Working Paper 145/14

DRIVERS OF PERFORMANCE IN PRIMARY EDUCATION IN TOGO

Johannes G. Hoogeveen
Mariacristina Rossi
Dario Sansone

Drivers of performance in primary education in Togo

Johannes G. Hoogeveen[1]

Mariacristina Rossi[2]

Dario Sansone[3]

October, 2014

[1] World Bank. E-mail: jhoogeveen@worldbank.org

[2] University of Turin, CeRP - CCA, CEPS/INSTEAD and NETSPAR. E-mail: rossi@econ.unito.it

[3] Georgetown University. E-mail: ds1289@georgetown.edu

Abstract

This paper uses new data available from a school census in Togo to analyze differences in primary school performances across regions. Our results, obtained from a stochastic frontier analysis, suggest that differences in efficiency explain only part of the observed variation, while resource availability is the most important driver of performance differences. In addition to this, the paper notes that resources are distributed quite unevenly among regions and schools. By improving access to inputs, particularly in the underserved schools, performance can be expected to go up considerably.

JEL Classification: C21, I21, I25
Keywords: efficiency, education, Togo, stochastic frontier, performances.

1. Introduction

Togo is a small country situated on the Gulf of Guinea. Starting around 1993, the country experienced a deep socio-economic crisis which lasted till August 2006. Since that time presidential and parliamentary elections have been held, donors have started to re-engage, debt relief was granted (in December 2010) and the country has made remarkable progress rehabilitating its social, institutional and economic infrastructure.

Togo's primary education sector illustrates the progresses that have been made. Through the combined effect of the introduction of free primary education in 2008 and the absorption of community schools in the public school system, the number of students enrolled in public primary schools increased from less than 600,000 in 2006/07 to about one million five years later. Over the same period the number of public schools increased from 3,783 to 4,593 and the number of classrooms from 16,538 to 23,615[4].

The primary education sector faces some important challenges. The 2010 PASEC study, which tested students in grade 2 and 5 for learning achievement, found that, amongst the students in grade 5, 42% have such a low score in French that it equates their school achievement to complete failure; for mathematics 26% of students should be considered a complete failure[5]. A recently (2013) completed Service Delivery Indicator (SDI) also observed poor performance on a learning test carried out on grade 4 students. It found that only 45% of students was able to complete a test which all should have been able to complete successfully. The survey also observed significant shortages in the learning environment (classrooms are too dark, textbooks are missing, students lack pencils or notebooks) and uncovered the presence of large inefficiencies: instead of teaching an average of five and a half hours a day, teachers teach only for about 2 hours and forty minutes. This indicator increases up to about three hours if teachers who were striking are removed from the sample.

While the SDI survey shows significant challenges at the national level, the study does not inform about differences at the sub-national level (beyond a rural and urban distinction)[6]. Yet, primary school leaver exams show the presence of large differences in performance between regions whereby the pattern seems to be that the closer schools are to the coast, the better they perform.

In a context of serious financial constraints, in which the demands for secondary and tertiary education are expanding rapidly, where large infrastructure investments are needed to recover from the crisis years, where inequality is rising rapidly[7], and where there are serious issues with both the availability of scholastic inputs and the efficiency of the primary education system, it is critical to understand the drivers of school performance. This paper aims to do so using a unique data set with

[4] Source: Ministry of Education, 2013.
[5] Source: Republic of Togo, Rapport PASEC, 2012.
[6] The SDI survey collected facility level information from 200 schools: 148 public, 28 faith-based, and 24 private non-denominational schools. This is a sample that provides a representative snapshot of the learning environment in public and private schools and which can be broken down by rural and urban areas.
[7] Household survey data (QUIBB) collected in 2006 and 2011 demonstrated that the Gini coefficient increased from 0.36 in 2006 to 0.40 in 2011, with most of the increase in consumption realized in the south of the country.

administrative data for every primary school in Togo and implements this by carrying out a frontier analysis.

The remainder of this paper is organized as follows. In the next section we provide a brief description of some of the main challenges of Togo's education system. This is followed by the introduction of our data in Section 3 and the estimation strategy in Section 4. Results are presented in Section 5. Conclusions follow in Section 6.

2. Scholastic inputs, efficiency and performance

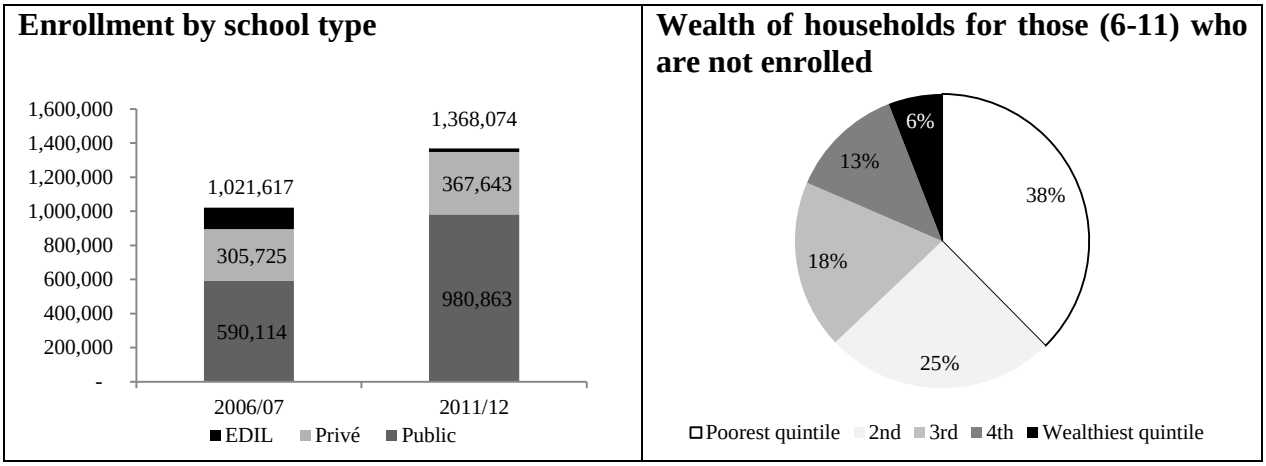
Togo's general education system is divided into four levels: (i) a three-year pre-school cycle designed for 3-5 year olds, (ii) a six-year primary cycle designed for 6-11 year olds, (iii) a seven-year secondary education cycle designed for 12-18 years old, consisting of a four-year junior level and a three-year senior level and (iv) a higher education system (two public universities and private institutions). There are also (i) technical and vocational education at the junior and senior secondary levels and (ii) literacy programs.

The primary cycle has experienced a remarkable recovery following the crisis which lasted almost a decade and a half. The recovery is marked by a large increase in enrollment in the primary school system as a result of the introduction of free universal education in 2008 but also because of the regularization of locally funded schools (Écoles D'Initiative Locale, or EDIL) which have been absorbed into the public system. As a consequence, the fraction of children attending public schools increased from 58% in 2006/07 to 72% in 2011/12 and total enrolment in public primary schools went up from around 600,000 in 2006/07 to over 1,000,000 students in 2011/12, or an increase by 66% (Figure 1).

Despite this increase in enrollment, primary school enrollment remains far from universal. According to the 2011 QUIBB[8], only about 82% of eligible children attends a primary school. But of the children aged 6-11 that do not attend primary school, those from the poorest households are overrepresented: 38 percent of children that do not go to school comes from the poorest households, whereas only 6 percent comes from a household in the top wealth quintile.

[8] Questionnaire des Indicateurs de Base du Bien-être.

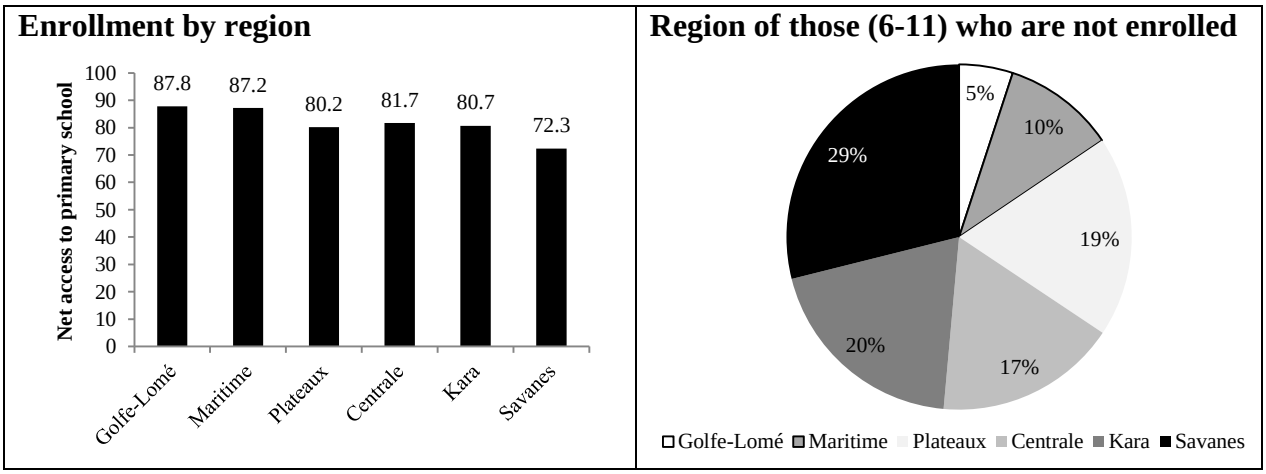
Figure 1: Primary school enrollment



Source: staff calculations based on EMIS and QUIBB 2011.

