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## **A Cross-Country Comparisons of Student Achievement: the Role of Social Values**

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# **Cross-Country Comparisons of Student Achievement: the Role of Social Values**

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## **Abstract**

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This paper looks at country-average results in surveys of student-achievements like PISA, PIRLS or TIMSS. As other recent papers do, I advance the idea that the between-countries differences are determined by cultural factors. Focusing on the macro-level, I discuss social values as part of the contextual determinants for student achievement. Values are defining features of the unwritten, but powerful, hidden curriculum, and are likely to have strong impact on learning. I combine macro-data computed from the values surveys (EVS/WVS 1990-2008), respectively PISA, TIMSS, and PIRLS (1999-2009). Cross-classified models assess the effect of dominant social values on student achievement. The findings show that a society that places high value on autonomy in child rearing creates an environment for higher student achievement. Conversely, promoting authoritarian values as a priority for younger generations has the opposite effect. The effect is even stronger for achievements in mathematics.

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**Keywords:** child-rearing values, student achievement, comparative large-scale surveys of student achievement, social values, school and society

# **Comparación entre Países del Logro Académico: El Papel de los Valores Sociales**

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## **Resumen**

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Este documento analiza resultados promedio de los países en las encuestas de logro académico como PISA, PIRLS o TIMSS. Como otros trabajos recientes, avanza la idea de que las diferencias entre los países están determinadas por factores culturales. Centrándose en el nivel macro, analizo los valores sociales como parte de los determinantes contextuales para el logro académico. Los valores están definiendo las características del no escrito, pero potente currículo oculto y son propensos a tener fuerte impacto en el aprendizaje. Combino datos macro calculados a partir de las encuestas de valores (EVS/WVS 1990-2008), respectivamente PISA, TIMSS y PIRLS (1999-2009). Los modelos de clasificación cruzada evalúan el efecto de los valores sociales dominantes en el logro del estudiante. Los resultados demuestran que una sociedad que otorga gran valor a la autonomía en la crianza crea un ambiente de mayor rendimiento de los estudiantes. Por el contrario, promoviendo valores autoritarios como una prioridad para las nuevas generaciones tiene el efecto contrario. El efecto es aún mayor en sus logros en matemáticas.

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**Palabras clave:** valores de crianza, logro estudiantil, encuestas comparativas a gran escala del rendimiento de los estudiantes, valores sociales, escuela y sociedad



When analyzing the results of the comparative large-scale student achievement surveys (CLSSAS), like TIMSS, PISA or PIRLS, scholars often point to culture as a source of cross-country differences or similarities (Leung, 2002; Kjærnsli & Lie, 2004, p. 284; Birenbaum et al, 2005). However, there has been little effort to empirically test the impact of dominant social values on average (societal level) student achievement. This paper argues that culture determines achievement through the hidden curriculum, which is broadly defined as the result of shared social values within a society. I use the term social values in the sense proposed by current social values literature (Jagodzinski, 2004). They are latent constructs that define what is desirable and legitimate from one's point of view, are deeply rooted within the social fabric, manifest themselves through behaviors and attitudes, and shape formal and informal social norms.

Hidden curriculum is frequently discussed in education research and policymaking as an issue that shapes socialization in schools (Cornbleth, 2002; Apple, 2004). It consists mainly of social values that are common to teachers, parents, and pupils who are part of the broader society. The hidden curriculum transcends formalized norms and makes the school responsible for the institutional transmission of both desirable and undesirable values. Considering the value orientations of the teachers, they do not limit their action to what pupil learn from their instructor, but they also define how teachers behave. For instance, a teacher who views independence as a positive trait is more likely to encourage students to think independently. Conversely, if a teacher gives more emphasis to religious faith, he or she is more likely to give academic credit for religious explanations than to scientific ones.

Teachers, pupils, and parents live in societies. They continuously interact with other people, who were once students, parents, or both, share values, and *make* what society actually is. In turn, society shape their values, through either primary socialization (Inglehart, 1997), institutionalization (Gundelach, 1994), or both (Arts, 2011). In short, the dominant values of a society tend to influence the values of teachers and students.

When answering tests, the students did not limit themselves to using information that they previously accessed and stored in their memories; they also drew on ways of doing, which define how they approach the cases proposed by the respective tests. This means they call on all of their

knowledge and organize it according to their patterns of thinking, which ultimately depended on their value orientations. This creates a clear link between the wide-spread value orientations within the society and the average performance of students in international studies that assess the achievements of fourth or eighth graders. I argue that there are specific values related to a society's dominant beliefs which have a positive impact on student achievement.

In test the hypothesis at macro-level, using country-level data derived from values surveys to predict the average achievement scores registered in various CLSSAS. I focus on how so-called “child-rearing values” or “parental values” (Tufiş, 2008) influence a country's average scores in the PISA, TIMSS or PIRLS. Parental values explicitly refer to what people think kids should learn at home, and generally indicate the value orientation towards what people consider useful to be preserved by future generations. They include aspects like religious faith, independence, responsibility, and obedience. I argue that such values have a strong impact on a country's average performance in the CLSSAS. I expect that autonomy values, such as responsibility and independence, have a positive impact, while orientations toward authority—such as giving precedence to religious faith and obedience—decrease average student achievement, particularly in math and science.

