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GOVERNMENT SPENDING EFFICIENCY IN LATIN AMERICA: A FRONTIER APPROACH

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ABSTRACT

Government spending efficiency in providing education and health is evaluated across countries of the world, with a special emphasis on Latin American countries. Using stochastic frontier and data envelopment analysis, it is found that important inefficiencies are at hand. Those inefficiencies are only partly explained by environmental factors such as education of the adult population and GDP per head.

EFICIENCIA DEL GASTO GUBERNAMENTAL EN AMÉRICA LATINA: UN ENFOQUE DE FRONTERA

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RESUMEN

En este estudio se evalúa la eficiencia del gasto del Gobierno en proveer educación y salud a partir de un "enfoque de frontera". Tanto con el método de frontera estocástica y como con el de análisis envolvente de datos, se encontró ineficiencias importantes para América Latina. Esas ineficiencias se explican, sólo en parte, por factores ambientales tales como la educación de la población adulta y el PIB per cápita.

Government Spending Efficiency in Latin America:
a Frontier Approach[1]

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February 2012

Abstract

Government spending efficiency in providing education and health is evaluated across countries of the world, with a special emphasis on Latin American countries. Using stochastic frontier and data envelopment analysis, it is found that important inefficiencies are at hand. Those inefficiencies are only partly explained by environmental factors such as education of the adult population and GDP per head.

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1. Introduction

We study efficiency in government activity by means of a cross country analysis that focuses on education and health. The choice of these two sectors when studying efficiency is very common in the literature of government spending efficiency and is based on the importance of public spending in the aforementioned sectors. For the sake of robustness, we resort to two methods to obtain the frontier: Data Envelopment Analysis (DEA) and Stochastic Frontier Approach (SFA).

Cross country analysis, and in spite of some well known problems, especially those associated with homogeneity of data, has been extensively used before when studying efficiency in public spending. Examples include Joumady and Ris (2005), Afonso and St. Aubyn (2006) and St. Aubyn, Pina, Garcia and Pais (2009) for education in developed countries, Afonso and St. Aubyn (2011) and Mirzosaid (2011) for health in CIS and OECD countries respectively, and Afonso, Schuknecht and Tanzi (2005) for general government performance in industrialized countries.

Herrera and Pang (2005) include Latin American countries in their sample, as they study efficiency of public spending on education and health using data available for a sample of 140 countries between 1996 and 2006. Their work provide evidence of a significant level of inefficiency in Latin America. The authors also found, in accordance with Afonso et al. (2005), that countries with higher expenditure levels register lower efficiency ratings.

None of these papers however put special emphasis in Latin America nor explore efficiency combining DEA with the stochastic frontier method. These two methods complement each other, yet the simultaneous use of these two approaches is rare in the literature[2].

DEA does not require an ex-ante imposition of the functional form of the frontier. However, it is very sensitive to outliers and does not allow inference regarding the inputs statistical significance. Moreover the distance to the frontier is completely regarded as inefficiency not acknowledging any possibility of noise or stochastic factors affecting performance. The SFA framework overcomes these limitations but with a cost - that of imposing a functional form for the frontier.

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[2] St. Aubyn, Pina, Garcia and Pais (2009) being one exception.

As compared to the previous literature, our work also provides a more recent assessment as we incorporate data until 2009, including recently released 2009 PISA results. In addition, we provide efficiency scores with and without considering environmental effects. Previous work focusing of DEA usually incorporate environmental variables in a second stage tobit regression without providing corrected score indexes.

For this analysis on education and health efficiency, we use data from the World Bank, the World Development Indicators, or "WBDI"[3].

When getting the frontiers we proceed as follows.

Firstly, we compute efficiency scores using SFA analysis. We "explain" (or correct) computed scores by including a large set of environmental variables. By excluding non significant variables, we present parsimonious models in each case.

Secondly, we estimate DEA versions of the same models. For each model, there is an uncorrected and a corrected version. Similarly to the SFA procedure, the corrected version includes environmental variables as inputs.

The rest of the paper is organized as follows. In the second section we provide a brief review of the methods to calculate/estimate the frontier stressing their relative advantages and disadvantages. Section 3 analyses efficiency in education while section 4 focuses on heath. Finally section 5 concludes.

2. Efficiency: what do we mean and how do we measure it

Efficiency is basically a comparison between inputs used and attained outputs. When a decision making unit (DMU) – be it a company, a government body, or a country – reaches that level of output or outputs that is the maximum attainable under the existing technology, that DMU is said to be efficient, i.e., it operates on the *production possibility frontier*. When it produces less than what can possibly be accomplished, the DMU is said to be inefficient.

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[3] See World Development Indicators, http://data.worldbank.org/data-catalog/world-development-indicators

Figure 1

The Production Possibility frontier

output

C

B

d_{2c}

A

d_2 { D_c

production
possibility
frontier

$\bullet D$

d_{1c}

d_1 {
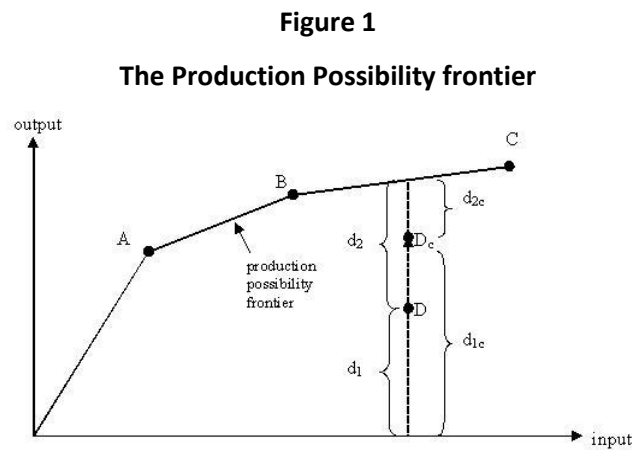
input

Figure 1 clarifies these concepts in a one input – one output structure. DMUs A, B, and C are on the production possibility frontier, and are thus efficient. DMU D, however, is inefficient as it only produces d_1 units of output. Production should rise by d_2 units if the possibility frontier were to be reached. The output efficiency coefficient, $d_1/(d_1+d_2)$, is a possible measure of DMU D's inefficiency, and is extensively used in this paper. It gives how much DMU D is producing in proportion of the full potential. For an efficient unit, in our example, this coefficient would be 1, or 100 percent. Note that it would also be possible to measure the distance to the frontier as a horizontal distance. A coefficient obtained in this manner would express how much a DMU could be saving in terms of the inputs if it produced the same quantity of output in efficient conditions.

It could be the case, however, that unit D inefficiency results from some inputs that were omitted. These inputs are sometimes beyond the control of the DMU, and deserve the name of non-discretionary inputs or environmental variables. In our example, unit D could be operating in a particularly harsh environment (e.g. a school in a difficult neighborhood) and some of the distance to the frontier is possibly ascribed to this condition. If environment becomes milder, unit D could be operating in D_c, and its output efficiency score would be higher and equal to $d_{1c}/(d_{1c}+d_{2c})$.

If environment is responsible for part of the inefficiency, than it becomes possible to correct the raw inefficiency by taking into account non-discretionary inputs. In our paper, we will provide both uncorrected and corrected efficiency scores.

In what follows, we use two different methods to estimate the production possibility frontier - DEA (Data Envelopment Analysis) and SFA (Stochastic Frontier Analysis) in what concerns

government spending efficiency in Latin America. The methods are briefly described below. The production functions of education and health---main areas to search for public spending efficiency---are extremely complicate objects. Moreover, data limitations usually make difficult to provide a clean measure of inefficiency. Indeed, frontiers methods, of any kind, are not excluded of such limitations, yet; they represent a powerful tool for benchmarking DMUs performance. In fact, they are perhaps the most a common approach when dealing with inefficiency of any DMUs. This popularity rest on some of their advantages for instance: no need to impose restrictions regarding the functional form linking inputs and outputs (when using non parametric methods), ability to decompose deviation from frontier into inefficiency and noise (when using stochastic frontier methods) and even ability to deal with non-observable time invariant heterogeneity.

DEA (Data Envelopment Analysis)

A full presentation of the method may be found in Coelli *et al.* (2005). The researcher identifies relevant inputs (*X*) and outputs (*Y*). Then, the following mathematical programming problem is computed, for a given *i*-th DMU (decision making unit):

$$
\begin{aligned}
&Max\ _{\lambda,\delta_i}\ \delta_i \\
&\text{s.to}\ \ \delta_i y_i \leq Y\lambda \\
&\qquad x_i \geq X\lambda \\
&\qquad n1'\lambda = 1 \\
&\qquad \lambda \geq 0
\end{aligned}
\qquad . \qquad (1)
$$

In problem (1), δ_i is a scalar satisfying $\delta_i \geq 1$. It measures technical efficiency of the *i*-th unit as the distance to the efficiency frontier, the latter being defined as a linear combination of best practice observations. With $\delta_i > 1$, the decision unit is inside the frontier (i.e., it is inefficient), while $\delta_i = 1$ implies that the decision unit is on the frontier (i.e., it is efficient). In what comes next, we will define $\mu_i = \delta_i^{-1}$ as the country *i* DEA output efficient score, which is necessarily greater then zero and no higher than 1. An interesting intuition is that μ_i is the fraction country *i* is producing of its potential efficiency level. It follows that $\mu_i = 1$ when country *i* is efficient.

Uncorrected efficiency scores were calculated by considering inputs controlled by governments as inputs. Corrected scores were computed by adding to these inputs the environmental variables.

DEA models were estimated using the DEAP software written by Tim Coelli.

SFA (Stochastic Frontier Analysis)

The DEA frontier is assumed to be deterministic, and differences between the frontier and actual outputs are fully related to inefficiency. Suppose, alternatively to the DEA approach, that the frontier is stochastic. In that case, such differences may also stem from stochastic noise. Specifically, and after Coelli et al. (2005), assume the following model:

$$\ln y_{it} = F(X_{it}, \beta) + \eta_{it} + \varepsilon_{it} \tag{8}$$

where i is the country and t the time period. We have:

y_{it} – the output, e.g. the PISA score;

X_{it} – the vector of inputs;

β – set of production function parameters to be estimated;

η_{it} – normally distributed random error;

ε_{it} – non-negative efficiency effect, assumed to have a truncated normal distribution.

As with DEA, uncorrected efficiency scores were obtained by including government inputs in X_{it}m and corrected scores were estimated by complementing these inputs with nom-discretionary factors.

SFA models were estimated by maximum likelihood using STATA.

3. Efficiency in providing education

Education is considered a tool for social mobility and development. Indeed, countries spend a sizable fraction of their total spending in education as shown in table 1. (Figures correspond to averages from 2000 to 2009).

Table 1

Education inputs

Region/country	public spending in education (% GDP)	spending per student (% of PIB per head, secondary education)	teachers per student (ratio)
East Asia & Pacific	4.01	17.40	0.06
Europe & Central Asia	4.94	24.78	0.10
Middle East & North Africa	4.68	18.68	0.07
North America	4.23	18.67	0.10
South Asia	4.30	18.85	0.04
Sub-Saharan Africa	4.68	29.03	0.04
Argentina	4.72	20.62	0.08
Bolivia	6.31	14.49	0.06
Brazil	4.90	15.80	0.06
Chile	3.33	13.02	0.04
Colombia	3.98	12.55	0.04
Guatemala	3.08	5.33	0.06
Mexico	4.89	14.03	0.06
Panama	3.82	12.63	0.06
Peru	2.62	9.77	0.06
Uruguay	2.77	10.13	0.07
Venezuela	3.66	8.18	0.10
Latin America average, selected countries	4.01	12.41	0.06

Source: own computation based on WBDI.

Public expenditure in education is around 4 to 5 percent of GDP in all regions. However, in terms of expenditure per student (as a fraction of GDP per head) the Region "Latin America and the Caribbean" comes at the bottom, particularly for secondary education. Moreover, there is an important dispersion within the region. On average, Latin America also employs less teachers per student than Europe, North America or the Middle East and North Africa.

A critical goal of government spending in education is to provide more *and* better educated citizens. Hence, an analysis of inefficiency in public expenditure in education should look at

variables not only measuring "access" to education but also at variables measuring the "quality "of education. Here we look at these two dimensions, in particular, we work with two outputs: (1) the average grade in PISA (considering mathematics, reading and science) and (2) the secondary net enrolment rate.

