

## The ABCs for Smart Regulations: Education and the Quality of Business Regulations

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*“Education is what remains after one has forgotten what one has learned in school.”*

Albert Einstein

### Introduction

Do more educated societies have better business regulations? An intuitive answer for many would be a “yes”. However, such claim would be much stronger if it was supported by data. A plethora of research discusses the benefits of education for entrepreneurship, the labor force, economic growth, individual earnings, as well as lawmaking (recent work includes for example Barro, 2013; Hanushek and Wößmann, 2007; OECD, 2017; World Bank 2018). More specifically, research suggests a link between education and the efficiency of policymakers and policy implementers (Kim et al., 2018; World Bank, 2019). However, the discussion is lacking regarding the association between education and the quality of business regulations.

The purpose of this paper is to fill this gap and investigate a relationship between education and the quality of the legal framework that regulates local small and medium firms. We conduct the analysis using various metrics of education to account for both its length and quality. As a measure of the quality of business regulations, we use the ease of doing business score, as recorded by the World Bank’s *Doing Business* project. We find that schooling is, in fact, strongly associated with quality of business regulations.

Education and business regulations can interact through a variety of factors: better educated policymakers are likely to design a more efficient legal framework; regulations may be better implemented by well-educated officers and public servants; or, a more educated business community can be proactive in lobbying for better preparation of public servants and better quality of regulations. While we do not investigate each of these potential channels individually, we find strong evidence of a positive relationship between the educational system and the quality of business regulations. We find this significant association with the business regulatory framework when we look at education from a variety of angles: literacy rates and educational attainment, years of schooling (nominal and adjusted for quality of education), and harmonized test scores. The ease of doing business, as measured by *Doing Business* project, is positively associated with both the amount and the quality of education.

The remainder of the note is structured as follows. Section 2 provides an overview of the existing literature that links education to the business environment (including economic growth, entrepreneurship, workforce) as well as lawmaking and implementation of policies. It also introduces mechanisms for how education and business regulations may be related. Section 3 describes the data used in the analysis, while Section 4 introduces the empirical methodology. Section 5 documents the findings and discusses the relationship between education and business regulatory framework. Section 6 concludes.

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*Acknowledgement: We thank Arvind Jain and Valeria Perotti for comments and inputs on the data and analysis.*

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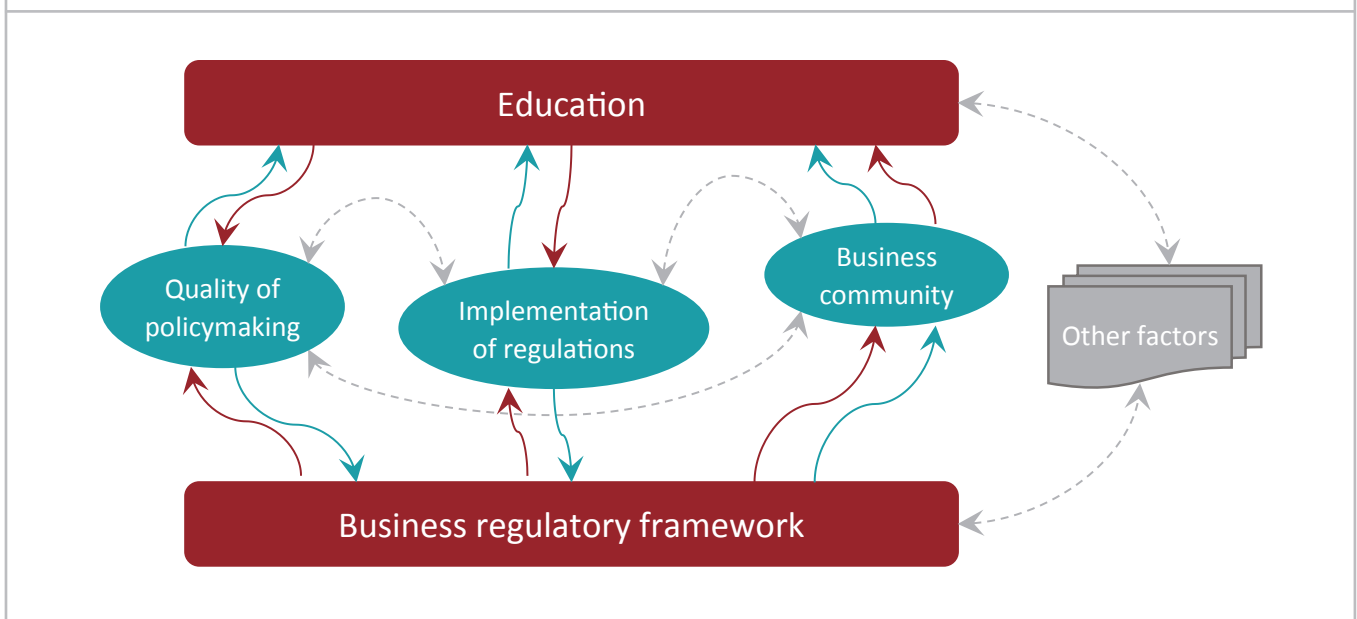
### Literature review

