of excess students and oversubscribed schools.

Third, there were hints of intraregional disparities. While its public high schools were generally congested, Calabarzon (IV-A) also had more undersubscribed schools than most regions.

Table 13 classifies schools by the types of binding constraints they face. The programming exercise suggests that under the high (low) estimate 4,402 (2,859) of the schools had a binding teacher constraint, 647 (1,045) had a binding classroom constraint, and 1,439 (2,092) had a binding seat constraint. But some schools faced a combination of binding constraints: 116 (38) schools did not have enough teachers and rooms for their enrollment size, 48 (12) did not adequately provide enough teachers and seats, 34 (108) did not have enough classrooms and seats, and 94 (21) had insufficient teachers, classrooms, and seats.

Table 14 shows the resources required to completely solve the congestion problem in public high schools in SY 2007-2008: 63,803 nationally funded teachers (41,422 teachers), 15,866 (15,597) classrooms, and 923,550 seats.

The way forward

The previous section provided glimpses of various aspects of the basic education sector that suggest that all is not right with it. It is important to emphasize, however, that being limited to what can be undertaken with data from the BEIS and various household surveys, the analyses suffer from *data availability bias* and fall far short of what is needed to diagnose the underlying causes of sectoral problems and to prescribe how best to solve them.²³

Two hypothetical questions drive home the point: If an extra P1 billion were made available to DepEd, what empirical evidence can it marshal to allocate the funds such that socially optimal outcomes would be obtained? Or to achieve, say, a basic education completion rate of 90 percent (i.e., 10 percent of Grade 1 pupils do not ever graduate from high school) in which high school graduates have a minimum score of 80 percent in a standardized secondary level achievement test, what empirical evidence can be used to show how this can be achieved over a five-year period and how much the plan would cost?

No matter how comprehensive information systems and feedback mechanisms are, however, they are not and cannot be the magic bullet on their own. More fundamentally, what is needed in the basic education sector is—the trite phrase notwithstanding— a paradigm shift.

First, it is high time that the sector holds itself explicitly and doggedly to the question of its *raison d'être*. How effectively and efficiently is the school system transmitting knowledge to, inculcating values in, and developing the productive skills of the next generation?

Second, DepEd needs to overhaul the centralized, bureaucratic administrative mindset that it inherited from the American colonial government in favor of a regulatory approach that hands greater autonomy to school districts and school heads. Specifically, this means that working within the minimal set of immutable institutional constraints,²⁴ DepEd²⁵ must (1) redesign the incentive structures of stakeholders such that behaviors would be more consistent with the societal goal for the basic education sector and (2) organize information systems and feedback mechanisms that are oriented toward the goal and that enable it and stakeholders to diagnose the causes of problems and prescribe solutions.

Obviously, these changes are easier said than done. Admittedly, drawing up the blueprint will be costly and require an expert team of education specialists, regulation economists, statistical analysts, designers of information systems, and lawyers. The long-term decline of the basic education sector and the negative impact this has had on the competitiveness, growth, and development of the country as documented by many accounts, however, suggest that time is past due for systemic and systemwide reforms. And there seems to be no better way. In any case, the following discussion is intended to illustrate the possibilities.

Size as the dominant policy concern

PHDR 2000 makes the point that the pressure of high population growth on the school system forced education policymakers to focus on providing more and more inputs and facilities just to keep apace and to cut corners, e.g., by reducing school hours and increasing the number of shifts, in order to spread out the costs. Consequently, as of 2000, access statistics were satisfactory, but quality as measured by achievement test scores and dropout, cohort survival, and completion rates suffered.

Arguably, however, in the context in which DepEd operates, the policy response is understandable. It is easy to be railed by media and Congress for refusing to accommodate children into the school system. It is more difficult to prove that high dropout rates or low test scores are due to defects in the school system *per se* rather than to problems involving other factors, e.g., poverty, family background, or school disruptions caused by natural calamities, political crises, or breakdown in peace and order.

Moreover, it is hard to hide congestion—that children have no seats, class sizes are large, textbooks are lacking. In contrast, it is easy to sweep low quality under the proverbial rug. Once poorly performing students drop out or graduate, they fall out of the ambit of DepEd, possibly into that of the Social Welfare Department in the first case and the Labor Department in the second. Directing underperforming students not to show up for achievement tests easily raises a school's average score.

From the vantage point of the regulatory paradigm that is being proposed, however, the point is: Had DepEd held itself or been held by stakeholders to basic education's social goal, it might have been more circumspect about trading off quality for quantity, and possibly better interventions could have been designed and undertaken.

Essentially, the country's high population growth boils down to a budget constraint problem for DepEd. In response to a budget that does not increase as fast as population growth, the department may adopt three strategies (which are not mutually exclusive): allocate the budget more efficiently, leverage budgetary allocations to increase overall resources for the basic education sector, and rationalize overall resources.

To allocate the budget more efficiently, DepEd can conduct programming exercises similar to the one presented in the previous section to have a sense of resource shortfalls by school, school and legislative district, province, and region. (Indeed, under a school-based management or SBM system that is discussed below, the department can provide each school with a template and train each school head to undertake the exercise.) It can then develop allocation rules to mitigate the negative effects of the budget constraint on quality.

For instance, using audit records on the costs of a desk and a classroom and the average annual salary of a nationally employed teacher, DepEd can simply convert the input shortages in each school into their annual values in monetary terms by the formula

$$p = x_c + x_r + x_t,$$

where x_c and x_r are, respectively, the cost of the number of desks and of classrooms required by the school divided by the average life of the input type, and x_t is the annual salary of teachers required by the school. If all schools are treated equally, then the allocation rule would be to rank schools by ascending monetary value of their input shortages and allocate budgetary resources as far as they can go.²⁶

Alternatively, equity and efficiency considerations could be added. For instance, schools in remote and poverty-stricken areas that have good efficiency scores (i.e., show good achievement scores given their input bundle) could be given priority. Over time and if a reward and penalty system is instituted, schools could be allocated some percentage of their cost savings if they are able to extend the lifetime of desks and classrooms or taxed if these inputs have lower than average durations.

To increase resources for the basic education sector, DepEd can more (pro)actively seek support from local government units, legislators (through pork barrel funds), and the private sector.²⁷ For instance, the department can hold annual conferences for corporate foundations and other donors that are interested in the education sector, where it can report projections of budgetary shortfalls and ask for funding commitments, both specified and unspecified as to use. It may even use these conferences to lobby public support for a larger budget.

Additionally, DepEd can negotiate *quid pro quo* arrangements where, say, the local government funds the construction of a school building or covers the rent of classroom space (for three- or four-shift schools) in exchange for teacher items in the plantilla. More creatively, it may negotiate schemes such as P1 million in additional funds from donors for every point increase in the past year's mean secondary level achievement test score for either the nation as a whole or the poorest areas of the country.

To address the specific problem of shortage of teaching and nonteaching staff, DepEd can consider establishing a corps of volunteers, particularly new college graduates, parents, and retirees, who either complement the work of nonteaching staff (e.g., as receptionists, security guards and school traffic aides, library clerks) on a regular basis or train to teach topics in specific subjects and can be called to teach on an intermittent basis. Drawing on economic principles, the department may explore using nonlinear pricing strategies by offering a menu of price-quality options for families to self-select into, based on their willingness to pay for quality.

In fact, such a policy in rudimentary form has been in place for at least two decades. The educational services contracting scheme (ESC) provides a tuition subsidy worth P10,000 in NCR and P5,000 in the rest of the country to public elementary school graduates who opt to enroll in ESC-participating private high schools. In effect, public high schools are decongested, and as a result of the subsidy, more resources are channeled to the education sector because ESC beneficiaries are induced to spend more than the value of their subsidy.

Finally, DepEd can rationalize the use of resources that it is able to raise from all sources. Given funding commitments from donors (so that some schools, districts, or budget items are favored), the department should realign its own budget both for efficiency and equity considerations to the extent possible. For instance, since LGUs with large special education funds (SEF) tend to have schools with overcapacity relative to enrollment [District 3 in Quezon City], private high schools in the area should not be allotted ESC slots. Alternatively, public consultations should be conducted to decide how LGUs should spend their SEFs, e.g., build more school buildings or provide private school scholarships to decongest public schools.

Obviously, crafting these interventions is not straightforward. In particular, DepEd has to be mindful about how they affect the incentives of stakeholders. For instance, the ESC program does not enjoy widespread support among teachers and principals of public high schools as well as school district and regional officials because school size (i.e., enrollment) matters in the allocation of DepEd resources and in the assignment of plantilla positions.

Concomitant to the interventions, therefore, is the realigning of performance incentives. School principals could be judged on the basis of how well they are able to leverage DepEd resources to increase the budgetary resources of their schools or decongest their schools without worsening access or quality in the school district. School district and regional officials could be judged on the basis of sectoral performance rather than the administration of public schools alone.

The point remains, however, that the sector has to be focused on delivering its social goal (and performance reviews have to be undertaken periodically) and that new and creative strategies that take into account the incentives of stakeholders have to be adopted.

Quality of education

PHDR 2000 cites deteriorating quality, as evidenced by low achievement test scores and cohort survival rates, as another grave concern of the basic education sector. In particular, it attributes the quality deficit to (1) the lack of relevance of the curriculum, especially for disadvantaged sectors, due to the one-size-fits-all curriculum policy, (2) poor student comprehension and learning due to policy inflexibility on the language of instruction in specific subjects and grade levels, and (3) the inadequacy and poor quality of inputs, specifically teachers and textbooks.

Again, it can be argued that the policies betray a lack of focus on basic education's social goal. For instance, the usual argument of DepEd officials (and even educationists in teacher colleges) who balk at the need both to develop different, more contextualized learning modules (for increased relevance) and to translate instructional materials, particularly for the first three grades, to different languages (to make them more comprehensible to pupils) is that the effort would be too expensive. What is forgotten is that mathematics and science, at least in the early stages, are best learned in the context of a pupil's everyday experiences and that foundations are particularly important because of the cumulative nature of concepts in these subjects. What is missed is that, unless a less costly way that is equally effective is found, the aforementioned interventions must be undertaken because the current state of things defaults into a poorly educated citizenry and a less productive workforce that may have even bigger long-term costs and negative consequences.

A related issue, the debate on English as the medium of instruction, is instructive. The ostensible reason of proponents, according to several bills in the House of Representatives, is to expose students early to English and raise their level of proficiency to make the country more globally competitive. The literature on economic growth (e.g., Jones [2002] and Easterly et al. [1994]), though, maintains that a developing country's prospects for long-term economic growth depend in large part on the proficiency of its workforce (of high school graduates) in science and mathematics because the knowhow facilitates transfer of technology, thereby attracting foreign direct investments.

In effect, for the country to be more globally competitive and have better prospects for long-term growth, the question of language of instruction should be subsidiary to the problem of how learning in science and mathematics can occur effectively for the largest number of grade school and high school students. In other words, the language question in basic education should be: In what language(s)—and in what contexts—can effective learning in science and mathematics take place?