3.1 Education "quality" models (PISA as an output)

PISA, or Programme for International Student Assessment, is organized by the OECD and "reviews the extent to which students near the end of compulsory education have acquired some of the knowledge and skills that are essential for full participation in modern societies, particularly reading, mathematics and science" [OECD (2010), p. 17]. Following Afonso and Aubyn (2005, 2006) we use the simple PISA average of 15-year old students scores on math, reading and sciences as a measure of a country educational achievement. Result should be similar if we take each of these subjects independently as they are highly correlated, as shown in table 2.

Table 2

PISA scores correlation coefficients

	Mathematics			
Mathematics	1.0000	Reading		
Reading	0.9383	1.0000	Science	
Science	0.9624	0.9639	1.0000	Average
Average	0.9832	0.9812	0.9900	1.0000

PISA tests are made every three years since 2000. Hence, we have test scores for four periods, 2000, 2003, 2006, and 2009. PISA scores are not available for all countries. For instance, for years 2006 and 2009 we have 55 and 62 countries respectively (see appendix).

Figure 2 displays PISA scores in 2009 vs. PISA scores for 2006 (only Latin American countries are labeled).[4] A point above the line indicates an improvement from 2006 to 2009.

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[4] In the appendix we show separate figures for each year containing countries names.

Figure 2

PISA 2006 vs. 2009
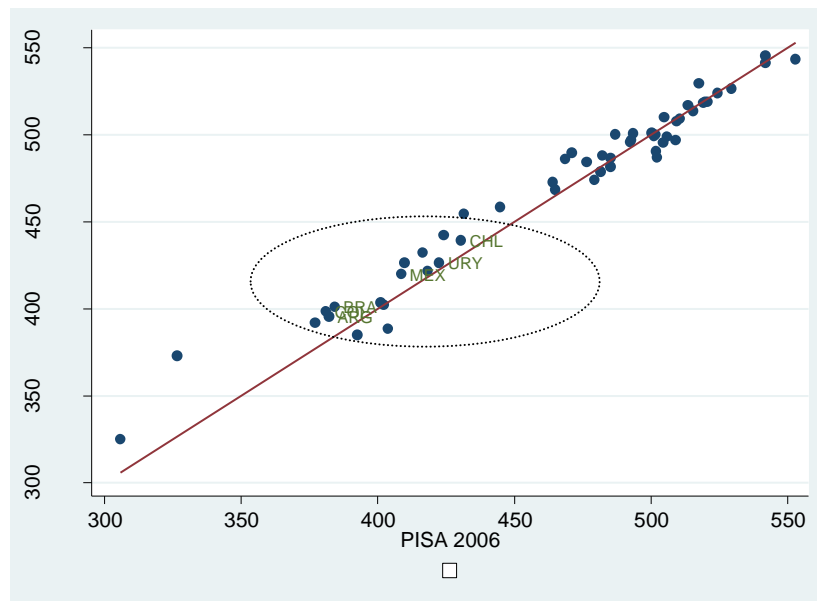
Figure 2 highlights the poor performance of Latin America students in both years. However, this does not necessary reflect education system inefficiency as we must account for the use of inputs. In the region, Chile and Uruguay show the best performance, while Argentina is at the bottom. The figure also suggests that there are no important changes in the relative performance (rank position) of Latin America countries.

As previously mentioned, in the empirical analysis we proceed as follows. First, we compute two sets of efficiency scores using SFA. The first set is obtained without environmental variables, i.e., with inputs only as regressors. The second set includes environmental variables.

Secondly, we present our DEA results. As with SFA, we present results from two models, without and with environmental variables. Inputs, outputs and environmental variables are the same with SFA and DEA.

SFA results

Our stochastic frontier regression results then from the consideration of the PISA scores as the dependent output variable. All variables are in logs and estimation of the frontier results from a two period panel. The output variable in the first and second periods correspond to PISA 2006 and PISA 2009 scores, respectively. The inputs and environmental variables correspond to the averages in each period, 2001-2006 and 2005-2009.

Table 3 summarize SFA regression results.

Table 3

SFA education quality models - regression results

Variable	(1)	(2)	(3)	(4)	(5)
teacher/student ratio	-0.0026				
total education spending per head		0.1203**		0.0477**	
spending per student (secondary)			0.0951**		0.0485**
GDP per head				0.0591**	0.0538**
years of schooling (adults)				0.1204**	0.1364**

Note: ** Significant at 5%

Three possible input variables were considered - teachers per student, total education spending per head and education spending per student. The teacher/student ratio was not significant in statistical terms, while the two other inputs were. Moreover, results with these two other inputs were similar in terms of output scores per country. We have kept regressions with education spending per head, columns (2) and (4) in table 4 as our main specifications.

Model in column (2) constitutes our SFA education quality uncorrected model, while the SFA corrected model, column (4), includes the environmental variables that were found to be significant. These were GDP per head and adult years of schooling. As with the input, the average of the last five years was taken[5].

The fact that these environmental variables are significant suggests that students in more affluent countries and where parents are more educated display a better performance, even if resources in the educational system are of a comparable magnitude.

Table 4 includes output average 2006-2009 scores for world regions and Latin American countries.

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[5] A potential environmental variable, the Gini index as an indicator of asymmetry in income distribution could not be included as it would significantly reduce sample.

Table 4

Education quality, SFA output scores

Region	PISA Score (relative to max) (%)	uncorrected output score (%)	corrected output score (%)
East Asia & Pacific	94.2	96.5	96.9
Europe & Central Asia	89.9	91.5	92.4
Latin America and Caribbean	76.0	87.2	87.6
Middle East & North Africa	75.0	74.6	77.6
North America	98.3	93.6	93.8
Argentina	70.3	81.0	81.2
Brazil	71.0	83.5	86.3
Chile	78.7	91.7	90.1
Colombia	70.5	85.7	87.8
Mexico	74.9	83.4	85.4
Uruguay	76.8	95.5	93.3

Note the fact that Latin America is only more efficient than the Middle East and North Africa weather we consider environmental factors (corrected scores) or inputs only (uncorrected scores). On average, Latin America and Caribbean countries attain 87.6 percent of the expected result one could expect from a completely efficient region, already considering environmental factors specific to each country, namely income and parents' education.

Two comments are worth making.

 (i) One could argue that lower PISA scores could be the result of more inclusive education systems that end up with a less performing pool of students. To take this into account we could include enrollment as a control variable. However, those countries on the frontier have simultaneously achieved high enrollment rates with high PISA grades. Indeed, entered the regression with a positive, albeit non significant coefficient.

(ii) Performance measures are for the entire education system and not restricted to public action. These are, however, the measures commonly used in the analysis of efficiency of public expenditure on education (see Herrera and Pang, 2005; St. Aubyn and Afonso, 2005). One reason is that a significant portion of public spending on education goes to public system schools. Similarly, there is a very high correlation between indicators of the education system

as a whole and the public sector. For example, for 2009 the correlation coefficient between the average PISA public grade and the whole system one is 0.98.

DEA results

Table 5

Education quality, DEA 2006 results

region/country	corrected DEA (%)	uncorrected DEA (%)	uncorrected ranking (48 countries considered)	corrected ranking (48 countries considered)
East Asia & Pacific	97.4	96.2		
Europe & Central Asia	94.4	93.1		
Latin America & Caribbean	87.6	85.9		
Middle East & North Africa	79.4	73.6		
North America	96.1	96.1		
Argentina	83.6	83.1	41	43
Brazil	87.5	84.8	40	41
Chile	92.2	92.2	25	27
Colombia	88.5	87.0	36	38
Mexico	86.0	82.2	42	42

Note: Uruguay is not included in the table as it was found to be efficient by default.

We have computed two sets of DEA models, concerning 2006 and 2009 results, respectively. In each case we have computed uncorrected and corrected models, i. e without and with environmental variables as inputs. These variables were the same as in the selected SFA models above. Table 5 summarizes output efficiency scores for world regions (computed as country averages) and for Latin American and Caribbean countries for 2006[6].

Similarly, table 6 contains results for 2009.

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[6] Extended results are presented in the appendix.

Table 6

Education quality, DEA 2009 results

region/country	corrected DEA (%)	uncorrected DEA (%)	uncorrected ranking (54 countries considered)	corrected ranking (54 countries considered)
East Asia & Pacific	98.7	97.0		
Europe & Central Asia	94.6	93.1		
Latin America & Caribbean	90.2	87.8		
Middle East & North Africa	84.8	78.4		
North America	93.9	93.8		
Argentina	84.3	81.5	47	47
Brazil	91.4	85.8	43	38
Chile	94.5	94.3	17	24
Colombia	93.6	89.1	41	27
Mexico	88.3	85.0	44	45
Panama	81.4	78.5	48	48
Peru	90.2	90.2	37	42
Uruguay	97.8	97.8	8	12

SFA and DEA results - a synthesis

Table 7 summarizes results presenting efficiency indices obtained with the quality of education models (both DEA and SFA). Figures are two-period averages. The first column shows average PISA scores (2006-2009) as a percentage of the maximum.

Table 7

Education quality efficiency scores - synthesis

Region/country	PISA score (rel. to max.) in %	SFA efficiency score (uncorrected) in %	DEA efficiency score (uncorrected) in %	SFA efficiency score (corrected) in %	DEA efficiency score (corrected) in %
East Asia & Pacific	94.2	96.5	96.6	96.9	98.1
Europe & Central Asia	89.9	91.5	93.1	92.4	94.5
Latin America & Caribbean	76.0	87.2	86.9	87.6	88.9
Middle East & North Africa	75.0	74.6	76.0	77.6	82.1
North America	96.3	93.6	95.0	93.8	95.0
Argentina	70.3	81.0	82.3	81.2	84.0
Brazil	71.0	83.5	85.3	86.3	89.5
Chile	78.7	91.7	93.3	90.1	93.4
Colombia	70.5	85.7	88.1	87.8	91.1
Mexico	74.9	83.4	83.6	85.4	87.2

First, note that Latin America has the worst performance in terms of PISA scores. Second, although the region attains on average only 0.76 of the value of the country with the highest score, considering inputs (expenditure per capita) and environmental factors (GDP per capita and years of schooling of the adult population) the region is closer to the border. However, even considering that fewer inputs are employed in the region as compared to most developed countries and that economic conditions are more adverse, Latin American students attain on average a corrected score between 88% and 90%, suggesting the prevalence of efficiency problems.

Note that SFA and DEA scores are quite similar. Considering countries of the region, Uruguay is consistently the country with the best efficiency score. Chile is also often relatively well positioned. On the other hand, Argentina and Mexico are countries with a lower efficiency rate.

For the sake of completeness, table 8 presents results for countries of the region with separate 2006 and 2009 estimates. Note that Peru and Panama only joined the PSA program 2009.

Table 8

Education quality efficiency scores - country results

country	PISA 2006		PISA 2009	
	SFA efficiency score (uncorrected) %	DEA efficiency score (uncorrected) %	SFA efficiency score (uncorrected) %	DEA efficiency score (uncorrected) %
Argentina	80.5	83.1	82.3	81.5
Brazil	81.6	84.8	85.9	85.8
Chile	89.6	92.2	93.9	94.3
Colombia	82.7	87.0	88.6	89.1
Mexico	82.0	82.2	86.0	85.0
Panama	.	.	79.0	78.5
Peru	.	.	86.9	90.2
Uruguay	94.0	efficient by default	95.4	97.8
Average	85.1	87.6	85.9	87.8

Note that there is a small tendency for improvement from 2006 to 2009 across almost all Latin American countries considered , as is apparent from figures 3 and 4.