Our goal is to study the relationship between education and the business regulatory environment. There is limited available research on this topic. However, we can draw from research on the topic of education and entrepreneurship, economic growth, and individual earnings. There is an abundance of literature discussing beneficial social and economic outcomes from investments in education. Just to mention a few recent examples, research has found a positive relationship between education and economic growth (Altinok et al., 2018; Barro, 2013; Canals, 2017), individual earnings (Hanushek and Wößmann, 2007), quality and employability of the labor force (Berger and Fisher, 2013; OECD, 2017; Roser et al., 2018), and also business creation and growth (Bruhn and Zia, 2011; Greene, 2015; Quatraro and Vivarelli, 2014; Raposo and do Paço, 2011). It is possible that by boosting businesses and employment, education indirectly stimulates the need for efficient regulations that would create a harmonious environment for companies to operate in.

The effect that education has on behavioral patterns of an individual could also contribute to the quality of regulations that govern society. Manley (1903) argues that “character education” is the most practical type of schooling and it has competitive advantages over technical training. He writes: “As between these two requirements, that a student shall have the technical knowledge necessary to do the work of a position, or the qualities of head and heart which he needs to hold that position and gain still higher positions, all know which is more important. The student and his friends insist on technical instruction, nothing else to business education, while employers merrily weed out the ill-mannered and rattle-brained; and the world is satisfied.” (Manley, 1903, p. 565) Certainly, educational institutions and research on the matter have substantially evolved since. However, the quality of education continues to play an important role in business development, and a high-quality education goes beyond mere technical skills.

Despite a wide range of research discussing the connection between education and entrepreneurship, one aspect remains untouched: the association between education and the business regulatory framework. This association can potentially be observed through three different mechanisms. First, policymakers’ educational background is likely to influence the quality of policies that are drafted and adopted. However, efficient policies are only the first step to a business-friendly regulatory environment. Equally, if not more important, is the implementation of such policies on the ground. Therefore, another mechanism is that well-educated public officers contribute to a more efficient application of the legal framework designed by policymakers. Finally, the third mechanism is that a well-educated business community is

Figure 1. Relational mechanisms between education and business regulatory framework



more likely to actively participate in developing a beneficial business environment – this can be attained through lobbying for efficient regulations, participating in drafting policies and legislation, or engaging in a public-private partnership with educational institutions (figure 1).

To some extent, the hypothesis of these associations is supported by the existing literature. Education can be linked to the efficiency of policymakers as it improves personal decision-making and cognitive skills (Falch and Massih, 2011; Guerra-Carrillo, Katovich and Bunge, 2017; Kim et al., 2018; Morewedge et al., 2018; Ritchie, Bates and Deary, 2015). Training of public officers is associated with the efficiency of implementation of business regulations (World Bank, 2019). Education is also linked to political activism of the general public (UNESCO, 2014), which can help in monitoring how regulations are being implemented in practice. The middle class and the business community can promote efficient lawmaking (Business Roundtable, 2016; Loayza, Rigolini, Llorente, 2012; Jochnick, 2018). However, lobbying by large corporations can pose threats to inclusiveness and fairness of regulations (Corporate Europe Observatory, 2018). At the same time, no research was identified which analyzes the specific association between education and business regulations.

Due to lack of relevant reliable data on a global scale, it is not possible to analyze each of the mechanisms individually. Therefore, we look at the overall relationship between education and efficiency of business regulations. We look at education from three standpoints: amount of education, quality of education, and “hybrid” metrics that account for both quantity and quality of education. There is a variety of sources that allow us to look at this relationship.