Another challenge is the presence of large regional inequalities in almost every aspect of the primary education system. There is a distinct pattern in that the further north one goes, the worse the results. The Savanes region, in the upper north of the country is often worst off, while the coastal regions Golfe-Lomé and Maritime typically are best off. This can be illustrated with school access. The average for Togo is 82%, but in the coastal region enrolment rate is around 87%, whereas in Savanes it is only 72%. Almost a third of the children aged 6 to 11 that are not enrolled in a primary school can be found in Savanes, even though only 12% of Togo's population resides there (Figure 2).

Figure 2: Primary school enrollment

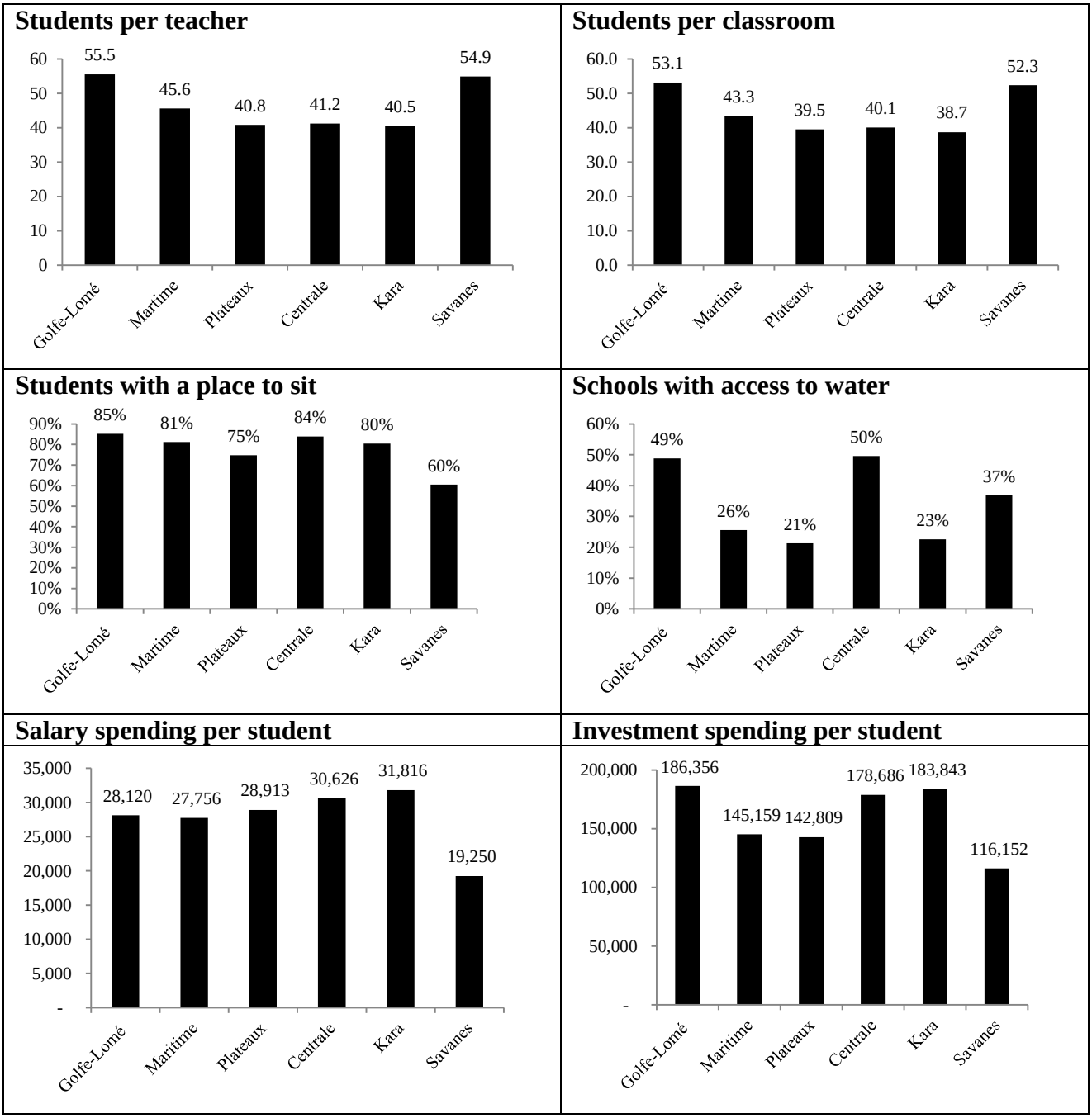


Source: staff calculations based on QUIBB 2011.

These stark differences are reflected in differences in scholastic inputs. The number of students per teacher varies from around 40 in Kara to over 55 in Golfe-Lomé and Savanes. In Plateaux the average number of students per classroom is 40; in Golfe-Lomé is its 53. In Savanes only 60% of students sit at a desk; in Golfe-Lomé 85% of students do. In Plateaux only 21% of schools has access to water; in Golfe-Lomé and Central about half the schools have such access. In terms of spending, the differences are equally striking. Salary spending per student (taking into account

differences in payments for different type of staff) in Savanes is 60% of that in Kara. The same holds for the total amount spent on investments. Considering the total outlays for buildings, toilets, desks and chairs spending per student in Savanes is around CFAF 116,000. For students in Kara CFAF 183,000 has been spent, almost 60% more.

Figure 3: School characteristics: 2010-2011



Source: Staff calculations based on Ministry of Education EMIS Data Base

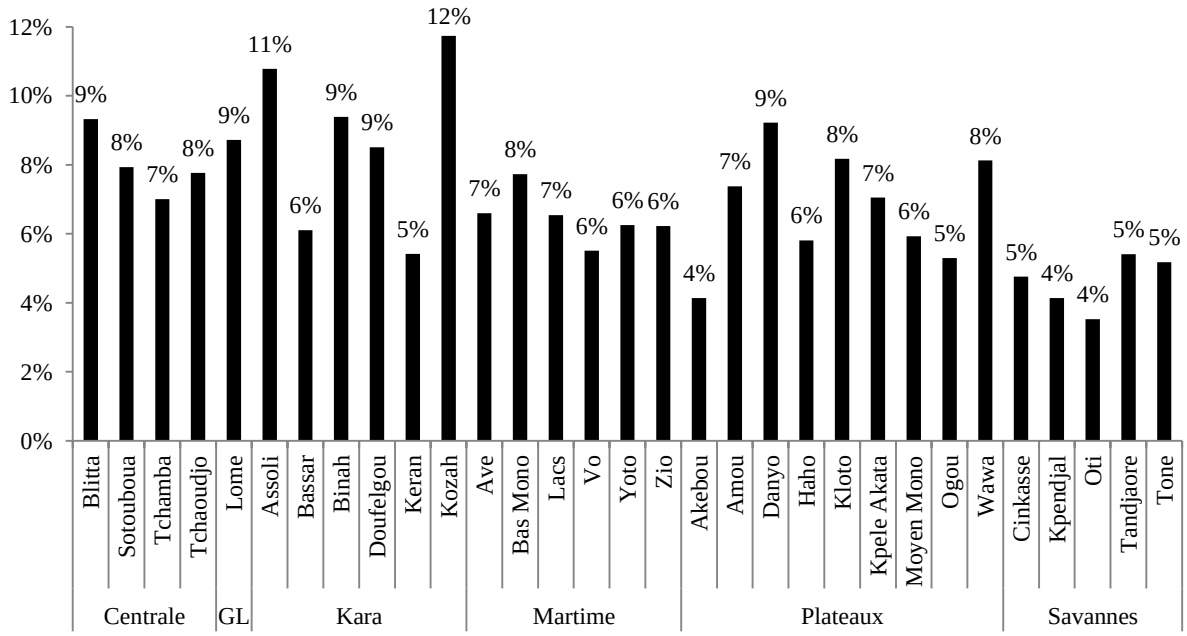
At the prefecture, or at the school level, these differences are even more pronounced. This can be illustrated with the number of students per classroom. At the national level, the average for public schools is 43 students per class, but at the regional level this varies from 39 to 53 students per class. At the prefecture level, the variation goes from as low as 16 students per class to as much as 103. It

is hard to imagine that this kind of variance is an efficient way of allocating resources. Cantons where the number of students is only 16 per classroom have too many classrooms (or too few students). Cantons with more than a hundred students per classroom may have so many students in a classroom that it becomes plausible that very little learning takes place, implying that most education spending would be wasted.