Figure 3

SFA uncorrected scores for Latin American countries
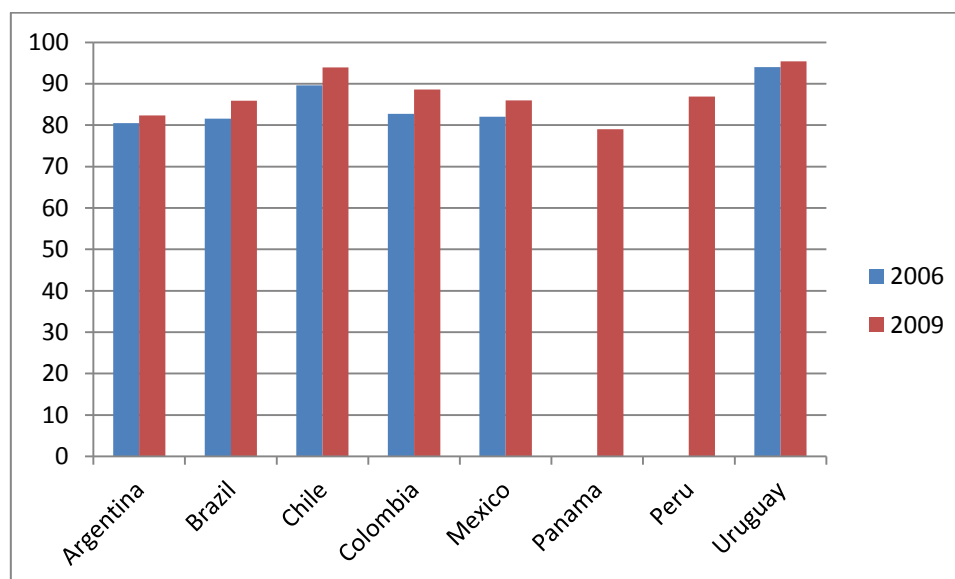
Figure 4

DEA uncorrected scores for Latin American countries
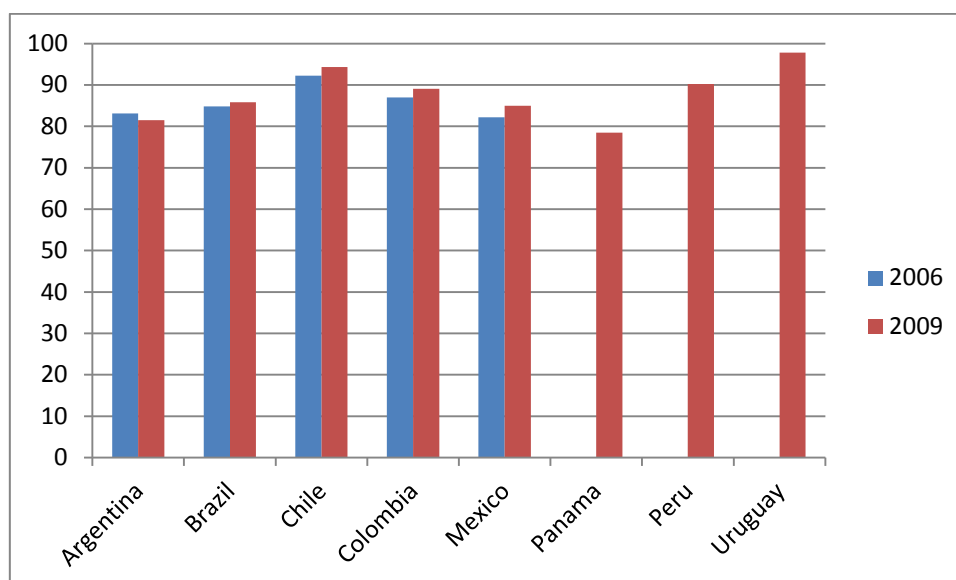
3.2. The "access" models (enrollment as an output)

In this section we analyze an access variable, the enrollment rate in secondary education. This variable measures the students secondary education as a fraction of the total population in the relevant age-group.

Table 9 shows values for this variable across world regions.

Even though access indicators in Latin America are not as low as in South Asia or Sub-Saharan Africa, still they are lower than those levels associated with more developed regions as Europe and Central Asia and even the Middle East and North Africa. Chile is the region country with a better access indicator with a net enrollment rate above 85% for the period 2006-2009.

Table 9

Enrolment rates (%) in secondary education

	2000-2005 (average)	**2006-2009 (average)**
East Asia & Pacific	62.89	68.77
Europe & Central Asia	86.16	87.65
Latin America & Caribbean	**67.31**	**70.26**
Middle East & North Africa	67.72	77.78
North America	86.95	88.26
South Asia	35.09	42.85
Sub-Saharan Africa	30.27	30.69
Argentina	**80.07**	**79.33**
Bolivia	**71.28**	**70.41**
Brazil	**73.49**	**79.07**
Chile		**85.26**
Colombia	**57.54**	**68.12**
Dominican Republic	**46.57**	**54.33**
Ecuador	**49.90**	
El Salvador		**54.88**
Guatemala		**37.82**
Jamaica		**77.80**
Mexico	**61.74**	**70.00**
Nicaragua	**38.14**	
Panama	**62.56**	**64.51**
Paraguay		**57.82**
Peru	**67.44**	**72.64**
Trinidad and Tobago	**67.67**	
Uruguay		**67.06**
Venezuela		**66.81**

Table 10

Access model, SFA regression results

Variable	(1)	(2)
total education spending per head	0.1348***	0.02035
GDP per head		0.0996*
literacy rate (adults)		0.793***

significant at: *1% level; ** 5% level; ***10% level

Table 10 shows regression results from SFA. The input variable is, again, and for the sake of comparability, expenditures per capita in real terms. And, following close the quality model, environmental variables include GDP per capita and a proxy for the education of adults, this time the adult literacy rate. Coeffcients are significant (with the exception of the one corresponding to public spending in specification 2) and carry the expected sign. We have considered two periods, 2000-2005 and 2006-2009, taking the logs of averaged variables in the two period panel regression.

Table 11

Access in education, efficiency scores

	Average 2005-2009				Average 2000-2004			
	SFA efficiency score (uncorrected) in %	DEA efficiency score (uncorrected) in %	SFA efficiency score corrected) in %	DEA efficiency score (corrected) in %	SFA efficiency score (uncorrected) in %	DEA efficiency score (uncorrected) in %	SFA efficiency score corrected) in %	DEA efficiency score (corrected) in %
East Asia & Pacific	72.59	73.78	73.09	77.63	71.53	65.40	64.76	71.00
Europe & Central Asia	91.02	95.61	91.64	96.67	89.57	92.90	88.08	94.10
Latin America & Caribbean	**75.73**	**75.85**	**77.52**	**81.19**	**70.40**	**69.10**	**70.25**	**75.20**
Middle East & North Africa	72.67	79.44	83.40	87.67	64.88	60.90	75.11	79.60
North America	84.27							
South Asia	52.28	61.05	72.69	79.93	39.27	74.60	76.78	76.60
Sub-Saharan Africa	39.35	50.67	55.37	68.73	33.64	45.30	49.95	61.80
Argentina	**83.41**	**87.20**	**83.02**	**87.60**	**85.46**	**88.20**	**83.38**	**88.90**
Bolivia	**78.54**	**80.60**	**83.50**	**89.40**	**79.27**	**81.20**	**92.80**	**93.10**
Brazil	**84.65**	**88.30**	**90.06**	**94.90**	**79.57**	**82.00**	**84.85**	**91.20**
Chile	**91.53**	**95.50**	**90.51**	**95.50**				
Colombia	**74.75**	**77.40**	**77.75**	**81.50**	**62.83**	**64.50**	**64.81**	**68.50**
Ecuador					**59.43**	**59.60**	**54.43**	**64.40**
Guatemala	**44.03**	**44.10**	**54.88**	**57.30**				
Jamaica	**84.12**	**87.60**	**92.77**	**99.10**				
Mexico	**73.14**	**76.50**	**75.98**	**78.60**	**64.15**	**65.80**	**67.12**	**69.20**
Panama	**69.48**	**72.40**	**71.65**	**74.60**	**67.14**	**63.90**	**69.54**	**73.50**
Peru	**82.48**	**83.70**	**88.98**	**92.10**	**76.04**	**77.80**	**79.57**	**87.00**
Paraguay	**66.28**	**66.90**	**68.37**	**71.00**				
Uruguay	**73.77**	**76.30**	**73.52**	**76.30**				
Venezuela	**72.03**	**75.00**	**73.29**	**76.30**				

We have also computed uncorrected and corrected DEA models for he two periods and considering the same variables. Efficiency scores for SFA and DEA models are presented in table 11.

Again, SFA and DEA scores are similar and providing essentially the same ranking.

The Latin America and Caribbean countries slightly improved their efficiency performance from 2000-2004 to 2005. However, and even considering the socioeconomic environment together with the level of education spending, this region is still about 20 percent below the efficiency frontier. Chile, the best performer in the region, is operating at about 90 percent of the potential allowed by its inputs and socioeconomic conditions (as measured by SFA). corrected efficiency scores can reach values as low as 54% (Guatemala). In addition to Guatemala, Venezuela, Mexico and Panama show remarkably low levels of efficiency.

Overall, results suggest that the region is operating with significant levels of inefficiency in both quality and access in education. While some of the poor performance in terms of quality and access to education appears to be linked to adverse conditions and inadequate resources, performance indicators are not in line with education levels for inputs and socioeconomic conditions. In fact, frontier analysis suggests that provision of quality and access is between 80% and 90% of the region potential.

4. Efficiency in Health Services

In this section we examine provision of health services. As in the case of education, governments spend a significant part of their budget in providing health services. Figure 5 illustrates this fact.

Figure 5

Public expenditure in Health (%GDP)

1996-2000 2001-2005 2006-2009

Total Expenditure in Health (%GDP)

1996-2000 2001-2005 2006-2009
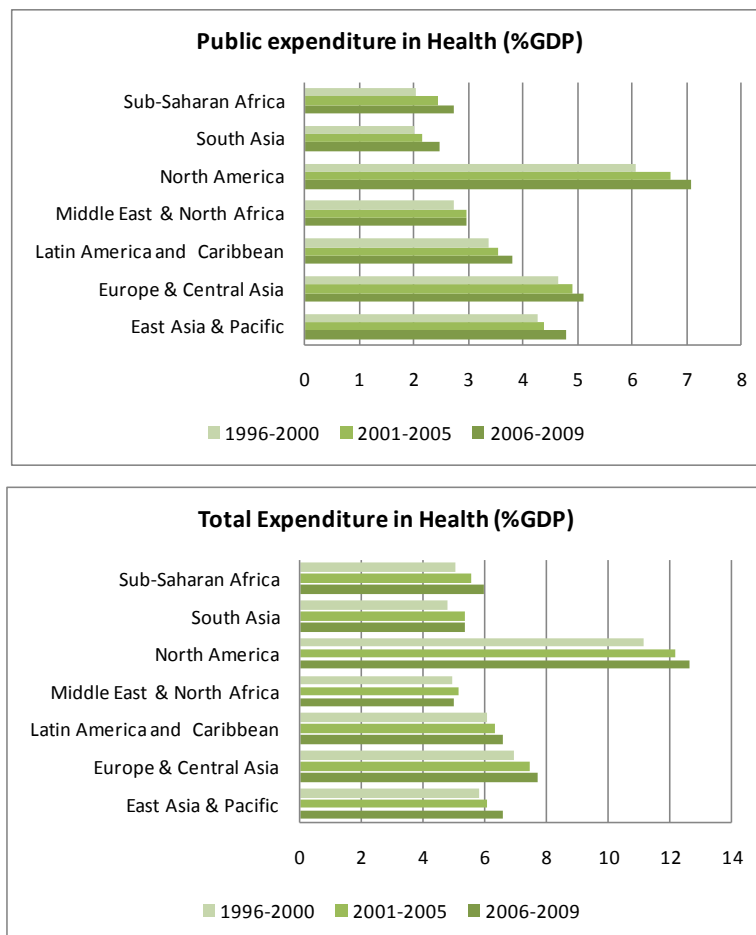
North America is the region that spends the most in health (as fraction of its GDP) followed by Europe and Central Asia and East Asia and Pacific. Latin America and the Caribbean ranks fourth in term of public expenditure in health. The figure also suggests a small increase over time in all regions.   The importance of public expenditure as a fraction of total expenditure ranges from around 70% in the case of East Asia and Pacific to around 40% for the case of Sub-Saharan Africa. In Latin America public expenditure in health is around 56% of total expenditure.

Note the importance across countries of the private portion of total expenditure on health, as shown by figure 6.