### Data used in the analysis

We use panel data that cover 11 years of observations in 190 economies. Sample sizes and years of observations vary depending on the specific metric of education used (years of education, standardized testing scores, etc.) due to missing data. Details on data availability are provided in the description of each relevant dataset, and summary statistics are provided in Annex 1.

Datasets used in the analysis:

#### (i) Data about **regulatory business environment:**

- The ease of doing business score helps assess the quality of business regulations and their implementation over time.<sup>1</sup> It captures the gap of each economy from the best regulatory performance observed on each of the indicators across all economies in the *Doing Business* sample since 2005. One can both see the gap between a particular economy’s performance and the best performance at any point in time and assess the absolute change in the economy’s regulatory environment over time as measured by *Doing Business*. An economy’s ease of doing business score is reflected on a scale from 0 to 100, where 0 represents the lowest and 100 represents the best performance.<sup>2</sup> For example, an ease of doing business score of 75 in *Doing Business 2019* means an economy was 25 percentage points away from the best regulatory performance observed across all economies and across time. A score of 80 in *Doing Business 2020* would indicate that the economy is improving. In the analysis we use 11 years of observations (2008-2018) in 190 economies.

#### (ii) Data about **the level of education:**

- Literacy rates, including breakdown by gender, and age groups 15-24, 25-64, and 65 and above.<sup>3</sup> The data reflect the percentage of a respective population who can, with understanding, read and write a short, simple statement on their everyday life. Generally, ‘literacy’ also encompasses ‘numeracy’, the ability to make simple arithmetic calculations. In the analysis we use 11 years of observations (2008-2018) in 142 economies (the sample varies in each year). For the purposes of this analysis we use data for economies where observations on all groups are available.
- Educational attainment: primary education; for the purposes of this analysis, lower secondary, upper secondary attainment was grouped under secondary education; and post-secondary, Bachelor’s or equivalent, Master’s or equivalent, Doctoral or equivalent were grouped into tertiary education.<sup>4</sup> The data represent the percentage of a population, ages 25 and over, that completed the respective level of education. In the analysis we use 11 years of observations (2008-2018) in 139 economies (the sample varies in each year).

For the purposes of this analysis we use data for economies where observations on all groups are available.

- Duration of compulsory education is the number of years that children are legally obliged to attend school.<sup>5</sup> In the analysis we use 11 years of observations (2008-2018) in 174 economies (the sample varies in each year).

(iii) Data about **quality of education**:

- Program for International Student Assessment (PISA) scores.<sup>6</sup> PISA tests the skills and knowledge of 15-year-old students in reading, mathematics and science. The PISA-based Test for Schools provides school-level estimates of performance and information about the learning environment and students' attitudes gathered from student questionnaires. In each test subject, there is theoretically no minimum or maximum score in PISA; rather, the results are scaled to fit approximately normal distributions, with means for OECD countries around 500 score points and standard deviations around 100 score points. Data are published every three years (data for 2009, 2012, 2015 and 2018 were used in the analysis) and cover a sample of 80 economies (the sample varies in each year).
- Component "Harmonized Learning Outcome" of the Human Capital Index.<sup>7</sup> Harmonized Test Scores are retrieved from the Global Database on Education Quality (Patrinos and Angrist, 2018). This database harmonizes scores across major international student achievement testing programs measured in TIMSS-equivalent units, where 300 is minimal attainment and 625 is advanced attainment.<sup>8</sup> The most recent (2018) estimates are used, covering 157 economies.

(iv) Data combining **quality and quantity of education**:

- Component "Learning-Adjusted Years of School" of the Human Capital Index.<sup>9</sup> Learning-Adjusted Years of School are calculated by multiplying the expected years of schooling by the ratio of the most recent harmonized test scores to

625, where 625 corresponds to advanced attainment on the TIMSS test (Filmer et al. 2018). Data are available for one year – 2018 – and cover 157 economies.

