# Education, Institutions and Growth: Fact-finding using available data

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## ABSTRACT

The data analysis on education, institution and growth shed further light on the limitations to empirical research as well as provide patterns that may be a useful reference for it. Firstly, carrying out Cluster Analysis similar-country grouping is obtained, and unsurprisingly, it is shown that all "good" qualities tend to come together. The mapping so generated allows a visualization of "classes" and provides a more "structured" reference to interpret human capital and growth than standard (though with a loss of precision). Secondly, the *internal* analysis on education institutions using aggregated data on schools, staff, resources and practices from Pisa 2012, aids to link good education outcomes with "softer" variables (in comparison to more traditio

nal factors as resources, socio-economic background, etc.); the *external* analysis explores externalities and interactions between education institutions and contextual settings. This analysis suggests stronger than expected links of learning outcomes to the economic environment, and weaker than expected impact of educational practices which seem to relay on rather more "native" elements for success, not considered in the analysis.

**Key words**: institutions, education, growth, development

**JEL**: O15, O43

## INTRODUCTION

Following the categories proposed by Acemoglu (2009), in the explanation of growth there is a role for the *proximates* (technology and human and physical capital) as well as the *fundamentals* (luck, geography, institutions, culture); although the empirical literature is vast it is also to some extent inconclusive, mainly consisting of piecemeal evidence on several intervening factors in growth.

Indeed, what we know is still little. Noticeably, higher levels of income also *generate* data availability (as well as data quality), thus part of the growth (or no-growth) phenomenon to investigate is still on the shade. For instance, considering the top half of income distribution (GDP per capita) the information on years of schooling (a measure human capital, one of growth *proximates*) is available for 92% of the countries, while for those in the bottom half availability is just 74%. Considering total expenditure on education (a rough measure of education quality, other proxy of human capital), data availability for the top half is 73% while for the lower half is only 25%. A better approximation to education quality is provided by test scores, where the more comprehensive assessment carried out by PISA-OECD covers 77% of the countries of the top half of the income distribution and 17% of the lower half. Something similar also happens with other variables relevant for development, *proximates* and *fundamentals*, such as human development measures also related to health and genre, and institutional aspects as transparency and crime.

Time is also a key issue in data records. Not only delays in data reporting are usually associated to less developed countries, but the actual history of data reporting tend to be shorter too: for instance, of the countries with data on GDP per capita in 2010 just 73% have such records for 1970 (existing countries in both years), though this availability is 81% for countries in the top half while for those in the bottom half is 69%.

Thus empirical evidence on growth can only be based on a subset of a more homogenous group of richer countries with available data, and even if this is possibly the best of what can be done, it leaves out the core of the growth phenomenon, making it very difficult to find robust empirical links in a research area that is already complex; thus, a comprehensive explanation still remains "elusive" (Easterly 2001). Rather than testing possible links, these notes are a "back to basics" exercise that briefly analyses patterns in available data on education, institutions and growth.

These notes are organised as follows: a first section setting the specific framework for analysis of institutions in education, and four other sections (A, B, C, D) dealing with data description and analysis. Section A critically describe available proxy variables, while section B presents details of sources and availability. Sections C and D describe the fact-finding exercise related to institutions, human capital and growth, with a focus on educational institution in section D. A final section offers some concluding remarks.

## FOCUS ON EDUCATION INSTITUTIONS

In the literature here is scarce consideration of institutional aspects related to both learning outcomes, measured by test scores, and other non-test-results outputs, as social attitudes or interpersonal skills. Schools differ tremendously in their practices, but does it matter?

Even when difficult to assess and often unobservable, institutional aspects are key elements, in particular, Unesco has increasingly recognized the importance of good governance, and the Education for All Monitoring Report (2009) states: *"Education is about much more than what happens in schools. Through education, societies inculcate their values and ideas, and equip their citizens with skills. (..............).Governance is a central concern. The aim of good governance in education, as in other areas, is to strengthen accountability and give people a voice in decisions that affect their lives so as to enable the delivery of good-quality services. Good governance is also about social justice and fairness. Education for all, as the term itself makes clear, is about all citizens enjoying an equal right to quality education. Translating good governance principles into practice involves reforms in institutional arrangements that link children and parents to schools, local education bodies and national ministries."*

The side-effect of the omission of institutional variables is the introduction of biases in the result and noise in the analysis of students and schools performance. There is an increasing body of literature emphasising the relevance of institutional aspects for better education outcomes as for instance Rajkumar and Swaroop (2008), Fuchs and Wößmann (2007), Wößmann et al. (2007), and Wößmann (2003), among others. It has also been relevant the focus on problems arising from weak education institutions, leading to a somewhat new research area of corruption in the education sector (see for instance, Cardenas 2012, Hallak and Poisson 2005, and Heyneman 2004, 2007). To be more precise, Heyneman (2007) singles out that *"education corruption includes the abuse of authority for both personal as well as material gain. An education system can be corrupt in four ways: i- through its education functions, ii- through the supply of goods and services, iii- through professional misconduct, and iv- in the treatment of taxation and property"*. The economy-wide effects of failing educational institutions can be traced in recent literature that explores a broader perspective considering education, institutions and growth (e.g. Bjørnskov·and Méon 2013, Dias and Tebaldi 2012, Faruq and Taylor 2011, Hall et al. 2010, among others).

## A - VARIABLES

The exercises will be based on available data on human capital and institutions in their role as economic growth drivers. Possible proxies of human capital and institutional settings are not straightforward choices, and also may be difficult to measure. In this section a brief description of possible alternatives, albeit incomplete, is presented.

## Proxies of human capital (HK):

Years of schooling: A measure of the average years of schooling of the population may be a good proxy of human capital and it is easy to monitor, however this not takes into account differences in quality of education across countries thus it may be a misleading proxy for country comparisons.

Enrolment rates: Enrolments in primary and secondary education are easy to measure and widely available, however these indicators do not provide any information on the generation of human capital stocks when completion rates are low (as in developing countries).

Percentage of graduates in the population: Technically, this indicator may be the closest proxy to the concept of human capital, but similarly to the case of Years of Schooling, it does not take into account differences in higher education quality within and between countries.

Quality of Education: This indicator would measure knowledge effectively transmitted to and learned by students, as a good proxy of human capital in individuals. The two main approaches to assess education quality are, either measuring it by input resources or by learning outcomes, any of them has its drawbacks. Quality measured by resources, eg. share of education expenditure in GDP, may be a distorted indicator of education quality due to inefficient allocation of education spending. Test scores, which may be a wider accepted proxy of education quality, not only are they scarce for international comparisons, but also they are a partial and maybe inadequate representation of useful skills for growth.

Human Development Index. This index that combines information on education, health and income could be a good proxy of human capital and it is widely available. It has also drawbacks, as its composition on very basic information (life expectancy and expected schooling years) is a weak indicator of relevant-for-growth skill differences across countries.

## Proxies of Institutional quality:

Information on institutional quality provides a framework for economic incentives and policy making effectiveness, and the selected variables are Control of Corruption and Rule of Law. Similar variables also available and relevant as Regulation Quality and Government Effectiveness are not considered at this stage (for simplification purposes, as they are loosely linked to the theoretical approach guiding these notes). Other relevant aspect considered is inequality levels measured by Gini Index. Education institutional variables are described in section D.

Control of Corruption. Based on national surveys the indicator Control of Corruption "measures the extent to which public power is exercised for private gain, including both petty and grand forms of corruption, as well as 'capture' of the state by elites and private interests" (Kauffman et al. 2007).

Rule of Law. Based on national surveys the indicator Rule of Law "measures the extent to which agents have confidence in and abide by the rules of society, and in particular the quality of contract enforcement, the police, and the courts, as well as the likelihood of crime and violence" (Kauffman et al. 2007).

Crime. Crime Index is an estimation of overall level of crime in a country.