Even if the importance of context factors in explaining school outcomes is recognized, empirical analysis rarely underlines the impact of such determinants (Creemers & Kyriakides, 2008, p. 151). This paper contributes to such yet to be written literature by adding to the few papers that consider and empirically test the impact of country-level cultural traits on student achievement (Fensham, 2007; Minkov, 2008). If considering that teaching patterns and all classroom interactions are “aligned with their national cultural beliefs, expectations, and values” (Givvin et al., 2005, p. 312), the findings also provide insights for curriculum development. The paper also contributes to the literature describing the impact of social values, particularly of the child-rearing values. The results and the method add knowledge which increases CLSSAS usage in a field almost unexplored until now, and increases the potential of such tools to investigate cross-country differences and inform education policies.

## **How Values Influence School Achievement**

Determinants of effective models of successful education may exist at various levels. Family and students, classmates and teachers, school culture, and context-level factors are important contributors to the schools' outcomes (Creemers & Kyriakides, 2008). In this paper I focus only on contextual determinants at the societal level. My assumption is that what happens at this level is likely to be reflected in daily classroom activities and influence the school's outcomes. This is in line with Creemers' and Kyriakides' (2008) dynamic model of educational effectiveness. However, I explicitly extend the explanation to consider widely shared social values as part of the factors operating at the contextual-level, which define the "wider educational environment" discussed in the mentioned work (pp. 138-140).

The idea of school embeddedness in society is a common concept in the sociology of education (Bourdieu & Passeron, 1977; Shavit & Blossfeld, 1993). Education systems serve societies by providing socialization and training, but they also depend on the society in which they are embedded. Teachers, students, and parents are part of a society – they share its values and life styles, and behave accordingly.

Social learning theories (Bandura, 1977) argue that people learn by observing the relevant behaviors and attitudes of others. Children tend to imitate adult behavior, and the values that they daily observe. Adult models are not necessarily parents or teachers, but these actors are the most relevant since they are the most salient part of the students' daily environments. Their pervasive influence goes far beyond written laws and formal regulations, and is embedded in the hidden curriculum (Giroux & Penna, 1983). The hidden curriculum manifests in "attitudes, values, beliefs, and behavior" (Cornbleth, 2002). It relates to how teachers, parents, and children use and decode various communication stimuli.

Following Snyder (1971), one can define what happens between students and educators, as being structured by formal curricula, and as being dependent on the teacher's behavior and the students' support. Formal curriculum is also shaped by common social norms and value orientations. Teacher's behavior is, at least partially, a manifestation of the respective person's values (Van Deth & Scarborough, 1995). Similarly, children's and parents' values play a role in supporting classroom activities.

Therefore, social values are an important input for the education systems. They determine what people can expect from life and education, what they believe is important, and what pupils, parents, and teachers consider essential to learn in school. They define the hidden curriculum, and influence future patterns of thinking and behaving for the “average” graduate. Widespread social values are part of the context-level factors that have what Creemers and Kyriakides (2008, p. 140) call the “ability to increase opportunities for learning and develop positive values for learning.”

It is likely that the interdependence between social values and the educational process is reflected in student achievement. Fensham (2007) argues that the national average school performance, as recorded by international large-scale projects such as PISA or TIMSS, should be explained both by directly observable factors measured at the country-level and by cultural factors. The first are “manifestations of more fundamental values and complex mores” (p. 153), which may be partially found amongst cultural determinants. Fensham insists on separating directly measurable factors, which he labels as contextual variables, from cultural factors. This does not mean that culture is outside the context. On the contrary, since Fensham pledges to consider the national context as an explanatory variable for the TIMSS or PISA national average scores, the different labeling underlines the role of culture as an important contextual trait. Both types of determinants create the context in which education occurs. Culture is primarily considered a set of educational practices, but, as I have already mentioned, such practices are manifestations of the more general cultural context. This discussion could be extended to the community level, but for the sake of simplicity, I prefer to treat society as a homogenous entity.

Minkov (2008) notes that cross-country differences are not sufficiently explained by stocks of education, wealth, or education policy, and concludes that culture should be considered a predictor for student achievement in the TIMSS and PISA. Birenbaum et al. (2005, p. 175-176) propose various cultural explanations for the high achievements of the Singaporean students revealed by the TIMSS in 1999. They include a strong examination of culture, and meritocracy as the basic principle for societal structure. Leung (2002) also formulates hypotheses regarding the superiority of South-Asian students in mathematic achievement, proven by the results of the TIMSS 1999. He suggests that “cultural values that they [the respective countries]

share,” such as stress on modesty, may explain these results, but the mechanism through which such values impact student achievement remains unknown (p. 106-107). I argue that dependency on widespread social values may be part of this unknown mechanism. Givvin et al. (2005) found that despite cross-country similarities, national patterns of teaching exist, which they have hypothesized that comes from a “cultural nature of teaching” (p. 340). One may also say that a teacher’s behavior and beliefs depend on their society’s shared values.