To improve quality, DepEd's bureaucratic obsession on standardization and insistence on centralized administrative control have to give way to a regulatory stance where decisionmaking is devolved but always considered for its impact on outcomes. In particular, this means that DepEd's policy and planning offices have to accord a more central role to measuring and rewarding (or penalizing) performance (i.e., the efficiency with which inputs translate into outcomes per peso of the school's, school district's, or region's budgetary resources) and devote more resources to solving coordination failures (particularly those arising from adverse stakeholder behavior, such as moral hazard and adverse selection). Instead of expending resources on vetting and procuring textbooks or tweaking the credential and tenure requirements of the promotion system for teachers, for instance, DepEd would concentrate on designing and

overseeing *tournaments* (of schools, school districts, and regions) and monitoring and rewarding performance.

In effect, decision units (i.e., schools, school districts, and regions) would be left free to decide within limits how budgets will be utilized, which textbooks will be adopted, and how teachers will teach, but would also be held responsible on how they score based on some pre-set criteria (e.g., having achievement test scores over the last n years that are better—higher and less dispersed—than what are predicted by estimated school production functions or having actual costs that for the given outcomes over the last n years are lower than what are predicted by estimated cost functions for schools, average annual growth rates of age-specific enrollment levels, and cohort survival rates). To persistently improve system performance, DepEd would also hold regular conferences or stakeholder consultations where problems can be discussed, solutions proposed, and best practices (or the technologies of the most efficient schools)²⁸ disseminated.

It is worth mentioning at this juncture that the ongoing initiative to decentralize the administration of schools using the SBM framework that is at the core of the Basic Education Sector Reform Agenda (BESRA) is a good fit to the regulatory perspective being proposed. Commendable features of the SBM framework include (1) the recognition that decisionmaking about the allocation of scarce resources available to the school should rest with the its stakeholders (i.e., the principal and teachers, students and their families, and local governments and civil society) since, on the one hand, they are the direct beneficiaries of school outcomes, and, on the other hand, they are likely to be the most well-informed about the school's particular circumstances; (2) the collaborative forging of a covenant among stakeholders in the forms of a school improvement plan and a school operating budget; and (3) the regular monitoring of how resources are utilized and periodic evaluation of the impacts on school programs and projects to ensure accountability.

The point remains, however, that the initiative can benefit further from a DepEd central office that adopts a regulatory perspective, i.e., creates an environment that gives paramount importance to a pre-set criteria of outcomes, makes provisions for the regular monitoring of performance, provides for a system of rewards and penalties, and sets up consultative forums for stakeholders where problems are discussed and best practices are disseminated.

A final word

Obviously, much remains to be said and done. Due to time, resource, and space constraints, this paper does not analyze achievement tests, government and household expenditures on basic education, and equity, just to name a few important topics. Nor does it discuss the information needs of DepEd as regulator, although this is perhaps best left to a team of experts to tackle.

The research activity and the ensuing debate, however, need not end here. Analyses that have not found space in this paper will be posted on the Human Development Network (HDN) Website. Education is too important to be out of mind and sight for any given length of time. Considerable and constant thought, discussion, and effort need to be applied to it.

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Notes

1 An interesting aside is that both the school system as we know it and nationalism as an ideology are outgrowths of print technology. Obviously, it is almost unimaginable that learning on a massive scale can be carried out without textbooks and workbooks. But on nationalism, Anderson [2003] notes that it was an ideal subject for book publishers in capitalist economies who were in search of content that would catch a large audience, i.e., readers fluent in the language used in the book (and therefore sharing a common bond).

2 The word is used advisedly. Arguably, the classroom is an artificial environment where contrived activities that facilitate learning are conducted.

3 These numbered 2.5 million in 2004 and 2.7 million in 2007.

4 To the question, “Why is ___ not currently attending school,” the respondent was asked to pick only one of about 15 possible answers.

5 This is the survey-design-consistent standard error.

6 Based on population estimates that are obtained from APIS 2004 and 2007, the annual growth rate of the six- to 13-year-old population was 1.76 percent if ARMM is included and 1.65 percent if not.

7 From the population estimates derived from APIS 2004 and 2007, the annual growth rate of the 12- to 17-year-old population was 4.3 percent with ARMM and 4.22 percent without ARMM.

8 Throwing out the unlikely 1.1 percent first- to second-year dropout rate between SY 2005-2006 and SY 2006-2007 yields an average dropout rate of 10.5 percent.

9 This is defined as the proportion of the population 15 years and older who say they can read and write.

10 Formally, the variable may be described as follows: Define s_{i_a} as the years of schooling implied by the highest grade completed by the i_a th child who is a years old, where $i_a = 1, \dots, n_a$ and $a = 7, \dots, 17$. Specifically, s_{i_a} equals 1 if the highest grade completed is Grade 1, 2 if Grade 2, \dots , 6 if Grade 6 or 7, \dots , 7 if first-year high school, \dots , and 10 if the individual is a high school graduate. Let s_a be the years of schooling implied by the highest grade that is expected to have been completed by age a . Specifically, $s_7 = 1, \dots, s_{11} = 5, s_{12} = s_{13} = 6, s_{14} = 7, \dots$, and $s_{17} = 10$. Then the ceiling-imposed years of schooling variable is given by

$$s_{i_a}^* = \begin{cases} s_{i_a} & \text{if } s_{i_a} \leq s_a \\ s_a & \text{if } s_{i_a} > s_a. \end{cases}$$

In effect, $s_{i_a}^*$ measures the number of years that a child is behind relative to the years in school he is expected to have put in at his age.

11 An alternative interpretation of the statistic at least in the case of seven-year-old children is that only half of them have completed Grade 1.

12 Given the increasing numbers of children that need to be served, this reduction in the number of schools needs to be investigated: Is it a real phenomenon of some 300 schools being closed

down or a spurious one of the schools simply not submitting their administrative reports? Unfortunately, there is no way to tell until data on SY 2008-2009 become available.

13 That is, $N/S \equiv S^{-1} \sum n_i$ for $i = 1, \dots, S$, where n_i is the level of enrollment in the i th school and N is total enrollment.

14 These are not cases of missing enrollment data but of enrollment values being zero in the school-level worksheets of the BEIS.

15 Nationally funded employees whose posts are connected with a school but are deployed elsewhere are not included in this category or in the count taken here.

16 Forms of support include salaries, honoraria, and stipends. Typically, the values of these are lower than the compensation that nationally funded personnel receive.

17 Locally funded teachers may or may not have passed the Licensure Exam for Teachers that are required of nationally funded teachers. Those who have are usually waiting for an opening for a regular DepEd position.

18 Again, these are actual zeros in the school data.

19 In SY 2002-2003 the largest value of the ratio for nationally funded teachers was 1,878. This was a school in San Jose del Monte City, Central Luzon, which had one nationally funded teacher and 23 locally funded counterparts.

20 The student-to-nationally funded-teacher ratio does not constitute an upper bound for the student-to-teacher ratio because the two indicators may have slightly different samples. For instance, a school with only locally funded teachers would not be in the sample of the first ratio. The student-to-teacher ratio, however, is a lower bound for the student-to-nationally funded-teacher ratio. Effectively, this means that the minimum value of the ratio involving nationally funded teachers only cannot be lower than the ratio involving all teachers.

21 The original idea belongs to Honesto Nuqui who conducted the exercise with a slightly different set of assumptions for a World Bank evaluation of the Educational Services Contracting Scheme.

22 The data indicate that in SY 2007-2008 there were 6,079 one-shift, 332 two-shift, 28 three-shift, and 49 four-shift high schools.

23 This recalls the simile of economics being like a drunken search for car keys within the circle of light of a streetlight.

24 The point here is that DepEd should identify the institutional constraints that keep it from achieving optimal outcomes and develop a timetable for improving on these constraints, depending on the ease with which changes can be done. In a given planning or operational period, however, there will be constraints that are hard and fast and others that can be finessed.

25 The assumption here is that DepEd is a benevolent, utilitarian regulator. Technically, this means that DepEd maximizes a social welfare function that is the sum of the net welfare of each stakeholder in the basic education sector. Less formally, it means that DepEd's objective is to do the best it can on the society's goal for basic education.

26 An important consideration is that the allocation rules have to take the lumpiness of inputs into account. It doesn't do to provide funds for half the value of classroom construction, for example.

27 An important component of this effort will be annual reports, both general and specific to each donor, on how the funds were used, including DepEd's contributions especially in relation to *quid pro quo* arrangements. DepEd must endeavor to show in these reports, not only that outcomes improved as a result, but perhaps more importantly that the use of funds was not tainted by corruption.

28 A possible best practice is worth mentioning. Targeted at low middle-income households who demand quality education, Roosevelt College (RC) offers a double dose of English, Filipino, science, and mathematics relative to the curriculum of public high schools. Perhaps more importantly, teachers' compensations consist of a basic salary that is lower than that of a nationally funded teacher and merit pay that depends on how well students in their classes perform in achievement tests at the end of the school year. One can thus surmise that the compensation package effects a separating equilibrium: Teachers who cannot get their students to score high in achievement tests would rather transfer to public schools; teachers who can do so on a regular basis would rather stay in RC.

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Table 1
Grade 1 enrollment and grade-to-grade dropout rates (excludes ARMM), SY 2002-2003 to SY 2007-2008

School Year	Grade 1 Enrollment	Dropout Rates				
		Grade 2	Grade 3	Grade 4	Grade 5	Grade 6
2002-2003	2,427,727					
2003-2004	2,403,754	17.51	4.68	3.63	3.20	5.10
2004-2005	2,428,630	17.85	4.86	3.95	3.74	5.59
2005-2006	2,348,636	18.44	5.51	4.61	4.36	6.26
2006-2007	2,434,928	15.97	4.42	3.26	3.12	5.10
2007-2008	2,486,697	17.42	5.25	3.90	3.65	5.74
Average	2,421,729	17.44	4.94	3.87	3.61	5.56

Source: BEIS

Table 2
First year enrollment and year-to-year dropout rates (excludes ARMM), SY 2002-2003 to SY 2007-2008

School Year	First Year Enrollment	Dropout Rates		
		Year 2	Year 3	Year 4
2003-2004	1,461,137			
2004-2005	1,446,711	10.63	9.45	10.18
2005-2006	1,101,067	9.58	9.24	9.64
2006-2007	1,569,528	1.95	11.87	13.96

2007-2008	1,473,003	11.42	7.42	10.78
Average	1,410,289	8.39	9.50	11.14

Source: BEIS

Table 3
Average years of schooling, 2004 and 2007
(Ceiling-imposed)

Age (in years)	2004			2007			Comparison of Means (2004 vs. 2007)		
	Both Sexes	Male	Female	Both Sexes	Male	Female	Both Sexes	Male	Female
7	0.49	0.45	0.54	0.48	0.44	0.52	*		**
	0.007	0.008	0.008	0.007	0.008	0.008			
	964	503	459	887	465	454			
8	1.27	1.21	1.33	1.29	1.23	1.35			
	0.010	0.011	0.011	0.010	0.011	0.011			
	949	502	515	881	441	421			
9	2.15	2.06	2.24	2.16	2.07	2.24			
	0.012	0.013	0.013	0.012	0.014	0.014			
	936	492	474	937	457	465			
10	3.00	2.87	3.13	3.07	2.99	3.16			
	0.014	0.017	0.015	0.015	0.017	0.016			
	967	541	490	922	476	418			