## B – DATA

Table 1 presents the list of variables used as well as details of sources. Data availability differs across variables and groups of countries, as it is shown in tables 2 and 3.

**Table 1 Data source for variables**

| Label | Variable | Source | Year* |
|---|---|---|---|
| GDP | Gross Domestic Product per capita | World Bank | 2012 or last available data |
| CC | Control of Corruption | Worldwide Governance Indicators - World Bank | 2012 |
| ROL | Rule of Law | Worldwide Governance Indicators - World Bank | 2012 |
| HDI | Human Development Index | United Nations | 2012 |
| GINI | Gini Index | United Nations | Last available data (not always recent) |
| CRIME | Crime | NUMBEO | 2012 |
| EDEX | Education expenditure as percentage of GDP | World Development Indicators - World Bank | Average on available data 2000-2012 |
| ENRP | Net Enrolment in Primary Education | World Development Indicators - World Bank | Average on available data 2000-2012 |
| ENRS | Net Enrolment in Secondary Education | World Development Indicators - World Bank | Average on available data 2000-2012 |
| TER | Percentage of the population with complete tertiary education | Barro and Lee (2013) | 2010 |
| YSC | Years of Schooling | Barro and Lee (2013) | 2010 |
| LEARNING | Learnings outcomes measured by test scores in Mathematics in Pisa 2012 | PISA – OECD | 2012 |

*Average of available years are used in an attempt to reduce missing data
Source: Own elaboration

In tables 2 and 3 three set of countries are considered:

**ALL**: Countries with data for GDP in 2012 (or 2011).

**REDUCED**: Small islands and states below a population of 280.000 are eliminated as rarely other information than GDP is available.

**ONLY WITH TESTS**: Considers only countries for which comparable learning outcomes assessments are available in Pisa 2012.

The information on the Variation Coefficient (standard variation/mean), VC, is also provided in Table 2. As the VC is a measure of the dispersion over the mean it provides information on the degree of homogeneity in any array of countries.

**Table 2 Summary of availability of data by variable and statistics**

| Variables | ALL | | REDUCED | | ONLY WITH TESTS | |
|---|---|---|---|---|---|---|
| | No of countries | VC | No of countries | VC | No of countries | VC |
| GDP | 205 | 1.52 | 178 | 1.43 | 63 | 0.90 |
| CC | 210 | Inf | 177 | 8.22 | 63 | 1.34 |
| ROL | 212 | Inf | 177 | 4.45 | 63 | 1.15 |
| HDI | 152 | 0.26 | 146 | 0.26 | 63 | 0.10 |
| GINI | 156 | 0.23 | 152 | 0.22 | 63 | 0.21 |
| CRIME | 128 | 0.35 | 125 | 0.34 | 63 | 0.30 |
| EDEX | 75 | 0.33 | 71 | 0.31 | 63 | 0.19 |
| ENRP | 169 | 0.15 | 152 | 0.15 | 63 | 0.04 |
| ENRS | 155 | 0.41 | 138 | 0.43 | 63 | 0.12 |
| TER | 146 | 0.85 | 142 | 0.86 | 63 | 0.55 |
| YSC | 146 | 0.37 | 142 | 0.37 | 63 | 0.19 |
| LEARNING | 63 | 0.12 | 62 | 0.12 | 63 | 0.12 |

Source: Own elaboration

The aggregated picture of Table 2 allows to identify initial problems of data availability; thus, to compare across countries any combination of variables either it requires to eliminate a massive amount of observations with incomplete data, or to make more or less risky assumptions.

The availability problem can be also disaggregated by income levels, which is presented in Table 3.

**Table 3 Data availability by income groups***

| Variables | No of countries | VC | High Income | % | VC | Low Income | % | VC |
|---|---|---|---|---|---|---|---|---|
| GDP | 178 | 1.43 | 52 | **100** | 0.59 | 126 | **100** | 0.89 |
| CC | 177 | 8.20 | 52 | **100** | 0.88 | 123 | **98** | 0.89 |
| ROL | 177 | 6.42 | 52 | **100** | 0.67 | 123 | **98** | 0.88 |
| HDI | 146 | 0.26 | 47 | **90** | 0.08 | 98 | **78** | 0.24 |
| YSC | 142 | 0.37 | 48 | **92** | 0.15 | 93 | **74** | 0.39 |
| TER | 142 | 0.86 | 48 | **92** | 0.53 | 93 | **74** | 0.92 |
| GINI | 152 | 0.22 | 38 | **73** | 0.18 | 114 | **90** | 0.21 |
| CRIME | 125 | 0.34 | 49 | **94** | 0.33 | 76 | **60** | 0.26 |
| EDEX | 71 | 0.31 | 38 | **73** | 0.23 | 32 | **25** | 0.35 |
| ENRP | 152 | 0.2 | 46 | **88** | 0.07 | 106 | **84** | 0.17 |
| ENRS | 138 | 0.4 | 43 | **83** | 0.07 | 94 | **75** | 0.48 |
| LEARNING | 62 | 0.1 | 40 | **77** | 0.08 | 22 | **17** | 0.13 |

*REDUCED base. High and low income are defined in reference to average GDP per capita.
Source: Own elaboration

From here it can be highlighted that:

- i) Low income countries are more a heterogeneous group (as shown by the VC) by any of the variables, except crime.
- ii) The scarcity of data for any of the variables is more pronounced in the low income group (as shown in the column "%", the proportion of countries in the group with data for each variable).

## C – FACT-FINDING

This section considers the base **ONLY WITH TESTS** (set of countries with learning outcomes assessments in Pisa 2012), which provides a "reasonable" complete set for all variables. Table 4 displays the Correlation Matrix.

**Table 4 Correlation matrix\***

| Variables | GDP | CC | ROL | HDI | GINI | Crime | EDEX | LEARNING | ENRP | ENRS | TER | YSC |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| GDP | **1** | **0.7** | **0.7** | **0.6** | **-0.3** | **-0.4** | 0.2 | **0.4** | 0.1 | **0.3** | **0.3** | **0.3** |
| CC | **0.7** | **1.0** | **1.0** | **0.8** | **-0.3** | **-0.4** | **0.4** | **0.5** | **0.4** | **0.4** | **0.4** | **0.4** |
| ROL | **0.7** | **1** | **1** | **0.8** | **-0.3** | **-0.5** | **0.4** | **0.6** | **0.4** | **0.5** | **0.5** | **0.5** |
| HDI | **0.6** | **0.8** | **0.8** | **1** | **-0.4** | **-0.5** | **0.3** | **0.6** | **0.3** | **0.6** | **0.6** | **0.8** |
| GINI | **-0.3** | **-0.3** | **-0.3** | **-0.4** | **1** | **0.6** | 0.0 | **-0.4** | -0.2 | **-0.5** | -0.1 | **-0.5** |
| Crime | **-0.4** | **-0.4** | **-0.5** | **-0.5** | **0.6** | **1** | -0.1 | **-0.6** | -0.1 | **-0.4** | -0.1 | **-0.3** |
| EDEX | 0.2 | **0.4** | **0.4** | **0.3** | 0.0 | -0.1 | **1** | 0.2 | 0.2 | 0.2 | **0.3** | 0.1 |
| LEARNING | **0.4** | **0.5** | **0.6** | **0.6** | **-0.4** | **-0.6** | 0.2 | **1** | 0.2 | **0.5** | **0.3** | **0.4** |
| ENRP | 0.1 | **0.4** | **0.4** | **0.3** | -0.2 | -0.1 | 0.2 | 0.2 | **1** | **0.3** | **0.3** | 0.2 |
| ENRS | **0.3** | **0.4** | **0.5** | **0.6** | **-0.5** | **-0.4** | 0.2 | **0.5** | **0.3** | **1** | **0.4** | **0.5** |
| TER | **0.3** | **0.4** | **0.5** | **0.6** | -0.1 | -0.1 | **0.3** | **0.3** | **0.3** | **0.4** | **1** | **0.7** |
| YSC | **0.3** | **0.4** | **0.5** | **0.8** | **-0.5** | **-0.3** | 0.1 | **0.4** | 0.2 | **0.5** | **0.7** | **1** |

*Values in bold are different from 0 with a significance level alpha=0.05. Missing data replaced by average values. Source: Own elaboration

Facts to highlight:

- i) Correlations between GDP and CC, ROL, HDI and several proxies of HK are significant and positive.
- ii) Correlations between GDP and Crime are significant and negative.
- iii) Crime is significant and positive correlated with inequality (GINI) and significant and negative correlated with institutional quality (CC and ROL) and several proxies of HK.