Figure 6 - private and public expenditure on health

percentage of GDP; average 2005-2009
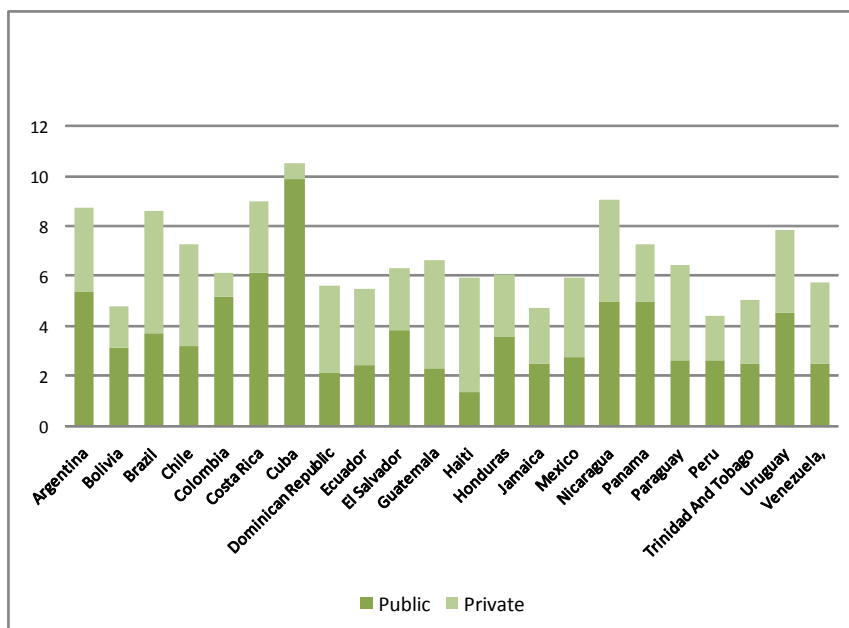
Outcomes

As health outputs, we consider life expectancy at birth and the survival rate for children under five. Figures 7 and 8 show the evolution of these two outputs for the different regions since 1960.

Figure 7
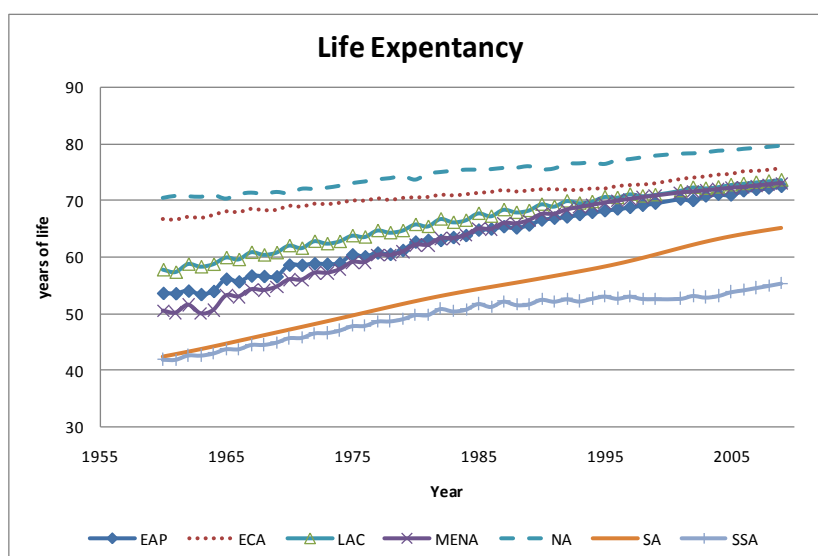
Figure 8
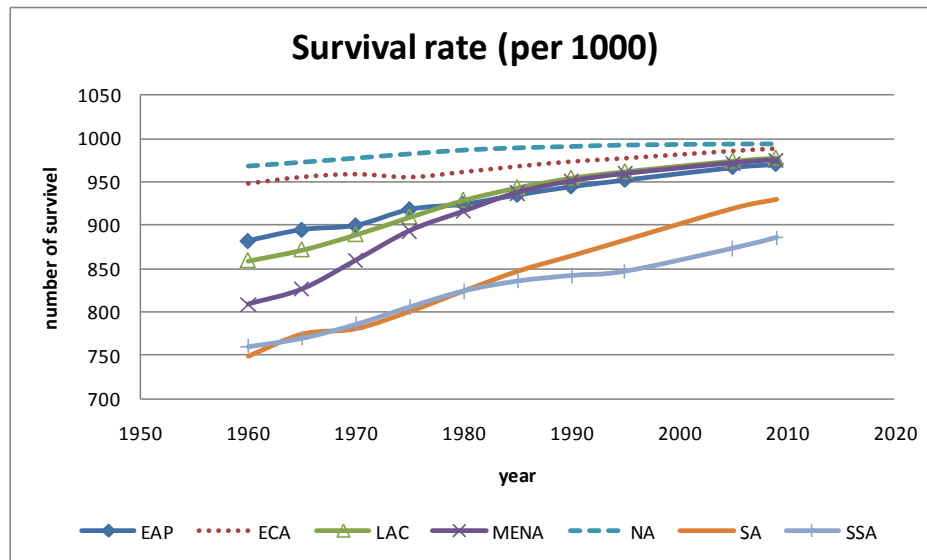
First, notice that there is a clear increasing trend for all regions. Hence, we introduce time as a control variable in frontier estimations. North America and Europe and Central Asia show better health outcomes in all periods for both outputs. Latin America shows - by the end of the period - similar outcomes than Middle East and North Africa and East Asia and Pacific. There is a sort of convergence more clearly noticed in the case of the survival rate; however, South Asia and especially sub-Saharan Africa still lag behind.

<u>SFA results</u>

Our SFA preferred specifications for health included public and private expenditure on health per capita in real terms, real GDP per capita and the literacy rate as regressors. These first two variables are inputs whereas the two other ones are more properly considered as environmental variables. We have considered two outputs, like expectancy and the survival rate in separate regressions in a two period panel data (2000-2004 and 2005-2009).

Table 12 presents results from the SFA regression.

Table 12

Health - SFA regression results

Variable	life expectancy (1)	life expectancy (2)	health survival (3)	health survival (4)
public expenditure per head	0.026***	3.850E-06	0.013***	0.0019
private expenditure per head	0.074**	0.0219***	0.0009	0.0056
period dummy	0.07***	0.00477**		0.0083***
adult literacy rate		0.0927***		0.0762***
GDP per head		0.0261***		0.0089**

significant at: *10% level, ** 5% level, ***1% level.

Note that public expenditure per head is highly significant when environmental variables are not included. Increasing literacy among adults or a higher GDP per head increase efficiency in providing health, i.e. coefficients associated with these variables are positive (and statistically significant).

Table 13

SFA health efficiency scores per country

Country	survival rate (per thousand)	survival rate efficiency score (%)	life expectancy (years)	life expectancy efficiency score (%)	survival rate difference	life expectancy difference
Argentina	982	98.5	74.66	95.4	14.87	3.57
Bolivia	928	95.0	64.51	88.6	48.48	8.26
Brazil	971	98.5	71.47	92.6	15.27	5.71
Chile	990	99.1	77.99	98.6	9.00	1.07
Colombia	977	98.8	72.13	96.8	12.12	2.41
Dominican Republic	964	98.2	71.96	95.0	17.71	3.81
Mexico	978	98.5	74.55	95.4	14.83	3.61
Panama	975	98.3	75.07	97.7	16.46	1.77
Paraguay	973	99.2	71.14	97.8	7.61	1.62
Peru	968	98.5	72.18	96.7	14.48	2.46
Trinidad y Tobago	965	96.2	68.75	85.6	37.82	11.58
Uruguay	984	99.1	75.40	98.2	9.05	1.41
Venezuela	979	98.7	73.35	94.4	13.23	4.32

Table 13 shows the efficiency scores (output oriented) for the two output variables. In both cases, frontier estimate includes public and private expenditure on health per capita in real

terms, real GDP per capita and the literacy rate. The table also shows the efficiency score, the average output variables for the period 2000-2009 and the difference between this observed value and potential value (the frontier level) in his last two columns.

Output-oriented health efficiency scores are relatively high for Latin American and Caribbean countries. Results are worse in the case of Trinidad and Tobago and Bolivia, which are about 95% of its potential in terms of survival rate and less than 90% of their potential life expectancy. These values imply apparently small differences across countries but those are quite significant in terms of what they really represent. For example, in the case of Bolivia, being on the frontier means increasing the number of surviving children by about 50 per thousand and increase life expectancy by more than 8 years. For Argentina, on its turn, being efficient would imply reduction in infant mortality by 15 per thousand and increase life expectancy by almost 4 years.

This analysis can be complemented with an input-oriented efficiency analysis, which would indicate how much we could save in terms of spending to reach the observed levels of life expectancy and child survival. In this case this is particularly useful as a way of further differentiate countries, as the output perspective tends to produce very high efficiency scores in all cases.

We have computed input oriented DEA models for periods 2000-2004 and 2005-2009. In both case annual averages were taken for all variables. The input considered was either the infant survival rate or life expectancy, and, as with SFA, two inputs and two environmental variables were included - public and private real expenditure per capita, real GDP per capita and the literacy rate.

Table 14 shows some results for DEA by region and countries in Latin America.

On average, life expectancy and infant survival rate output levels could be obtained with a 20 percent input reduction, although one must acknowledge that attaining complete efficiency is not a trivial matter. The dispersion in the region is important. Countries like Chile or Nicaragua are very efficient while other important countries like Bolivia deviates substantially from the efficiency frontier.

Table 14

Health DEA input oriented efficiency scores (2005-2009)

region/country	life expectancy as an output input oriented scores	infant survival rate as an output input oriented scores
East Asia & Pacific	85.4	89.6
Europe & Central Asia	72.9	85.5
Latin America & Caribbean	**79.3**	**80.8**
Latin America & Caribbean	79.3	91.5
South Asia	90.3	90.5
Sub-Saharan Africa	72.1	74.9
Argentina	**78.1**	**83.2**
Bolivia	**56.3**	**60.4**
Brazil	**68.3**	**79.6**
Chile	**100.0**	**90.8**
Colombia	**85.8**	**83.3**
Costa Rica	**100.0**	**92.1**
Dominican Republic	**74.6**	**70.7**
Ecuador	**99.7**	**81.0**
El Salvador	**72.2**	**93.1**
Guatemala	**76.9**	**79.1**
Honduras	**89.9**	**85.4**
Jamaica	**73.6**	**76.1**
Mexico	**82.0**	**83.7**
Nicaragua	**100.0**	**100.0**
Panama	**85.2**	**75.8**
Paraguay	**72.6**	**82.2**
Peru	**82.3**	**80.5**
Suriname	**58.3**	**73.1**
Trinidad and Tobago	**54.0**	**61.7**
Uruguay	**82.4**	**84.6**
Venezuela, RB	**72.9**	**81.1**

4. Conclusion

We have analyzed efficiency across countries in providing two important outputs where public intervention is of paramount importance. These are health and education. We have taken into

account not only the input and output levels but also environmental variables that affect public provision of health and education services. We paid special attention to Latin American countries.

Efficiency, either in education or in health, is positively affected by income and adult population education levels. That is to say, a richer environment and a more educated population are more fertile ground for young people learning and for the general population health status.

Our results suggests that the Latin American region underperforms in the provision of quality and quantity of education services as well as health services. Even though this partially reflects lack of resources and harsh environmental conditions, the frontier analysis provides evidence that there is an important component of technical inefficiency. That is to say, there is scope for improving the quality and quantity of services provided with current employed resources if better practices are incorporated in public sector performance in the region.

This conclusion puts the policy discussion of finding the best practices in limelight. The candidate list is large and of course to provide a description of these practices is beyond the scope of this paper. We can however mention a few (Use of TICs, pay as performance schemes, designed intervention as for instance the right targeting and calibration of conditional cash transfer programs to promote school attendance). The implementation of this best practice is far from being a trivial task, as country and regional particularities have to be taken into account.

A natural extension of our work would be to explore micro/within country data to grasp whether the inefficiency is concentrated across particular regions, schools or health facilities.