In summation, my assumption is that the social values shared in a society directly influence the types of values that children learn, which, in turn, are reflected in student achievement. Societal value orientations also influence teachers’ values and beliefs, which influence the students’ patterns of thinking. Student achievement is the visible outcome of this process and may be assessed in a comparative manner through the CLSSAS. CLSSASS may only partially reflect student achievement, for instance ignoring social skills and student well-being, but they have the merit to provide comparable cross-country measurements of school outcomes. Culture, as determinant of achievements, can be seen as a multidimensional phenomenon. Various social values may underline the patterns in which people price school and education, its role in social life, how skills form and permanently improve, when learning ends, if ever does it. Some may trigger higher achievements; other may deter the quality of education. The scope of this paper is limited to a narrow set of values, the parental ones, relevant for the education process, as I argue in the next section.

### **The Role of Parental Values**

Social values scholars (Inglehart, 1997; Hagermaars et al, 2005; Tufiş, 2008) treat the parental or child-rearing values as part of a mix of value orientations which contrasts two sets of preferences regarding what children should learn. The first includes values related to autonomy, such as responsibility and independence, while obedience and religious faith are part of the second set, which refers to complying with authority. Parental values are said to be of high importance for directing the early socialization processes, and the relation that children develop with school and society (Kohn, 1977; Tudge et al, 2000; Tulviste et al, 2007). Therefore they are

essential for the attitudes towards learning, and should be reflected in student achievements. The basic mechanisms were described in the previous section, and further support for selecting parental values as relevant for culture are to be found in the education science.

UK's Plowden report (1967) popularized child-centeredness and creativity as basic attributes that lead to effective learning. In the early 1980s, governments become reluctant to such approaches, but these ideas are currently back as dominant paradigm in schooling (Jeffrey & Woods, 2009). Teaching approaches based on promoting responsibility, independence, and creativity are regarded as beneficial in classroom activities. They are said to enhance personal traits and harmonious development of students, stimulating their capacity to learn and to understand the world. Obedience and strict respect for authority are regarded as destructive to personal initiative and to explicit orientation towards knowledge. Pascal and Bertram (1997) identify autonomy as a key adult value orientation that promotes desirable learning outcomes. Autonomy implies children creativity, independence and responsibility, and leads to high-quality thinking and development (Hayes, 2010, p. 7). Other empirical findings suggest that approaches related to encouraging responsibility and independent thinking lead to higher achievements. For instance, in their analysis of school achievements in science, Lavonen & Laaksonen (2009) show out that frequent use of interactive teaching, including teacher demonstrations, practical work and students drawing own conclusions, lead to better outcomes.

Therefore, my first hypothesis is (H1a) *societies that share value orientations towards autonomy, such as independence and responsibility, are likely to better perform in comparative surveys of student's achievements.*

Orientations toward authority, particularly religious faith and obedience, are likely to have the opposite effect. Firstly, wide-spread beliefs that children should learn religious faith, with its old commandment to belief without investigation, imply a general inhibition of curiosity, of the predisposition to self-discover how the world works. Obedience follows the same line of thought, but may be particularized to a more tangible authority. Secondly, it is likely that teachers who are oriented toward obedience prefer lecturing, and are not prone to promote teaching paths based on self-developing and participation. Both mechanisms lead to less independence

and responsibility. A complementary hypothesis results from these assumptions: (H1b) *average student achievement is higher in societies that are less oriented toward values of authority, such as religious faith and obedience.*

Student achievements are commonly measured by tests that produce scores varying within a certain range. Any of the tested subjects cannot be classified below the lower bound or above the upper limit. Let us imagine a society that is indifferent to respect for authority/autonomy value orientations. A small increase in orientations towards autonomy will have some impact on student achievements. However, after a certain point, due to the upper limitation of the test scores, the marginal contribution to achievement will start to decrease, although the overall effect will remain positive. The same is valid when one considers the negative impact of the orientations toward authority. Therefore, the second hypothesis (H2) holds that *the effects described by (H1a) and (H1b) will be logarithmic.*

CLSSAS test achievements in reading, mathematics, and science. Of the four types of specific value orientations (independence, obedience, responsibility, religious faith), religious faith may have particular effects depending to the topic. The rational approach, which assesses situations considering all implications and available facts and knowledge, may be seen as opposed to the religious explanation, which often assumes the existence of indubitable truths that cannot be subject to debate or research (Inglehart, Norris, 2004). Due to its specific connection to rational explanation and exact sciences, I expect that (H3) *orientations towards religious faith (as child-rearing values) have a stronger negative impact on achievement in mathematics and science, as compared to the impact on reading.*

Overall, I claim that child-rearing values are part of the context in which schools and pupils evolve. Their impact on student achievements is described in the three hypotheses that I advanced. The next section reviews the other factors that should be controlled for, as they derive from existing literature. However, I am not insisting much on the mechanisms that underlie their influence, since the focus of the paper remains the impact of social values.

### Other Country-Level Determinants of Student Achievements

Cultural reproduction theories (Bourdieu & Passeron, 1977) provide strong reasons for controlling for parental education. *Stocks of education*, including the education level of the adult population, extend the scope of the indicator. It also provides rough information about the societal aspirations related to the trajectory of education.

*Institutional arrangements* are important leverages that might determine more effective teaching, and are of high importance to researchers and decision-makers. Investments in education (Barber, 2006) tap for the amount of resources allocated to education. Curricular aspects are the easiest to change in terms of policy implications (Adolfsson & Henriksson, 1999; Birenbaum et al, 2005).