Facts in i) and ii) are in line with the model's predictions (see companion paper); facts in iii) requires more theoretical grounding.

These observed facts also suggest some country grouping by similar characteristics; Table 5 presents the corresponding Cluster Analysis (using XLSTAT).

**Table 5 Cluster Analysis on Growth, Institutions and Education**

| Country Name | GDP | CC | ROL | YSC | TER | GINI | CRIME | LEARNING | Groups |
|---|---|---|---|---|---|---|---|---|---|
| Albania | 4000 | -0.72 | -0.57 | 10.39 | 4.98 | 34.51 | 51.31 | 394 | 1 |
| Argentina | 11573 | -0.49 | -0.71 | 9.28 | 3.31 | 44.49 | 57.48 | 388 | 1 |
| Brazil | 11340 | -0.07 | -0.11 | 7.18 | 5.20 | 54.69 | 67 | 391 | 1 |
| Bulgaria | 6978 | -0.24 | -0.12 | 9.94 | 12.08 | 28.19 | 40.02 | 439 | 1 |
| China | 6091 | -0.48 | -0.49 | 7.54 | 3.91 | 42.06 | 30.13 | 613 | 1 |
| Colombia | 7748 | -0.43 | -0.39 | 7.34 | 8.46 | 55.91 | 58.54 | 376 | 1 |
| Costa Rica | 9386 | 0.58 | 0.47 | 8.35 | 13.17 | 50.73 | 61.4 | 407 | 1 |
| Indonesia | 3557 | -0.66 | -0.60 | 5.50 | 1.73 | 38.14 | 46.67 | 375 | 1 |
| Jordan | 4909 | 0.07 | 0.37 | 8.64 | 6.38 | 35.43 | 47.58 | 386 | 1 |
| Malaysia | 10432 | 0.30 | 0.51 | 9.53 | 5.03 | 46.21 | 66.41 | 421 | 1 |
| Mexico | 9749 | -0.41 | -0.56 | 8.52 | 13.91 | 47.16 | 52.46 | 413 | 1 |
| Peru | 6796 | -0.39 | -0.61 | 8.53 | 16.56 | 48.14 | 58.14 | 368 | 1 |
| Romania | 9036 | -0.27 | 0.02 | 10.42 | 6.48 | 27.42 | 28.73 | 445 | 1 |
| Serbia | 5190 | -0.31 | -0.39 | 9.53 | 7.64 | 29.62 | 39.28 | 449 | 1 |
| Thailand | 5480 | -0.34 | -0.17 | 6.55 | 8.77 | 39.37 | 37.56 | 427 | 1 |
| Tunisia | 4237 | -0.18 | -0.14 | 6.48 | 6.24 | 36.06 | 47.03 | 388 | 1 |
| Turkey | 10666 | 0.17 | 0.04 | 6.47 | 5.85 | 40.03 | 39.95 | 448 | 1 |
| Vietnam | 1755 | -0.56 | -0.50 | 5.49 | 3.01 | 35.57 | 53.26 | 511 | 1 |
| Chile | 15452 | 1.56 | 1.37 | 9.74 | 11.65 | 52.06 | 47.09 | 423 | 2 |
| Croatia | 13881 | -0.04 | 0.21 | 8.99 | 5.30 | 33.65 | 28.9 | 471 | 2 |
| Czech Rep | 18683 | 0.23 | 1.01 | 12.32 | 5.60 | 25.82 | 33.88 | 499 | 2 |
| Estonia | 16717 | 0.98 | 1.13 | 12.01 | 17.97 | 36 | 29.07 | 521 | 2 |
| Greece | 22083 | -0.25 | 0.39 | 10.50 | 22.37 | 34.27 | 43.05 | 453 | 2 |
| Hungary | 12531 | 0.28 | 0.60 | 11.67 | 12.58 | 31.18 | 37.52 | 477 | 2 |
| Kazakhstan | 12116 | -0.88 | -0.66 | 10.36 | 11.81 | 29.04 | 49.41 | 432 | 2 |
| Korea, Rep. | 22590 | 0.47 | 0.97 | 11.69 | 17.92 | 31.59 | 16.35 | 554 | 2 |
| Latvia | 14008 | 0.15 | 0.76 | 10.40 | 11.90 | 34.81 | 43.74 | 491 | 2 |
| Lithuania | 14183 | 0.31 | 0.81 | 10.90 | 16.41 | 37.57 | 34.71 | 479 | 2 |
| Poland | 12708 | 0.59 | 0.74 | 9.95 | 9.11 | 32.73 | 37.53 | 518 | 2 |
| Portugal | 20165 | 0.93 | 1.04 | 7.73 | 3.84 | 38.45 | 35.06 | 487 | 2 |
| Russian Fed | 14037 | -1.01 | -0.82 | 11.73 | 23.28 | 40.11 | 52.67 | 482 | 2 |
| Slovak Rep | 16847 | 0.07 | 0.46 | 11.56 | 6.50 | 26 | 32.72 | 482 | 2 |
| Slovenia | 22000 | 0.81 | 0.98 | 11.70 | 10.05 | 31.15 | 33.21 | 501 | 2 |
| Uruguay | 14703 | 1.32 | 0.54 | 8.41 | 6.40 | 45.32 | 46.64 | 409 | 2 |
| Australia | 67556 | 2.00 | 1.75 | 12.04 | 22.35 | 35.19 | 41.23 | 504 | 3 |
| Austria | 46642 | 1.35 | 1.84 | 9.71 | 9.52 | 29.15 | 25.83 | 506 | 3 |
| Canada | 52219 | 1.92 | 1.75 | 12.26 | 28.00 | 32.56 | 36.29 | 518 | 3 |
| Denmark | 56326 | 2.39 | 1.85 | 10.27 | 12.53 | 24.7 | 29.27 | 500 | 3 |
| Finland | 45721 | 2.22 | 1.94 | 10.28 | 13.06 | 26.88 | 29.16 | 519 | 3 |
| Ireland | 45932 | 1.45 | 1.73 | 11.60 | 20.18 | 34.28 | 53.59 | 501 | 3 |
| Japan | 46720 | 1.61 | 1.32 | 11.49 | 24.01 | 24.85 | 18.1 | 536 | 3 |
| Netherlands | 45955 | 2.13 | 1.84 | 11.17 | 16.45 | 30.9 | 37.07 | 523 | 3 |
| Singapore | 51709 | 2.15 | 1.77 | 8.82 | 12.19 | 42.48 | 21.35 | 573 | 3 |
| Sweden | 55041 | 2.31 | 1.93 | 11.61 | 16.74 | 25 | 38.28 | 478 | 3 |
| United States | 51749 | 1.38 | 1.60 | 13.27 | 31.59 | 40.81 | 50.15 | 481 | 3 |
| Belgium | 43372 | 1.55 | 1.40 | 10.57 | 20.40 | 32.97 | 41.53 | 515 | 4 |
| France | 39772 | 1.42 | 1.43 | 10.43 | 10.55 | 32.74 | 47.28 | 495 | 4 |
| Germany | 41863 | 1.78 | 1.64 | 12.21 | 12.77 | 28.31 | 27.14 | 514 | 4 |
| Hong Kong China | 36796 | 1.71 | 1.56 | 10.02 | 7.25 | 43.44 | 22.68 | 561 | 4 |
| Iceland | 42416 | 1.86 | 1.67 | 10.39 | 18.35 | 0 | 31.68 | 493 | 4 |
| Israel | 33250 | 0.83 | 0.92 | 11.92 | 24.31 | 39.2 | 33.28 | 466 | 4 |
| Italy | 33072 | -0.03 | 0.36 | 9.30 | 6.64 | 36.03 | 45.59 | 485 | 4 |
| New Zealand | 37749 | 2.32 | 1.88 | 12.50 | 24.40 | 36.17 | 42.85 | 500 | 4 |
| Spain | 28624 | 1.05 | 1.04 | 10.35 | 16.55 | 34.66 | 32.42 | 484 | 4 |
| United Arab Emirates | 39058 | 1.18 | 0.56 | 8.86 | 10.10 | 0 | 20.79 | 434 | 4 |
| United Kingdom | 39093 | 1.64 | 1.69 | 9.13 | 13.63 | 35.97 | 42.62 | 494 | 4 |
| Luxembourg | 103828 | 2.12 | 1.77 | 10.09 | 10.87 | 30.76 | 31.88 | 490 | 5 |
| Norway | 99558 | 2.24 | 1.95 | 12.63 | 14.58 | 25.79 | 33.73 | 489 | 5 |
| Qatar | 89736 | 1.19 | 1.03 | 7.28 | 11.62 | 41.1 | 21.76 | 376 | 5 |
| Switzerland | 78925 | 2.15 | 1.81 | 10.27 | 12.38 | 33.68 | 31.79 | 531 | 5 |