Another way to demonstrate the relation between adequate scholastic inputs, efficiency and performance is by exploring the relation between outcomes and spending. The performance measure that was selected is the number of students that have been admitted to participating in the primary school leaving exam over the total number of students in the school. Children that pass the CEPD[9] exam are allowed to proceed to secondary school. We prefer this measure over a more direct measure (such as the fraction of students that have passed the exam) because there is reason to suspect that schools and students behave strategically with respect to who take the exam (not all students in CM2 are allowed to participate in the CEPD exam).

This defined, one notes the existence of large differences in our performance measure (Figure 4). Some cantons like Kozah in the Kara region, and Grande Lome (GL) do well with respectively 12 and 11 percent of students admitted to the final exam. Others do poorly, such as Akebou in Plateaux of Kpendjal and Oti in the Savanes regions whose performance ratios are only a third of those of the aforementioned cantons (4%). Cantons in the northern region (Savanes) do particularly poorly. Beyond the fact that Centrale and Kara do better than Plateaux, with Maritime in an intermediate position, the most striking about the figure is the large degree of intra-regional variation.

Figure 4: School performance by canton in 2010/11



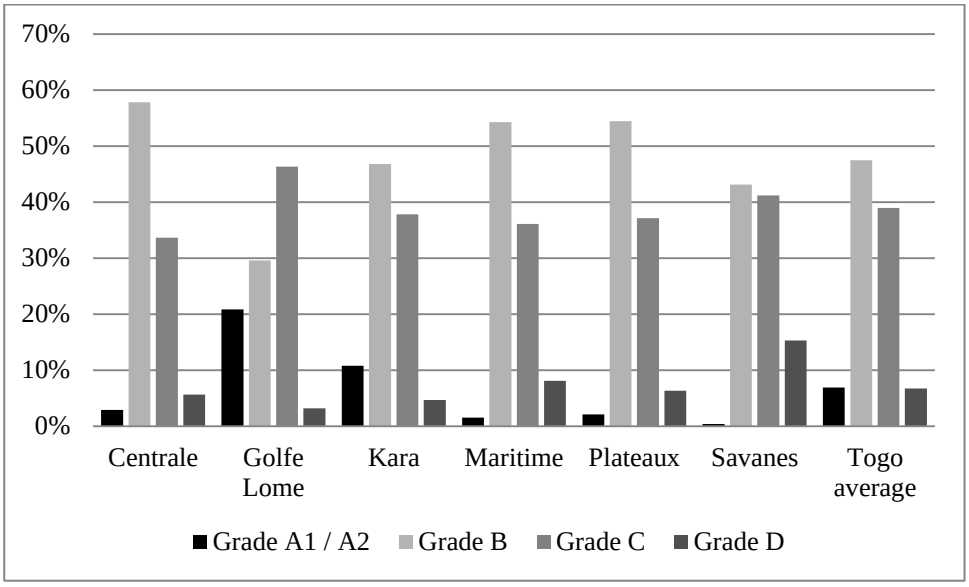
Note: School performance is defined as the number of students that have been admitted to participating in the primary school leaving exam over the total number of students in the school.

[9] Certificat d'études du premier degré.

On the spending side, we calculate the annual spending on teacher salaries per student, taking account of the different grade and different levels of pay of teachers[10]. As spending on teachers makes up about 84% of the total primary education budget, it is a good proxy for total spending.

Figure 5 shows once again striking differences among regions. Indeed, if we look at payment grades for civil servants, the majority of teachers in Lome are in grade C, while in all the other except Savanes they are mainly in grade B.

Figure 5: Distribution of teachers of different grade levels by region



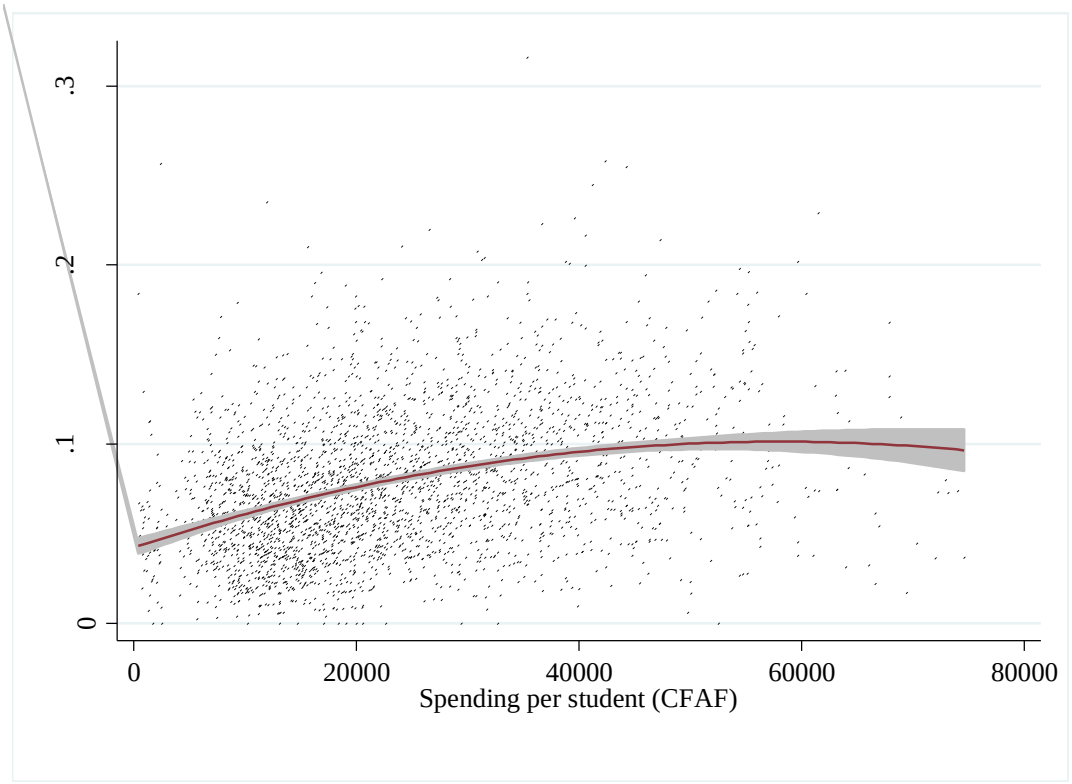
Source: Ministry of Education, 2010/11

Figure 6 illustrates the relation between outcomes and expenditure. The graph presents for all public schools a measure of performance (on the vertical axis) and a measure of spending (on the horizontal axis). Each dot in Figure 6 represents a public school. The figure can now be used to identify those schools that do particularly well: these are the schools with the best performance for a given level of spending.

The line in figure 6 presents local averages. The line is upward sloping suggesting that more inputs (or more spending per student) lead to better results. The line helps illustrate that certain schools perform poorly given the resources they receive (those below the line do worse than average), while others (those above the line) do better than average. Excellent are those schools that lie furthest above the regression line.

[10] Voluntary teacher receive about CFAF 90,000 per annum whereas a civil servant receives almost 2 million and an assistant teacher 1.3 million.

Figure 6: Teacher spending per student and school performance (public schools only)



This figure can also be used to demonstrate that within the universe of schools in Togo there is scope for efficiency improvements through efficiency gains. Some schools receiving CFAF 20,000 per student do extremely poorly and have a performance ratio of around zero, whereas others have performance ratios higher than 0.1. By bringing the schools up to at least the average (of about 0.9) significant advances can be made without incurring additional spending.

The discussion so far has only illustrated that both inputs and efficiency matter for performance. Which of these factors matter most, and which inputs are more important, cannot be inferred. For this we need to turn to regression analysis, which is presented in the remainder of the paper.

3. Data

The main dataset used in the regression analysis are Primary School Census data, particularly those for 2010/2011. This dataset comprises detailed information for each school for a total of 6158 observations. In Table 1 we show the distribution of the schools across regions: the relative majority (around 25%) is located in the Plateaux region, while the region with the smallest number of schools is Savanes. Our analysis is centered on the ratio of admitted to the final exam of primary school (CEPD) over the total number of students in the school. To construct this variable, we merged the 2010/2011 census dataset with the following wave, since in the 2010/2011 census information about admissions to the exam was not present.

