Correlation Between Corruption and Education in Developing Countries

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ABSTRACT

- Cross-country empirical studies that analyze the relationship between corruption perception and education indicators are abundant. In this study, I use the PISA outcomes to proxy for education quality as well as other education indicators and regress them with two different corruption measures and control variables. Running GLS on the standardized mean values of the PISA results shows that lower corruption is associated with an increase in the PISA scores for math (0.23 σ), science (0.20 σ), and reading (0.29 σ) across countries; however, these coefficients are not statistically significant after controlling for fixed effects and other control variables. Dropout rates show a stronger relationship (-3.15). In addition, I use other educational indicators such as enrollment and schooling years to study the effect of corruption in the access to education and human capital stock. Using interactions in my regressions show worse PISA outcomes for developing countries in general.

BACKGROUND

- Dridi 2014 compiled a literature review of similar empirical studies. Education quality is constantly measured by repeater or dropout rates, access to education through enrollment rates, and human capital stock through schooling years.

- TI's Global Corruption Report on Education in 2013 presented case studies from different countries. "Corruption in education is an extra burden on the poor." Then, developing countries suffer more deeply from the effect of corruption in education. The non-transparent nature of corruption makes it hard to measure it.

- Corruption perception is a good measure of corruption. The lack of resources that corruption carries over are correlated with public discontent (CHR. Michelsen Institute 2006, Smith 2008).

- Country case studies also exist that study corruption within the sector of education specifically. PETS: shown negative consequences of embezzlement of resources in education (Ferraz et al, 2014).

- The D.R. ended up with the worst score among the countries in the PISA 2015 examinations. A 70.7% fell into the lowest achievers! (PISA, 2015). Around 4.4% of the GDP is being spent in education; also, lots of construction of schools and the extension of the school day period. However, this has not had its desired effect yet.