Table 3
Average years of schooling, 2004 and 2007
(Ceiling-imposed)

Age (in years)	2004			2007			Comparison of Means (2004 vs. 2007)		
	Both Sexes	Male	Female	Both Sexes	Male	Female	Both Sexes	Male	Female
11	3.93	3.77	4.09	4.00	3.88	4.14			
	0.017	0.021	0.017	0.016	0.019	0.019			
	924	508	425	846	437	413			
12-13	5.09	4.94	5.24	5.14	5.00	5.28			
	0.015	0.019	0.018	0.016	0.019	0.018			
	1326	975	932	1299	942	878			
14	6.24	6.05	6.44	6.27	6.12	6.42			
	0.020	0.024	0.022	0.019	0.022	0.021			
	926	491	433	894	443	441			
15	7.08	6.78	7.37	7.09	6.87	7.29			**
	0.023	0.029	0.021	0.022	0.027	0.022			
	919	471	428	906	451	414			
16	7.84	7.48	8.20	7.85	7.55	8.13			**
	0.026	0.033	0.022	0.027	0.032	0.026			
	873	471	375	856	421	396			

Table 3
Average years of schooling, 2004 and 2007
(Ceiling-imposed)

Age (in years)	2004			2007			Comparison of Means (2004 vs. 2007)		
	Both Sexes	Male	Female	Both Sexes	Male	Female	Both Sexes	Male	Female
17	8.49	8.13	8.20	8.54	8.12	8.99			
	0.030	0.034	0.022	0.031	0.037	0.031			
	802	407	375	836	420	353			

Source: BEIS

Notes:

The numbers (in smaller typefont) below the estimate of the mean are the design-consistent standard error and degrees of freedom (number of PSUs – number of strata), respectively.

As suggested in Korn and Graubard (1999:75), the *t*-tests care carried out using the Satterthwaite approximation of the degrees of freedom.

*** Statistically significant at significance level 0.001.

** Statistically significant at significance level 0.05.

* Statistically significant at significance level 0.1.

Table 4a
Enrollment in public elementary schools (includes ARMM), SY 2002-2003 to SY
2007-2008

School Year	Sample Size	Mean	Std. Dev.	Minimum	Maximum
2002-2003	36,588	329.31	499.9375	0	11,945
2003-2004	37,017	325.95	495.4668	0	12,934
2004-2005	35,380	325.92	499.2575	0	12,550
2005-2006	35,503	320.70	491.8706	0	12,226
2006-2007	37,673	320.75	491.2689	0	12,521

Table 4a
Enrollment in public elementary schools (includes ARMM), SY 2002-2003 to SY 2007-2008

School Year	Sample Size	Mean	Std. Dev.	Minimum	Maximum
2007-2008	37,306	327.16	502.0455	0	12,840

Source: BEIS

Table 4b
Enrollment in public elementary schools (excludes ARMM), SY 2002-2003 to SY 2007-2008

School Year	Sample Size	Mean	Std. Dev.	Minimum	Maximum
2002-2003	34,657	331.82	507.4478	0	11,945
2003-2004	35,058	328.51	503.0529	0	12,934
2004-2005	35,380	325.92	499.2575	0	12,550
2005-2006	35,503	320.70	491.8706	0	12,226
2006-2007	35,672	322.92	498.8342	0	12,521
2007-2008	35,271	328.47	508.1920	0	12,840

Source: BEIS

Table 5a
Enrollment in public secondary schools (includes ARMM), SY 2002-2003 to SY 2007-2008

School Year	Sample Size	Mean	Std. Dev.	Minimum	Maximum
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Table 5a
Enrollment in public secondary schools (includes ARMM), SY 2002-2003 to SY 2007-2008

School Year	Sample Size	Mean	Std. Dev.	Minimum	Maximum
2002-2003	5,504	870.47	1177.8570	4	12,440
2003-2004	5,751	874.26	1169.7170	9	12,559
2004-2005	5,783	852.38	1151.6110	11	13,097
2005-2006	6,002	804.51	1089.9490	7	12,015
2006-2007	6,384	787.41	1064.1580	0	11,989
2007-2008	6,488	790.14	1050.3880	8	11,381

Source: BEIS

Table 5b
Enrollment in public secondary schools (excludes ARMM) , SY 2002-2003 to SY 2007-2008

School Year	Sample Size	Mean	Std. Dev.	Minimum	Maximum
2002-2003	5,361	877.62	1188.7590	4	12,440
2003-2004	5,586	878.17	1181.5490	9	12,559
2004-2005	5,783	852.38	1151.6110	11	13,097
2005-2006	6,002	804.51	1089.9490	7	12,015
2006-2007	6,154	794.82	1079.0640	4	11,989
2007-2008	6,250	797.32	1065.4430	8	11,381

Source: BEIS

Table 6a
Teacher ratios in public elementary schools (includes ARMM), SY 2002-2003 to SY 2007-2008

School Year	<i>N : NTF</i>	<i>N : All</i>	<i>NTF : S</i>	<i>All : S</i>
2002-2003	36.25	17.74	9.08	18.56
2003-2004	36.55	17.62	8.92	18.50
2004-2005	36.13	17.37	9.02	18.76
2005-2006	35.57	17.09	9.02	18.76
2006-2007	35.93	17.34	8.93	18.49
2007-2008	36.21	17.33	9.04	18.88

Source: BEIS

Notes:

N = enrollment

NTF = nationally funded teachers

All = nationally and locally funded teachers

S = schools

Table 6b
Teacher ratios in public elementary schools (excludes ARMM), SY 2002-2003 to SY 2007-2008

School Year	<i>N : NTF</i>	<i>N : All</i>	<i>NTF : S</i>	<i>All : S</i>
2002-2003	36.02	17.62	9.21	18.83
2003-2004	36.33	17.50	9.04	18.77
2004-2005	36.13	17.37	9.02	18.76
2005-2006	35.57	17.09	9.02	18.76
2006-2007	35.66	17.22	9.06	18.76
2007-2008	35.83	17.15	9.17	19.15

Table 6b
Teacher ratios in public elementary schools (excludes ARMM), SY 2002-2003 to SY 2007-2008

School Year	<i>N : NTF</i>	<i>N : All</i>	<i>NTF : S</i>	<i>All : S</i>
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Source: BEIS

Notes:

N = enrollment

NTF = nationally funded teachers

All = nationally and locally funded teachers

S = schools

Table 7a
Teacher ratios in public secondary schools (includes ARMM), SY 2002-2003 to SY 2007-2008

School Year	<i>N : NTF</i>	<i>N : All</i>	<i>NTF : S</i>	<i>All : S</i>
--------------------	-----------------------	-----------------------	-----------------------	-----------------------

2002-2003	44.56	37.91	19.54	22.96
2003-2004	45.85	35.52	19.07	24.61
2004-2005	45.32	35.33	18.81	24.13
2005-2006	43.73	34.09	18.40	23.60
2006-2007	43.97	34.35	17.91	22.92
2007-2008	43.33	33.94	18.23	23.28

Source: BEIS

Notes:

N = enrollment

NTF = nationally funded teachers

All = nationally and locally funded teachers

S = schools

Table 7b
Teacher ratios in public secondary schools (excludes ARMM), SY 2002-2003 to SY 2007-2008

School Year	<i>N : NTF</i>	<i>N : All</i>	<i>NTF : S</i>	<i>All : S</i>
2002-2003	44.49	37.91	19.73	23.15
2003-2004	45.62	35.45	19.25	24.78
2004-2005	45.32	35.33	18.81	24.13
2005-2006	43.73	34.09	18.40	23.60
2006-2007	43.49	34.01	18.27	23.37
2007-2008	43.08	33.85	18.51	23.55

Source: BEIS

Notes:

N = enrollment

NTF = nationally funded teachers

All = nationally and locally funded teachers

S = schools

Table 8a
Teachers in public elementary schools (includes ARMM)

School Year	Sample Size	Mean	Std. Dev.	Minimum	Maximum
<i>NTF : S</i>					
2002-2003	36,588	9.08	12.1271	0	231
2003-2004	37,017	8.92	11.8328	0	229
2004-2005	35,380	9.02	11.8708	0	236
2005-2006	35,489	9.02	11.7804	0	248
2006-2007	37,673	8.93	11.6602	0	256

Table 8a
Teachers in public elementary schools (includes ARMM)

School Year	Sample Size	Mean	Std. Dev.	Minimum	Maximum
2007-2008	37,277	9.04	11.8621	0	266
<i>All : S</i>					
2002-2003	36,588	18.56	24.8295	0	488
2003-2004	37,017	18.50	24.5854	0	482
2004-2005	35,380	18.76	24.7542	0	488
2005-2006	35,489	18.77	24.6435	0	500
2006-2007	37,673	18.49	24.1919	0	518
2007-2008	37,276	18.90	24.7340	0	532

Source: BEIS

Notes:

N = enrollment

NTF = nationally funded teachers

All = nationally and locally funded teachers

S = schools

Table 8b
Teachers in public elementary schools (excludes ARMM)

School Year	Sample Size	Mean	Std. Dev.	Minimum	Maximum
<i>NTF : S</i>					
2002-2003	34,657	9.21	12.2646	0	231
2003-2004	35,058	9.04	11.9718	0	229

Table 8b
Teachers in public elementary schools (excludes ARMM)

School Year	Sample Size	Mean	Std. Dev.	Minimum	Maximum
2004-2005	35,380	9.02	11.8708	0	236
2005-2006	35,489	9.02	11.7804	0	248
2006-2007	35,672	9.06	11.8031	0	256
2007-2008	35,242	9.18	11.9940	0	266
<i>All : S</i>					
2002-2003	34,657	18.83	25.1272	0	488
2003-2004	35,058	18.77	24.8978	0	482
2004-2005	35,380	18.76	24.7542	0	488
2005-2006	35,489	18.77	24.6435	0	500
2006-2007	35,672	18.76	24.5095	0	518
2007-2008	35,241	19.17	25.0407	0	532

Source: BEIS

Notes:

N = enrollment

NTF = nationally funded teachers

All = nationally and locally funded teachers

S = schools

Table 9a
Teachers in public secondary schools (includes ARMM)

School Year	Sample Size	Mean	Std. Dev.	Minimum	Maximum
<i>NTF : S</i>					
2002-2003	5,504	19.54	31.3912	0	745
2003-2004	5,751	19.07	30.6969	0	342
2004-2005	5,783	18.81	30.2690	0	331
2005-2006	6,002	18.40	29.7171	0	341
2006-2007	6,384	17.91	29.1123	0	342
2007-2008	6,488	18.23	28.8784	0	314
<i>All : S</i>					
2002-2003	5,504	22.96	35.0164	0	790
2003-2004	5,751	24.61	37.2433	0	758
2004-2005	5,783	24.13	35.1365	0	509
2005-2006	6,002	23.60	34.8496	0	500
2006-2007	6,384	22.92	33.4875	0	519
2007-2008	6,488	23.28	33.2234	0	511