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Appendix

1. DEA quality model - 2006

Country	PISA	expenditure	years of schooling	gdp	output score uncorrrected	output score corrrected	ranking uncorrected	ranking corrected
Argentina	382.07	39364.13	9.13	10057.62	0.831	0.836	41	43
Australia	519.89	156370.61	11.87	32027.72	0.947	0.947	16	19
Austria	502.17	181076.16	9.40	32965.96	0.910	0.922	29	29
Belgium	510.54	190896.06	10.47	31682.78	0.923	0.923	24	26
Brazil	384.24	36379.11	7.20	8319.57	0.848	0.875	40	41
Bulgaria	416.49	33238.28	9.70	8693.18	0.933	0.938	20	22
Canada	529.50	170515.28	11.23	34112.00	0.961	0.961	11	16
Chile	430.54	42988.18	9.71	11667.42	0.922	0.922	25	27
Colombia	381.11	29419.55	7.11	6989.56	0.870	0.885	36	38
Croatia	479.27	54680.30	8.70	14611.73	0.988	0.996	5	9
Czech Republic	501.81	85997.36	12.75	19471.70	0.944	0.944	17	20
Denmark	501.13	270820.72	9.89	32722.67	0.906	0.906	31	32
Estonia	515.57	74748.95	11.57	15318.77	1.000	1.000	1	1
Finland	552.85	188471.36	9.85	29946.54	1.000	1.000	1	1
France	492.82	167606.97	9.89	29447.20	0.895	0.899	32	33
Germany	504.79	143431.66	11.84	31281.73	0.922	0.922	26	28
Greece	464.10	87915.58	9.95	23916.56	0.868	0.884	37	39
Hong Kong SAR, China	541.91	141441.16	9.86	33660.08	0.990	1.000	#N/D	#N/D
Hungary	492.41	89178.23	11.49	16252.27	0.918	0.949	27	18
Iceland	493.59	247820.48	10.12	32975.80	0.893	0.893	33	35
Indonesia	392.47	9390.58	5.59	3099.87	1.000	1.000	#N/D	#N/D
Ireland	509.04	171838.36	11.26	37327.80	0.924	0.924	23	25
Israel	444.81	148597.27	11.28	22843.58	0.811	0.820	43	44
Italy	468.54	130525.06	8.98	28225.25	0.858	0.887	39	37
Japan	517.48	106895.43	11.27	29706.14	0.952	0.952	15	17
Korea, Rep.	541.88	93125.19	11.47	22059.46	1.000	1.000	1	1
Kyrgyz Republic	305.77	8120.55	8.55	1689.59	1.000	1.000	#N/D	#N/D
Latvia	485.07	62105.84	10.18	12034.94	0.977	0.999	7	8
Lithuania	481.48	67733.53	10.29	13152.81	0.954	0.970	13	14
Macao SAR, China	509.38	83011.40	7.53	32640.70	0.966	1.000	10	1
Mexico	408.60	62559.39	8.45	12376.50	0.822	0.860	42	42
Netherlands	520.75	188217.25	10.83	34711.59	0.942	0.942	18	21
New Zealand	524.47	158593.20	12.45	24275.68	0.955	0.962	12	15
Norway	486.89	333923.78	12.35	46254.04	0.881	0.881	34	40
Poland	500.29	72673.20	9.68	13297.11	0.976	1.000	8	1
Portugal	470.92	111717.10	7.58	20629.07	0.866	0.978	38	12
Qatar	326.49	175525.22	7.21	63077.79	0.592	0.666	45	45
Romania	409.70	29513.36	10.06	8903.39	0.935	0.936	19	23

Russian Federation	465.00	41622.86	8.35	11127.49	1.000	1.000	1	1
Slovak Republic	482.30	62742.37	11.10	15418.22	0.970	0.970	9	13
Slovenia	505.89	130235.66	8.68	22692.12	0.926	0.992	22	10
Spain	476.40	114748.96	9.78	26950.72	0.875	0.893	35	36
Sweden	504.33	227389.30	11.54	31850.93	0.912	0.912	28	31
Switzerland	513.49	204337.52	9.66	35392.46	0.929	0.935	21	24
Thailand	418.28	29829.06	6.83	6474.51	0.953	0.982	14	11
Tunisia	377.11	44385.18	6.57	6216.28	0.804	0.897	44	34
Turkey	431.64	29769.54	6.44	10295.74	0.984	1.000	6	1
United Kingdom	501.77	174710.08	9.40	32140.72	0.910	0.922	30	30
Uruguay	422.48	22527.79	8.09	8983.69	1.000	1.000	#N/D	#N/D

2. DEA quality model - 2009

Country	PISA	expenditure	years of schooling	gdp	output score uncorrrected	output score corrrected	output score uncorrrected	ranking uncorrected	ranking corrected
Argentina	395.72	57030.23	9.13	12273.88	0.815	0.843	0.815	47	47
Australia	518.84	158112.63	11.87	33707.27	0.951	0.954	0.951	12	20
Austria	486.84	185959.06	9.40	34776.24	0.892	0.901	0.892	39	43
Belgium	509.26	197861.94	10.47	32898.91	0.933	0.937	0.933	22	26
Brazil	400.99	43212.35	7.20	9088.95	0.858	0.914	0.858	43	38
Bulgaria	432.15	42450.56	9.70	10341.71	0.926	0.962	0.926	25	18
Canada	526.58	175344.81	11.23	35444.03	0.965	0.967	0.965	10	17
Chile	439.30	41951.73	9.71	12852.52	0.943	0.945	0.943	17	24
Colombia	398.59	30826.16	7.11	7798.78	0.891	0.936	0.891	41	27
Czech Republic	490.50	93272.70	12.75	22044.63	0.922	0.927	0.922	26	32
Denmark	499.18	273051.50	9.89	33687.30	0.915	0.918	0.915	31	35
Estonia	513.63	89780.31	11.57	17932.05	0.973	1.000	0.973	#N/D	#N/D
Finland	543.49	195759.95	9.85	32077.44	0.996	1.000	0.996	4	4
France	496.88	168485.94	9.89	30161.96	0.911	0.923	0.911	33	33
Germany	510.16	142435.52	11.84	32570.79	0.935	0.938	0.935	21	25
Greece	473.00	97985.31	9.95	26118.29	0.879	0.901	0.879	42	44
Hong Kong SAR, China	545.57	143694.00	9.86	38543.16	1.000	1.000	1.000	1	1
Hungary	495.66	94166.41	11.49	17476.22	0.929	0.969	0.929	24	15
Iceland	500.85	270676.31	10.12	35593.67	0.918	0.920	0.918	28	34
Indonesia	385.19	11250.42	5.59	3518.36	1.000	1.000	1.000	#N/D	#N/D
Ireland	496.92	192263.31	11.26	39073.46	0.911	0.911	0.911	34	39
Israel	458.57	150815.03	11.28	24681.07	0.841	0.850	0.841	45	46
Italy	485.93	128160.95	8.98	28042.18	0.893	0.935	0.893	38	28
Japan	529.43	107831.38	11.27	30777.33	0.977	0.977	0.977	9	13
Kazakhstan	398.56	24588.74	10.10	9881.37	0.933	0.933	0.933	23	30
Korea, Rep.	541.16	100199.60	11.47	24539.85	1.000	1.000	1.000	1	1
Kyrgyz Republic	324.91	10229.74	8.55	1901.64	1.000	1.000	1.000	#N/D	#N/D
Latvia	486.60	77984.50	10.18	14493.82	0.950	0.989	0.950	14	10
Lithuania	478.82	74653.87	10.29	15838.54	0.942	0.960	0.942	18	19
Macao SAR, China	507.66	99792.57	7.53	45334.54	0.939	1.000	0.939	19	6
Mexico	419.89	63636.61	8.45	12979.22	0.850	0.883	0.850	44	45
Netherlands	518.82	197050.13	10.83	36646.29	0.951	0.952	0.951	13	21
New Zealand	524.06	158410.61	12.45	25161.44	0.961	0.968	0.961	11	16
Norway	500.35	325129.88	12.35	48169.51	0.917	0.917	0.917	29	36
Panama	368.79	44953.77	9.29	10690.16	0.785	0.814	0.785	48	48
Peru	368.05	18450.62	9.49	7199.02	0.902	0.902	0.902	37	42
Poland	501.12	78445.31	9.68	15446.24	0.977	1.000	0.977	#N/D	#N/D
Portugal	489.72	110535.02	7.58	20907.68	0.903	1.000	0.903	#N/D	#N/D
Qatar	373.09	208275.98	7.21	63369.11	0.684	0.758	0.684	49	49
Romania	426.57	39768.85	10.06	10562.30	0.921	0.948	0.921	27	23

Russian Federation	468.50	47196.34	8.35	13373.15	0.991	0.996	0.991	6	9
Serbia	442.39	43737.62	9.02	9473.94	0.945	0.998	0.945	16	8
Singapore	543.20	140728.25	8.47	47373.84	0.996	1.000	0.996	5	5
Slovak Republic	488.13	66246.00	11.10	18552.31	0.982	0.982	0.982	7	11
Slovenia	498.77	137071.86	8.68	25321.18	0.915	0.972	0.915	32	14
Spain	484.26	120023.93	9.78	27862.15	0.892	0.917	0.892	40	37
Sweden	495.60	230234.16	11.54	33501.96	0.908	0.911	0.908	36	40
Switzerland	517.01	202721.63	9.66	37125.61	0.948	0.950	0.948	15	22
Thailand	421.75	31976.23	6.83	7169.84	0.936	1.000	0.936	20	7
Tunisia	391.93	48524.60	6.57	7031.81	0.826	0.935	0.826	46	29
Turkey	454.52	33160.10	6.44	11528.17	1.000	1.000	1.000	1	1
United Kingdom	500.10	186162.80	9.40	33295.68	0.917	0.930	0.917	30	31
United States	496.41	238836.77	12.10	43035.01	0.910	0.910	0.910	35	41
Uruguay	426.58	27331.23	8.09	10842.43	0.978	0.978	0.978	8	12

3. DEA access model - 2000-2004

countryname	enrollment rate	expenditure	gdp	Adult literacy	uncorrected output scores	corrected output scores	uncorrected ranking	corrected ranking
Albania	71.55	15274.09	5328.96	98.71	0.829	0.834	24	34
Argentina	80.07	39741.12	9570.59	97.19	0.882	0.889	21	28
Armenia	84.12	6984.22	2907.91	99.40	1.000	1.000	1	1
Bangladesh	42.45	2249.45	953.90	47.49	0.990	1.000	7	1
Benin	18.80	4648.66	1305.28	34.66	0.237	0.612	63	53
Bolivia	71.28	20521.05	3422.71	86.72	0.812	0.931	26	19
Brazil	73.49	31512.27	8036.06	87.49	0.820	0.912	25	24
Bulgaria	86.79	26492.85	7688.71	98.20	0.977	0.985	8	11
Cambodia	21.44	1947.36	1141.83	73.61	0.715	0.715	37	43
Cape Verde	56.39	18248.40	2377.19	80.80	0.647	0.810	42	35
Chad	8.85	1463.99	890.09	27.02	0.953	0.953	10	13
Colombia	57.54	27512.56	6611.32	92.80	0.646	0.685	43	47
Cote d'Ivoire	19.83	7625.50	1644.75	48.73	0.235	0.449	64	62
Croatia	83.88	52259.23	13359.79	98.15	0.907	0.910	19	25
Cyprus	90.77	142371.34	23480.54	96.80	0.940	0.940	12	17
Dominican Republic	46.57	11160.67	5735.42	87.00	0.546	0.616	46	52
Ecuador	49.90	6794.95	5903.53	90.98	0.596	0.644	45	50
Equatorial Guinea	21.63	9589.92	15606.51	86.99	0.255	0.288	61	68
Eritrea	20.83	2618.69	684.87	52.51	0.355	0.732	58	41
Estonia	86.54	68004.75	12874.01	99.77	0.917	0.917	17	22
Ethiopia	15.63	2065.95	548.10	35.90	0.446	1.000	52	1
Gambia, The	32.65	2656.54	1087.72	36.82	0.541	1.000	47	1
Georgia	76.84	6595.79	2859.43	99.65	0.922	0.922	16	21
Greece	83.72	79203.85	22224.88	95.99	0.878	0.878	22	29
Guinea	17.68	1764.67	912.51	29.48	0.798	0.799	28	36
Hungary	88.24	78393.16	14880.22	99.00	0.926	0.926	15	20
Indonesia	54.52	7997.27	2889.14	90.38	0.646	0.705	44	45
Italy	90.44	130635.53	28068.65	98.42	0.937	0.937	13	18
Kenya	35.66	7636.24	1278.84	73.61	0.423	0.587	53	55
Lao PDR	31.49	3055.18	1440.62	69.16	0.414	0.548	54	57
Lesotho	21.18	13199.57	1199.14	86.25	0.247	0.312	62	65
Lithuania	93.84	61703.21	11179.15	99.65	1.000	1.000	1	1
Macao SAR, China	71.15	78990.03	26378.07	91.30	0.746	0.762	34	38
Macedonia, FYR	81.08	24810.72	7093.25	96.13	0.915	0.941	18	16
Madagascar	13.84	2701.46	870.57	70.68	0.222	0.302	65	67
Malaysia	67.62	73258.13	10604.58	88.69	0.713	0.782	38	37
Maldives	44.67	28941.31	3684.59	96.33	0.501	0.531	49	58
Mauritania	14.26	5404.44	1582.79	51.21	0.176	0.309	68	66
Mauritius	72.16	37839.49	9520.86	84.30	0.798	0.910	29	26
Mexico	61.74	61398.79	12052.91	90.59	0.658	0.692	41	46
Moldova	79.27	10328.97	1910.84	96.65	0.932	1.000	14	1