Table 1: Number of schools by Region

	Initial Data		Sample Data	
	Freq.	Percent	Freq.	Percent
Central	761	12.36	492	11.26
Gulf Lome	992	16.11	672	15.38
Kara	882	14.32	699	16.00
Coastal	1,187	19.28	820	18.77
Plateau	1,595	25.90	1,143	26.17
Savanna	741	12.03	542	12.41
Total	6,158	100	4,368	100

The school census data sets only present school information, but in our regression we also want to include non-school variables as controls such as the level of education of the population living in proximity of the school in a region. Such information is available from the poverty map that was constructed by combining the population census (RGPH4[11]) of 2009 and the household survey QUIBB of 2011. It was not possible to match school level information to census or poverty map information, but at the canton level this was possible. But even then, it was not always possible to obtain a correct match and some observations were lost in this process[12]. As a result, the number of observations used in the estimations was reduced to 4,368. The last two columns of Table 1 display the final data which are used in the analysis.

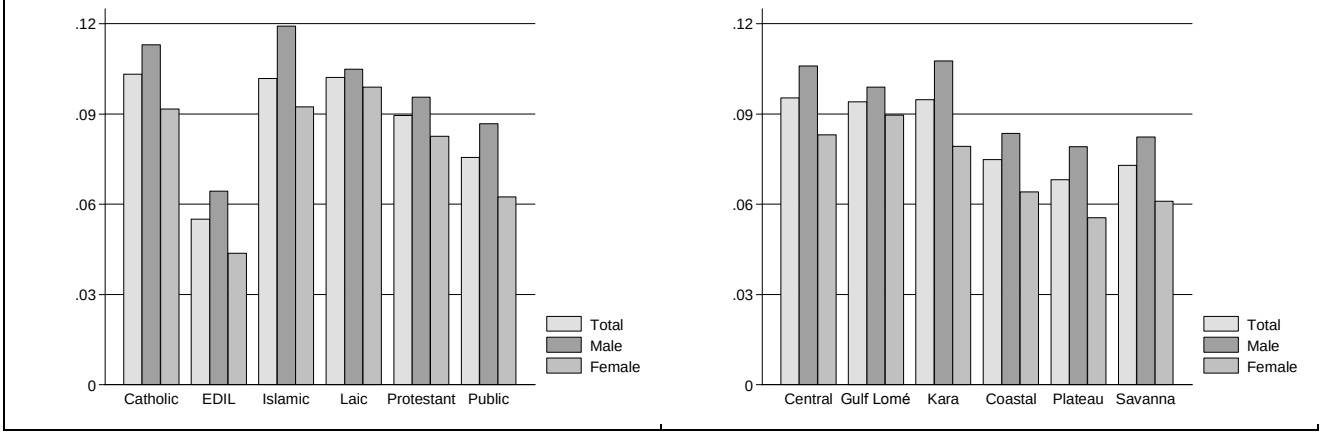
An overview of the main variables used in the regression can be found in the Appendix. Here we consider some of them which are correlated to our main variable of interest: the percent of students admitted to the CEPD over the total number of students in the school. Figure 7 shows how schools performed on average by school type (Public, EDIL, Catholic, Islamic, Protestant and Laic) and by region. The figure shows that the best performing schools are private schools and that Kara, Lome and the Central region are the regions with the highest levels of performance. It is interesting to note the gender dimension of school performances, which suggests that in all regions and across all school types boys perform better than girls: this in contrast to what is generally found in OECD countries. The difference in performance is least pronounced in Laic schools and in Lomé, and most pronounced in Community and Islamic schools.

[11] Quatrième Recensement Général de la Population et de l'Habitat.

[12] For instance, some schools were dropped because the total number of students admitted to CEPD was bigger than the total number of students in CM2.

Figure 7: Performance by school type and by region

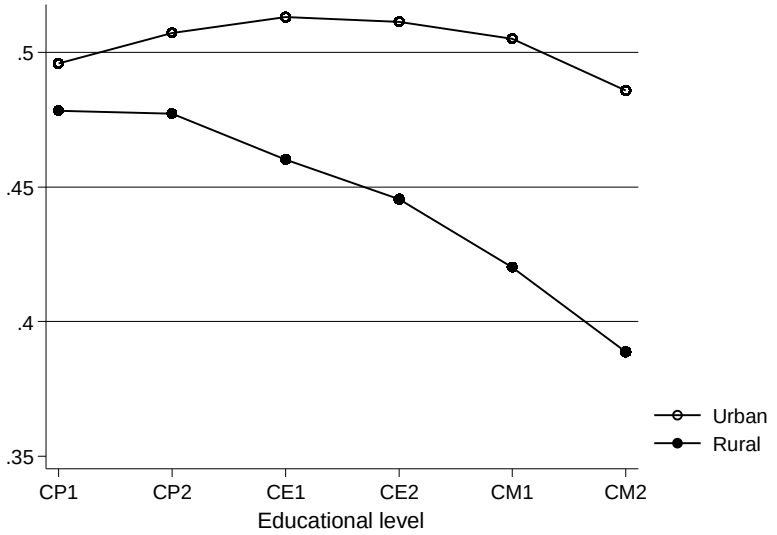
Admitted CEPD over total students in the school By type of school	Admitted CEPD over total students in the school By region



Note: Schools whose pass rate was equal to 0 have been dropped.
Source: Togo School Census 2010 and 2011.

Figure 8 provides further information about the gender issue: the ratio between girls in CP1[13] and total number of students in CP1 does not differ substantially between urban and rural areas. Nevertheless, while this ratio remains roughly stable for higher educational levels in cities, there is a steady decline of female students across classes in the countryside. Indeed, in CP1 the ratio is 47.83% (49.59% in urban areas), whereas in the last year of primary school (CM2[14]) is 38.88% (48.58% in urban areas).

Figure 8: Ratio of female over male students by grade in rural and urban areas



Note: Male students are the complement to one of female student.
Source: Togo School Census 2010 and 2011.

[13] That is "Cours Preparatore 1", the first year of primary school.
[14] Cours Moyen 2.

4. Background review on frontier analysis of educational output

Figure 6 above can be used to assess efficiency in a non-parametric manner. The production frontier would be derived by drawing a line enveloping the most efficient schools. Such an approach would be sensitive to outliers, but this is something that could be addressed by using a jackknife procedure. Such a Data Envelope Approach (DEA) assumes that all deviations from the frontier are the result of inefficiency and it is sensible to measurement error. Indeed, as stressed in Greene (1980), the main disadvantage of DEA is that environmental variables are usually not included in the model, so that any measurement error or unaccounted heterogeneity is included in the inefficiency measure. Moreover, no parameter estimates are being derived.

Instead of a DEA approach we opt for a stochastic frontier analysis (SFA) to identify efficiency. The advantage of using this approach is that by making assumptions about the distribution of inefficiency, the regression error term can be decomposed into statistical noise and a measure of inefficiency. This feature comes at the cost of having to specify the functional form and making assumptions about the distribution of inefficiency.

Stochastic frontier analysis is similar to standard regression techniques but differs by exploiting the one-sided nature of inefficiency to decompose the error term into a standard error term and an asymmetric component that measures inefficiency. Formally, the basic stochastic frontier model is given by:

$$y_i = f(x_{i,} ß) + v_i - u_i$$

where, y_i is the output of school i, our performance measure, $f(.)$ is a measurable production function, x_i are exogenous variables, $ß$ is a vector of unknown parameters and v_i-u_i is the composed error term consisting of v, the symmetric disturbance (idiosyncratic effect), and u, the non-negative disturbance measuring the inefficiency of the school (productive inefficiency). There are a number of different types of assumptions on the distribution of the inefficiency. Usually the random errors v_i are assumed to be independently and identically distributed $N(0;\sigma_v^2)$ and independent from the u_i. The most common assumption for the inefficiency term is the half-normal distribution (Aigner et al. 1977), i.e. the non-negative truncation of the $N(0; \sigma_u^2)$[15].The principal advantage of this approach to measure efficiency is that it addresses statistical noise explicitly. Furthermore, and in contrast to non-parametric approaches, standard statistical tests can be used to assess variables.

Frontier equation and measures of technical efficiency are usually estimated using maximum likelihood estimation (Greene, 1980)[16]. In a first step the parameters β, σ_v^2, σ_u^2 and the constant are estimated; subsequently the estimated inefficiency is obtained by calculating the mean (or the mode) of the conditional distribution $f(u_i|\varepsilon)$ where $\varepsilon_i = v_i - u_i$. This second step is required to disentangle the inefficient component from the noise.

[15] Another suggested distribution is the exponential (Aigner et al, 1977). In addition to this, Stevenson (1980) used the truncated normal, useful to incorporate environmental variables through the mean and the variance of u_i, and the normal-gamma, whose advantage is that it allows the distribution to move away from zero.