Schooling age (Adolfsson & Henriksson, 1999), also reflected in the age at the time of testing, teaching quality, inequality of access to quality teachers (Akiba et al., 2007), the pupil/teacher ratio, and classroom size (Barber, 2006) are additional potential determinants.

CLSSAS have different approaches in what is being tested: IEA's TIMSS and PIRLS include curriculum-related testing, while the OECD's PISA tests the students' ability to use knowledge in their daily lives (Rutkowski & Rutkowski, 2009, p. 139). Therefore, when using information from different comparative surveys, it is important to control for their provider.

The level of *economic output* is an indicator of country's ability to convert wealth into human capital (OECD, 2010a). Wealth means having abundant resources, including resources for education (Barber, 2006), but also implies higher material security and more focus on self-development. Richer societies are more complex: in daily life people need to deal with various situations and have higher amounts of information to process. Facing such daily challenges increases people (and students) "ability to grasp complex information" (Barber, 2006, p. 131).

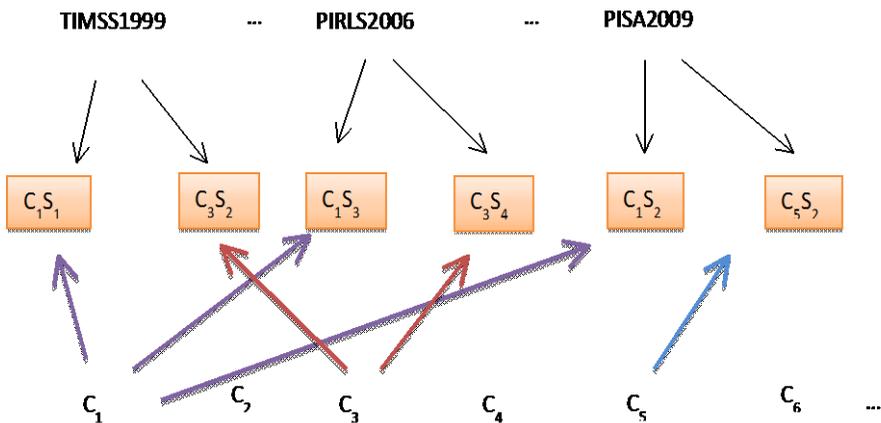
### Data and Methodology

I put together information on student achievements (the dependent variable) and child-rearing values (the main set of independent variables). The CLSSAS provided information on the dependent variable, while the main

independent variables (value orientations) were derived from the values surveys. Information on the other control variables was collected from various official statistics. This section briefly describes the data sources and variables used in this study. When explaining the process of producing the variables, I gradually introduce the structure of the resulting dataset, also depicted in Table 1.

### Dependent Variable

Each CLSSAS wave provides information on a limited number of educational systems (countries). In order to have access to a larger number of countries, I considering several large-scale surveys, conducted over a reasonably short amount of time, allowing drawing conclusions for a broader population. The resulting dataset includes, at the first level, country-survey observations. Figure 1 describes how the dependent variables were derived from the surveys. For each survey-country pair, the mean value of the respective sample represents the value of the dependent variable for this study. Such average scores correspond to the squares in Figure 1, and result from the combination between a country ( $C_i$ ) and a survey ( $S_j$ ).



*Figure 1.* Schematic visual representation of the dependent variable  
 Note:  $C_iS_j$  = Country Average for the country ( $C_i$ ) in the survey ( $S_j$ ).

Therefore, the dependent variable is a series of 1076 average country scores registered in the PISA, TIMSS, and PIRLS surveys between 1999 and 2009. TIMSS is a large-scale comparative survey of math and science achievement that tests eighth grade students from various countries every four years. This paper uses results from the 1999, 2004, and 2007 waves. The PIRLS is conducted by the same IEA team and collects data from fourth graders by assessing their reading achievement. I employ the PIRLS from 2001 and 2006. The OECD conducts the PISA survey every three years, primarily in OECD countries, by testing eighth graders in mathematics, reading, and science. This study employs the PISA scores from 2000, 2003, 2006, and 2009.

Overall, I have considered 24 surveys that represent combinations of providers (PISA or TIMSS/PIRLS), grades (fourth or eighth), and topics (math, science, and reading). These surveys may be labeled as “TIMSS 1999, math, grade 8”, “PIRLS, 2001, reading, grade 4”, etc.

For each country and each survey I collected the mean scores. Each country’s original mean score was rescaled in order to get an average of 500 points for the set of countries in the study (in the case of TIMSS and PIRLS), respectively for the OECD members (in the case of PISA). Therefore, in order to compare the country averages across the surveys, it is necessary to control for the characteristics of the surveys.