**Methodological approach**

The following general model is used in the analysis:

$$B_{ij} = \beta_0 + \beta_1 E_{ij} + \beta_2 M_{ij} + \varepsilon_{ij}$$

where  $B_{ij}$  represents quality and efficiency of business regulations in economy  $i$  in year  $j$ ;  $E_{ij}$  reflects a specific metric of education in economy  $i$  in year  $j$ ;  $M_{ij}$  is the log of gross national income (GNI) per capita in economy  $i$  in year  $j$ ; and  $\beta_0$ ,  $\beta_1$  and  $\beta_2$  are coefficients.<sup>10</sup>

When gender-disaggregated data are available, the analysis is replicated for each gender to identify whether it is female or male education that drives the overall relationship. Furthermore, the analysis is replicated for three age groups in case of literacy rates (youth, adults and senior population).

This same methodological approach is used across 14 models with the following variables acting as predictors: literacy rates, education attainment, years of compulsory education, and PISA scores for reading/math/science.

Finally, in the case of harmonized learning outcomes and learning-adjusted years of education, only one year of observations is available. Therefore, a simple regression controlling for GNI is used in both cases.

**Findings and discussion of the results**

The data show a statistically significant relationship between literacy and efficiency of business regulations. On average, a one percentage point increase in the literacy rate is associated with a 0.16 points increase in the ease of doing business score (see Annex 2, table 1). This association remains strong when literacy rates are disaggregated by gender (see figure 2). Female literacy rates have a slightly stronger association with

Figure 2. Association between ease of doing business and literacy rates in males and females



Source: UNESCO Institute for Statistics database; Doing Business database  
 Notes: Relationship for females is statistically significant at the 1% level before and after controlling for income per capita. Relationship for males is statistically significant at the 10% level before and after controlling for income per capita.

the business regulatory framework, compared to male literacy rates (the former relationship is significant at the 1% level, while the latter at the 10% level). A one percentage point increase in female literacy rates is associated with an average 0.15 points higher ease of doing business score. For males, this coefficient is at 0.13 points. Results suggest that economies where access to education differs for men and women may not be fully exploiting their potential for efficient regulations of entrepreneurship.

Literacy rates in people of all age groups are positively associated with quality of the business regulatory framework. The same results are obtained when the analysis is repeated using literacy rates for youth (15-24 year-olds, at the 5% significance level), adults (25-64 year-olds, at the 5% significance level), and seniors (65+ year-olds, at the 1% significance level). However, the coefficient is slightly higher for youth – a one percentage point change in literacy rates in this group is associated with a 0.14 percentage points average increase in the ease of doing business score. For seniors, the respective associated increase in the ease of doing business score is at 0.10 percentage points (see Annex 2, table 1).

However, literacy rates only provide a birds-eye view on the education system. Data on different educational attainments can shed more light on the level of education in an economy. Results suggest a strong positive association between the ease of doing business score and educational attainment at all levels. The strongest relationship is observed at the secondary level of education: a one percentage point increase in the secondary education completion rate is associated, on average, with a 0.28 point increase in the ease of doing business score (see Annex 2, table 2). However, it is important to keep in mind that each level of education implies completion of the previous levels. In other words, a person must complete their primary education prior to being able to attain secondary, and secondary education is a pre-requisite for person's attainment of tertiary level. Therefore, the results should not be interpreted as secondary education being dominant over primary. To progress in advanced education, students must have built their analytical skills and cognitive abilities at an early age.

Next, we look at measures of education quality. Results show a strong positive association between the ease of doing business score and PISA scores on math (see Annex 2, table 3). The same result holds when proficiency in math is disaggregated by gender. A one point increase in female proficiency in math is associated, on average, with a 0.10 point increase in the ease of doing business score. For males, this number is 0.05. At the same time, students' proficiency in reading and science do not have a statistically significant relationship with the efficiency of business regulations. This is a somewhat unexpected finding. The difference in these relationships may be explained by the nature of the assessed skills. In mathematics proficiency, students are tested on their ability in applying theoretical knowledge to real-life problem solving. The tests measuring reading proficiency, however, assess students' comprehension, while science tests measure the ability to apply a methodological approach, as well as explain or interpret phenomena. While the latter two sets of skills are generally important to communicate or provide sound arguments in a discussion, it is the problem-solving skillset that implies creativity and "thinking outside the box". Problem-solving skills can help policymakers find the best-fit solution for a specific set of legislative issues, or they can enable regulators to efficiently implement the rule of law in a specific non-standard case. Yet, it is still arguable

that reading and comprehension, as well as the ability to find the "fit-for-purpose" solutions, are crucial for effective regulatory changes – from drafting to implementing the reforms. Further research will be helpful in shedding light upon this unexpected result. The harmonized test scores also have a positive and statistically significant relationship with the ease of doing business score. When harmonized test scores increase by one point, the associated average improvement in the ease of doing business score is 0.09 points (see Annex 2, table 4).