[16] After normalizing the constant term, the model would satisfy the Gauss-Markov assumption, so OLS estimators are BLUE and consistent (except the intercept). Nevertheless, the ML estimator is nonlinear and more efficient. (Greene, 2012)

Considering educational output as the product of a production function is quite a strong assumption as it suggests that schools are like firms in that there is a technical relationship whereby the combination of certain quantities of inputs will lead to a certain amount of outputs. This view is attractive in that it allows identifying inefficiencies (more inputs are needed for a given level of output than is strictly necessary) but has been criticized. It has been argued that human capital accumulation, and education in particular, is a delicate process and learning occurs at uneven and different paces. Furthermore, peer effects and social environment are likely to play an important role in learning, factors that are typically not identified by the econometrician or impossible to quantify. Worthington (2001) listed four reasons to explain why education production functions fail to identify a clear causal relationship between technical educational inputs and achievements. First, it has been pointed out that many empirical studies select methodologies ad hoc. In particular, they choose input and output variables which are not in line with the production function approach itself. Second, inputs under the control of policy-makers might only have a small effect on school performance and innate abilities and socio-economic background may be much more important (Deller and Rudnicki, 1993). Nevertheless, Pereira and Moreira (2007) highlighted that innate abilities are extremely relevant when trying to model individual student performances, whereas they should be similar on average across schools. Third, the final outcomes in education context are not only due to supply-side factors, which are taken into account in the production function, but also to demand-side variables. In other words, school achievements depends both on decisions made by politicians and administrators, as well as considerations made by parents and students about costs and benefits of further education (Mayston, 1996). Finally, schools are not equal and they do not produce outputs at the same rate (Hanushek, 1986).

Despite the possible criticisms, frontier efficiency measurement techniques have been applied to many different types of institutions: primary and secondary schools (Sengupta and Sfeir (1986); Deller and Rudnicki (1993); Chalos and Cherian (1995); Pereira and Moreira (2007)), universities (Athanassopoulos and Shale, 1997), university departments (Sinuany-Stern et al. (1994); Johnes and Johnes (1993, 1995); Beasley (1990, 1995); Madden et al. (1997)) and training and enterprise councils (Cubbin and Zamani, 1996).

5. Estimation Results

Table 2 contains the main regression result using a stochastic frontier technique as explained in the above section[17]. We first present our basic specification (column 1) and a richer specification in column (2)[18].

[17] We use the STATA command frontier to perform the analysis, with the default half normal distribution in the model. We also performed the analysis by using a Tobit analysis and we also excluded thee top 255. However, the results have not changed substantially.

[18] It is important to stress that the dependent variable is the ratio, not the percentage, of students admitted to the CEPD over the total number of students in the school. This explain why at first sight the coefficients in Table 2 have small magnitude.

Table 2: Dependent Variable: Admitted CEPD / Total students in the school

	(1)	(2)
Private school (d)	0.014015***	0.021946***
	(0.0013)	(0.0044)
Number of teachers in the school	-0.001223**	-0.000426
	(0.0004)	(0.0004)
Teachers-students ratio	0.002554***	0.001466**
	(0.0005)	(0.0005)
Female ratio in CM2	0.026710***	0.022680***
	(0.0034)	(0.0033)
Average student age in CM2	-0.001066*	-0.000656
	(0.0005)	(0.0005)
CP1-CP2 taught together (d)	0.005535***	0.004637**
	(0.0016)	(0.0015)
CE1-CE2 taught together	-0.001050	0.000501
	(0.0016)	(0.0015)
CM1-CM2 taught together (d)	-0.027240***	-0.022625***
	(0.0014)	(0.0014)
Employment Ratio	-0.000615***	-0.000162*
	(0.0001)	(0.0001)
Net enrolment rate - primary	0.000054	0.000358***
	(0.0001)	(0.0001)
Urban(d)	0.006201***	0.007130***
	(0.0013)	(0.0014)
Average qualification teachers in private school		-0.004470*
		(0.0018)
Ratio of permanent teachers		-0.008761***
		(0.0021)
Repeating students rate		-0.056092***
		(0.0044)
Ln Average teacher age		0.016199***
		(0.0042)
Gender Headmaster (d)		0.008066***
		(0.0018)
Average qualification teachers		0.002982**
		(0.0009)
Seats every 100 students		-0.000041
		(0.0000)
Desks every 100 students		0.000284***
		(0.0000)
Toilets every 100 student		0.001490***
		(0.0004)
Water in school		-0.000092
		(0.0011)
Math books per students		0.003174
		(0.0023)
Reading books per students		0.002538
		(0.0018)
Dependency ratio		0.001847***
		(0.0001)
Enrollment rate (secondary school)		0.000363***
		(0.0001)
Constant	0.127766***	-0.112837***
lnsig2v	-6.889271***	-7.068340***
	(0.0214)	(0.0225)
lnsig2u	-16.88815	-17.02233
	(108.2370)	(63.9037)
Lambda	.006748	.006908
Observations	4368	3957

Standard errors in parentheses $^{*}\ p < 0.05$, $^{**}\ p < 0.01$, $^{***}\ p < 0.001$

One of the main results is that private school show better results. This is in line with Pereira and Moreira (2007). However, private schools are likely to also be more expensive, so we should not infer from this that private schools use their resources in a more efficient way. In fact, if private schools pay their teachers better, one would expect these schools to perform better. In the absence of information on the actual cost of schools, the best we can do is to just illustrate by using a dummy variable the differences between private and public schools and note that a cost benefit analysis would be a very useful contribution of future work. It is worth noting that the regressions do not control neither for family background nor for knowledge of children at school start (i.e. kindergarten attendance). Hence the magnitude of the private school variable is likely to be affected by endogeneity problems, as it is likely that high social class students self-select into private schools.

The results show that additional teachers increase performance. Overall, for the country as a whole, an additional teacher per every hundred students would lead to an increase in the pass rate between 0.14 and 0.25 percentage points.

We now turn to the gender composition of the class. Given the high drop-out rate of females, we expect that a higher female to male ratio could lead to an average improvement, if the girls in school are a selected sample and are better than average students. The coefficient of female students over total students in CM2 is positive and strongly significant, thus implying a substantial peer effect: the more numerous are the girls with respect to boys in the class, the bigger is the chance of having higher performances.

Older students in class do have a detrimental effect on the overall performance, but this effect holds in the more parsimonious specification only. Similarly, schools regularly merge classes, so it is important to see the effect of such policy. Unexpectedly, if the first two years (CP1-CP2) are taught together, the effect is positive and significant. This result might signal an imitation effect that at young age could be beneficial for all children (in a similar vein with the kindergarten). Conversely, the effect is strongly negative and significant for the last two grades (CM1-CM2) and for all regions, thus revealing that classes with more than one advanced course taught simultaneously might have detrimental effects on learning. This result is very robust and corroborates that the environment, which includes the learning environment, is something policy-makers should focus on. Indeed, the magnitude of the last coefficient is rather high: teaching CM1-CM2 together would lead to a reduction of more than 2 percentage points in the outcome.

Employment rate in the canton in which the school is located acts as detrimental to performance, possibly because it acts as a proxy for the fact that parents have fewer opportunities to spend time with their children after school. From a geographical point of view, urban schools perform better than rural ones.

In the richer specification we include additional variables which could impact the outcome of interest. Considering the qualification of teachers the effect is strongly significant and positive. Qualification of teachers in private schools, in contrast, gives approximately no impact, if anything. The ratio of repeating students has a negative impact on the pass rate, as expected. Experience (approximated by age) of the teacher has a strong impact on school performance in the country as a whole. Furthermore, if the school headmaster is a woman, resources are used more efficiently:

ceteris paribus, a female headmaster leads to an increase of around one percentage point in the pass rate.

We also insert among regressors the ratio of permanent teachers out of total teachers. One might expect that the number of permanent teachers could positively affect the overall performance, through a selection effect, the permanent teachers being likely to be better teachers within an efficient recruitment system. However, the results work towards an opposite direction: the higher the ratio of permanent teachers, the lower is the school performance. We infer that increasing the quality of teacher is thus not correlated with hiring more permanent teachers and conclude that headmasters and policy-makers should focus more on improving the quality of their teachers.

In addition to this, the characteristics of the school premises do matter: the number of desks significantly affects the frontier as the quality of infrastructure shows an important role. The more desks are available the higher the performance. The availability of desks has an enormous importance and, remarkably, toilets as well. An additional toilet for every hundred students has the same impact of as an additional teacher. Possibly this result could reflect better hygienic conditions, which, in turn, would turn into higher performance.

All in all, the above results might suggest that the efforts should concentrate on good quality of learning. The environment matters a lot, as well as the composition of the class. Also, a higher age of students acts as detrimental, suggesting that repeating students might reduce the effort of others.

At the end of the tables it is possible to note that lambda, defined as

$$\lambda = \frac{\sigma_u}{\sigma_v}$$

is not statistically different from zero. When λ goes close to $+\infty$, then all variation from the frontier is due to the inefficiency term, then it should be better to use the deterministic approach. On the other hand, if λ is close to 0 - as in our case - SFA is a more appropriate choice.

A critical result of our analysis is the low variability in the inefficiency term u_i. This implies that it is possible to distinguish between more and less efficient schools, but the key factor explaining differences in performance is the presence of inputs (and the noise component of the error term). In other words, differences in the pass rate are due mainly to lack of resources rather than technical inefficiency. We want to stress this result as it is crucial for the policy stand-point. Resources are distributed unevenly among regions and schools, and their distribution is the main driver of differences in results.