### **Independent Variables: Child-Rearing Values**

For each of the 1076 country-survey pairs I have employed EVS and WVS data (European, and World Values Survey, respectively) to compute independent variables tapping for parental values. Despite being different studies, the methodology and questionnaires of the two values surveys generally overlap. The 1990-1993, 1995-1997, 1999-2001, 2005-2006, and 2008-2009 waves included a set of items on parental values. They asked the respondents to indicate, from a list of qualities, the top five values they would like children to learn at home. Among these qualities, four choices are of interest for my aim. *Responsibility* and *Independence* stand for an explicit value orientation toward autonomy, while *Religious faith* and *Obedience* go in the opposite direction, tapping for orientation toward authority (Inglehart,

1997; Hagenaars et al., 2003). A SEM analysis proves that it is difficult, if not impossible, to achieve even partial measurement invariance across countries and across EVS/WVS waves for a model using all four items<sup>1</sup>. For the purposes of this paper, I computed the proportion of respondents who selected each of the four items for each country and each data-collection year. This produced four indicators (independence, responsibility, religious faith, and obedience) for each country and wave of the value surveys. Next, I associated these indicators with the country-survey pairs for which CLSSAS has provided estimates of student achievement. Since the years of data collecting in the CLSSAS and in the value surveys do not coincide, my option was to consider those estimates of value orientations that were closer in time. For instance, the Austrian TIMSS 2007 average achievement score is associated with the results from EVS 2008, because this was the closest data-collection year for Austria in the value surveys.

Table 1

*Variables in the empirical models and their ranges*

Level / variable name	Description/comment	Min	Max	Source
<b><u>Survey-country pairs</u></b>				
Score	Average student achievement for a certain country in a certain CLSSAS <b>(dependent variable)</b> .	197	607	CLSSAS
Independence, Responsibility, Religious Faith, Obedience	Percentages of the respondents that mentioned each of the respective values, registered for the closest available year to respective CLSSAS data collecting	0%	100%	EVS/ WVS
GNI per capita (PPP)	Computed for the year of the respective CLSSAS	1040	60210	WDI*
Average age of respondents	At the time of data collection (years).	9.70	15.91	CLSSAS
<b><u>Country specific</u></b>				
Pupil/teacher ratio in primary education	Average indicators for available 1999-2010 data	10.03	39.76	WDI*
Tertiary attainment of adult population		2.44%	53.05%	Barro-Lee (2011)
Average years of schooling adult population		3.90	13.19	
Public spending on education (% of GDP)		1.49	8.21	WDI*
<b><u>Survey characteristics</u></b>				
PISA	The CLSASS was conducted by the OECD. Dummy variable. Reference category: test by IEA.	0	1	CLSSAS
Grade 8	Testing eighth graders in the final years of lower secondary. Dummy variable. Reference category: last year of primary school.	0	1	CLSSAS
Math	Testing math achievement (dummy variable).	0	1	CLSSAS
Science	Testing achievement in science (dummy variable).	0	1	CLSSAS
Year of CLSSAS	Year of CLSSAS data collection.	1999	2009	CLSSAS

\* Different sources were employed for few specific countries (see text for details).

## **Other Control Variables**

For each of the 24 surveys I have considered several control variables that describe: the survey provider (dummy variable: PISA=1, TIMSS/PIRLS=0); if the pupils are eight of fourth graders; if the test is in science, reading, or math; the average age of the respondents. The later variable represents a good proxy for the starting-age of compulsory education. It is reported as such in the TIMSS reports, while for the PISA surveys I used my own calculations.

For each survey-county pair, I added the GNI per capita, measured in PPP. Data is available from the World Bank's World Development Indicators database (WDI), except for Taiwan, for which the GNI/capita was estimated using IMF (2009). Including GDP/capita, the impact of social values on country-level estimates of student achievements is cleaned out of potential distortions due to between-countries differences in wealth.

The pupil-teacher ratio in primary education (PTR), and public spending for education (as a percentage of GDP) are average values of the available 1999-2010 indicators provided by the WDI. When missing, I have completed the PTR data with indicators reported by UNICEF (2008): for Switzerland, Norway, Iceland, and the Netherlands the closest accessible indicator was for 2005, while for Turkey, Bosnia, and Montenegro, data was only available for 1999. Missing, information on public spending on education was derived from World Bank (2002) for Montenegro, respectively and Izvorski (2006) for Bosnia (2004).

I used the Barro-Lee (2011) estimates for 2005, to assess tertiary attainment (percentage of tertiary graduates in total population aged 25+) and average number of completed school years of adult population. These indicators describe the country more stable context and I have kept them fixed at country level regardless of when the CLSSAS data was collected.

## **Methodological approach**

Some of the above variables have incomplete information for specific countries. Listwise deletion led to a final sample of 919 cases, covering 67 societies<sup>2</sup>, most of them advanced economies. Since the selection depended on the availability of data, the sample is not probabilistic.

The data describes a cross-classified pattern (Hox, 2010, p. 171-187), as visualized in Table 1 with the average scores nested both in countries (67 societies) and in CLSSAS (24 surveys). Therefore I run cross-classified multilevel models, with all of the effects fixed.

In order to test (H2), the social value indicators were transformed into logarithmic scales. The same transformation applied to GNI/capita. (H3) imposed including interaction terms between the logarithm value of religious faith and the *math* and *science* variables.

Five types of models were tested: First, the empty model (a model with no predictor, but controlling for the nesting of cases both in countries and in surveys) shows if there is variance across countries. The second model includes all controls, except for parental values. The third model (the full model) adds parental values as predictors. By contrasting the second and the third model, it is possible to assess if child-rearing values contribute to a better explanation of the variation. A fourth model, which includes only the parental values as predictors, evaluates the magnitude of their impact when nothing else is known about other sources of variation. The logarithms of the respective indicators are used in all these models, when the parental values indicators are included as required by (H2). Finally, I have built a fifth model, identical to the full model, without employing logarithms in order to test H2 more accurately. Each model used the *lmer* procedure in R, and all of the effects were fixed.