It is no surprise – given the above results – that a statistically significant positive relationship is also observed between an economy's ease of doing business score and years of compulsory education, with each additional year of compulsory education being associated with an average increase of ease of doing business score by 0.3 points (see Annex 2, table 5).

Another strong positive association is observed when measures of quality and quantity of education are combined. Learning-adjusted years of schooling show a strong positive association with the quality of business regulations. On average, one additional learning-adjusted year of schooling is associated with a 3.09 points increase in the ease of doing business score (see Annex 2, table 5).

Overall, the results suggest a strong association between education in an economy and the efficiency of its business regulations. Both quality and quantity of education show significant results.

## Conclusions

Data show that both educational quantity and quality have a strong positive relation with the business regulatory environment.

Basic literacy, educational attainment, years of schooling, relative proficiency of students are all strongly correlated with the business regulatory framework. Further research is needed to better understand the drivers of the relationship between education and quality of business regulations.

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## NOTES

- 1 World Bank Group, *Doing Business* project, <https://www.doingbusiness.org/>
- 2 The ease of doing business scores for each year were calculated as the average of scores for all indicators included in *Doing Business* in the respective year (e.g., getting electricity data were added to the dataset in *Doing Business 2010*, so the ease of doing business score in prior years does not include the ease of getting electricity). Several changes in methodology took place in *Doing Business* topics over the course of the years – this should be kept in mind while interpreting the results. The author finds it justifiable to use historical data for the purposes of this research note despite methodology breaks in the time series, since the end goal of these data under any methodology is to represent the effectiveness of the business regulatory framework. In all years, the scores are normalized on a scale from 0 to 100, with higher scores representing better business regulatory environment. For more information on *Doing Business* methodology, please consult <https://www.doingbusiness.org/>.
- 3 UNESCO Institute for Statistics, <http://uis.unesco.org/>
- 4 UNESCO Institute for Statistics, <http://uis.unesco.org/>
- 5 UNESCO Institute for Statistics, <http://uis.unesco.org/>
- 6 Organization for Economic Co-operation and Development, <http://www.oecd.org/pisa/>
- 7 World Bank Group, <https://www.worldbank.org/en/publication/human-capital>
- 8 TIMSS refers to the Trends in International Mathematics and Science Study. TIMSS is a flagship study of the International Association for the Evaluation of Educational Achievement (IEA). This study is an international assessment of student achievement in mathematics and science at fourth and eighth grades. TIMSS is designed to capture the breadth and richness of these subjects as they are taught in the participating countries. It collects detailed information about curriculum and curriculum implementation, together with empirical information about the contexts for schooling. Data are available at <https://www.iea.nl/index.php/data-tools/repository/timss>
- 9 World Bank Group, <https://www.worldbank.org/en/publication/human-capital>
- 10 Data on gross national income (GNI) per capita downloaded from <https://databank.worldbank.org/>. Data reflect the gross national income, converted to U.S. dollars using the World Bank Atlas method, divided by the midyear population.

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Annex 1. Summary statistics for the variables used

Variable	Obs	Mean	Std. Dev.	Min	Max
ease of doing business score	2,059	60.46	13.16	19.98	88.70
literacy rates (all)	375	85.20	17.57	22.31	100.00
literacy rates (females)	375	82.19	20.89	12.19	100.00
literacy rates (males)	375	88.32	14.37	31.33	100.00
literacy rates (age 15-24)	369	92.01	13.74	30.79	100.00
literacy rates (age 25-64)	369	84.34	19.79	18.74	100.00
literacy rates (age 65 and above)	362	63.47	26.89	3.73	99.95
educational attainment - tertiary	654	23.51	12.94	0.00	69.07
educational attainment - secondary	679	69.64	23.71	5.93	100.00
educational attainment - primary	564	82.99	19.83	10.93	100.00
PISA - math (all)	261	460.81	53.56	325.10	573.47
PISA - math (female)	261	458.05	52.75	326.67	575.14
PISA - math (male)	261	463.59	54.65	323.52	571.86
PISA - reading	260	460.65	49.59	339.69	549.47
PISA - science	261	465.30	50.22	331.64	555.58
harmonized test scores	149	432.04	69.64	304.92	580.87
learning-adjusted years of schooling	149	7.92	2.72	2.28	12.90
years of compulsory education	1,895	9.58	2.28	5.00	17.00
gni_log	2,021	8.55	1.44	5.25	11.71