Source: BEIS

Notes:

N = enrollment

NTF = nationally funded teachers

All = nationally and locally funded teachers

S = schools

Table 9b
Teachers in public secondary schools (excludes ARMM)

School Year	Sample Size	Mean	Std. Dev.	Minimum	Maximum
<i>NTF : S</i>					
2002-2003	5,361	19.73	31.7329	0	745
2003-2004	5,586	19.25	31.0514	0	342
2004-2005	5,783	18.81	30.2690	0	331
2005-2006	6,002	18.40	29.7171	0	341
2006-2007	6,154	18.27	29.5122	0	342
2007-2008	6,250	18.51	29.2841	0	314
<i>All : S</i>					
2002-2003	5,361	23.15	35.4073	0	790
2003-2004	5,586	24.78	37.6906	0	758
2004-2005	5,783	24.13	35.1365	0	509
2005-2006	6,002	23.60	34.8496	0	500
2006-2007	6,154	23.37	33.9538	0	519
2007-2008	6,250	23.55	33.7303	0	511

Source: BEIS

Notes:

N = enrollment

NTF = nationally funded teachers

All = nationally and locally funded teachers

S = schools

Table 10a
Enrollment-to-teacher ratios in public elementary schools (includes ARMM)

School Year	Sample Size	Mean	Std. Dev.	Minimum	Maximum
<i>N : NTF</i>					
2002-2003	36,134	36.43	18.1580	0.00	1878.00
2003-2004	36,438	37.07	16.7995	3.67	516.00
2004-2005	35,087	35.54	13.7279	4.50	314.00
2005-2006	35,306	34.72	13.5670	0.00	344.00
2006-2007	37,311	35.45	15.1239	5.00	405.50
2007-2008	36,956	35.79	16.1179	0.00	342.50
<i>N : All</i>					
2002-2003	36,587	17.91	7.9582	0.00	417.00
2003-2004	37,012	17.81	7.9302	0.00	431.00
2004-2005	35,354	16.83	5.5518	2.00	134.00
2005-2006	35,459	16.46	5.5370	0.00	168.00
2006-2007	37,591	17.02	6.7046	2.50	127.00
2007-2008	37,248	17.00	7.4356	0.00	300.00

Source: BEIS

Notes:

N = enrollment

NTF = nationally funded teachers

All = nationally and locally funded teachers

S = schools

Table 10b
Enrollment-to-teacher ratios in public elementary schools (excludes ARMM)

School Year	Sample Size	Mean	Std. Dev.	Minimum	Maximum
<i>N : NTF</i>					
2002-2003	34,291	35.56	16.9649	0.00	1878.00
2003-2004	34,565	36.18	15.1902	3.67	516.00
2004-2005	35,087	35.54	13.7279	4.50	314.00
2005-2006	35,306	34.72	13.5670	0.00	344.00
2006-2007	35,454	34.55	13.0660	5.00	361.00
2007-2008	35,073	34.60	12.9996	0.00	318.00
<i>N : All</i>					
2002-2003	34,656	17.37	6.4405	0.00	239.00
2003-2004	35,054	17.30	6.9439	0.00	431.00
2004-2005	35,354	16.83	5.5518	2.00	134.00
2005-2006	35,459	16.46	5.5370	0.00	168.00
2006-2007	35,608	16.55	5.7436	2.50	110.00
2007-2008	35,217	16.35	5.5529	0.00	135.06

Source: BEIS

Notes:

N = enrollment

NTF = nationally funded teachers

All = nationally and locally funded teachers

S = schools

Table 11a
Enrollment-to-teacher ratios in public secondary schools (includes ARMM)

School Year	Sample Size	Mean	Std. Dev.	Minimum	Maximum
<i>N : NTF</i>					
2002-2003	4,700	50.63	57.1726	0.48	1553.00
2003-2004	4,666	53.52	87.3782	0.28	3887.00
2004-2005	4,595	49.80	44.1469	6.50	1331.00
2005-2006	4,703	48.22	41.0768	4.20	683.50
2006-2007	5,005	50.57	56.0768	4.56	1416.00
2007-2008	5,311	52.43	58.5023	4.00	1459.00
<i>N : All</i>					
2002-2003	5,323	46.59	60.6551	0.39	1358.00
2003-2004	5,604	46.34	68.0076	0.26	2084.00
2004-2005	5,633	44.46	69.6369	4.33	1975.00
2005-2006	5,795	44.04	57.9852	3.50	1801.00
2006-2007	6,110	43.24	50.2135	4.00	875.00
2007-2008	6,288	44.09	61.2215	3.00	2105.00

Source: BEIS

Notes:

N = enrollment

NTF = nationally funded teachers

All = nationally and locally funded teachers

S = schools

Table 11b
Enrollment-to-teacher ratios in public secondary schools (excludes ARMM)

School Year	Sample Size	Mean	Std. Dev.	Minimum	Maximum
<i>N : NTF</i>					
2002-2003	4,567	50.33	57.1145	1.00	1553.00
2003-2004	4,518	52.32	77.1198	0.28	3887.00
2004-2005	4,595	49.80	44.1469	6.50	1331.00
2005-2006	4,703	48.22	41.0768	4.20	683.50
2006-2007	4,860	49.65	49.9194	4.56	1317.00
2007-2008	5,127	50.81	47.8424	4.00	882.00
<i>N : All</i>					
2002-2003	5,182	46.63	60.9050	1.00	1358.00
2003-2004	5,439	45.97	62.2809	0.26	1914.00
2004-2005	5,633	44.46	69.6369	4.33	1975.00
2005-2006	5,795	44.04	57.9852	3.50	1801.00
2006-2007	5,937	43.29	50.8024	4.00	875.00
2007-2008	6,060	44.17	62.1299	3.00	2105.00

Source: BEIS

Notes:

N = enrollment

NTF = nationally funded teachers

All = nationally and locally funded teachers

S = schools

Table 12
Results of programming exercise

	High Estimate	Low Estimate
Excess students	2,140,703	1,749,906
Oversubscribed schools	6,102	5,796
Empty seats	140,568	175,226
Undersubscribed schools	386	692

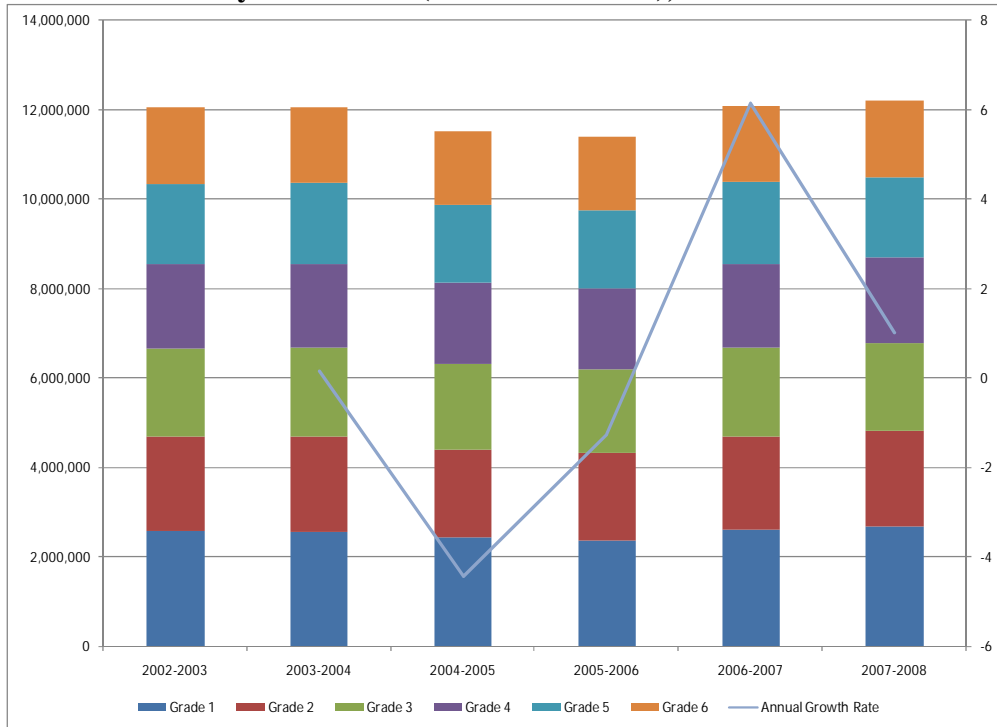
Table 13
Public high schools by type of binding constraint, SY 2007-2008

	High Estimate	Low Estimate
Teachers	4,402	2,859
Rooms	647	1,045
Seats	1,439	2,092
Ties		
Teachers and rooms	116	38
Teachers and seats	48	12
Rooms and seats	34	108
Teachers, rooms, and seats	94	21

Table 14
Resources required to solve the congestion problem

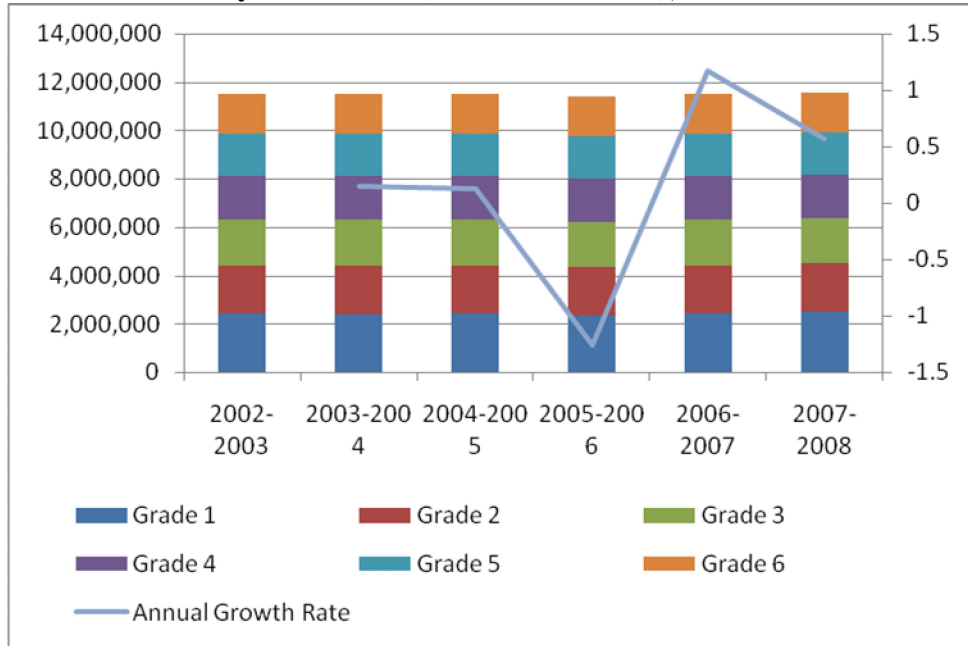
	High Estimate	Low Estimate
Teachers	63,803	41,422
Rooms	15,866	15,597
Seats	923,550	923,550