One may question if ‘learning religious faith’ might have the same meaning in different religious cultures. To prevent such bias, the models were repeated including covariates for the percentages of Christian, Muslim, Buddhist, Confucian, and Hindu in the total population<sup>2</sup>. They control for the effect of religious culture, and bring Religious Faith closer to indicate same concept in every country. All results remained unchanged, proving the robustness of the analysis.

## **Findings**

Considering the average results from various CLSSAS, several Asian countries are among the performers along with Western societies, while African societies tend to lag behind. If looking only to Europe, the best represented region in surveys like PISA and TIMMS, Western societies tend

to receive higher scores as compared to Eastern ones, the same being valid for the North-South differences. Similar polarizations are noticeable when inspecting the parental values. The percentage of those who declare that Responsibility is important to be learnt reaches 90% in several East Asian societies (Korea, Taiwan, Japan), and in some of the European countries (the Nordic ones, Germany, Switzerland, the Netherlands). It goes as low as 30-50% in African countries like Nigeria, Burkina Faso, Tanzania, Mali, Ethiopia, etc., but also in Kosovo, Great Britain, Bosnia, and Bangladesh.

Independence is also prized mainly in Northern Europe and East Asia, while several Eastern-Europeans, most African countries, Latin America, but also Hong-Kong and France gives it less importance.

Religious faith is supported as parental value by more than 80% of the adults in Egypt, Pakistan, Romania, Jordan, Macedonia, Irak, Indonesia and several others – mainly Muslim or Orthodox. South-East Asia, Northern Europe, France and most of non-Orthodox or Catholic post-communist societies are at the opposite stance, with 10% or less stressing the importance of learning Religious Faith.

Obedience is considered more important by over 50% of respondents to value surveys in African countries, India, Romania, Indonesia and several Latina American societies. Less than 15% of Northern Europeans, Japanese, Chinese, Germans and Czechs value obedience,

All these descriptive suggest a certain match between country-level aggregates of child-rearing values and student achievements. Bivariate Pearson correlations separately estimated for each CLSSAS indicate that religious Faith and Obedience as inversely related to achievements, with typical negative correlation coefficients of 0.6-0.7 and 0.4-0.5. Independence and Responsibility seems more loosely connected to achievements, but the sense of the relation is the expected one. In their cases, the Pearson correlations are around 0.3, respectively 0.2.

Table 2

*Variance and deviation in various tested models*

Model	Empty	All controls, but social values	Full	Only social values predictors
<b>Deviance</b>	<b>8328</b>	<b>8117</b>	<b>8049</b>	<b>8304</b>
<b>Variance (std.dev)</b>				
Across countries	4703.8 (68.6)	2212.5 (47.0)	1705.7 (41.3)	3121.9 (55.9)
Across surveys	197.5 (14.1)	38.3 (6.2)	37.8 (6.1)	193.3 (13.9)
Residual (level 1)	320.5 (17.9)	275.0 (16.6)	258.7 (16.1)	321.6 (17.9)
<i>TOTAL</i>	<i>5221.8</i>	<i>2525.8</i>	<i>2002.2</i>	<i>3636.8</i>
<b>Decrease in total unexplained variance</b>	-	<b>52%</b>	<b>62%</b>	<b>30%</b>

Number of observations: 919, groups: countries – 67; surveys – 24.

Multivariate analysis can show if these observations hold true when considering all the CLSSAS and controlling for their characteristics.

The empty cross-classified multilevel model reveals that most of the variation occurs across countries, while only a small part is derived from the differences between surveys (Table 2 first column). Adding the controls for the characteristics of the surveys and the countries, but not the parental values indicators, decreased the total variation by 52%. Including the social values indicators, the total unexplained variance decreased by an additional 10%, to a total of 62% (column 3). On the other hand, as compared to the model with no predictor, there is decrease in unexplained variance in the model that includes only child-rearing values (column 4). All these indicate that parental values add to other contextual explanations and survey characteristics to explain the variance of country-average scores in various CLSSAS results. In other words, the cultural characteristics that they measure are important in determining cross-country differences in achievements.

To show the direction of the impact of parental values, Table 3 presents the estimates of the fixed effects in the full model. Wealth, the education of adults (particularly tertiary attainment), lower pupil-teacher ratio, and the

average age at the time of testing showed positive effects. The average age at the time of testing is an indicator of the starting school age. Its strong impact, which manifests when controlling for the grade of the tested population, produces important consequences for assessing the performance of different educational-systems through the CLSSAS results. This means that countries with low achievement scores where students were older than average, should give even more attention to their education policies, specifically to the adequacy of the entry age and to preschool education.