In the following table we present predicted performance by quintile of performance and the region in which the school is located. The schools requiring most attention i.e. the worst performing schools are concentrated in the Plateau and Savanas regions, while few poorly performing schools are found in Lomé and the Central region. The second best performers show a percentage of 10% in Savanna and the highest in Gulf Lomé and Plateau. Targeting poorest performing school does not mean targeting a region in particular, at least with the exception of Gulf Lomé where the percentage of worst performing school is negligible.

Table 3: Predicted school performance, by quintile and region

Quintile	Central	Lomé	Kara	Coastal	Plateau	Savanes	Total
Worst performing	4.7	0.3	12.5	17.8	42.5	22.3	100
2	9.1	9.8	16.3	16.2	30.5	18.1	100
3	11.1	17.3	13.0	21.0	27.3	10.1	100
4	16.6	22.7	14.1	15.16	22.2	9.5	100
Best performing	15.7	24.4	31.0	8.0	14.1	6.8	100
Total	11.4	14.9	17.4	15.6	27.3	13.4	100

6. Conclusions

The public education system in Togo has made substantial improvements over the past few years: particularly the percentage of children who had never gone to school decreased sharply between 2006 and 2011 in all regions and across wealth quintiles. There are also significant challenges including how to accommodate the large influx of new students, how to improve levels of learning and redress regional inequalities.

By carrying out a stochastic frontier analysis, the paper looked more into the drivers of performance. A key result is that differences in performance between schools are mainly attributable to a lack of resources and less to differences in technical inefficiency. This is an important point, because the paper also noted that resources are distributed quite unevenly among regions and schools. By improving access to inputs, particularly in the underserved schools, performance can be expected to go up considerably.

The fact that inefficiency is a less important factor explaining differences in performance should not be taken to mean that there are no efficiency issues affecting Togo's primary schools. As the SDI survey has demonstrated, teachers only spend around 50% of their time teaching. This is an important inefficiency that needs to be addressed. What the regression suggests is that the inefficiency of teachers not teaching is something that affects all schools more or less equally, but also that it may be something that is picked by our control variables. For instance, and we are speculating here, the reason why the presence of more permanent teachers has a negative impact on performance might be because once made permanent, teachers are less motivated to show up and teach. The latter, how to motive teachers, is something to consider carefully, particularly as the Government of Togo has just announced an initiative to hire an additional 5,000 permanent teachers.

The results also suggest the importance of paying more attention to the learning environment. The effects can be subtle and are, at times, surprising. Combining the first two classes of primary school was found to have a positive impact on performance, but combining the last two classes not. Improving teacher quality also has an important impact on performance, but teacher quality (as expressed through experience or qualifications) is different from hiring permanent teachers. Finally, schools with higher repeating student rates perform worse, and schools that manage to retain more girl perform better.

Appendix

Table A1. Summary Statistics

Variables	Mean	St. Dev
Number of Teachers	5.36	1.86
Teacher students	2.69	1.05
Average qualification teachers*private	0.60	1.07
Private	0.26	0.44
Repeating students rate	0.22	0.12
Ln Average teacher age	3.64	0.13
Female Headmaster	0.07	0.26
Female ratio in CM2	0.41	0.15
Average qualification teachers	2.42	0.62
Average student age in CM2	11.91	1.05
Seat every 100 student	82.18	38.65
Desk every 100 student	41.12	19.82
Toilet every 100 studentw	1.11	1.47
Water	0.35	0.48
Mathbook per student	0.34	0.33
Readbook per student	0.49	0.42
CP1-2 taught toghether	0.22	0.41
CE1-2 taught toghether	0.35	0.48
CM1-2 taught toghether	0.45	0.50
Employment rate	70.53	8.72
Employment rate (w/o salary)	87.97	8.75
Dependency ratio	54.53	5.90
Enrollment primary	78.78	7.80
Enrollment secondary	37.04	14.60
Urban	0.26	0.44
Admitted CEPD/Tot students in the school	0.08	0.04
Observations	3957	

References

Aigner, D., Lovell, C. and Schmidt, P. (1977), "Formulation and estimation of stochastic frontier production function models", *Journal of Econometrics*, 6 (1): 21.37.

Athanassopoulos, A.D. and Shale, E. (1997), "Assessing the comparative efficiency of higher education institutions in the UK by means of data envelopment analysis", *Education Economics*, 5(2): 117–134.

Beasley, J.E. (1990), "Comparing university departments", *OMEGA Journal of Management Science*, 18: 171–83.

Beasley, J.E. (1995), "Determining teaching and research efficiencies", *Journal of the Operational Research Society*, 46: 441–452.

Chalos, P. (1997), "An examination of budgetary inefficiency in education using data envelopment analysis", *Financial Accountability and Management*, 13: 55–69.

Cubbin, J. & Zamani, H. (1996), "A comparison of performance indicators for training and enterprise councils in the UK", *Annals of Public and Cooperative Economics*, 67: 603–632.

Deller, S.C. and Rudnicki, E.R. (1993), "Production efficiency in elementary education: The case of Maine public schools", *Economics of Education Review*, 12: 45–57.

Greene, W. (1980), "Maximum likelihood estimation of econometric frontier functions", *Journal of Econometrics*, 13: 27–56.

Greene, W. (2012), "Econometric Analysis", Pearson, Seventh Edition.

Hanushek, E. (1986), "The economics of schooling: Production and efficiency in public schools", *Journal of Economic Literature*, 24: 1141–1177.

Johnes, G. & Johnes, J. (1993), "Measuring the research performance of UK economics departments: An application of data envelopment analysis", *Oxford Economic Papers*, 45: 332–347.

Johnes, J. & Johnes, G. (1995), "Research funding and performance in U.K. university departments of economics: A frontier analysis", *Economics of Education Review*, 14: 301–314.

Madden, G., Savage, S. and Kemp, S. (1997), "Measuring public sector efficiency: A study of economics departments at Australian universities", *Education Economics*, 5: 153–168.

Pereira, M.C. and Moreira, S. (2007), "A Stochastic Frontier Analysis of Secondary Education Output in Portugal," Working Papers w200706, Banco de Portugal, Economics and Research Department.

Republic of Togo (2012), Rapport PASEC, " Améliorer la qualité de l'éducation au Togo: les facteurs de réussite" .

Sengupta, J.K. and Sfeir, R.E. (1986), "Production frontier estimates of scale in public schools in California", *Economics of Education Review*, 5: 297–307.

Sinuany-Stern, Z., Mehrez, A. & Barboy, A. (1994), "Academic departments efficiency via DEA", *Computers & Operations Research*, 21: 543–556.

Stevenson, R. (1980), "Likelihood functions for Generalized Stochastic Frontier Estimation", *Journal of Econometrics*, 13, pp.58-66.

World Bank (2014), Results of the Togo SDI survey.

Worthington, A. (2001), "An Empirical Survey of Frontier Efficiency Measurement Techniques in Education", *Education Economics*, 9(3): 245-268.

Our papers can be downloaded at:

http://cerp.carloalberto.org/en/publications

CeRP Working Paper Series

N° 145/14	Johannes G. Hoogeveen Mariacristina Rossi Dario Sansone	Drivers of performance in primary education in Togo
N° 144/14	Elsa Fornero	Economic-financial literacy and (sustainable) pension reforms: why the former is a key ingredient for the latter
N° 143/14	Kees de Vaan Daniele Fano Herialt Mens Giovanna Nicodano	A Reporting Standard for Defined Contribution Pension Plans
N° 142/14	Elisabetta Cagna Giulio Casuccio	Equally-weighted Risk Contribution Portfolios: an empirical study using expected shortfall
N° 141/14	Massimo Baldini Costanza Torricelli Maria Cesira Urzì Brancati	Family ties: occupational responses to cope with a household income shock
N° 140/14	Cecilia Boggio Elsa Fornero Henriette Prast Jose Sanders	Seven Ways to Knit Your Portfolio: Is Investor Communication Neutral?
N° 139/14	Laura Bianchini Margherita Borella	Cognitive Functioning and Retirement in Europe
N° 138/13	Claudio Morana	Insights on the global macro-finance interface: Structural sources of risk factors fluctuations and the cross-section of expected stock returns
N° 137/13	Claudio Morana	New Insights on the US OIS Spreads Term Structure During the Recent Financial Turmoil
N° 136/13	Anna Lo Prete	Inequality and the finance you know: does economic literacy matter?
N° 135/13	Rik Dillingh Henriette Prast Mariacristina Rossi Cesira Urzì Brancati	The psychology and economics of reverse mortgage attitudes: evidence from the Netherlands
N° 134/13	Annamaria Lusardi Olivia S. Mitchell	The Economic Importance of Financial Literacy: Theory and Evidence
N° 133/13	Annamaria Lusardi Pierre-Carl Michaud Olivia S. Mitchell	Optimal Financial Knowledge and Wealth Inequality
N° 132/13	Riccardo Calcagno Sonia Falconieri	Competition and dynamics of takeover contests
N° 131/13	Riccardo Calcagno Maria Cesira Urzì Brancati	Do more financially literate households invest less in housing? Evidence from Italy
N° 130/12	Maela Giofré	Financial Education, Investor Protection and International Portfolio Diversification
N° 129/12	Michele Belloni Rob Alessie Adriaan Kalwij	Lifetime Income and Old Age Mortality Risk in Italy over Two Decades