Figure 1a
Public elementary enrollment (includes ARMM), SY 2002-2003 to SY 2007-2008



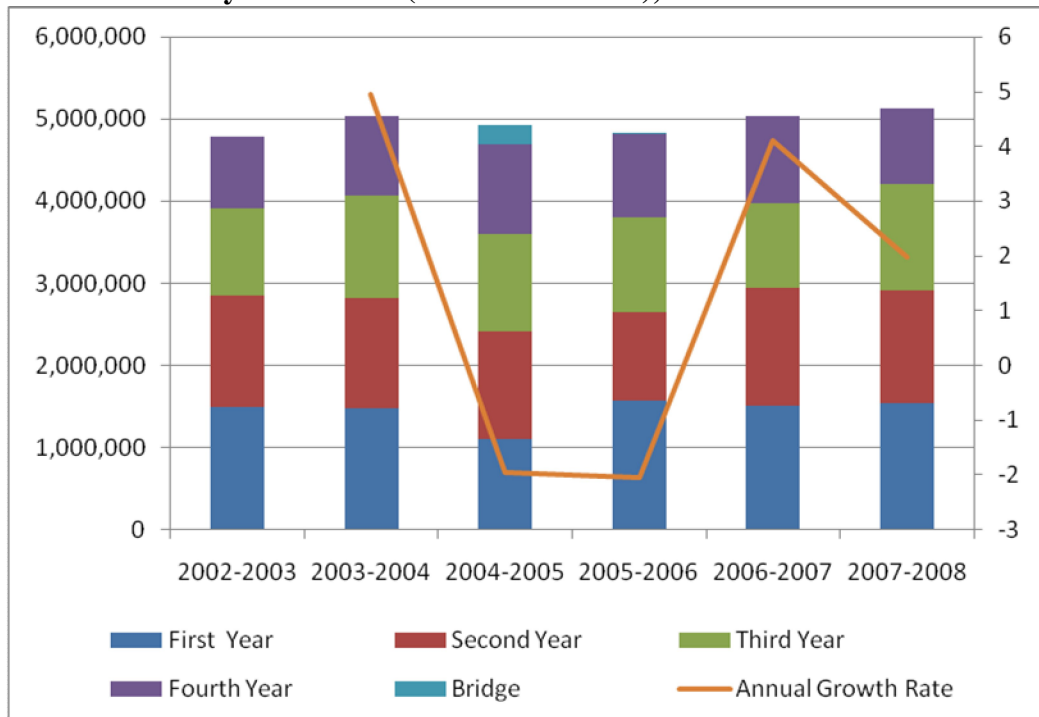
Source of data: BEIS

Figure 1b
Public elementary enrollment (excludes ARMM), SY 2002-2003 to SY 2007-2008



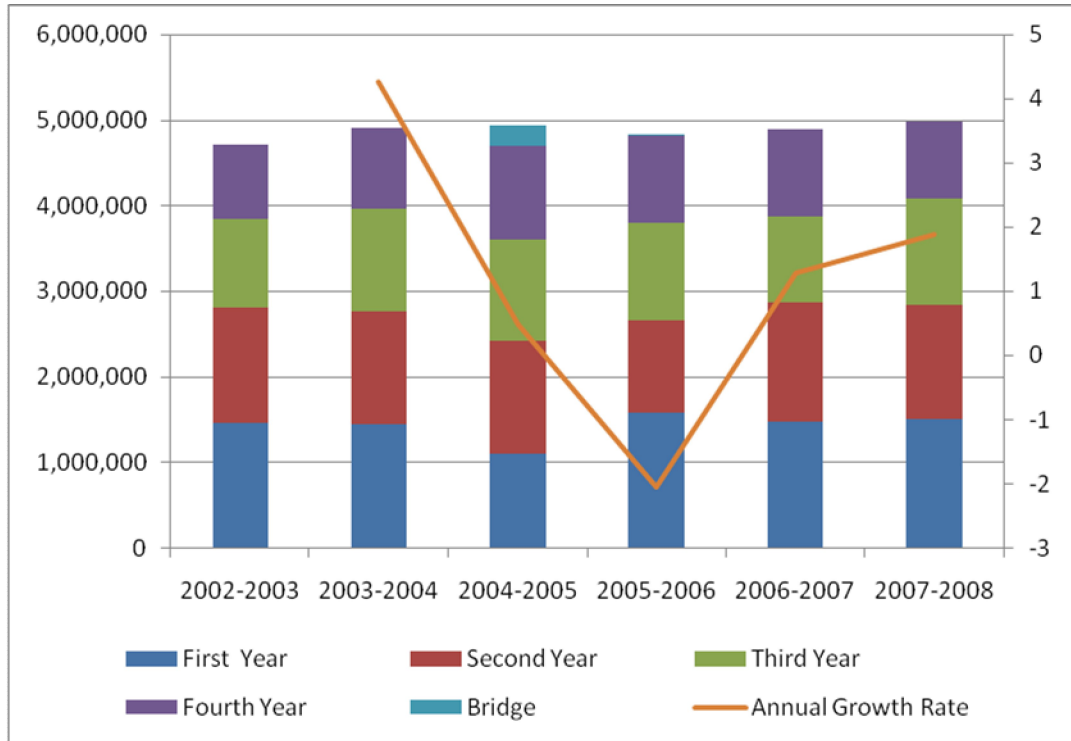
Source of data: BEIS

Figure 2a
Public secondary enrollment (includes ARMM), SY 2002-2003 to SY 2007-2008



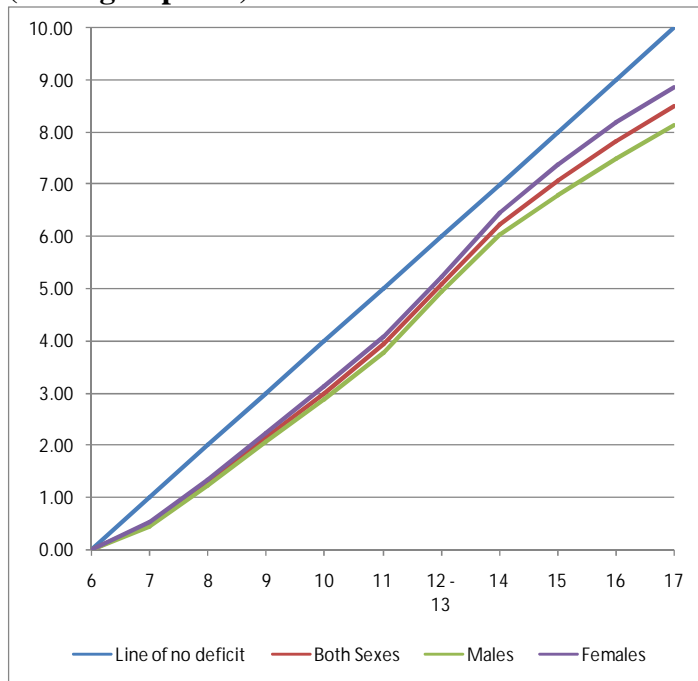
Source of data: BEIS

Figure 2b
Public secondary enrollment (excludes ARMM), SY 2002-2003 to SY 2007-2008



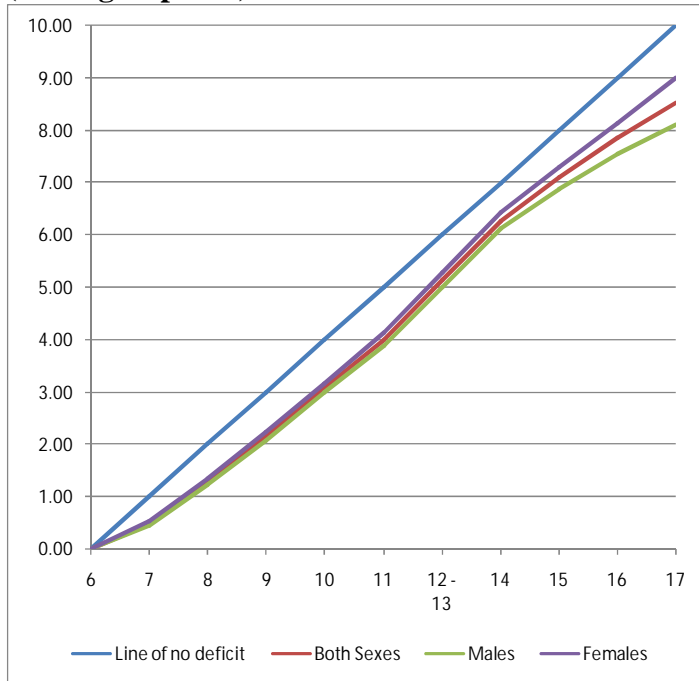
Source of data: BEIS

Figure 3a
Age-specific mean highest grade attainment, 2004
(Ceiling-imposed)



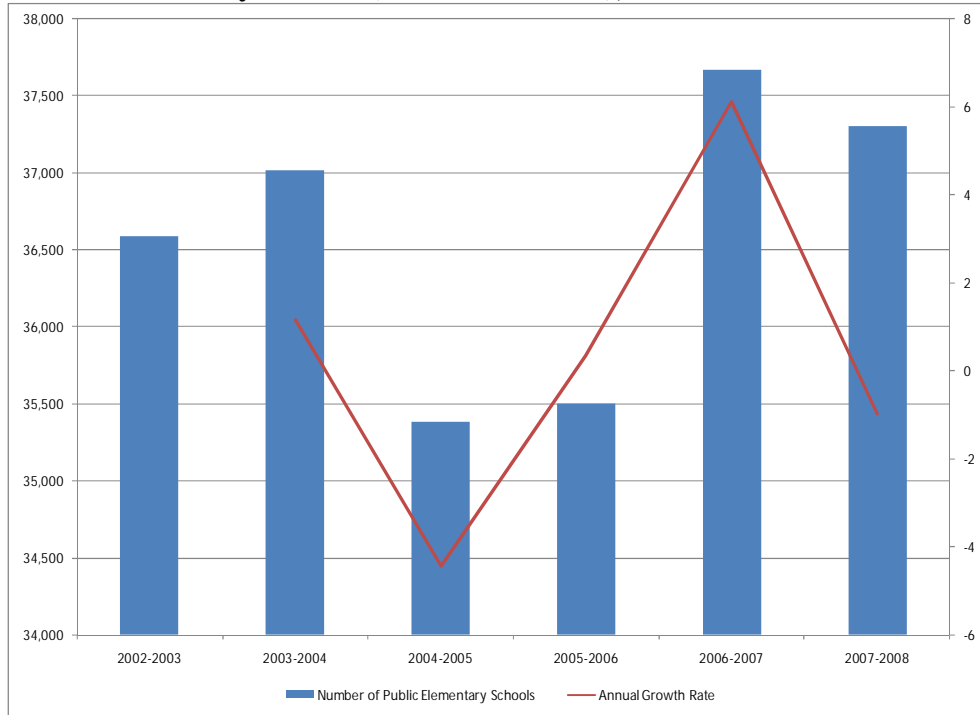
Source of data: APIS 2004

Figure 3b
Age-specific mean highest grade attainment, 2007
(Ceiling-imposed)