Mongolia	73.03	13501.62	2195.12	97.77	0.850	0.905	23	27
Morocco	32.67	18048.06	3183.14	52.31	0.375	0.671	57	49
Mozambique	3.74	2557.20	573.97	48.16	0.067	0.207	69	69
Namibia	46.66	33575.71	4852.54	85.04	0.519	0.605	48	54
Nicaragua	38.14	7335.67	2170.45	76.68	0.453	0.576	51	56
Niger	6.13	1390.20	584.66	9.39	1.000	1.000	1	1
Oman	71.67	72262.63	18773.83	81.36	0.756	0.854	32	32
Panama	62.56	36331.10	8246.43	91.90	0.693	0.735	39	40
Peru	67.44	16387.40	5674.62	87.67	0.778	0.870	30	30
Philippines	55.92	8458.90	2675.09	92.60	0.662	0.710	40	44
Poland	90.99	65489.29	12352.38	99.40	0.966	0.966	9	12
Qatar	78.21	133743.27	62385.05	88.96	0.810	0.838	27	33
Romania	79.90	25755.07	7840.04	97.30	0.900	0.916	20	23
Samoa	64.31	14274.23	3391.41	98.60	0.747	0.758	33	39
Senegal	16.26	5168.03	1501.51	39.28	0.202	0.461	66	61
Seychelles	96.54	92132.56	17281.99	91.84	1.000	1.000	1	1
Slovenia	91.65	122225.57	21030.84	99.70	0.949	0.949	11	14
Swaziland	30.06	26958.39	4119.95	79.56	0.338	0.418	59	63
Tajikistan	76.02	3023.66	1192.70	99.45	1.000	1.000	1	1
Togo	22.50	3119.68	779.90	53.16	0.295	0.640	60	51
Trinidad and Tobago	67.67	65577.27	16135.63	98.40	0.718	0.719	36	42
Tunisia	65.64	40580.16	5797.08	74.30	0.722	0.944	35	15
Turkey	68.00	26731.72	9413.83	87.37	0.765	0.855	31	31
Uganda	14.60	3058.35	825.02	68.14	0.192	0.351	67	64
Ukraine	88.29	22450.83	4456.16	99.43	1.000	1.000	1	1
Vanuatu	35.26	32107.41	3527.21	78.20	0.393	0.503	55	59
Yemen, Rep.	33.48	20518.78	2105.43	54.80	0.381	0.674	56	48
Zambia	22.61	2364.62	1042.65	69.15	0.473	0.473	50	60

4. DEA access model - 2005-2009

countryname	enrollment rate	expenditure	gdp	Adult literacy	uncorrected output scores	corrected output scores	uncorrected ranking	corrected ranking
Argentina	79.33	57927.29	12273.88	97.70	0.872	0.876	29	40
Armenia	85.24	13739.10	4879.33	99.50	0.989	1.000	9	1
Azerbaijan	86.19	13763.42	6945.04	99.50	1.000	1.000	1	1
Bahrain	88.67	93479.09	30088.02	90.80	0.938	0.948	22	32
Bangladesh	40.77	2906.74	1178.21	55.00	0.834	0.959	36	26
Belarus	87.94	58149.07	10201.54	99.70	0.967	0.984	11	18
Bhutan	41.52	25254.19	4072.25	52.81	0.475	0.811	66	50
Bolivia	70.41	24453.13	3873.08	90.74	0.806	0.894	40	38
Botswana	64.42	109484.12	12248.28	83.30	0.681	0.787	56	55
Brazil	79.07	44502.59	9088.95	89.81	0.883	0.949	26	31
Bulgaria	85.12	44427.27	10341.71	98.30	0.951	0.955	19	28
Burkina Faso	13.08	4808.96	1063.41	26.14	0.185	1.000	#N/D	#N/D
Cambodia	29.57	2651.71	1657.90	77.59	0.644	0.644	58	68
Central African Republic	9.64	914.22	676.81	54.60	1.000	1.000	#N/D	#N/D
Chile	85.26	42773.03	12852.52	98.65	0.955	0.955	17	29
Colombia	68.12	31074.23	7798.78	92.79	0.774	0.815	44	48
Cyprus	94.77	172671.19	25318.87	97.80	1.000	1.000	1	1
Dominican Republic	54.33	15472.66	7071.18	88.24	0.629	0.697	60	64
El Salvador	54.88	18629.52	6022.81	83.18	0.633	0.739	59	62
Eritrea	25.12	1225.89	609.65	65.30	1.000	1.000	#N/D	#N/D
Estonia	90.27	88617.84	17932.05	99.80	0.959	0.959	14	27
Ethiopia	23.19	4087.18	741.45	35.90	0.371	0.998	72	12
Georgia	77.82	11539.81	4157.00	99.70	0.918	0.924	23	33
Ghana	43.56	7003.66	1288.20	65.80	0.531	0.798	63	52
Greece	91.38	103861.92	26118.29	97.00	0.966	0.966	12	23
Guatemala	37.82	13088.80	4255.28	73.80	0.441	0.573	68	71
Guinea	26.96	1612.37	958.83	38.00	0.848	1.000	32	1
Hungary	90.46	95090.43	17476.22	99.00	0.956	0.961	16	24
Indonesia	64.88	11735.42	3518.36	91.98	0.764	0.827	47	46
Iran, Islamic Rep.	75.11	50477.80	10064.55	82.39	0.833	0.952	37	30
Italy	92.31	126159.30	28042.18	98.80	0.975	0.975	10	20
Jamaica	77.80	38493.76	7099.72	85.90	0.876	0.991	28	16
Kazakhstan	87.00	25433.64	9881.37	99.70	0.995	0.995	7	14
Kenya	43.97	10105.35	1405.88	86.50	0.524	0.655	64	67
Kuwait	78.25	189506.11	44598.77	93.97	0.826	0.827	39	47
Kyrgyz Republic	80.45	10769.67	1901.64	99.30	0.954	0.988	18	17
Lao PDR	35.93	4929.30	1856.33	72.70	0.498	0.588	65	70
Lebanon	74.49	26026.73	10364.13	89.61	0.851	0.921	31	34
Lesotho	24.38	18585.28	1382.18	89.50	0.281	0.367	75	76
Lithuania	92.93	76210.74	15838.54	99.70	1.000	1.000	1	1
Macao SAR, China	75.90	100691.71	45334.54	93.50	0.802	0.802	41	51

Madagascar	20.45	2903.89	928.17	70.68	0.419	0.494	70	73
Malaysia	68.54	69514.49	12504.67	92.10	0.743	0.774	51	57
Maldives	67.13	37858.54	4764.76	98.40	0.756	0.793	49	54
Mali	28.58	4110.46	1032.56	26.18	0.456	1.000	67	1
Mauritania	15.39	5735.63	1781.03	56.80	0.190	0.302	77	77
Mauritius	80.10	42486.87	10950.52	87.50	0.897	0.975	24	21
Mexico	70.00	63507.13	12979.22	92.27	0.765	0.786	46	56
Moldova	81.80	19916.85	2553.19	98.30	0.942	0.996	21	13
Mongolia	82.63	15113.53	2990.25	97.30	0.957	1.000	15	1
Mozambique	4.98	3770.62	738.68	54.00	0.085	0.170	78	78
Namibia	52.58	35935.29	5733.56	88.20	0.594	0.668	61	66
Niger	8.87	2246.05	607.28	28.67	0.215	1.000	#N/D	#N/D
Oman	77.11	79522.85	21051.07	86.65	0.827	0.875	38	41
Pakistan	30.68	6126.98	2305.58	52.57	0.377	0.634	71	69
Panama	64.51	40793.52	10690.16	93.50	0.724	0.746	54	61
Paraguay	57.82	16427.81	4104.59	94.56	0.669	0.710	57	63
Peru	72.64	18870.38	7199.02	88.73	0.837	0.921	34	35
Philippines	59.69	8056.07	3119.03	93.60	0.722	0.762	55	60
Poland	93.45	82631.63	15446.24	99.50	0.999	1.000	6	1
Portugal	83.71	111313.09	20907.68	94.60	0.885	0.885	25	39
Qatar	82.41	207560.28	63369.11	93.08	0.870	0.871	30	43
Romania	75.01	41451.22	10562.30	97.60	0.841	0.843	33	45
Saudi Arabia	70.33	128253.44	21370.25	85.50	0.743	0.797	52	53
Senegal	21.19	8169.42	1633.12	41.89	0.256	0.521	76	72
Seychelles	94.58	93310.48	18625.91	91.84	1.000	1.000	1	1
Sierra Leone	24.94	2652.75	698.06	39.80	0.543	1.000	62	1
Slovenia	90.93	139808.31	25321.18	99.70	0.960	0.960	13	25
South Africa	71.14	48671.80	9175.37	89.00	0.791	0.859	42	44
Spain	94.14	119538.91	27862.15	97.78	0.995	0.995	8	15
Swaziland	29.00	35782.64	4461.36	86.50	0.327	0.380	73	75
Syrian Arab Republic	64.40	21050.34	4132.01	83.60	0.740	0.873	53	42
Tajikistan	81.15	5711.31	1650.62	99.70	1.000	1.000	1	1
Thailand	68.09	32059.22	7169.84	93.51	0.772	0.813	45	49
Tunisia	71.28	50452.09	7031.81	78.00	0.791	0.981	43	19
Turkey	73.67	32999.04	11528.17	88.33	0.835	0.908	35	37
Uganda	18.33	3553.16	1010.67	74.60	0.326	0.398	74	74
Ukraine	83.88	35824.19	6124.00	99.70	0.947	0.973	20	22
United Arab Emirates	79.71	55877.60	51992.72	90.03	0.878	0.921	27	36
Uruguay	67.06	29986.09	10842.43	97.94	0.763	0.763	48	58
Venezuela, RB	66.81	40215.16	10999.24	95.15	0.750	0.763	50	59
Yemen, Rep.	37.44	11549.80	2213.67	60.90	0.441	0.678	69	65
Zambia	38.31	1989.29	1211.72	70.70	1.000	1.000	#N/D	#N/D