Table 1  
*Effects in the full model*

	Estimate	Std. Error	t value
<b>level 1 (Country*Survey)</b>			
(Intercept)	2621.1	(1067.1)	2.46
ln(Responsibility)	26.7	(11.4)	2.34
ln(Independence)	3.0	(4.5)	0.66
ln(Obedience)	-4.3	(4.6)	-0.93
ln(Religious Faith)	-11.3	(4.8)	-2.36
ln(GNI/capita)	22.1	(5.7)	3.84
Average age when testing	35.3	(3.0)	11.89
<b>Country level</b>			
Public spending on education (% in GDP)	-10.9	(4.9)	-2.23
Tertiary Attainment	1.3	(0.6)	2.07
Average Years of schooling (adult population)	0.9	(4.0)	0.23
Pupil/teacher in primary education	-3.9	(1.1)	-3.53
<b>Survey characteristics</b>			
PISA	-73.7	(5.6)	-13.08
Science	-0.6	(4.6)	-0.14
Math	-17.7	(4.6)	-3.87
Grade 8	-144.9	(12.6)	-11.48
Year CLSSAS	-1.3	(0.5)	-2.40
<b>Interactions</b>			
ln(Religious Faith)*Science	-1.7	(1.6)	-1.03
ln(Religious Faith)*Math	-9.5	(1.6)	-5.90

Surprisingly, public spending on education seems to have a negative impact on achievements. However, it is necessary to point out that this is an incomplete indicator as it only reflects public spending, while in many countries, it is the total (private and public) investments in education that

make the difference. Considering the impact of the survey characteristics, curriculum-based tests (the IEA's surveys) produce higher scores than the PISA. The same is valid for surveys that test achievement in mathematics or of the 8<sup>th</sup> graders. Newer CLSSAS produce lower average scores.

Among child-rearing values, the two indicators for orientation towards autonomy are positively associated with higher achievement. The more a society is oriented toward such values, the higher the average CLSSAS score in the respective society. The opposite holds true for Religious Faith and Obedience. However, the effects of Independence and Obedience are not very strong. If the sample had been random and statistical inference had been possible, these effects would have been insignificant. Nevertheless, this does not change the conclusion related to the first hypothesis: societal orientation toward autonomy values in child-rearing leads to better achievements, while an orientation toward authority values has a negative impact on the country's average CLSSAS scores.

The second hypothesis (H2) relates to the shape of the effect. A logarithmic dependency was expected: the autonomy values produce positive effects, but, after a certain level, their marginal impact began to decrease. The same occurs with authority values, but the relation is negative. The 'full model' presented in Table 3 uses logarithms of the social values indicators. The results provide support for the hypothesis. However, in order to check if the effect is linear, I have constructed an alternative full model, in which the measures of the child-rearing values were not on logarithmic scales. The results do not change much. The deviance is 8073, the total unexplained variance (2152.2) is slightly higher in comparison to the 'full model' in Table 2, and the total decrease of unexplained variance compared to the empty model is 54%. When considering the t-values of the parental values and their interactions with the type of survey, these fixed effects are slightly lower, except for responsibility, which has a marginally stronger impact. Overall, the logarithmic full model performs better, which supports (H2).

Computing the effect size, one may notice that for a country where only 40% support Responsibility as important value to learn, an increase of the figure to 50% determines the average score in CLSSAS to grow with almost 9 points. An additional 10% increase brings other 8 points to the average score. When support for Religious Faith is as high as 90%, a 10% drop

increases the average performance in CLSSAS by 3 points. This is similar to the expected increase of average test score in a country that increases its GDP/capita of 15000 USD PPP with 2000 more. To match the above-discussed 10% increase in support for Responsibility, GDP/capita should increase its value with almost a half! Although changing values may be appealing for policy makers interested in boosting achievements, one should also remember that values are resilient to change (Jagodzinski, 2004). However, there are still ways to foster change, as I suggest in the final section of this paper.

The third hypothesis (H3) proposed a differential impact, by comparing math and science to reading. The two cross-level interactions in Table 3 show that the negative impact of ‘Religious Belief’ is multiplied in science achievement, and particularly in mathematics achievement. The negative impact is more salient in mathematics. This is likely because during primary and lower secondary, science curricula consist of basic notions, and in mathematics, the rational approach is introduced earlier.

Considering the size of the effects, the negative impact of religious faith on mathematics is comparable to the negative average impact that religious faith produces on the average CLSSAS performance. This implies that in countries that are strongly oriented toward religious faith, performance in mathematics could be better in the absence of such value orientation.

### **Discussion and Implications for Policy and Future Research**

This paper employed a macro-level analysis to test how school- and pupil-embeddedness in national culture influence the school achievement. Aggregate measures of child-rearing values were used to assess the impact of values on school achievement, at the aggregate (country) level. The empirical evidences support the three hypotheses: First, societal-level parental values have an impact on the CLSSAS estimates of average student achievement. Second, society’s pricing responsibility as value that children should learn increases the chances that primary and lower secondary students will perform better on international tests. Religious faith, when used as a driver for child rearing, produces the opposite effect, which has a stronger manifestation for mathematic achievement. Value orientations toward obedience have a small negative effect, while independence as a

parental value produces a small increase in the probability that students will have higher achievements in science, mathematics, and reading. All of these results hold true when controlling for various aspects of societal development, educational policy, and survey characteristics.

The findings contribute to two fields of social research that were rarely connected in the past research: social values and studies of country-level school performance. I argue that social values are part of the cultural environment in which schools evolve, and that they influence school achievement. To the best of my knowledge, this approach is new when considering parental values and their consequence for student achievement in CLSSAS. Therefore the paper joins current debates around the need to extend the contextualization of school outcomes by considering the consequences of cultural traits.