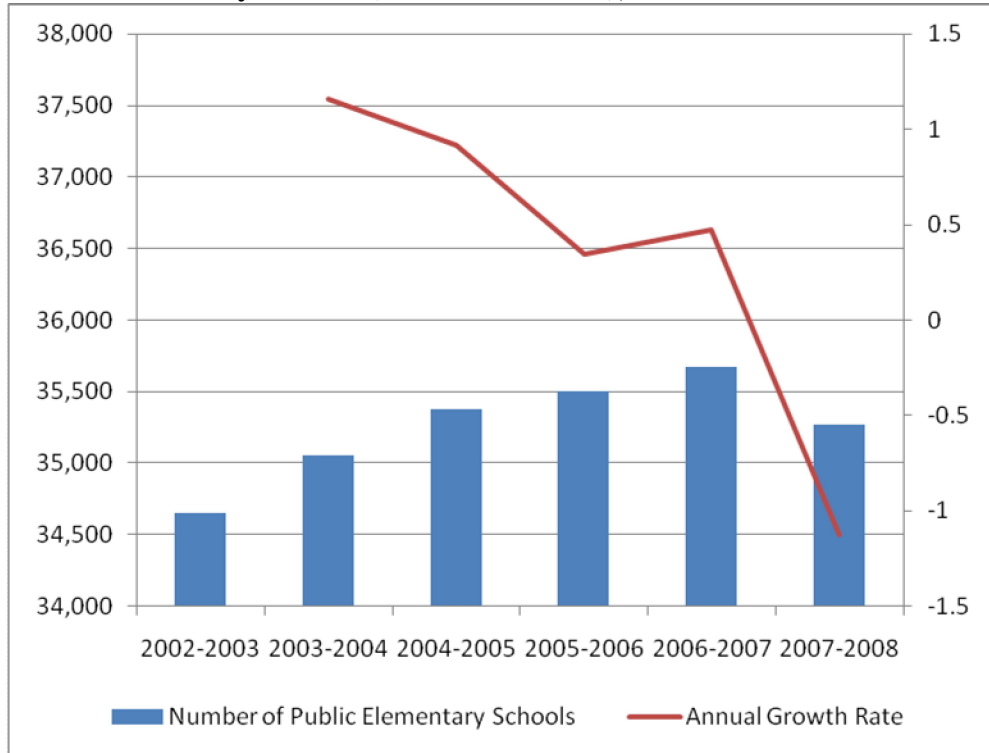
Source of data: APIS 2007

Figure 4a
Public elementary schools (includes ARMM), SY 2002-2003 to SY 2007-2008



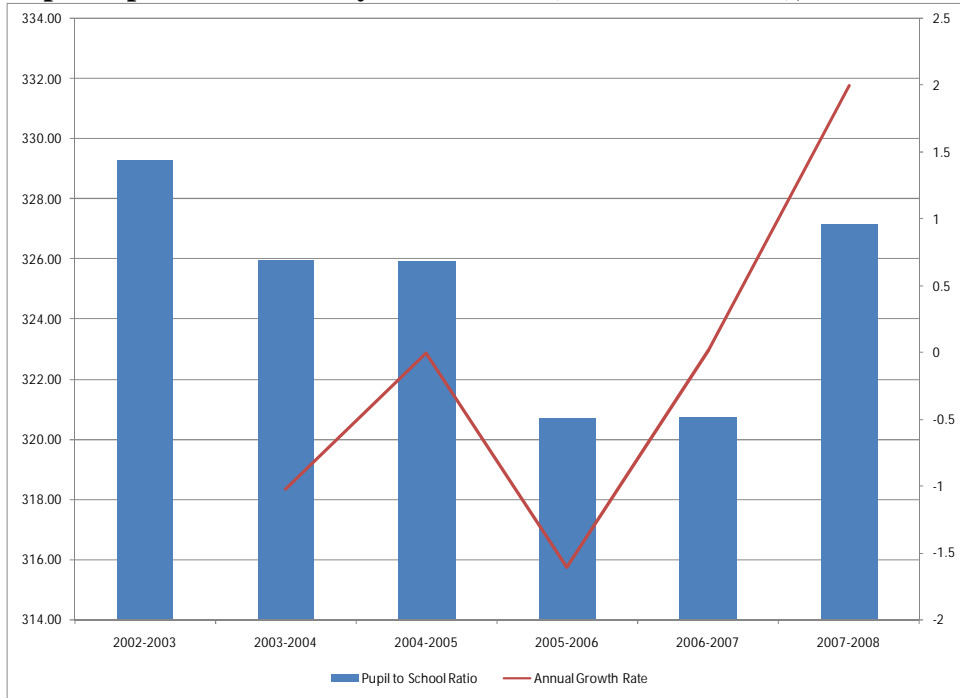
Source of data: BEIS

Figure 4b
Public elementary schools (excludes ARMM), SY 2002-2003 to SY 2007-2008



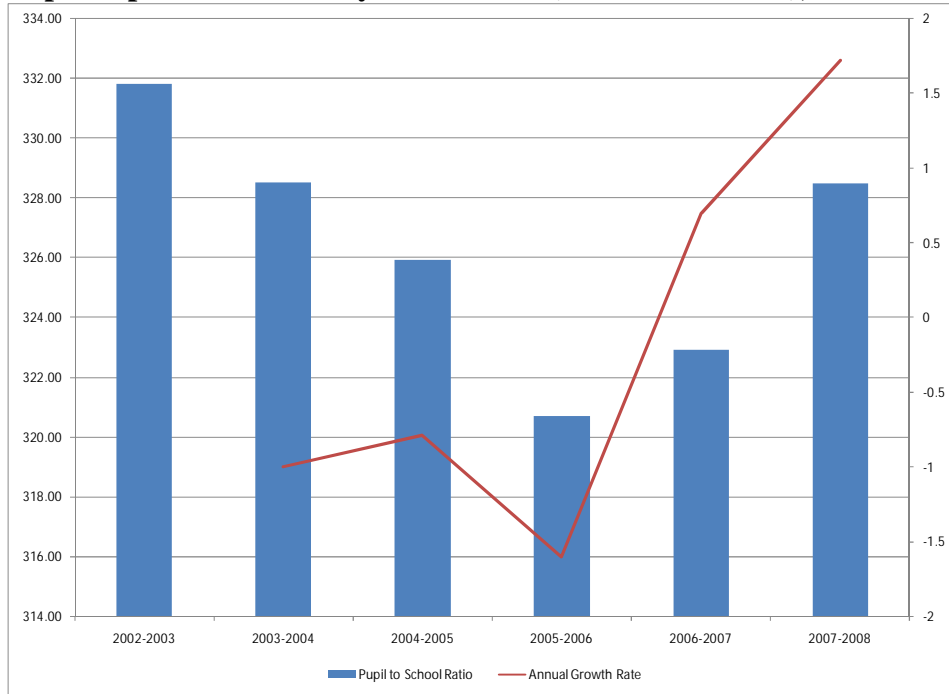
Source of data: BEIS

Figure 5a
Pupil-to-public elementary school ratio (includes ARMM), SY 2002-2003 to SY 2007-2008



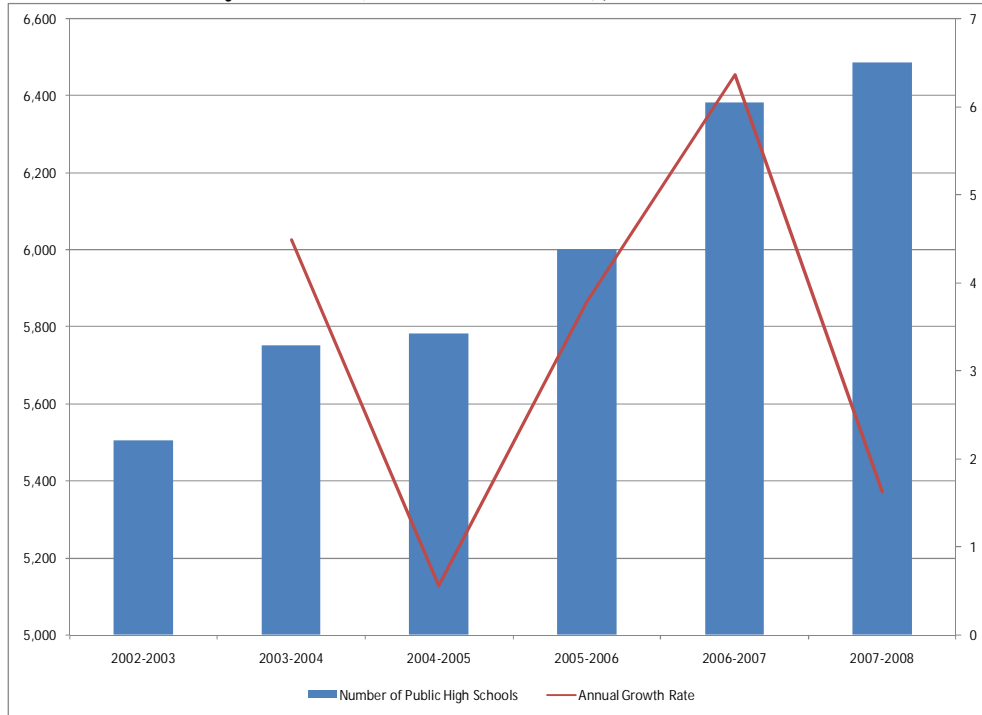
Source of data: BEIS

Figure 5b
Pupil-to-public elementary school ratio (excludes ARMM), SY 2002-2003 to SY 2007-2008