*Shaded cells correspond to below average of each indicator (averages are computed on all countries with available data for that indicator). In red are missing values replaced by most recent record or zero if no data is available. Source: Own elaboration

The Cluster Analysis shows that five groups are formed, which can fit into 3 classes:

Class I: Countries in Group 1 are low income with below average values for all variables.

Class 2: Countries in Group 2 are middle income with scarcer low values in all variables.

Class 3: Countries in Groups 3, 4 and 5 are high to very high income with rare occurrence of low values in the rest of the variables.

## D – FACT-FINDING IN EDUCATION

The analysis of educational institutions is based on Pisa 2012 data and indicators (OECD 2013b). Though these indicators can, in most cases, be linked to different aspects of governance, in it will be useful to group them following standard governance dimensions. For the case of education governance the World Bank report (2009) suggest five strategic areas: Transparency and Accountability; Education Service Provision Standards; Management Control Systems; Management Information Systems; and, Efficient Resource Use, understood as:

*Transparency and Accountability: The practices and regulatory efforts made by local government to enable transparent and accountable governance in education service delivery and expenditure for its constituents.*

*Education Service Provision Standards: Standards for service provision which are shaped by the Minimum Service Standard and good practices in the education sector.*

*Management Control Systems: The management control systems in place at local government level to improve incentive systems and the governance of procurement and asset management.*

*Management Information Systems: Data collection, management, secure storage, analysis and decision-making processes that ensure education planning and budget allocations are determined on the basis of quality information*

*Efficient Resource Use: Planning, budgeting and monitoring systems and procedures in place at local government level to assess the effectiveness and efficiency of budget planning and resource use with regard to development priorities.*

In what follows, the institutional aspects related to teachers, school principals, and systemic organization also considers their interactions (beyond the above categories) as far as it is allowed by data availability. The selected indicators and categories are:

- *School climate*

Students' views of teacher-student relations (label: ***tsr***)

School principals' views of how student behaviour affects learning (label: ***statt***)

School principals' views of how teacher behaviour affects learning (label: ***teatt***)

- *Quality of School Infrastructure*

Impact of teacher shortage on instruction, school principals' views (label: ***tsh***)

School principals' views on adequacy of physical infrastructure (label: ***adinf***)

School principals' views on adequacy of educational resources (label: ***adedr***)

- ***Transparency and Accountability***

Assessments post publicly (label: ***transp***)

Use of assessment practices for accountability and monitoring (label: ***acc***)

- ***Autonomy***

Index of school responsibility for resource allocation (label: ***autr***)

Index of school responsibility for curriculum and assessment (label: ***autc***)

- ***School Mananagement***

School quality assurance, by external evaluations or other (label: ***sqa***)

Percentage of students in schools whose principal reported any monitor of the practice of mathematics (label: ***mon***)

- ***Parents Pressure/Involvement***

Parental involvement in tracking students performance at school (label: ***parac***)

Parental involvement in extra curricular activities (label: ***parot***)

- ***Students Extra-curricular Activities*** (label: ***extra***)

- **Test Scores in Mathematics** (label: *LEARNING*)

The analysis is carried out at two levels. Firstly, the institutional settings *internal* to the education sector tries to spot types/approaches associated to successful outcomes. Secondly, the *external* analysis tries to identify relevant interactions between educational institutions and economic institutions as well as other contextual features.

INTERNAL ANALYSIS: The Cluster Analysis in Table 6 identifies five groups of countries with close educational practices, though no clear association between practices and learning outcomes arise. For instance, while countries in clusters 2 and 4 are associated to practices of transparency and accountability, which are seen as "good practices" (for encouraging responsibility taking by authorities and competence among schools and students), leaning outcomes are mixed (in cluster 2 learning outcomes are good, above average, while in cluster 4 are bad, below average). Something similar occurs with school quality assurance and monitoring (also seen as "good practices"), which characterizes countries in clusters 4 and 5 (with respectively bad and good learning outcomes) while those practices are not present in cluster 3 with good test results. And the same again with autonomy, where for instance is a relatively more generalized practice in countries of cluster 2 than 3, with good outcomes in both cases.