Considering practical consequences in terms of education policy, it may seem difficult for policymakers to manipulate factors like value orientations. This makes it hard to detect the implications for education policy. However, the stability of values was often questioned in the past decades (Arts, 2011). In the long-term, exposure to certain institutional factors may lead to changes in social values (Gundelach, 1994). Is it possible for policy to affect such changes? Let start with the easier, even if not-so-easy task: analysis in this paper considered society as a whole, but one may speculate on how to apply these findings when considering the values of the teaching staff. Teaching staff is a particular group which spends a lot of time in the relatively controlled environment of the schools. Here, the influence of institutions on social values could be used as leverage for policy directions. Teachers are not necessarily a homogeneous group: in any society, some may share value orientations toward autonomy, while others may value authority. Exposing teachers to training programs and explicit curriculum that reinforce values like responsibility and independence may influence their attitudes, behaviors, and even their value orientations. As the findings shows out, this may be beneficial for enhancing student achievement. However, in this sense, the evidence is still indirect. The results show that an average *societal* orientation towards autonomy values produces higher achievement. In order to see whether the value orientation of individual teachers influences student achievement, it is necessary to obtain data about the teachers' orientations of value. This might be a subject for future

research, as well as a potential proposal for the TIMSS and PISA teams.

Since the findings do not refer to individual teachers, but to society as whole, new questions may arise for societies to consider collectively. For instance, societies may consider through public debate, what is more important to teach the next generation: to stick to traditional values or to have more and better high achievers. The question is not easy to answer and may not have one comprehensive answer. Having higher achieving students may result in higher productivity and economic competitiveness. Dropping traditional values may involve changing cultural identity. Particularly in highly religious countries this may be an important issue.

Nevertheless, the findings add only a small brick to what should be a more sophisticated explanation of how cultural factors impact on student achievement, to be investigated by future research. Considering just the impact of parental values fails to properly predict the success of Asian education systems in CLSSAS tests. Other measures of cultural values should be included in more sophisticated models.

In terms of future research directions, the impact of social values, particularly parental values, could be considered in other several fields. One of them is school performance for immigrant children and second-generation migrants. If school achievement depends on cultural contexts, it might be the case that the culture of origin and the one of the host society mix up in determining the achievements of these children beyond language barriers and the status of origin family. Particularizing the assumptions of the segmented assimilation theory for the case of educational achievements as measured through the CLSSAS scores may be a topic for future research.

Gustafsson (2008, p. 10-12) points out the need to control for as many possible explanatory variables as possible when seeking to explain the cross-country variation of student achievement in the CLSSAS scores. This may also be the case for further validating the findings of this study. Three different levels would be necessary to achieve this. First, more indicators for culture are necessary, as this paper reduces them to child-rearing values. The second strategy is to add to the model curriculum-related indicators (Birenbaum et al, 2005; Adolffson & Henriksson, 1999), the average working-time of the students (Fuchs & Wößmann, 2004), and teacher quality (Akiba et al., 2007). Such indicators were not easily available or computable in a comparative analysis of the 67 societies included in this

study. This paper focused on between-country differences. The third strategy would be to extend it and explain differences within countries as well. Reynolds et al. (2002, p. 290) point out that regardless of the societal context, many factors that determine education outcomes are similar across-countries, but “the detail of how school level concepts play out within countries is different between countries”. Could social values be part of the contextual elements that change the impact of other factors? In order to assess this would require controlling for individual-level, classroom-level, and school-level characteristics (Creemers & Kyriakides, 2008). Community-level variables, including social values, should also be considered, since societies are not necessarily homogeneous. Such vast contextualization would allow verifying if the basic schooling rules change or not when context changes.

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### Notes

1 Using various other techniques of analysis on the EVS 2008 dataset, Rabušić (2011) reported similar findings.

2 Data was retrieved from the ARDA dataset

<http://www.thearda.com/Archive/CrossNational.asp>

3 Albania, Algeria, Argentina, Armenia, Australia, Austria, Belgium, Brazil, Bulgaria, Canada, Chile, Colombia, Croatia, Cyprus, Czech Republic, Denmark, Egypt, El Salvador, Estonia, Finland, France, Germany, Ghana, Greece, Hong Kong, Hungary, Iceland, Indonesia, Iran, Ireland, Israel, Italy, Japan, Jordan, Korea, Kyrgyzstan, Latvia, Lithuania, Luxembourg, Malaysia, Malta, Mexico, Morocco, Netherlands, New Zealand, Norway, Peru, Philippines, Poland, Portugal, Romania, Russian Federation, Saudi Arabia, Singapore, Slovak Republic, Slovenia, South Africa, Spain, Sweden, Switzerland, Thailand, Trinidad and Tobago, Turkey, Ukraine, United Kingdom, United States, Uruguay. In the cases of Belgium and the UK, the achievement indicators as well as the survey characteristics refer to Flanders and Wallonia, and to Scotland and England and Wales, respectively. For all other indicators, only nation-wide figures were available, therefore I have treated such country-

survey pairs as nested in Belgium, respectively the UK, when considering the country (instead of the above-mentioned divisions).

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