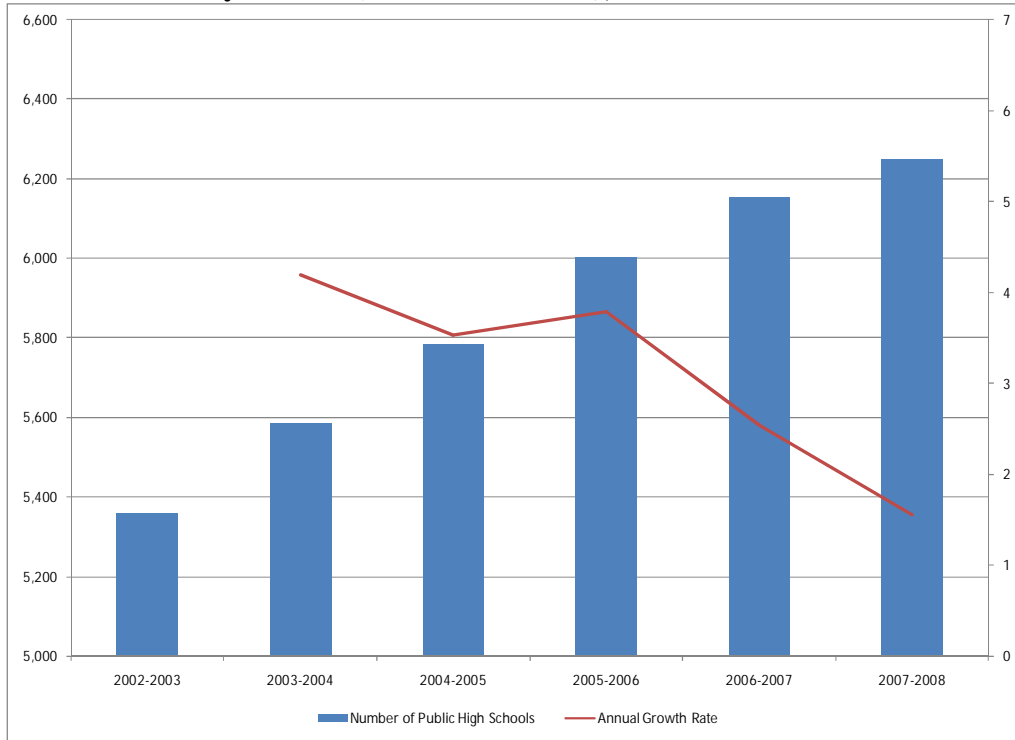
Source of data: BEIS

Figure 6a
Public secondary schools (includes ARMM), SY 2002-2003 to SY 2007-2008



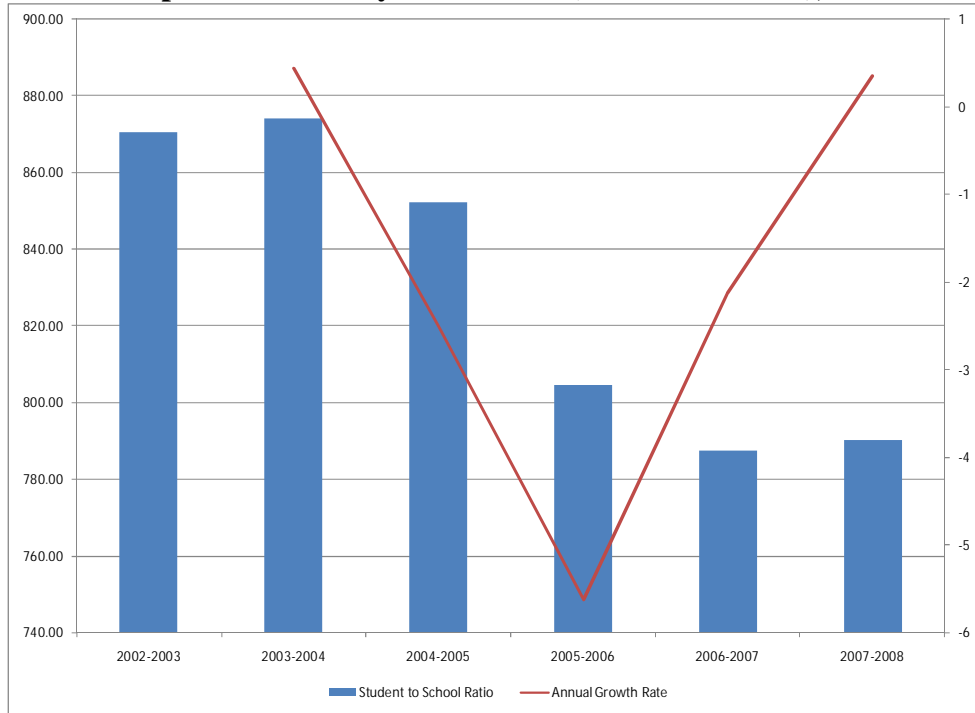
Source of data: BEIS

Figure 6b
Public secondary schools (excludes ARMM), SY 2002-2003 to SY 2007-2008



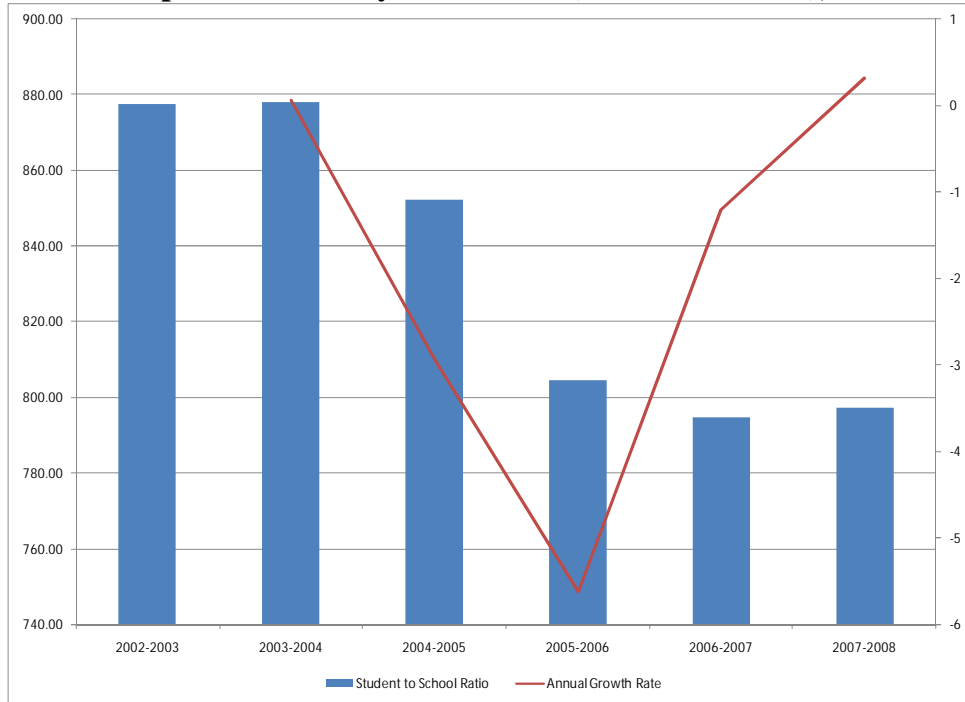
Source of data: BEIS

Figure 7a
Student-to-public secondary school ratio (includes ARMM), SY 2002-2003 to SY 2007-2008



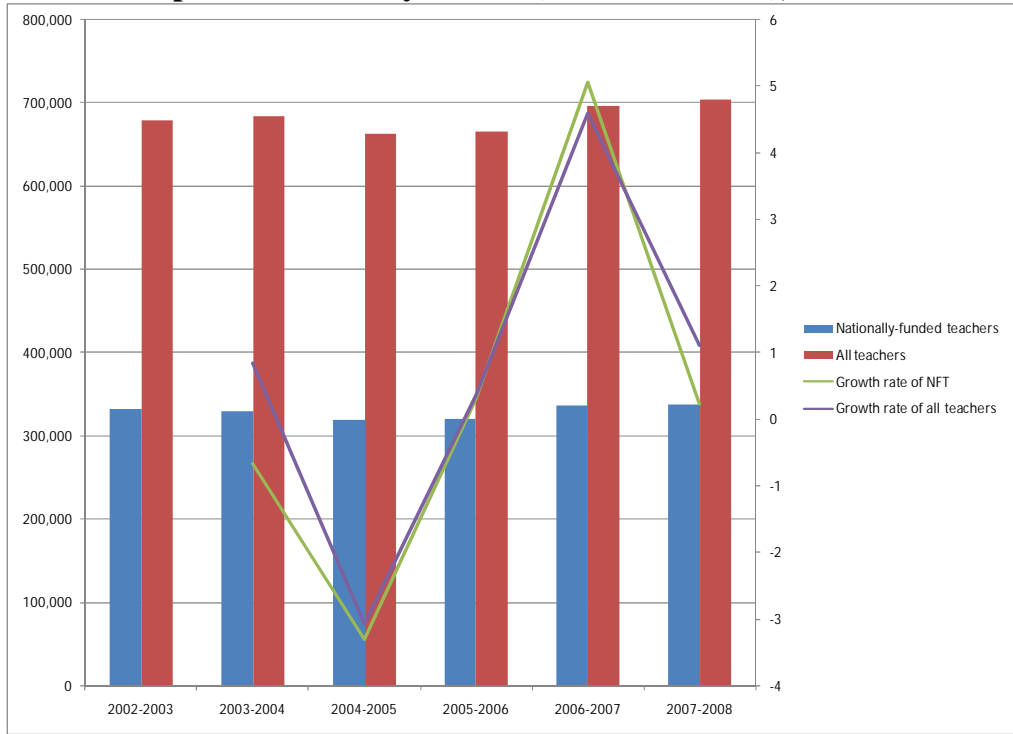
Source of data: BEIS

Figure 7b
Student-to-public secondary school ratio (excludes ARMM), SY 2002-2003 to SY 2007-2008



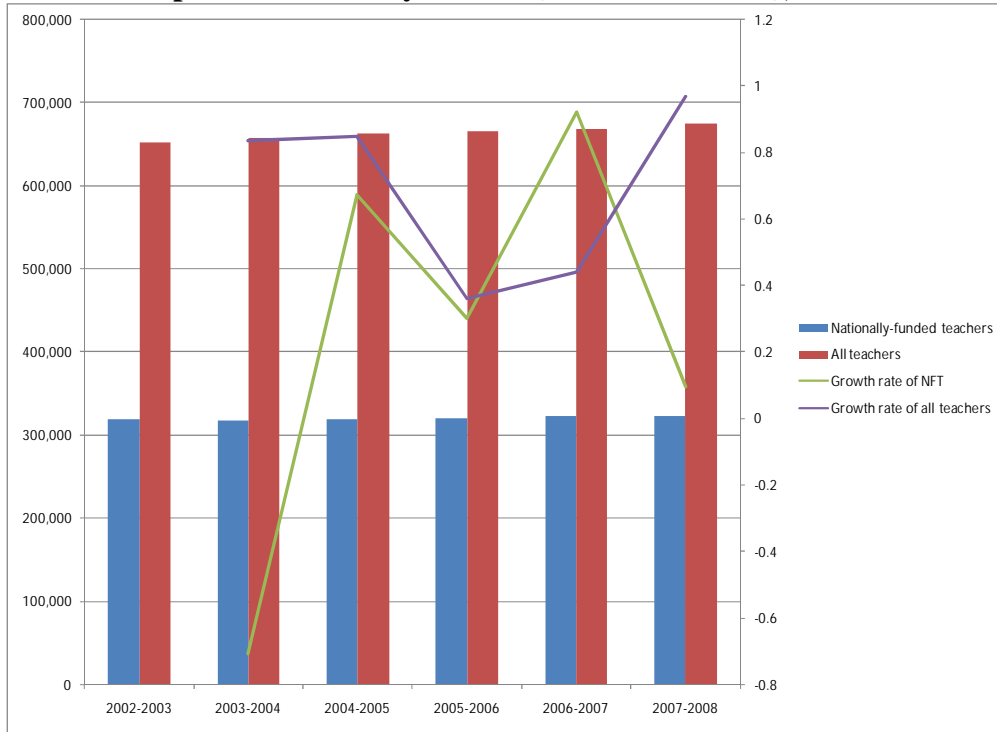
Source of data: BEIS

Figure 8a
Teachers in public elementary schools (includes ARMM), SY 2002-2003 to SY 2007-2008