**Table 6 Cluster Analysis on education institutional variables***

| Country | tsr | Statt | teatt | Tsh | Adinf | adedr | transp | acc | autr | autc | sqa | mon | parac | parot | extra | LEARNING | G |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Albania | 0.7 | 0.9 | 0.5 | -0.2 | -0.4 | -0.4 | 24.6 | 86 | -0.6 | -0.3 | 83 | 88 | 51 | 18 | 1.8 | 394 | 1 |
| Argentina | 0.2 | 0.2 | -0.4 | -0.1 | -0.4 | -0.5 | 8.0 | 49 | 0.0 | -0.5 | 50 | 66 | 32 | 10 | 1.0 | 388 | 1 |
| Brazil | 0.2 | -0.5 | -0.3 | 0.2 | -0.4 | -0.5 | 40.9 | 83 | -0.3 | -0.4 | 79 | 59 | 33 | 5 | 1.3 | 391 | 1 |
| Colombia | 0.5 | -0.6 | -0.5 | 0.7 | -0.8 | -1.4 | 51.2 | 81 | -0.4 | -0.1 | 70 | 49 | 48 | 19 | 1.7 | 376 | 1 |
| Costa Rica | 0.5 | -0.7 | -0.5 | 0.0 | -0.7 | -1.1 | 12.2 | 75 | -0.4 | -0.7 | 52 | 74 | 34 | 10 | 2.3 | 407 | 1 |
| Indonesia | 0.4 | 0.8 | 0.3 | 0.3 | -0.5 | -0.8 | 21.3 | 88 | 0.3 | 0.7 | 86 | 89 | 39 | 21 | 1.7 | 375 | 1 |
| Jordan | 0.4 | -0.1 | -0.5 | 1.0 | -0.6 | -0.4 | 20.4 | 77 | 0.5 | -1.0 | 73 | 95 | 30 | 12 | 1.3 | 386 | 1 |
| Malaysia | 0.2 | 0.0 | 0.0 | 0.2 | 0.1 | -0.2 | 35.1 | 86 | -0.5 | -0.9 | 89 | 90 | 22 | 10 | 1.8 | 421 | 1 |
| Mexico | 0.5 | 0.0 | -0.3 | 0.5 | -0.4 | -0.9 | 43.5 | 85 | -0.3 | -0.9 | 69 | 72 | 38 | 16 | 1.8 | 413 | 1 |
| Peru | 0.4 | 0.3 | -0.3 | 0.6 | -0.5 | -1.2 | 10.4 | 65 | 0.2 | -0.1 | 62 | 72 | 38 | 18 | 1.7 | 368 | 1 |
| Qatar | 0.1 | 0.5 | 0.5 | -0.1 | 0.5 | 0.8 | 48.4 | 89 | -0.4 | -0.9 | 95 | 94 | 45 | 17 | 1.8 | 376 | 1 |
| Tunisia | 0.0 | -0.7 | -0.7 | -0.1 | -1.3 | -1.3 | 16.9 | 77 | -0.2 | -0.6 | 60 | 63 | 21 | 3 | 1.4 | 388 | 1 |
| Uruguay | 0.2 | 0.0 | -0.7 | 0.3 | -0.4 | 0.1 | 9.8 | 53 | -0.5 | -0.8 | 52 | 69 | 20 | 4 | 1.5 | 409 | 1 |
| Bulgaria | 0.2 | 0.1 | 0.4 | -0.8 | 0.2 | 0.0 | 55.4 | 91 | 0.9 | -0.8 | 77 | 67 | 38 | 9 | 1.6 | 439 | 4 |
| Chile | 0.2 | 0.0 | -0.6 | 0.6 | -0.1 | -0.4 | 64.5 | 71 | 0.6 | 0.1 | 51 | 68 | 44 | 14 | 1.9 | 423 | 4 |
| Israel | 0.1 | -0.2 | -0.4 | 0.7 | -0.5 | -0.3 | 48.0 | 79 | -0.2 | 0.0 | 75 | 64 | 36 | 5 | 1.6 | 466 | 4 |
| Kazakhstan | 0.7 | -0.6 | -0.6 | 0.3 | -0.2 | -0.7 | 79.9 | 95 | -0.3 | -0.8 | 94 | 95 | 60 | 35 | 2.0 | 432 | 4 |
| Montenegro | 0.1 | 0.0 | 0.1 | -0.5 | -0.1 | -0.5 | 79.9 | 84 | -0.3 | -0.8 | 91 | 77 | 42 | 6 | 1.9 | 410 | 4 |
| Romania | 0.4 | 0.6 | 0.6 | -0.5 | 0.2 | 0.2 | 67.9 | 72 | -0.6 | -0.5 | 79 | 67 | 44 | 18 | 1.7 | 445 | 4 |
| Serbia | 0.1 | -0.5 | 0.0 | -0.7 | -0.3 | -0.6 | 57.1 | 71 | -0.4 | -0.9 | 69 | 59 | 43 | 6 | 2.0 | 449 | 4 |
| Thailand | 0.3 | 0.0 | -0.1 | 0.9 | -0.9 | -0.7 | 76.4 | 89 | 0.7 | 1.0 | 94 | 83 | 47 | 17 | 2.3 | 427 | 4 |
| Turkey | 0.2 | -0.3 | -0.2 | 0.9 | -0.3 | -0.4 | 67.0 | 87 | -0.7 | -1.1 | 80 | 65 | 35 | 10 | 1.7 | 448 | 4 |
| United Arab E | 0.4 | 0.4 | 0.0 | 0.1 | 0.1 | 0.4 | 46.7 | 86 | 0.4 | -0.4 | 88 | 91 | 38 | 15 | 1.5 | 434 | 4 |
| Australia | 0.1 | -0.2 | -0.1 | 0.2 | 0.2 | 0.7 | 69.0 | 72 | 0.1 | 0.1 | 81 | 59 | 29 | 5 | 2.2 | 504 | 2 |
| Canada | 0.3 | -0.5 | 0.1 | -0.3 | 0.3 | 0.3 | 61.0 | 84 | -0.4 | -0.5 | 76 | 59 | 33 | 4 | 2.7 | 518 | 2 |
| Czech Rep | -0.2 | 0.2 | 0.2 | -0.4 | 0.4 | 0.0 | 44.1 | 75 | 1.2 | 0.8 | 75 | 72 | 28 | 2 | 1.2 | 499 | 2 |
| Hungary | 0.0 | 0.1 | 0.4 | -0.6 | 0.2 | 0.2 | 48.0 | 84 | 0.5 | 0.0 | 63 | 65 | 21 | 6 | 1.8 | 477 | 2 |
| Latvia | 0.2 | -0.2 | 0.1 | -0.4 | 0.4 | 0.0 | 32.5 | 94 | 0.6 | -0.2 | 66 | 78 | 34 | 7 | 2.3 | 491 | 2 |
| Netherlands | -0.2 | -0.4 | -0.9 | 0.6 | -0.3 | 0.2 | 90.5 | 80 | 1.3 | 1.0 | 73 | 66 | 29 | 2 | 1.8 | 523 | 2 |
| New Zealand | 0.1 | -0.2 | -0.2 | 0.1 | 0.0 | 0.2 | 80.3 | 95 | 0.1 | 0.5 | 86 | 76 | 27 | 5 | 2.7 | 500 | 2 |
| Poland | -0.4 | 0.1 | 0.5 | -1.0 | 0.5 | 0.4 | 47.8 | 78 | -0.3 | 0.4 | 77 | 69 | 43 | 11 | 2.5 | 518 | 2 |
| Portugal | 0.3 | -0.1 | 0.1 | -0.8 | -0.3 | 0.2 | 52.4 | 86 | -0.5 | -0.7 | 73 | 58 | 43 | 2 | 1.4 | 487 | 2 |
| Russia | 0.1 | -0.2 | -0.3 | 0.4 | 0.2 | -0.5 | 77.7 | 98 | 0.0 | -0.2 | 86 | 85 | 39 | 22 | 1.7 | 482 | 2 |
| Slovak Rep | -0.2 | -0.2 | 0.0 | -0.3 | -0.1 | -0.5 | 77.1 | 76 | 0.8 | 0.5 | 67 | 71 | 25 | 6 | 1.3 | 482 | 2 |
| Slovenia | -0.2 | -0.4 | -0.1 | -0.7 | 0.1 | 0.4 | 52.9 | 74 | -0.1 | -0.4 | 60 | 58 | 35 | 7 | 2.2 | 501 | 2 |
| Sweden | 0.1 | -0.2 | -0.1 | -0.1 | 0.2 | 0.0 | 80.4 | 91 | 0.6 | -0.3 | 57 | 58 | 40 | 3 | 1.4 | 478 | 2 |
| United Kingdom | 0.2 | 0.4 | 0.4 | -0.2 | 0.0 | 0.5 | 87.1 | 96 | 1.1 | 1.0 | 88 | 88 | 29 | 3 | 2.8 | 494 | 2 |
| United States | 0.2 | -0.1 | 0.1 | -0.4 | 0.5 | 0.4 | 92.0 | 93 | 0.1 | -0.4 | 88 | 74 | 32 | 8 | 2.7 | 481 | 2 |
| Vietnam | 0.0 | 0.0 | -0.1 | 0.4 | -0.4 | -0.5 | 75.3 | 93 | -0.4 | -1.0 | 76 | 91 | 49 | 23 | 1.5 | 511 | 2 |
| Austria | -0.1 | -0.3 | -0.2 | -0.1 | -0.2 | 0.2 | 5.7 | 54 | -0.6 | -0.3 | 62 | 68 | 24 | 3 | 1.1 | 506 | 3 |
| Belgium | -0.1 | -0.1 | -0.3 | 0.3 | -0.1 | 0.3 | 3.1 | 50 | -0.3 | -0.1 | 61 | 64 | 27 | 1 | 1.2 | 515 | 3 |
| Croatia | -0.1 | -0.5 | -0.3 | -0.4 | -0.6 | -0.5 | 25.3 | 81 | -0.3 | -0.9 | 82 | 65 | 29 | 7 | 1.5 | 471 | 3 |
| Denmark | 0.1 | 0.1 | 0.1 | -0.2 | -0.2 | -0.1 | 39.7 | 67 | 0.2 | -0.0 | 54 | 49 | 38 | 5 | 1.1 | 500 | 3 |
| Estonia | -0.1 | -0.1 | 0.1 | 0.0 | 0.1 | -0.2 | 34.8 | 75 | 0.1 | 0.5 | 77 | 54 | 27 | 6 | 2.1 | 521 | 3 |
| Finland | -0.1 | -0.5 | -0.1 | -0.4 | -0.3 | -0.2 | 1.6 | 56 | -0.3 | -0.0 | 55 | 23 | 38 | 3 | 1.6 | 519 | 3 |
| France | -0.2 | 0.0 | -0.2 | -0.2 | 0.2 | 0.4 | 45.9 | 68 | -0.5 | -0.1 | 39 | 47 | 33 | 2 | 2.0 | 495 | 3 |
| Germany | -0.2 | -0.2 | -0.3 | 0.4 | 0.0 | 0.1 | 10.4 | 56 | -0.6 | -0.2 | 48 | 51 | 28 | 4 | 2.3 | 514 | 3 |
| Greece | -0.1 | 0.0 | -0.2 | -0.4 | -0.2 | -0.3 | 27.0 | 49 | -0.7 | -1.2 | 54 | 29 | 39 | 7 | 1.4 | 453 | 3 |
| Iceland | 0.2 | 0.3 | 0.1 | 0.2 | 0.3 | -0.3 | 31.4 | 85 | 0.0 | 0.2 | 58 | 42 | 33 | 4 | 1.9 | 493 | 3 |
| Ireland | 0.0 | -0.1 | 0.1 | -0.1 | 0.0 | 0.1 | 20.2 | 75 | -0.4 | 0.1 | 73 | 40 | 20 | 4 | 1.6 | 501 | 3 |
| Italy | -0.2 | 0.0 | -0.3 | 0.2 | -0.3 | 0.0 | 40.4 | 71 | -0.6 | 0.4 | 53 | 45 | 46 | 10 | 1.4 | 485 | 3 |
| Japan | -0.2 | 0.3 | -0.3 | -0.3 | -0.1 | 0.4 | 5.5 | 46 | -0.3 | 1.2 | 61 | 58 | 38 | 4 | 2.2 | 536 | 3 |
| Lithuania | 0.4 | 0.3 | 0.5 | -0.7 | 0.0 | 0.1 | 31.8 | 79 | 0.8 | 0.7 | 55 | 77 | 37 | 8 | 2.3 | 479 | 3 |
| Luxembourg | -0.1 | -0.3 | -0.3 | 1.1 | -0.5 | 0.0 | 14.0 | 70 | | -0.2 | -0.8 | 56 | 50 | 38 | 3 | 2.3 | 490 | 3 |
| Norway | -0.1 | -0.1 | -0.5 | 0.3 | -0.3 | -0.2 | 53.6 | 76 | -0.2 | -0.6 | 49 | 46 | 42 | 5 | 0.7 | 489 | 3 |
| Spain | 0.0 | 0.2 | -0.2 | -0.7 | 0.0 | 0.0 | 12.8 | 67 | -0.4 | -0.5 | 50 | 31 | 47 | 5 | 1.0 | 484 | 3 |
| Switzerland | 0.1 | 0.0 | 0.0 | 0.1 | 0.3 | 0.5 | 5.8 | 53 | -0.1 | -0.6 | 60 | 59 | 32 | 2 | 2.0 | 531 | 3 |
| China | 0.5 | 0.3 | -0.6 | 0.8 | -0.2 | 0.1 | 3.4 | 73 | -0.3 | -0.6 | 95 | 93 | 52 | 9 | 2.3 | 613 | 5 |
| Hong Kong Ch | 0.0 | 0.4 | -0.4 | -0.2 | 0.0 | 0.4 | 32.7 | 67 | 0.4 | 1.0 | 83 | 79 | 52 | 5 | 2.8 | 561 | 5 |
| Korea, Rep. | -0.1 | 0.1 | 0.0 | 0.1 | -0.2 | 0.1 | 71.0 | 80 | -0.4 | 0.7 | 78 | 87 | 37 | 5 | 2.1 | 554 | 5 |
| Liechtenstein | 0.1 | 0.1 | -0.1 | 0.1 | 0.1 | 0.8 | 34.1 | 74 | -0.1 | -0.3 | 77 | 72 | 30 | 2 | 2.1 | 535 | 5 |
| Macao Ch | 0.0 | 0.5 | -0.1 | 0.0 | -0.1 | 0.4 | 8.3 | 60 | 1.6 | 0.8 | 69 | 80 | 55 | 7 | 2.8 | 538 | 5 |
| Singapore | 0.4 | 0.5 | 0.1 | 0.1 | 0.4 | 1.2 | 50.8 | 96 | -0.4 | -0.3 | 90 | 76 | 40 | 4 | 2.5 | 573 | 5 |