	Chiara Marinacci	
N° 128/12	Fabio Cesare Bagliano Claudio Morana	Determinants of US Financial Fragility Conditions
N° 127/12	Mariacristina Rossi Serena Trucchi	Liquidity Constraints and Labor Supply
N° 126/11	Margherita Borella Flavia Coda Moscarola Mariacristina Rossi	(Un)expected retirement and the consumption puzzle
N° 125/11	Carolina Fugazza	Tracking the Italian employees' TFR over their working life careers
N° 124/11	Agnese Romiti Mariacristina Rossi	Should we Retire Earlier in order to Look After our Parents? The Role of immigrants
N° 123/11	Elsa Fornero Maria Cristina Rossi Maria Cesira Urzì Brancati	Explaining why, right or wrong, (Italian) households do not like reverse mortgages
N° 122/11	Serena Trucchi	How credit markets affect homeownership: an explanation based on differences between Italian regions
N° 121/11	Elsa Fornero Chiara Monticone Serena Trucchi	The effect of financial literacy on mortgage choices
N° 120/11	Giovanni Mastrobuoni Filippo Taddei	Age Before Beauty? Productivity and Work vs. Seniority and Early Retirement
N° 119/11	Maarten van Rooij Annamaria Lusardi Rob Alessie	Financial Literacy, Retirement Planning, and Household Wealth
N° 118/11	Luca Beltrametti Matteo Della Valle	Does the implicit pension debt mean anything after all?
N° 117/11	Riccardo Calcagno Chiara Monticone	Financial Literacy and the Demand for Financial Advice
N° 116/11	Annamaria Lusardi Daniel Schneider Peter Tufano	Financially Fragile Households: Evidence and Implications
N° 115/11	Adele Atkinson Flore-Anne Messy	Assessing financial literacy in 12 countries: an OECD Pilot Exercise
N° 114/11	Leora Klapper Georgios A. Panos	Financial Literacy and Retirement Planning in View of a Growing Youth Demographic: The Russian Case
N° 113/11	Diana Crossan David Feslier Roger Hurnard	Financial Literacy and Retirement Planning in New Zealand
N° 112/11	Johan Almenberg Jenny Säve-Söderbergh	Financial Literacy and Retirement Planning in Sweden
N° 111/11	Elsa Fornero Chiara Monticone	Financial Literacy and Pension Plan Participation in Italy
N° 110/11	Rob Alessie Maarten Van Rooij Annamaria Lusardi	Financial Literacy, Retirement Preparation and Pension Expectations in the Netherlands
N° 109/11	Tabea Bucher-Koenen Annamaria Lusardi	Financial Literacy and Retirement Planning in Germany

N° 108/11	Shizuka Sekita	Financial Literacy and Retirement Planning in Japan
N° 107/11	Annamaria Lusardi Olivia S. Mitchell	Financial Literacy and Retirement Planning in the United States
N° 106/11	Annamaria Lusardi Olivia S. Mitchell	Financial Literacy Around the World: An Overview
N° 105/11	Agnese Romiti	Immigrants-Natives Complementarities in Production: Evidence from Italy
N° 104/11	Ambrogio Rinaldi	Pension awareness and nation-wide auto-enrolment: the Italian experience
N° 103/10	Fabio Bagliano Claudio Morana	The Great Recession: US dynamics and spillovers to the world economy
N° 102/10	Nuno Cassola Claudio Morana	The 2007-? financial crisis: a money market perspective
N° 101/10	Tetyana Dubovyk	Macroeconomic Aspects of Italian Pension Reforms of 1990s
N° 100/10	Laura Piatti Giuseppe Rocco	L'educazione e la comunicazione previdenziale - Il caso italiano
N° 99/10	Fabio Bagliano Claudio Morana	The effects of US economic and financial crises on euro area convergence
N° 98/10	Annamaria Lusardi Daniel Schneider Peter Tufano	The Economic Crisis and Medical Care Usage
N° 97/10	Carlo Maccheroni Tiziana Barugola	E se l'aspettativa di vita continuasse la sua crescita? Alcune ipotesi per le generazioni italiane 1950-2005
N° 96/10	Riccardo Calcagno Mariacristina Rossi	Portfolio Choice and Precautionary Savings
N° 95/10	Flavia Coda Moscarola Elsa Fornero Mariacristina Rossi	Parents/children "deals": Inter-Vivos Transfers and Living Proximity
N° 94/10	John A. List Sally Sadoff Mathis Wagner	So you want to run an experiment, now what? Some Simple Rules of Thumb for Optimal Experimental Design
N° 93/10	Mathis Wagner	The Heterogeneous Labor Market Effects of Immigration
N° 92/10	Rob Alessie Michele Belloni	Retirement choices in Italy: what an option value model tells us
N° 91/09	Annamaria Lusardi Olivia S. Mitchell Vilsa Curto	Financial Literacy among the Young: Evidence and Implications for Consumer Policy
N° 90/09	Annamaria Lusardi Olivia S. Mitchell	How Ordinary Consumers Make Complex Economic Decisions: Financial Literacy and Retirement Readiness
N° 89/09	Elena Vigna	Mean-variance inefficiency of CRRA and CARA utility functions for portfolio selection in defined contribution pension schemes
N° 88/09	Maela Giofré	Convergence of EMU Equity Portfolios
N° 87/09	Elsa Fornero Annamaria Lusardi Chiara Monticone	Adequacy of Saving for Old Age in Europe

N° 86/09	Margherita Borella Flavia Coda Moscarola	Microsimulation of Pension Reforms: Behavioural versus Nonbehavioural Approach
N° 85/09	Cathal O'Donoghue John Lennon Stephen Hynes	The Life-Cycle Income Analysis Model (LIAM): A Study of a Flexible Dynamic Microsimulation Modelling Computing Framework
N° 84/09	Luca Spataro	Il sistema previdenziale italiano dallo shock petrolifero del 1973 al Trattato di Maastricht del 1993
N° 83/09	Annamaria Lusardi Peter Tufano	Debt Literacy, Financial Experiences, and Overindebtedness
N° 82/09	Carolina Fugazza Massimo Guidolin Giovanna Nicodano	Time and Risk Diversification in Real Estate Investments: Assessing the Ex Post Economic Value
N° 81/09	Fabio Bagliano Claudio Morana	Permanent and Transitory Dynamics in House Prices and Consumption: Cross-Country Evidence
N° 80/08	Claudio Campanale	Learning, Ambiguity and Life-Cycle Portfolio Allocation
N° 79/08	Annamaria Lusardi	Increasing the Effectiveness of Financial Education in the Workplace
N° 78/08	Margherita Borella Giovanna Segre	Le pensioni dei lavoratori parasubordinati: prospettive dopo un decennio di gestione separata
N° 77/08	Giovanni Guazzarotti Pietro Tommasino	The Annuity Market in an Evolving Pension System: Lessons from Italy
N° 76/08	Riccardo Calcagno Elsa Fornero Mariacristina Rossi	The Effect of House Prices on Household Saving: The Case of Italy
N° 75/08	Harold Alderman Johannes Hoogeveen Mariacristina Rossi	Preschool Nutrition and Subsequent Schooling Attainment: Longitudinal Evidence from Tanzania
N° 74/08	Maela Giofré	Information Asymmetries and Foreign Equity Portfolios: Households versus Financial Investors
N° 73/08	Michele Belloni Rob Alessie	The Importance of Financial Incentives on Retirement Choices: New Evidence for Italy
N° 72/08	Annamaria Lusardi Olivia Mitchell	Planning and Financial Literacy: How Do Women Fare?
N° 71/07	Flavia Coda Moscarola	Women participation and caring decisions: do different institutional frameworks matter? A comparison between Italy and The Netherlands
N° 70/07	Radha Iyengar Giovanni Mastrobuoni	The Political Economy of the Disability Insurance. Theory and Evidence of Gubernatorial Learning from Social Security Administration Monitoring
N° 69/07	Carolina Fugazza Massimo Guidolin Giovanna Nicodano	Investing in Mixed Asset Portfolios: the Ex-Post Performance
N° 68/07	Massimo Guidolin Giovanna Nicodano	Small Caps in International Diversified Portfolios
N° 67/07	Carolina Fugazza Maela Giofré Giovanna Nicodano	International Diversification and Labor Income Risk