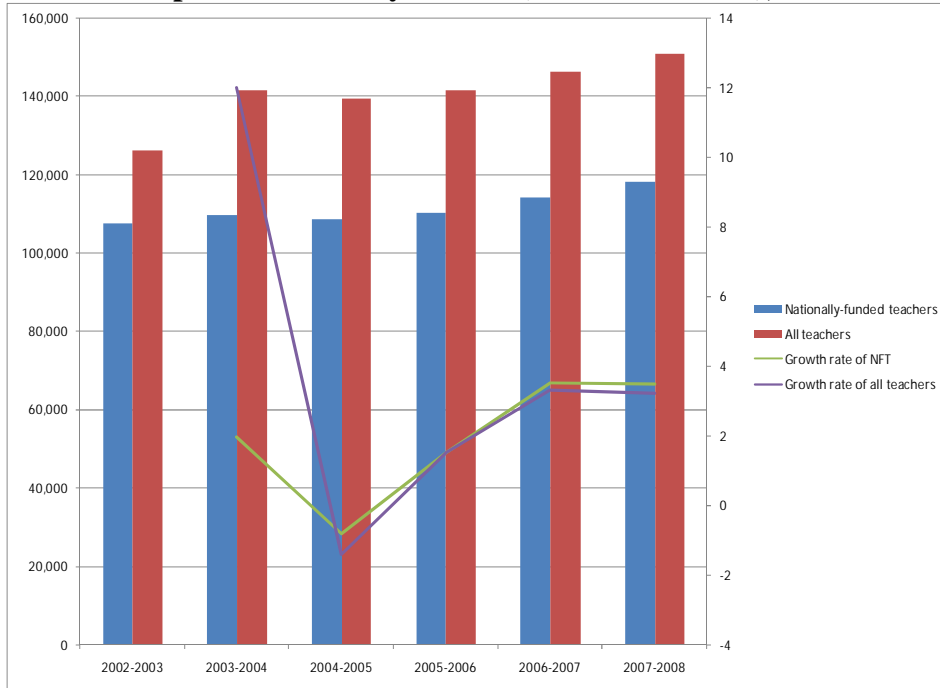
Source of data: BEIS

Figure 8b
Teachers in public elementary schools (excludes ARMM), SY 2002-2003 to SY 2007-2008



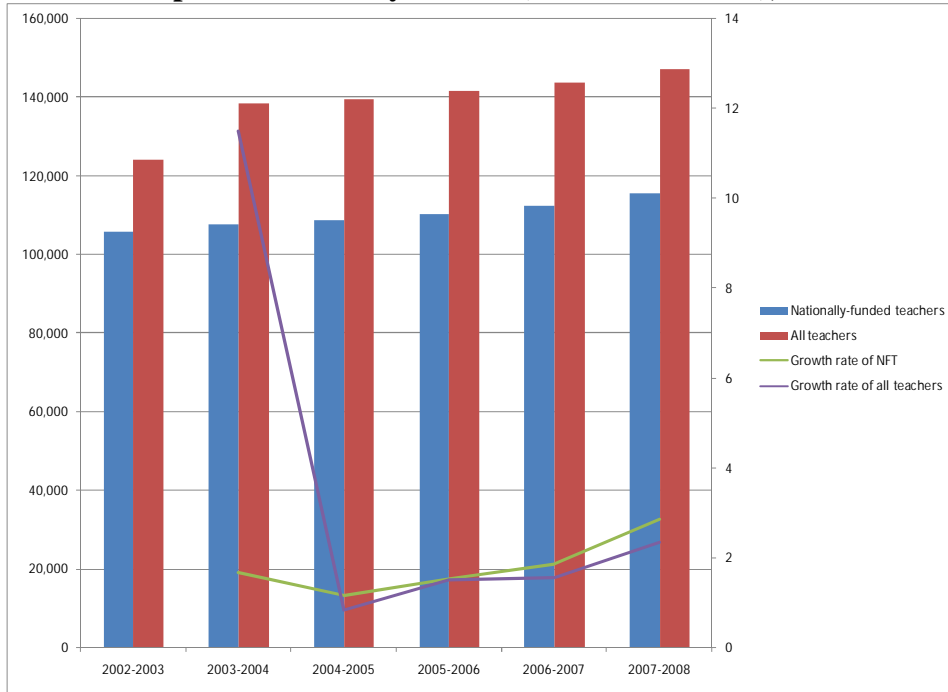
Source of data: BEIS

Figure 9a
Teachers in public secondary schools (includes ARMM), SY 2002-2003 to SY 2007-2008



Source of data: BEIS

Figure 9b
Teachers in public secondary schools (excludes ARMM), SY 2002-2003 to SY 2007-2008



Source of data: BEIS

Figure 10
Excess students in public high schools, SY 2007-2008

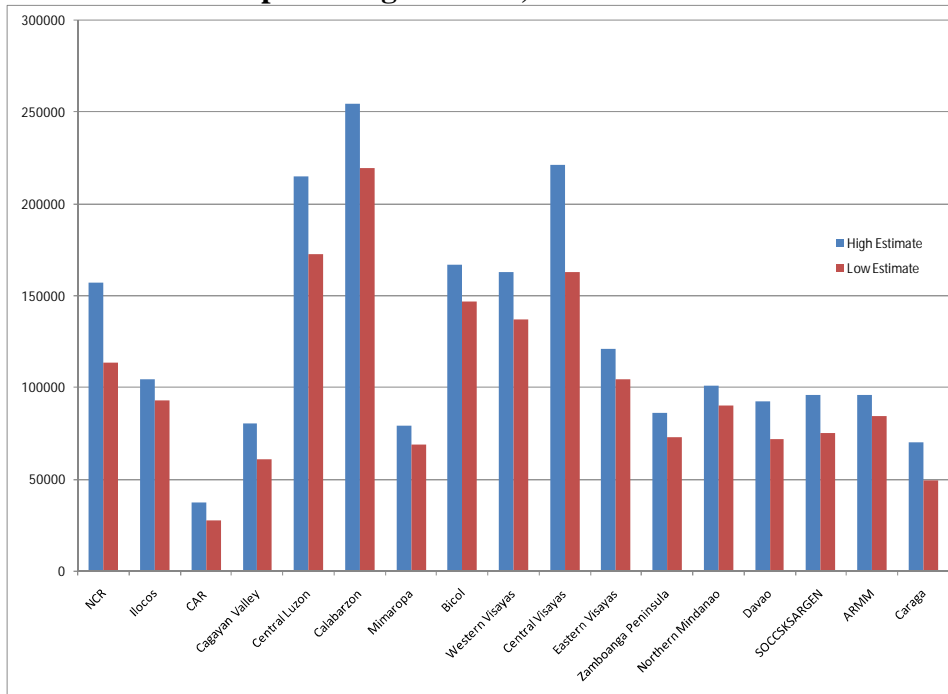


Figure 11
Oversubscribed public schools, SY 2007-2008

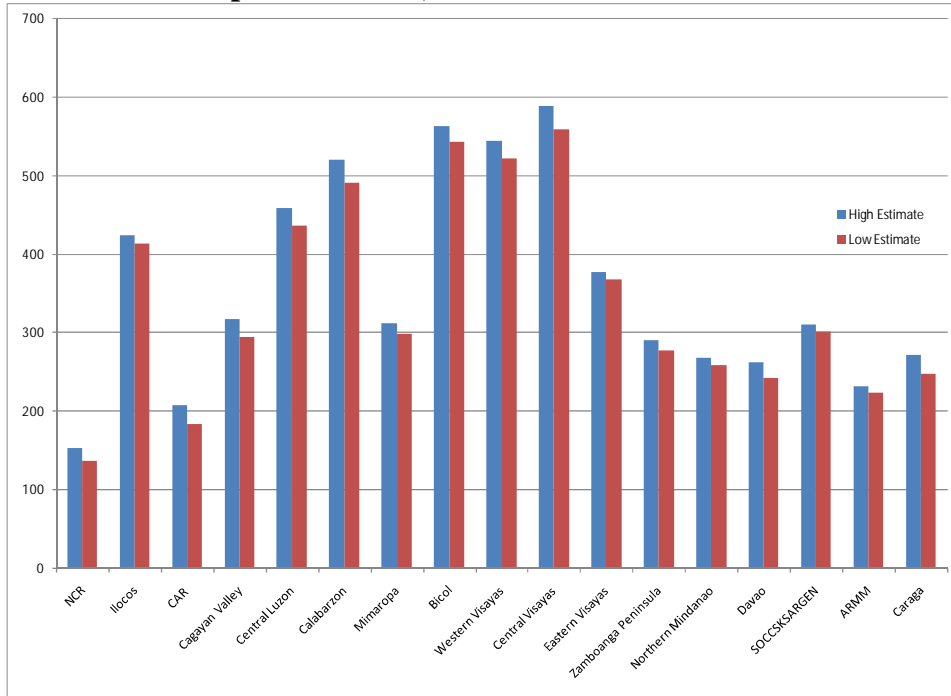


Figure 12
Empty seats, SY 2007-2008

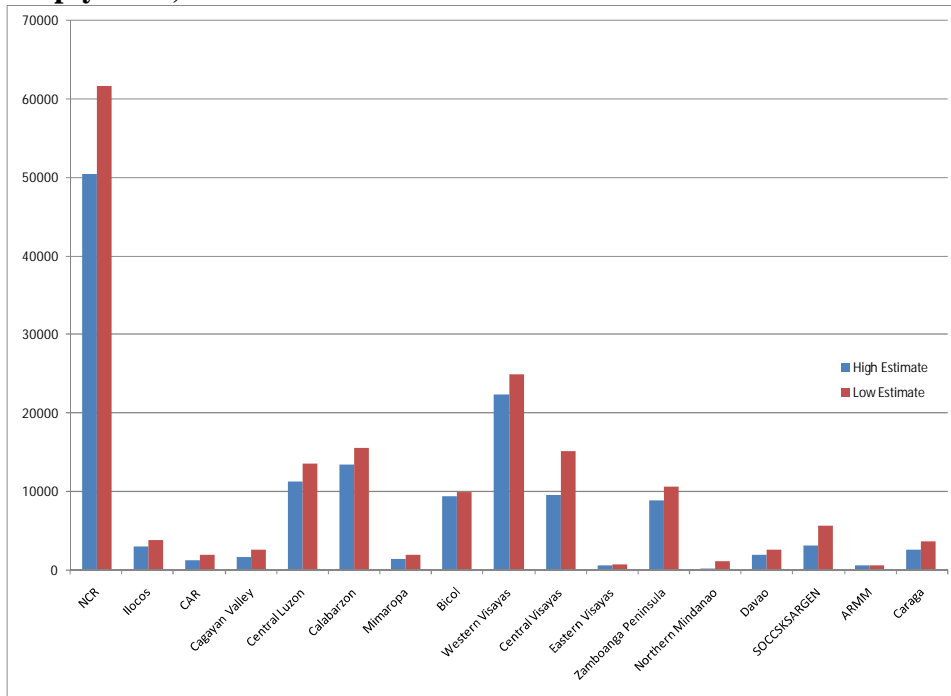


Figure 13
Undersubscribed public high schools, SY 2007-2008