*Shaded cells correspond to below average of each indicator. Source: Own elaboration

There is significant variation both in learning outcomes as in school practices across countries, however, "successful types" of school organization/approach are not easy to spot, and according to this analysis definitely there seem not to be a "rule of thumb" for success in education. Successful/unsuccessful approaches seem to be more deeply rooted, both on native features as well as on a richer set of *internal* and *external* features. Several thoroughly internal analysis has been done by Fuchs and Wößmann (2007), Wößmann et al. (2007), and Wößmann (2003), which tend to present positive effects of good institutions on learning outcomes, though their indicators and data differ significantly of those used here.

Anyway, the absence of "winner types" or any consistent set of "best practices" is not a rare finding, as actually the concept itself of best practice is questionable, as noted for instance by Rodrik (2008) and North (2008). As North notes "*(best-practice model) presumes it is possible to determine a unique set of appropriate institutional arrangements ex ante and views convergence towards those arrangements as inherently desirable. (...)* **Effective institutional outcomes do not map into unique institutional designs**. *Institutional function does not determine institutional form. And because there is no unique mapping from function to form, it is futile to look for uncontingent empirical regularities that link specific institutional rules to economic outcomes. What works will depend on local constraints and opportunities. Best-practice institutions are, by definition, non-contextual and do not take account these complications"* (bold added). Re-focusing this argument for the specificity of education, the contextual conditions may still add additional insight. So, what follows will look at the broader picture that also considers economic institutions and socio-economic conditions.

EXTERAL ANALYSIS. To start with, the correlation matrix among educational institutional variables and relevant economy-wide variables is presented in Table 7.

Firstly, the correlation matrix show that, as can be expected, learning outcomes are positive related to adequacy of infrastructure, adequacy of educational resources and autonomy of curriculum; also, as already noted before, test scores are uncorrelated to usually believed good practices as monitoring, transparency and autonomy. Secondly, there is an important connection between educational institutional variables and economic institutions. For instance, learning outcomes are positively and significantly correlated with good economic institutions (control of corruption and rule of law), and somewhat surprisingly these institutional variables are uncorrelated with the indicators of transparency and accountability that might be seen as their "equivalent" *inside* the education sector, though this may explain the lack of impact of these practices. Thirdly, there seem to be a positive externality from a good educational environment, as there is a positive and significant correlation between learning outcomes and human capital proxies as years of schooling and share of tertiary graduates in the population. Fourthly, as already noted outcomes are positively affected by adequacy of infrastructure and of educational resources, and Table 7 shows that these variables are positively associated to good economic institutions, unsurprisingly.