Annex 2. Regressions outcomes

Table 1. Literacy rates

VARIABLES	(1) db	(2) db	(3) db	(4) db	(5) db	(6) db	(7) db
gni_log	2.102** (0.935)	1.167 (0.994)	1.015 (0.994)	1.461 (0.988)	1.499 (0.971)	1.308 (1.003)	1.127 (0.962)
literacy rates (all)		0.155** (0.0613)					
literacy rates (females)			0.153*** (0.0533)				
literacy rates (males)				0.128* (0.0672)			
literacy rates (15-24)					0.136** (0.0645)		
literacy rates (25-64)						0.119** (0.0571)	
literacy rates (65 and above)							0.100*** (0.0307)
Constant	41.42*** (7.836)	36.03*** (8.026)	37.96*** (7.801)	35.47*** (8.388)	33.98*** (8.544)	38.06*** (7.943)	43.22*** (7.688)
Observations	359	359	359	359	359	359	359
R-squared	0.023	0.051	0.059	0.039	0.042	0.042	0.068
Number of economies	140	140	140	140	140	140	140
Regression method	Panel - FE	Panel - FE	Panel - FE	Panel - FE	Panel - FE	Panel - FE	Panel - FE
Standard errors in parentheses							
*** p<0.01, ** p<0.05, * p<0.1							

Table 2. Educational attainment

VARIABLES	(1) db	(2) db	(3) db	(4) db
gni_log	2.986*** (0.912)	2.524*** (0.902)	0.263 (0.915)	1.689* (0.958)
educational attainment - tertiary		0.179*** (0.0427)		
educational attainment - secondary			0.278*** (0.0343)	
educational attainment - primary				0.179*** (0.0460)
Constant	39.41*** (8.400)	39.59*** (8.246)	45.69*** (7.878)	36.47*** (8.302)
Observations	557	557	557	557
R-squared	0.024	0.062	0.152	0.057
Number of economies	118	118	118	118
Regression method	Panel - FE	Panel - FE	Panel - FE	Panel - FE
Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1				

Table 3. PISA scores

VARIABLES	(1) db	(2) db	(3) db	(4) db	(5) db	(6) db
gni_log	5.093*** (1.877)	4.401** (1.843)	3.861** (1.831)	4.847*** (1.858)	5.093*** (1.877)	5.202*** (1.881)
PISA - math (all)		0.0813*** (0.0253)				
PISA - math (female)			0.0998*** (0.0252)			
PISA - math (male)				0.0548** (0.0237)		
PISA - reading					0.00827 (0.0230)	
PISA - science						-0.0221 (0.0234)
Constant	22.89*** (18.44)	-7.791 (20.36)	-10.75 (19.65)	-0.109 (20.76)	19.07 (20.68)	32.11 (20.87)
Observations	261	261	261	261	260	261
R-squared	0.039	0.092	0.117	0.067	0.041	0.044
Number of economies	80	80	80	80	80	80
Regression method	Panel - FE	Panel - FE	Panel - FE	Panel - FE	Panel - FE	Panel - FE
Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1						

Table 4. Harmonized test scores and learning-adjusted years of schooling

VARIABLES	(1) db	(2) db	(3) db
gni_log	6.341*** (0.472)	3.149*** (0.679)	1.530* (0.783)
harmonized test scores		0.0867*** (0.0144)	
learning-adjusted years of schooling			3.086*** (0.429)
Constant	10.73** (4.152)	0.860 (4.069)	27.86*** (4.295)
Observations	147	147	147
R-squared	0.554	0.644	0.672
Regression method	Simple	Simple	Simple
Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1			

Table 5. Years of compulsory education

VARIABLES	(1) db	(2) db
gni_log	4.492*** (0.524)	4.177*** (0.535)
years of compulsory education		0.302*** (0.112)
Constant	22.47*** (4.529)	22.29*** (4.521)
Observations	1,825	1,825
R-squared	0.043	0.047
Number of economies	171	171
Regression method	Panel - FE	Panel - FE
Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1		