5. DEA health life expectancy model (2005-2009)

countryname	Life expectancy	health public expenditure	health private expenditure	gdp	adult education	uncorrected output scores	corrected output scores	uncorrected ranking	corrected ranking
Albania	76.5	203.01	303.58	6832.62	99.00	1.000	1.000	#N/D	#N/D
Algeria	72.1	310.60	67.40	7300.40	72.65	0.755	1.000	29	1
Angola	46.5	131.19	29.79	4662.05	69.60	0.332	0.514	82	114
Argentina	75.1	592.08	400.21	12273.88	97.70	0.333	0.781	81	65
Armenia	73.3	85.61	130.65	4879.33	99.50	0.651	0.786	38	64
Azerbaijan	69.9	72.74	340.87	6945.04	99.50	0.478	0.632	55	100
Bahrain	75.7	843.31	367.59	30088.02	90.80	0.398	0.861	61	49
Bangladesh	65.6	14.13	27.68	1177.87	55.00	1.000	1.000	1	1
Belarus	69.9	483.45	172.06	10391.60	99.70	0.183	0.585	109	105
Benin	60.9	32.77	30.79	1338.83	40.80	0.385	1.000	65	1
Bhutan	65.7	183.25	43.81	4072.25	52.81	0.406	0.973	59	34
Bolivia	65.4	131.36	69.10	3873.08	90.74	0.246	0.563	97	108
Bosnia and Herzegovina	75.0	444.78	331.37	6932.79	97.60	0.387	0.837	63	53
Botswana	53.0	794.47	232.38	12307.35	83.30	0.043	0.322	126	124
Brazil	72.2	349.68	470.67	9081.16	89.81	0.144	0.683	114	89
Brunei Darussalam	77.2	1024.37	183.16	48001.84	95.00	1.000	1.000	#N/D	#N/D
Bulgaria	72.8	486.05	365.40	10998.31	98.30	0.182	0.657	110	95
Burkina Faso	52.7	46.30	31.53	1063.41	26.14	0.313	1.000	85	1
Burundi	50.0	18.02	28.51	349.16	65.90	0.450	0.925	56	40
Cambodia	60.4	27.79	78.98	1658.73	77.59	0.338	0.581	78	107
Cameroon	50.9	26.86	80.14	1986.76	75.90	0.295	0.456	87	120
Cape Verde	70.7	120.13	39.03	3052.09	84.10	0.960	1.000	15	1
Central African Republic	46.7	11.65	18.29	676.81	54.60	0.697	0.954	34	35
Chad	48.6	38.44	40.94	1266.00	32.70	0.241	0.807	99	61
Chile	78.5	425.29	558.60	12852.52	98.65	1.000	1.000	1	1
China	72.9	108.02	135.07	5175.40	93.70	0.525	0.787	45	63
Colombia	72.7	427.51	80.59	7876.98	92.79	0.761	0.858	28	50
Comoros	64.9	21.39	16.00	1098.94	73.60	1.000	1.000	1	1
Congo, Dem. Rep.	47.6	9.19	11.44	279.56	66.60	0.888	1.000	20	1
Costa Rica	78.8	628.11	294.25	9869.92	96.00	1.000	1.000	1	1
Cote d'Ivoire	57.0	14.72	65.87	1539.12	54.60	0.524	0.684	46	87
Croatia	75.8	1161.06	192.60	16403.43	98.70	0.718	0.870	32	47
Cyprus	79.6	691.13	1019.25	25403.33	97.80	0.780	0.979	26	33
Dominican Republic	72.4	153.69	266.36	7071.18	88.24	0.319	0.746	84	73
Ecuador	75.0	185.70	242.83	7170.12	84.19	0.672	0.997	35	30
Egypt, Arab Rep.	69.9	106.59	147.25	4754.51	68.89	0.356	0.809	71	60
El Salvador	71.1	241.50	169.12	6005.58	83.18	0.276	0.722	90	84
Equatorial Guinea	49.9	505.13	185.72	27645.75	93.00	0.053	0.281	125	127
Eritrea	59.0	8.17	9.88	579.44	65.30	1.000	1.000	1	1
Estonia	73.3	851.01	270.71	17931.97	99.80	0.265	0.684	92	88
Ethiopia	54.7	18.58	15.52	741.45	35.90	0.637	1.000	39	1

Gabon	60.1	177.84	225.52	13183.12	87.00	0.054	0.441	124	121
Gambia, The	55.7	38.78	37.32	1218.26	45.30	0.265	0.769	93	67
Georgia	71.5	106.74	285.01	4157.57	99.70	0.399	0.693	60	85
Ghana	56.6	47.99	53.24	1302.85	65.80	0.186	0.598	108	101
Greece	79.6	1688.20	1070.18	26118.26	97.00	0.524	0.949	47	37
Guatemala	70.1	103.99	189.95	4245.53	73.80	0.345	0.769	74	68
Guinea	57.3	7.47	48.04	957.73	38.00	1.000	1.000	1	1
Guinea-Bissau	47.5	8.47	23.15	967.56	51.00	0.939	1.000	16	1
Honduras	72.0	132.66	91.22	3472.53	83.59	0.615	0.899	41	43
Hungary	73.3	1005.73	449.30	17476.22	99.00	0.158	0.665	112	93
India	63.4	32.52	79.39	2647.54	62.75	0.372	0.742	68	75
Indonesia	70.4	44.24	41.45	3518.36	91.98	1.000	1.000	#N/D	#N/D
Iran, Islamic Rep.	71.2	255.41	334.18	10064.55	82.39	0.177	0.693	111	86
Iraq	68.1	83.78	34.85	3051.91	77.60	0.753	0.883	30	44
Italy	81.1	2057.14	650.08	28042.18	98.80	1.000	1.000	1	1
Jamaica	71.6	179.51	163.24	7114.99	85.90	0.334	0.736	79	76
Jordan	72.5	258.48	177.28	4782.29	91.67	0.347	0.762	73	70
Kazakhstan	66.8	245.36	177.22	9881.37	99.70	0.136	0.505	117	116
Kenya	53.6	23.93	40.02	1405.46	86.50	0.339	0.523	76	113
Kuwait	77.8	766.24	205.30	44598.76	93.97	1.000	1.000	1	1
Kyrgyz Republic	67.5	58.31	65.47	1901.64	99.30	0.481	0.729	53	78
Lao PDR	64.5	14.94	66.75	1856.34	72.70	0.877	0.877	22	45
Latvia	71.7	592.26	406.92	14491.25	99.80	0.132	0.595	118	102
Lebanon	71.9	430.23	491.43	10387.88	89.61	0.119	0.668	119	92
Lesotho	44.8	64.03	40.90	1284.15	89.50	0.242	0.420	98	123
Liberia	57.8	10.99	29.84	345.03	58.10	0.724	1.000	31	1
Libya	74.1	317.17	170.50	14497.71	88.40	0.505	0.867	49	48
Lithuania	71.6	714.46	362.69	15835.73	99.70	0.137	0.589	116	103
Macedonia, FYR	74.1	454.44	242.98	8312.70	97.00	0.351	0.760	72	71
Madagascar	59.9	26.63	12.89	919.71	70.68	0.834	0.902	24	41
Malawi	52.4	33.44	18.37	660.54	72.80	0.538	0.732	44	77
Malaysia	74.2	259.89	323.96	12530.30	92.10	0.283	0.811	88	59
Maldives	71.1	314.30	165.44	4773.31	98.40	0.270	0.660	91	94
Mali	48.1	30.66	33.54	1032.56	26.18	0.295	1.000	#N/D	#N/D
Malta	79.4	3193.19	1016.71	21871.19	92.36	0.375	0.997	67	31
Mauritania	56.6	31.65	15.84	1794.25	56.80	0.624	0.842	40	52
Mauritius	72.5	242.05	368.16	10950.26	87.50	0.210	0.723	105	83
Mexico	74.8	366.01	426.79	12979.22	92.27	0.339	0.820	77	58
Moldova	68.2	139.02	137.17	2553.53	98.30	0.240	0.636	100	98
Mongolia	66.2	105.39	22.69	2990.25	97.30	0.833	0.833	25	54
Morocco	71.0	72.51	142.74	3802.82	56.40	0.556	1.000	43	1
Mozambique	47.8	29.09	10.86	738.73	54.00	0.910	1.000	19	1
Namibia	60.1	221.75	192.02	5740.02	88.20	0.057	0.436	122	122
Nepal	66.2	20.00	42.21	996.55	57.90	0.845	1.000	23	1
Nicaragua	72.7	125.03	100.53	2421.19	78.00	0.654	1.000	37	1

Niger	50.8	20.47	17.06	620.98	28.67	0.579	1.000	42	1
Nigeria	47.7	37.81	76.47	1869.82	60.10	0.213	0.497	103	118
Oman	75.6	530.54	135.52	21051.07	86.65	0.994	1.000	13	1
Pakistan	66.2	18.27	42.62	2301.36	52.57	0.928	1.000	18	1
Panama	75.5	570.98	262.64	10682.24	93.50	0.523	0.852	48	51
Papua New Guinea	60.8	56.30	12.53	1953.76	59.60	0.933	1.000	17	1
Paraguay	71.7	113.75	165.16	4104.51	94.56	0.411	0.726	58	81
Peru	73.0	199.21	138.58	7198.12	88.73	0.489	0.823	51	57
Philippines	71.6	43.02	77.22	3118.05	93.60	1.000	1.000	#N/D	#N/D
Poland	75.3	728.94	369.91	15446.24	99.50	0.358	0.772	70	66
Portugal	78.4	1636.25	762.91	21628.61	94.60	0.362	0.928	69	39
Qatar	75.7	1671.75	410.62	74906.14	93.08	0.334	0.830	80	55
Romania	72.5	534.79	138.73	10560.39	97.60	0.412	0.728	57	80
Russian Federation	67.3	552.58	315.97	13424.90	99.50	0.079	0.505	121	117
Rwanda	49.5	43.19	47.27	954.01	70.30	0.209	0.552	106	110
Samoa	71.5	228.24	39.37	4012.88	98.70	1.000	1.000	#N/D	#N/D
Sao Tome and Principe	65.3	63.26	92.85	1544.25	88.30	0.257	0.635	94	99
Saudi Arabia	72.9	618.78	260.07	21381.29	85.50	0.247	0.765	96	69
Senegal	55.4	54.23	43.07	1635.53	41.89	0.229	0.743	101	74
Seychelles	72.9	685.63	185.26	18625.91	91.84	0.344	0.748	75	72
Sierra Leone	47.2	9.37	89.63	698.06	39.80	0.797	1.000	#N/D	#N/D
Singapore	80.5	596.14	1105.69	47373.83	94.50	1.000	1.000	1	1
Slovenia	78.4	1528.07	689.84	25321.07	99.70	0.395	0.876	62	46
South Africa	51.6	322.08	487.83	9175.58	89.00	0.025	0.294	127	126
Spain	81.0	1879.43	830.69	27862.15	97.78	0.980	1.000	14	1
Sri Lanka	74.0	81.26	93.94	3975.51	90.68	0.887	0.949	21	38
Sudan	57.9	37.40	78.51	1838.48	69.30	0.215	0.555	102	109
Suriname	68.8	249.47	251.57	6441.34	90.70	0.143	0.583	115	106
Swaziland	45.5	192.67	107.08	4468.53	86.50	0.092	0.302	120	125
Syrian Arab Republic	74.0	61.00	83.69	4132.01	83.60	1.000	1.000	1	1
Tajikistan	66.4	23.12	65.98	1650.62	99.70	0.773	0.792	27	62
Tanzania	55.0	38.39	20.53	1151.74	72.60	0.481	0.645	54	97
Thailand	68.7	209.19	85.57	7170.29	93.51	0.332	0.649	83	96
Togo	62.1	16.67	48.76	775.15	64.90	0.656	0.901	36	42
Tonga	71.7	150.63	47.63	4072.25	99.02	1.000	1.000	#N/D	#N/D
Trinidad and Tobago	69.1	659.76	646.12	22696.45	98.70	0.056	0.540	123	111
Tunisia	74.1	247.98	221.02	7031.81	78.00	0.386	0.951	64	36
Turkey	71.7	558.85	234.31	11529.46	88.33	0.213	0.679	104	91
Turkmenistan	64.7	81.24	64.67	5639.86	99.50	0.251	0.511	95	115
Uganda	51.8	20.25	79.42	1010.67	74.60	0.385	0.588	66	104
Ukraine	68.3	250.86	196.98	6123.99	99.70	0.158	0.531	113	112
United Arab Emirates	77.6	725.18	343.28	51992.72	90.03	0.698	0.983	33	32
Uruguay	75.9	510.39	389.00	10842.43	97.94	0.484	0.824	52	56
Uzbekistan	67.6	58.77	64.52	2295.47	99.20	0.490	0.680	50	90
Vanuatu	70.0	117.55	27.40	3809.95	81.30	1.000	1.000	1	1

Venezuela, RB	73.5	284.51	372.69	10999.24	95.15	0.207	0.729	107	79
Vietnam	74.2	61.05	113.67	2429.44	92.50	1.000	1.000	1	1
Yemen, Rep.	62.4	40.44	91.52	2213.67	60.90	0.278	0.725	89	82
Zambia	44.5	43.37	32.37	1211.44	70.70	0.305	0.492	86	119