**Table 7 Correlation matrix education institutional variables and context**

| Variables | GDP | CC | ROL | HDI | YSC | TER | GINI | CRIME | EDEX | Tsr | statt | teatt | tsh | adinf | adedr | Transp | Acc | autr | autc | Sqa | mon | parac | parot | extra | LEARNING |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| GDP | **1** | **0.7** | **0.7** | -0.1 | 0.0 | 0.2 | **-0.5** | **-0.5** | 0.0 | **-0.3** | 0.1 | 0.0 | 0.1 | **0.3** | **0.6** | -0.1 | -0.2 | 0.1 | 0.1 | -0.1 | -0.2 | -0.1 | **-0.4** | 0.1 | **0.4** |
| CC | **0.7** | **1** | **1.0** | **0.3** | **0.3** | **0.4** | **-0.3** | **-0.4** | **0.3** | **-0.4** | -0.1 | 0.0 | 0.0 | **0.4** | **0.6** | 0.0 | -0.2 | 0.1 | 0.2 | **-0.3** | **-0.4** | **-0.3** | **-0.7** | 0.2 | **0.5** |
| ROL | **0.7** | **1.0** | **1** | **0.3** | **0.4** | **0.4** | **-0.3** | **-0.4** | **0.4** | **-0.5** | -0.1 | 0.1 | -0.1 | **0.4** | **0.7** | 0.0 | -0.2 | 0.1 | **0.3** | **-0.3** | **-0.4** | **-0.3** | **-0.7** | 0.2 | **0.6** |
| HDI | -0.1 | **0.3** | **0.3** | **1** | **0.7** | **0.5** | **0.4** | **0.4** | **0.5** | -0.2 | -0.2 | 0.0 | -0.1 | 0.1 | 0.1 | 0.0 | -0.1 | -0.2 | 0.1 | **-0.3** | **-0.4** | -0.2 | -0.2 | -0.1 | 0.2 |
| YSC | 0.0 | **0.3** | **0.4** | **0.7** | **1** | **0.7** | 0.0 | 0.2 | **0.5** | -0.2 | -0.1 | 0.1 | -0.2 | **0.3** | 0.2 | 0.1 | -0.1 | 0.1 | **0.3** | **-0.3** | **-0.3** | -0.2 | -0.2 | 0.0 | **0.3** |
| TER | 0.2 | **0.4** | **0.4** | **0.5** | **0.7** | **1** | 0.0 | 0.1 | **0.5** | -0.1 | -0.1 | 0.0 | 0.0 | **0.3** | 0.2 | 0.2 | 0.0 | 0.1 | 0.2 | -0.1 | **-0.3** | -0.2 | -0.2 | **0.3** | **0.3** |
| GINI | **-0.5** | **-0.3** | **-0.3** | **0.4** | 0.0 | 0.0 | **1** | **0.7** | 0.1 | **0.3** | -0.2 | -0.2 | 0.2 | **-0.3** | **-0.3** | 0.0 | 0.1 | **-0.3** | -0.2 | 0.1 | 0.1 | 0.0 | 0.2 | 0.0 | **-0.4** |
| CRIME | **-0.5** | **-0.4** | **-0.4** | **0.4** | 0.2 | 0.1 | **0.7** | **1** | 0.2 | **0.3** | **-0.3** | -0.2 | 0.2 | **-0.3** | **-0.5** | 0.0 | 0.2 | -0.2 | -0.2 | -0.1 | 0.0 | -0.2 | **0.4** | -0.2 | **-0.5** |
| EDEX | 0.0 | **0.3** | **0.4** | **0.5** | **0.5** | **0.5** | 0.1 | 0.2 | **1** | **-0.3** | **-0.3** | 0.0 | -0.2 | 0.1 | 0.0 | 0.1 | -0.1 | 0.1 | **0.3** | **-0.4** | **-0.5** | **-0.4** | **-0.4** | -0.1 | 0.1 |
| Tsr | **-0.3** | **-0.4** | **-0.5** | -0.2 | -0.2 | -0.1 | **0.3** | **0.3** | **-0.3** | **1** | 0.2 | 0.0 | **0.3** | -0.2 | **-0.3** | 0.1 | **0.4** | -0.1 | **-0.3** | **0.4** | **0.4** | **0.3** | **0.6** | 0.1 | **-0.5** |
| statt | 0.1 | -0.1 | -0.1 | -0.2 | -0.1 | -0.1 | -0.2 | **-0.3** | **-0.3** | 0.2 | **1** | **0.5** | -0.1 | **0.3** | **0.4** | -0.1 | 0.0 | 0.2 | **0.3** | 0.2 | **0.3** | **0.3** | 0.1 | 0.1 | 0.0 |
| teatt | 0.0 | 0.0 | 0.1 | 0.0 | -0.1 | -0.1 | -0.2 | -0.2 | 0.0 | 0.0 | **0.5** | **1** | **-0.6** | **0.5** | **0.3** | 0.2 | **0.3** | 0.1 | 0.1 | **0.3** | 0.1 | 0.0 | 0.0 | **0.3** | 0.0 |
| tsh | 0.1 | 0.0 | -0.1 | -0.1 | -0.2 | 0.0 | 0.2 | 0.2 | -0.2 | **0.3** | -0.1 | **-0.6** | **1** | **-0.4** | **-0.3** | 0.0 | 0.0 | -0.1 | 0.0 | 0.1 | 0.2 | 0.0 | **0.3** | 0.0 | -0.2 |
| adinf | **0.3** | **0.4** | **0.4** | 0.1 | **0.3** | **0.3** | **-0.3** | **-0.3** | 0.1 | -0.2 | **0.3** | **0.5** | **-0.4** | **1** | **0.7** | 0.2 | 0.2 | 0.2 | 0.1 | 0.1 | 0.0 | -0.1 | -0.2 | **0.3** | **0.4** |
| adedr | **0.6** | **0.6** | **0.7** | 0.1 | 0.2 | 0.2 | **-0.3** | **-0.5** | 0.0 | **-0.3** | **0.4** | **0.3** | **-0.3** | **0.7** | **1** | 0.1 | -0.1 | 0.1 | 0.2 | 0.0 | 0.0 | -0.1 | **-0.4** | **0.3** | **0.7** |
| transp | -0.1 | 0.0 | 0.0 | 0.0 | 0.1 | 0.2 | 0.0 | 0.0 | 0.1 | 0.1 | -0.1 | 0.2 | 0.0 | 0.2 | 0.1 | **1** | **0.7** | 0.2 | 0.1 | **0.4** | **0.3** | 0.1 | 0.2 | 0.2 | 0.0 |
| acc | -0.2 | -0.2 | -0.2 | -0.1 | -0.1 | 0.0 | 0.1 | 0.2 | -0.1 | **0.4** | 0.0 | **0.3** | 0.0 | 0.2 | -0.1 | **0.7** | **1** | 0.2 | 0.0 | **0.6** | **0.5** | 0.1 | **0.4** | 0.2 | -0.2 |
| Autr | 0.1 | 0.1 | 0.1 | -0.2 | 0.1 | 0.1 | **-0.3** | -0.2 | 0.1 | -0.1 | 0.2 | 0.1 | -0.1 | 0.2 | 0.1 | 0.2 | 0.2 | **1** | **0.6** | 0.1 | 0.2 | 0.0 | -0.1 | 0.2 | 0.1 |
| Autc | 0.1 | 0.2 | **0.3** | 0.1 | **0.3** | 0.2 | -0.2 | -0.2 | **0.3** | **-0.3** | **0.3** | 0.1 | 0.0 | 0.1 | 0.2 | 0.1 | 0.0 | **0.6** | **1** | 0.0 | 0.0 | 0.0 | -0.2 | **0.3** | **0.4** |
| sqa | -0.1 | **-0.3** | **-0.3** | **-0.3** | **-0.3** | -0.1 | 0.1 | -0.1 | **-0.4** | **0.4** | **0.3** | **0.3** | 0.1 | 0.1 | 0.0 | **0.4** | **0.6** | 0.1 | 0.0 | **1** | **0.7** | 0.2 | **0.4** | **0.3** | 0.0 |
| mon | -0.2 | **-0.4** | **-0.4** | **-0.4** | **-0.3** | **-0.3** | 0.1 | 0.0 | **-0.5** | **0.4** | **0.3** | 0.1 | 0.2 | 0.0 | 0.0 | **0.3** | **0.5** | 0.2 | 0.0 | **0.7** | **1** | 0.2 | **0.5** | **0.3** | -0.2 |
| parac | -0.1 | **-0.3** | **-0.3** | -0.2 | -0.2 | -0.2 | 0.0 | -0.2 | **-0.4** | **0.3** | **0.3** | 0.0 | 0.0 | -0.1 | -0.1 | 0.1 | 0.1 | 0.0 | 0.0 | 0.2 | 0.2 | **1** | **0.5** | 0.2 | 0.0 |
| parot | **-0.4** | **-0.7** | **-0.7** | -0.2 | -0.2 | -0.2 | 0.2 | **0.4** | **-0.4** | **0.6** | 0.1 | 0.0 | **0.3** | -0.2 | **-0.4** | 0.2 | **0.4** | -0.1 | -0.2 | **0.4** | **0.5** | **0.5** | **1** | 0.0 | **-0.5** |
| extra | 0.1 | 0.2 | 0.2 | -0.1 | 0.0 | **0.3** | 0.0 | -0.2 | -0.1 | 0.1 | 0.1 | 0.2 | 0.0 | **0.3** | **0.3** | 0.2 | 0.2 | 0.2 | **0.3** | **0.3** | **0.3** | 0.2 | 0.0 | **1** | **0.4** |
| LEARNING | **0.4** | **0.5** | **0.6** | 0.2 | **0.3** | **0.3** | **-0.4** | **-0.5** | 0.1 | **-0.5** | 0.0 | 0.0 | -0.2 | **0.4** | **0.7** | 0.0 | -0.2 | 0.1 | **0.4** | 0.0 | -0.2 | 0.0 | **-0.5** | **0.4** | **1** |