N° 66/07	Maarten van Rooij Annamaria Lusardi Rob Alessie	Financial Literacy and Stock Market Participation
N° 65/07	Annamaria Lusardi	Household Saving Behavior: The Role of Literacy, Information and Financial Education Programs (Updated version June 08: "Financial Literacy: An Essential Tool for Informed Consumer Choice?")
N° 64/07	Carlo Casarosa Luca Spataro	Rate of Growth of Population, Saving and Wealth in the Basic Life-cycle Model when the Household is the Decision Unit
N° 63/07	Claudio Campanale	Life-Cycle Portfolio Choice: The Role of Heterogeneous Under-Diversification
N° 62/07	Margherita Borella Elsa Fornero Mariacristina Rossi	Does Consumption Respond to Predicted Increases in Cash-on-hand Availability? Evidence from the Italian "Severance Pay"
N° 61/07	Irina Kovrova	Effects of the Introduction of a Funded Pillar on the Russian Household Savings: Evidence from the 2002 Pension Reform
N° 60/07	Riccardo Cesari Giuseppe Grande Fabio Panetta	La Previdenza Complementare in Italia: Caratteristiche, Sviluppo e Opportunità per i Lavoratori
N° 59/07	Riccardo Calcagno Roman Kraeussl Chiara Monticone	An Analysis of the Effects of the Severance Pay Reform on Credit to Italian SMEs
N° 58/07	Elisa Luciano Jaap Spreeuw Elena Vigna	Modelling Stochastic Mortality for Dependent Lives
N° 57/07	Giovanni Mastrobuoni Matthew Weinberg	Heterogeneity in Intra-Monthly Consumption. Patterns, Self-Control, and Savings at Retirement
N° 56/07	John A. Turner Satyendra Verma	Why Some Workers Don't Take 401(k) Plan Offers: Inertia versus Economics
N° 55/06	Antonio Abatemarco	On the Measurement of Intra-Generational Lifetime Redistribution in Pension Systems
N° 54/06	Annamaria Lusardi Olivia S. Mitchell	Baby Boomer Retirement Security: The Roles of Planning, Financial Literacy, and Housing Wealth
N° 53/06	Giovanni Mastrobuoni	Labor Supply Effects of the Recent Social Security Benefit Cuts: Empirical Estimates Using Cohort Discontinuities
N° 52/06	Luigi Guiso Tullio Jappelli	Information Acquisition and Portfolio Performance
N° 51/06	Giovanni Mastrobuoni	The Social Security Earnings Test Removal. Money Saved or Money Spent by the Trust Fund?
N° 50/06	Andrea Buffa Chiara Monticone	Do European Pension Reforms Improve the Adequacy of Saving?
N° 49/06	Mariacristina Rossi	Examining the Interaction between Saving and Contributions to Personal Pension Plans. Evidence from the BHPS
N° 48/06	Onorato Castellino Elsa Fornero	Public Policy and the Transition to Private Pension Provision in the United States and Europe
N° 47/06	Michele Belloni Carlo Maccheroni	Actuarial Neutrality when Longevity Increases: An Application to the Italian Pension System
N° 46/05	Annamaria Lusardi Olivia S. Mitchell	Financial Literacy and Planning: Implications for Retirement Wellbeing
N° 45/05	Claudio Campanale	Increasing Returns to Savings and Wealth Inequality

N° 44/05	Henrik Cronqvist	Advertising and Portfolio Choice
N° 43/05	John Beshears James J. Choi David Laibson Brigitte C. Madrian	The Importance of Default Options for Retirement Saving Outcomes: Evidence from the United States
N° 42/05	Margherita Borella Flavia Coda Moscarola	Distributive Properties of Pensions Systems: a Simulation of the Italian Transition from Defined Benefit to Defined Contribution
N° 41/05	Massimo Guidolin Giovanna Nicodano	Small Caps in International Equity Portfolios: The Effects of Variance Risk.
N° 40/05	Carolina Fugazza Massimo Guidolin Giovanna Nicodano	Investing for the Long-Run in European Real Estate. Does Predictability Matter?
N° 39/05	Anna Rita Bacinello	Modelling the Surrender Conditions in Equity-Linked Life Insurance
N° 38/05	Carolina Fugazza Federica Teppa	An Empirical Assessment of the Italian Severance Payment (TFR)
N° 37/04	Jay Ginn	Actuarial Fairness or Social Justice? A Gender Perspective on Redistribution in Pension Systems
N° 36/04	Laurence J. Kotlikoff	Pensions Systems and the Intergenerational Distribution of Resources
N° 35/04	Monika Bütler Olivia Huguenin Federica Teppa	What Triggers Early Retirement. Results from Swiss Pension Funds
N° 34/04	Chourouk Houssi	Le Vieillissement Démographique : Problématique des Régimes de Pension en Tunisie
N° 33/04	Elsa Fornero Carolina Fugazza Giacomo Ponzetto	A Comparative Analysis of the Costs of Italian Individual Pension Plans
N° 32/04	Angelo Marano Paolo Sestito	Older Workers and Pensioners: the Challenge of Ageing on the Italian Public Pension System and Labour Market
N° 31/03	Giacomo Ponzetto	Risk Aversion and the Utility of Annuities
N° 30/03	Bas Arts Elena Vigna	A Switch Criterion for Defined Contribution Pension Schemes
N° 29/02	Marco Taboga	The Realized Equity Premium has been Higher than Expected: Further Evidence
N° 28/02	Luca Spataro	New Tools in Micromodeling Retirement Decisions: Overview and Applications to the Italian Case
N° 27/02	Reinhold Schnabel	Annuities in Germany before and after the Pension Reform of 2001
N° 26/02	E. Philip Davis	Issues in the Regulation of Annuities Markets
N° 25/02	Edmund Cannon Ian Tonks	The Behaviour of UK Annuity Prices from 1972 to the Present
N° 24/02	Laura Ballotta Steven Haberman	Valuation of Guaranteed Annuity Conversion Options
N° 23/02	Ermanno Pitacco	Longevity Risk in Living Benefits
N° 22/02	Chris Soares Mark Warshawsky	Annuity Risk: Volatility and Inflation Exposure in Payments from Immediate Life Annuities

N° 21/02	Olivia S. Mitchell David McCarthy	Annuities for an Ageing World
N° 20/02	Mauro Mastrogiacomo	Dual Retirement in Italy and Expectations
N° 19/02	Paolo Battocchio Francesco Menoncin	Optimal Portfolio Strategies with Stochastic Wage Income and Inflation: The Case of a Defined Contribution Pension Plan
N° 18/02	Francesco Daveri	Labor Taxes and Unemployment: a Survey of the Aggregate Evidence
N° 17/02	Richard Disney and Sarah Smith	The Labour Supply Effect of the Abolition of the Earnings Rule for Older Workers in the United Kingdom
N° 16/01	Estelle James and Xue Song	Annuities Markets Around the World: Money's Worth and Risk Intermediation
N° 15/01	Estelle James	How Can China Solve ist Old Age Security Problem? The Interaction Between Pension, SOE and Financial Market Reform
N° 14/01	Thomas H. Noe	Investor Activism and Financial Market Structure
N° 13/01	Michela Scatigna	Institutional Investors, Corporate Governance and Pension Funds
N° 12/01	Roberta Romano	Less is More: Making Shareholder Activism a Valuable Mechanism of Corporate Governance
N° 11/01	Mara Faccio and Ameziane Lasfer	Institutional Shareholders and Corporate Governance: The Case of UK Pension Funds
N° 10/01	Vincenzo Andrietti and Vincent Hildebrand	Pension Portability and Labour Mobility in the United States. New Evidence from the SIPP Data
N° 9/01	Hans Blommestein	Ageing, Pension Reform, and Financial Market Implications in the OECD Area
N° 8/01	Margherita Borella	Social Security Systems and the Distribution of Income: an Application to the Italian Case
N° 7/01	Margherita Borella	The Error Structure of Earnings: an Analysis on Italian Longitudinal Data
N° 6/01	Flavia Coda Moscarola	The Effects of Immigration Inflows on the Sustainability of the Italian Welfare State
N° 5/01	Vincenzo Andrietti	Occupational Pensions and Interfirm Job Mobility in the European Union. Evidence from the ECHP Survey
N° 4/01	Peter Diamond	Towards an Optimal Social Security Design
N° 3/00	Emanuele Baldacci Luca Inglese	Le caratteristiche socio economiche dei pensionati in Italia. Analisi della distribuzione dei redditi da pensione (only available in the Italian version)
N° 2/00	Pier Marco Ferraresi Elsa Fornero	Social Security Transition in Italy: Costs, Distorsions and (some) Possible Correction
N° 1/00	Guido Menzio	Opting Out of Social Security over the Life Cycle