6. DEA health infant survival rate model (2005-2009)

country	survival rate under 5	health public expenditure	health private expenditure	gdp	adult education	uncorrected output scores	corrected output scores	uncorrected ranking	correccted ranking
Albania	982.6	203.01	303.58	6832.62	99.00	0.300	0.816	90	79
Algeria	965.1	310.60	67.40	7300.40	72.65	0.305	0.927	86	42
Angola	829.0	131.19	29.79	4662.05	69.60	0.332	0.514	76	124
Argentina	984.6	592.08	400.21	12273.88	97.70	0.229	0.832	105	72
Armenia	975.7	85.61	130.65	4879.33	99.50	0.614	0.772	41	95
Azerbaijan	960.4	72.74	340.87	6945.04	99.50	0.473	0.653	61	107
Bahrain	987.7	843.31	367.59	30088.02	90.80	0.386	0.935	69	39
Bangladesh	941.1	14.13	27.68	1177.87	55.00	0.798	1.000	19	1
Belarus	986.8	483.45	172.06	10391.60	99.70	0.665	0.864	33	60
Benin	876.5	32.77	30.79	1338.83	40.80	0.321	0.837	80	69
Bhutan	915.9	183.25	43.81	4072.25	52.81	0.226	0.860	107	62
Bolivia	942.3	131.36	69.10	3873.08	90.74	0.165	0.604	116	113
Bosnia and Herzegovina	985.0	444.78	331.37	6932.79	97.60	0.310	0.869	83	58
Botswana	939.8	794.47	232.38	12307.35	83.30	0.045	0.611	128	112
Brazil	976.9	349.68	470.67	9081.16	89.81	0.156	0.796	119	87
Brunei Darussalam	993.2	1024.37	183.16	48001.84	95.00	1.000	1.000	1	1
Bulgaria	988.3	486.05	365.40	10998.31	98.30	0.485	0.882	57	56
Burkina Faso	829.1	46.30	31.53	1063.41	26.14	0.313	1.000	82	1
Burundi	831.3	18.02	28.51	349.16	65.90	0.450	0.925	65	44
Cambodia	908.5	27.79	78.98	1658.73	77.59	0.286	0.573	92	116
Cameroon	845.0	26.86	80.14	1986.76	75.90	0.295	0.460	91	128
Cape Verde	969.9	120.13	39.03	3052.09	84.10	0.688	0.916	30	51
Central African Republic	826.0	11.65	18.29	676.81	54.60	0.697	0.954	28	33
Chad	791.0	38.44	40.94	1266.00	32.70	0.241	0.803	103	84
Chile	991.2	425.29	558.60	12852.52	98.65	0.518	0.908	54	53
China	977.9	108.02	135.07	5175.40	93.70	0.539	0.813	51	80
Colombia	979.7	427.51	80.59	7876.98	92.79	0.328	0.833	77	71
Comoros	893.8	21.39	16.00	1098.94	73.60	0.618	0.736	40	102
Congo, Dem. Rep.	801.4	9.19	11.44	279.56	66.60	0.888	1.000	15	1
Costa Rica	988.9	628.11	294.25	9869.92	96.00	0.580	0.921	45	46
Cote d'Ivoire	876.3	14.72	65.87	1539.12	54.60	0.524	0.754	53	99
Croatia	993.9	1161.06	192.60	16403.43	98.70	1.000	1.000	1	1
Cyprus	995.8	691.13	1019.25	25403.33	97.80	0.801	1.000	#N/D	#N/D
Dominican Republic	966.6	153.69	266.36	7071.18	88.24	0.271	0.707	97	105
Ecuador	973.8	185.70	242.83	7170.12	84.19	0.278	0.810	95	82
Egypt, Arab Rep.	974.7	106.59	147.25	4754.51	68.89	0.482	1.000	58	1
El Salvador	980.5	241.50	169.12	6005.58	83.18	0.339	0.931	74	41
Equatorial Guinea	850.0	505.13	185.72	27645.75	93.00	0.053	0.319	126	129
Eritrea	938.5	8.17	9.88	579.44	65.30	1.000	1.000	1	1
Estonia	993.7	851.01	270.71	17931.97	99.80	0.941	0.961	11	30
Ethiopia	887.0	18.58	15.52	741.45	35.90	0.637	1.000	37	1
Gabon	927.3	177.84	225.52	13183.12	87.00	0.046	0.544	127	120

Gambia, The	891.3	38.78	37.32	1218.26	45.30	0.265	0.820	99	78
Georgia	969.7	106.74	285.01	4157.57	99.70	0.426	0.732	68	103
Ghana	924.0	47.99	53.24	1302.85	65.80	0.186	0.751	114	100
Greece	996.0	1688.20	1070.18	26118.26	97.00	0.657	0.975	34	29
Guatemala	958.5	103.99	189.95	4245.53	73.80	0.308	0.791	84	90
Guinea	849.6	7.47	48.04	957.73	38.00	1.000	1.000	1	1
Guinea-Bissau	802.0	8.47	23.15	967.56	51.00	0.939	1.000	#N/D	#N/D
Honduras	968.3	132.66	91.22	3472.53	83.59	0.465	0.854	62	65
Hungary	993.1	1005.73	449.30	17476.22	99.00	0.581	0.926	44	43
India	929.1	32.52	79.39	2647.54	62.75	0.249	0.795	100	88
Indonesia	957.8	44.24	41.45	3518.36	91.98	0.857	0.857	16	64
Iran, Islamic Rep.	965.9	255.41	334.18	10064.55	82.39	0.164	0.751	117	101
Iraq	955.7	83.78	34.85	3051.91	77.60	0.573	0.828	48	73
Italy	995.8	2057.14	650.08	28042.18	98.80	0.889	0.989	14	27
Jamaica	968.9	179.51	163.24	7114.99	85.90	0.308	0.761	85	97
Jordan	973.8	258.48	177.28	4782.29	91.67	0.275	0.791	96	91
Kazakhstan	968.3	245.36	177.22	9881.37	99.70	0.246	0.656	101	106
Kenya	911.7	23.93	40.02	1405.46	86.50	0.339	0.569	75	117
Kuwait	989.6	766.24	205.30	44598.76	93.97	0.746	0.950	23	35
Kyrgyz Republic	960.5	58.31	65.47	1901.64	99.30	0.656	0.933	35	40
Lao PDR	936.0	14.94	66.75	1856.34	72.70	0.546	0.793	50	89
Latvia	990.8	592.26	406.92	14491.25	99.80	0.575	0.891	47	54
Lebanon	985.6	430.23	491.43	10387.88	89.61	0.266	0.921	98	47
Lesotho	899.7	64.03	40.90	1284.15	89.50	0.242	0.514	102	125
Liberia	872.3	10.99	29.84	345.03	58.10	0.724	1.000	24	1
Libya	980.2	317.17	170.50	14497.71	88.40	0.284	0.867	93	59
Lithuania	992.6	714.46	362.69	15835.73	99.70	0.718	0.916	26	50
Macedonia, FYR	988.0	454.44	242.98	8312.70	97.00	0.644	0.936	36	37
Madagascar	934.5	26.63	12.89	919.71	70.68	0.766	0.882	22	55
Malawi	878.3	33.44	18.37	660.54	72.80	0.538	0.768	52	96
Malaysia	993.2	259.89	323.96	12530.30	92.10	1.000	1.000	1	1
Maldives	982.1	314.30	165.44	4773.31	98.40	0.301	0.826	89	75
Mali	803.3	30.66	33.54	1032.56	26.18	0.295	1.000	#N/D	#N/D
Malta	993.4	3193.19	1016.71	21871.19	92.36	0.237	0.991	104	26
Mauritania	881.8	31.65	15.84	1794.25	56.80	0.624	0.823	39	76
Mauritius	983.9	242.05	368.16	10950.26	87.50	0.325	0.918	78	49
Mexico	981.5	366.01	426.79	12979.22	92.27	0.178	0.837	115	70
Moldova	981.8	139.02	137.17	2553.53	98.30	0.516	1.000	55	1
Mongolia	965.5	105.39	22.69	2990.25	97.30	0.914	0.914	12	52
Morocco	959.1	72.51	142.74	3802.82	56.40	0.451	1.000	64	1
Mozambique	847.8	29.09	10.86	738.73	54.00	0.910	1.000	13	1
Namibia	946.2	221.75	192.02	5740.02	88.20	0.097	0.600	123	114
Nepal	945.0	20.00	42.21	996.55	57.90	0.798	1.000	20	1
Nicaragua	971.4	125.03	100.53	2421.19	78.00	0.500	1.000	56	1
Niger	826.6	20.47	17.06	620.98	28.67	0.579	1.000	46	1
Nigeria	851.7	37.81	76.47	1869.82	60.10	0.213	0.527	111	123
Oman	986.2	530.54	135.52	21051.07	86.65	0.685	0.986	31	28
Pakistan	908.7	18.27	42.62	2301.36	52.57	0.438	0.853	66	66
Panama	976.4	570.98	262.64	10682.24	93.50	0.153	0.758	120	98

Papua New Guinea	929.9	56.30	12.53	1953.76	59.60	0.789	0.995	21	25
Paraguay	975.9	113.75	165.16	4104.51	94.56	0.464	0.822	63	77
Peru	975.4	199.21	138.58	7198.12	88.73	0.369	0.805	71	83
Philippines	966.0	43.02	77.22	3118.05	93.60	0.953	0.953	10	34
Poland	992.9	728.94	369.91	15446.24	99.50	0.720	0.921	25	45
Portugal	995.8	1636.25	762.91	21628.61	94.60	0.803	1.000	18	1
Qatar	988.5	1671.75	410.62	74906.14	93.08	0.315	0.920	81	48
Romania	985.2	534.79	138.73	10560.39	97.60	0.555	0.863	49	61
Russian Federation	985.4	552.58	315.97	13424.90	99.50	0.322	0.827	79	74
Rwanda	875.8	43.19	47.27	954.01	70.30	0.209	0.615	112	110
Samoa	973.0	228.24	39.37	4012.88	98.70	0.604	0.775	43	94
Sao Tome and Principe	920.6	63.26	92.85	1544.25	88.30	0.129	0.558	122	119
Saudi Arabia	978.5	618.78	260.07	21381.29	85.50	0.153	0.860	121	63
Senegal	901.8	54.23	43.07	1635.53	41.89	0.229	0.958	106	32
Seychelles	987.4	685.63	185.26	18625.91	91.84	0.611	0.941	42	36
Sierra Leone	795.9	9.37	89.63	698.06	39.80	0.797	1.000	#N/D	#N/D
Singapore	997.2	596.14	1105.69	47373.83	94.50	1.000	1.000	1	1
Slovenia	996.3	1528.07	689.84	25321.07	99.70	1.000	1.000	#N/D	#N/D
South Africa	930.1	322.08	487.83	9175.58	89.00	0.025	0.541	129	121
Spain	995.6	1879.43	830.69	27862.15	97.78	0.675	0.961	32	31
Sri Lanka	984.1	81.26	93.94	3975.51	90.68	1.000	1.000	1	1
Sudan	890.4	37.40	78.51	1838.48	69.30	0.215	0.533	109	122
Suriname	971.4	249.47	251.57	6441.34	90.70	0.225	0.731	108	104
Swaziland	911.7	192.67	107.08	4468.53	86.50	0.092	0.499	124	127
Syrian Arab Republic	982.7	61.00	83.69	4132.01	83.60	1.000	1.000	1	1
Tajikistan	932.5	23.12	65.98	1650.62	99.70	0.351	0.558	72	118
Tanzania	884.5	38.39	20.53	1151.74	72.60	0.481	0.640	59	108
Thailand	985.3	209.19	85.57	7170.29	93.51	1.000	1.000	#N/D	#N/D
Togo	897.1	16.67	48.76	775.15	64.90	0.475	0.778	60	93
Tonga	980.6	150.63	47.63	4072.25	99.02	0.709	0.870	27	57
Trinidad and Tobago	964.7	659.76	646.12	22696.45	98.70	0.071	0.617	125	109
Tunisia	978.0	247.98	221.02	7031.81	78.00	0.281	0.936	94	38
Turkey	976.0	558.85	234.31	11529.46	88.33	0.160	0.798	118	86
Turkmenistan	949.8	81.24	64.67	5639.86	99.50	0.348	0.599	73	115
Uganda	866.7	20.25	79.42	1010.67	74.60	0.385	0.612	70	111
Ukraine	984.1	250.86	196.98	6123.99	99.70	0.432	0.847	67	67
United Arab Emirates	991.9	725.18	343.28	51992.72	90.03	0.697	1.000	29	1
Uruguay	985.7	510.39	389.00	10842.43	97.94	0.303	0.846	88	68
Uzbekistan	959.1	58.77	64.52	2295.47	99.20	0.625	0.782	38	92
Vanuatu	982.0	117.55	27.40	3809.95	81.30	1.000	1.000	1	1
Venezuela, RB	981.4	284.51	372.69	10999.24	95.15	0.214	0.811	110	81
Vietnam	975.2	61.05	113.67	2429.44	92.50	0.852	1.000	17	1
Yemen, Rep.	927.1	40.44	91.52	2213.67	60.90	0.200	0.799	113	85
Zambia	851.2	43.37	32.37	1211.44	70.70	0.305	0.509	87	126