*Values in bold are different from 0 with a significance level alpha=0.05* Source: Own elaboration

Also there seem to be "compensating" practices at local level that are not effective enough, as parents volunteering above average particularly in cluster 1 composed by lower income countries where deficiencies in resources (teachers shortage, adequacy of resources) are detected; though probably for that reason more parent involvement is needed it leads to the counter-intuitive negative association of parents involvement and learning outcomes.

## CONCLUDING REMARKS

The data analysis on education, institutions and growth shed further light both on the limitations to any empirical analysis as well as provide a useful reference. Firstly, for selected variables the Cluster Analysis allows similar-country grouping by matching similarities across the board, and unsurprisingly, it is shown that all "good" qualities tend to come together. The mapping so generated allows a visualization of "classes" and provides a more "structured" reference to interpret human capital and growth than standard regressions against the same variables (though with a loss of precision). Secondly, the *internal* analysis on education institutions using aggregated data on schools, staff, resources and practices from Pisa 2012, aids to

link good education outcomes with "softer" variables (in comparison to more traditional factors as resources, socio-economic background, etc.); the *external* analysis explores externalities and interactions between education institutions and contextual settings.

The statistics reveals significant positive correlation between GDP and quality of economic institutions, as well as between GDP and human capital. Further cluster analysis leads to grouping into 3 classes of countries clearly differentiated: low income countries with poor economic institutions and low human capital; medium income countries less problem ridden in terms of institutions and human capital; high income countries virtually with no problem of quality of institutions and human capital levels. For education institutions, the *internal* analysis shows that there is no "rule of thumb" for success, instead, successful practices appear to be linked to native environment, and practices usually believed to be "good" (as transparency) tend to work in some environments but not in all. The *external* analysis suggests positive externalities on learning outcomes from good economic institutions and human capital accumulation.

## REFERENCES

Acemoglu, D. (2009) Introduction to modern economic growth. Princeton University Press.

Barro, R. and Lee J. W. (2013) A new data set of educational attainment in the world, 1950–2010. Journal of Development Economics, Vol. 104, 184–198.

Bjørnskov, C. and Méon, P. (2013) Is trust the missing root of institutions, education, and development? Public Choice, Vol. 157, 641–669.

Cárdenas, S. (2012). La corrupción en sistemas educativos: una revisión de prácticas, causas, efectos y recomendaciones. Revista Electrónica de Investigación Educativa, 14(2), 52-72. Accessed online 02/04/14 http://redie.uabc.mx/vol14no2/contenido-cardenas.html

Dias, J. and Tebaldi, E. (2012). Institutions, human capital, and growth: The institutional mechanism, Structural Change and Economic Dynamics, Vol. 23, 300-312.

Easterly, W. (2001) The elusive quest for growth. Economists' adventures and misadventures in the tropics. The MIT Press

Faruq, H., and Taylor, A. (2011) Quality of Education, Economic Performance and Institutional Environment. Int Adv Econ Res, Vol. 17, 224–235.

Fuchs, T., and Wößmann, L. (2007) What accounts for international differences in student performance? A re-examination using PISA data. Empirical Economics, Vol. 32, 433–464.

Hall, J., Sobel, R., and Crowleyi, G. (2010) Institutions, Capital, and Growth, Southern Economic Journal, Vol. 77(2), 385-405.

Kaufmann, D., Kraay, A. and Mastruzzi, M. (2007) Governance Matters VI: Aggregate and Individual Governance Indicators 1996–2006. World Bank Policy Research Working Paper 4280.

Hallak, J., and Poisson, M. (2005). Ethics and corruption in education: an overview. Journal of Education for International Development, 1(1), 1-16.

Heyneman, S. (2004) Education and corruption. International Journal of Educational Development, Vol. 24, 637–648.

Heyneman, S. (2007) Buying Your Way into Heaven: The Corruption of Education Systems in Global Perspective .Perspectives on Global Issues, Vol. 2. Issue 1.

North, D., Wallis, J. and Weingast, B. (2008) Violence and social orders: A conceptual framework for interpreted recorded human history. In North, D., Acemoglu, D., Fukuyama, F. and Rodrik, D. (Eds) *Governance, growth, and development decision making*. World Bank, Washington.

OECD (2013) Pisa Results 2012 in focus. What 15-year-olds know and what they can do with what they know, OECD website www.oecd.org

OECD (2013b) PISA 2012 Results: What Makes Schools Successful? Resources, Policies and Practices, Volume IV, OECD website www.oecd.org

Rajkumar, A.S. and Swaroop, V. (2008) Public spending and outcomes: Does governance matter? Journal of Development Economics, Vol. 86, 96–111.

Rodrik, D. (2008) Thinking about goverance. In North, D., Acemoglu, D., Fukuyama, F. and Rodrik, D. (Eds) *Governance, growth, and development decision making*. World Bank, Washington.

UNESCO (2009) Overcoming inequality. Why governance matters. EFA Global Monitoring Report. Unesco website www.unesco.org

Wößmann, L., Lüdemann, E., Schütz, G., and West, M. (2007) School Accountability, Autonomy, Choice, and the Level of Student Achievement: International Evidence from PISA 2003. OECD EDU/WKP(2007)8.

Wößmann, L. (2003) Schooling Resources, Educational Institutions and Student Performance: the International Evidence. Oxford Bulletin of Economics and Statistics, Vol. 65, 2, 117-170.

World Bank (2010) Governance Matters To Education Outcomes. World Bank.

## DATA WEBSITES

Barro and Lee http://www.barrolee.com/data/dataexp.htm

NUMBEO website http://www.numbeo.com/crime/rankings_by_country.jsp

OECD – PISA http://www.oecd.org/pisa/

United Nations – http://data.un.org/

World Bank - Worldwide Governance Indicators http://data.worldbank.org/data-catalog/worldwide-governance-indicators

World Bank - World Development Indicators http://data.worldbank.org/data-catalog/world-development-indicators