OBJECTIVES

- Study the relationship between corruption and education quality, human capital stock, and access to education with more recent cross-country data (2003-2015).
- Use a new indicator for education quality: PISA outcomes 2003-2015.
- Investigate whether the effect of corruption in developing countries is larger than in developed countries.
- Comment on the Dominican Republic's PISA outcomes in 2015.
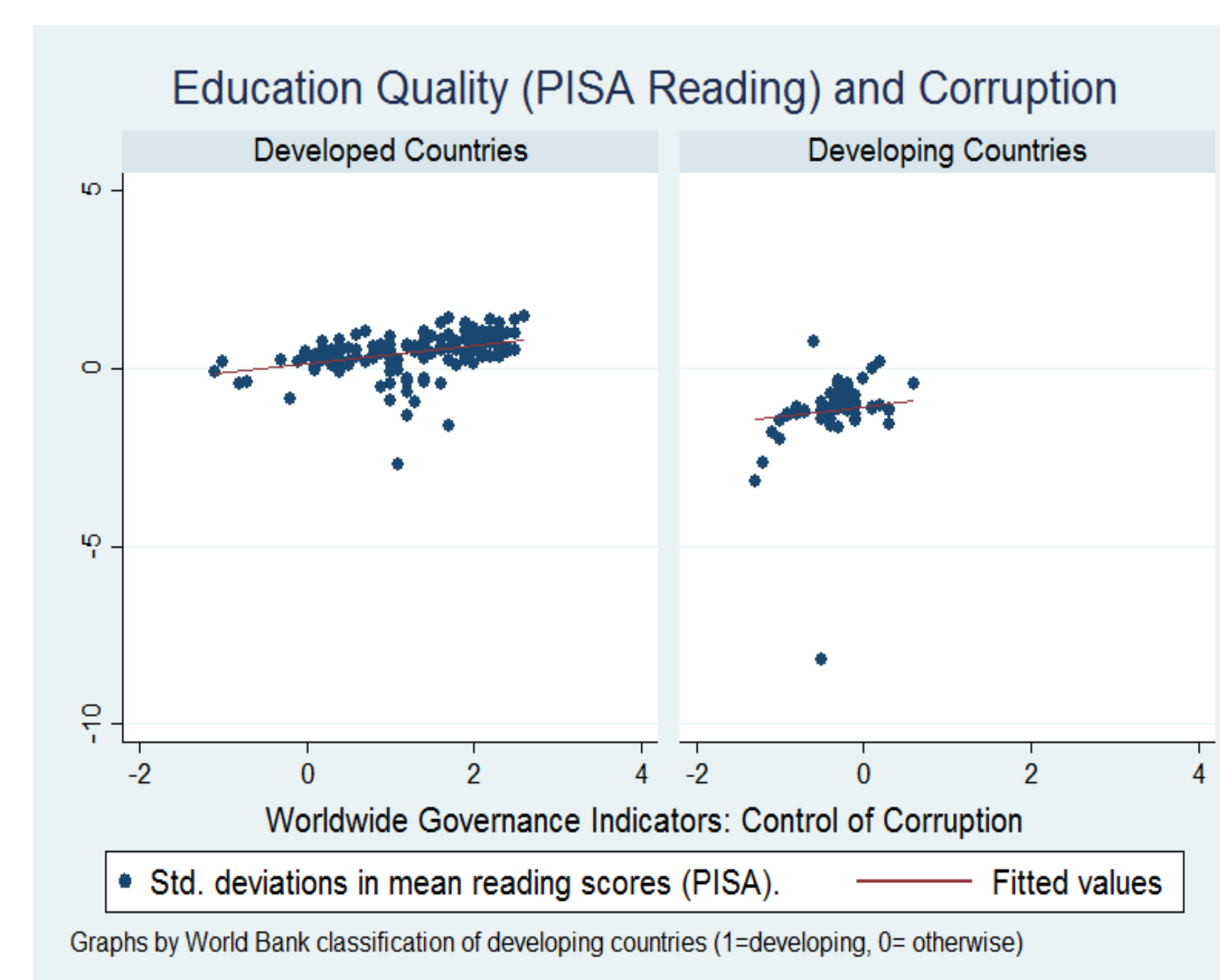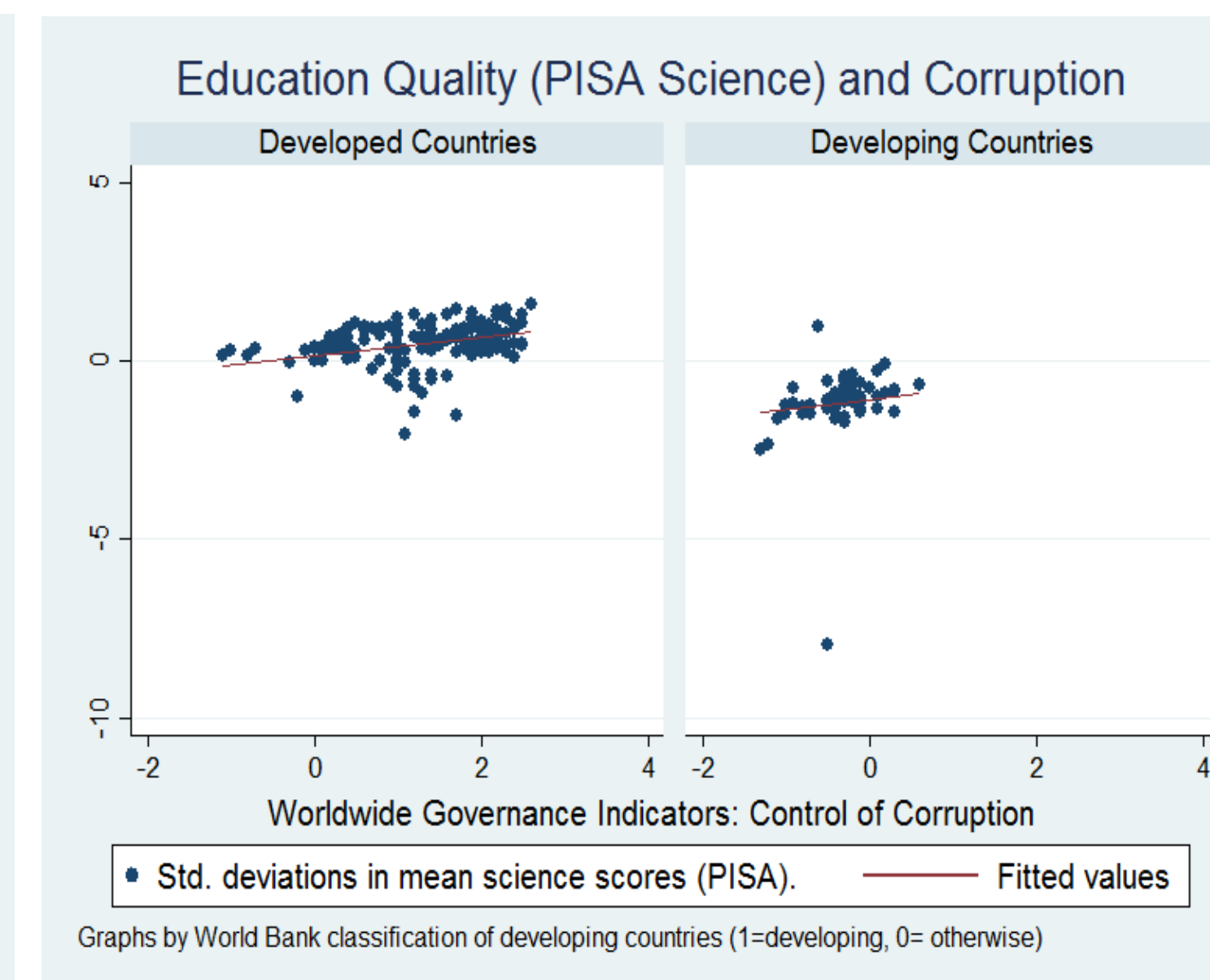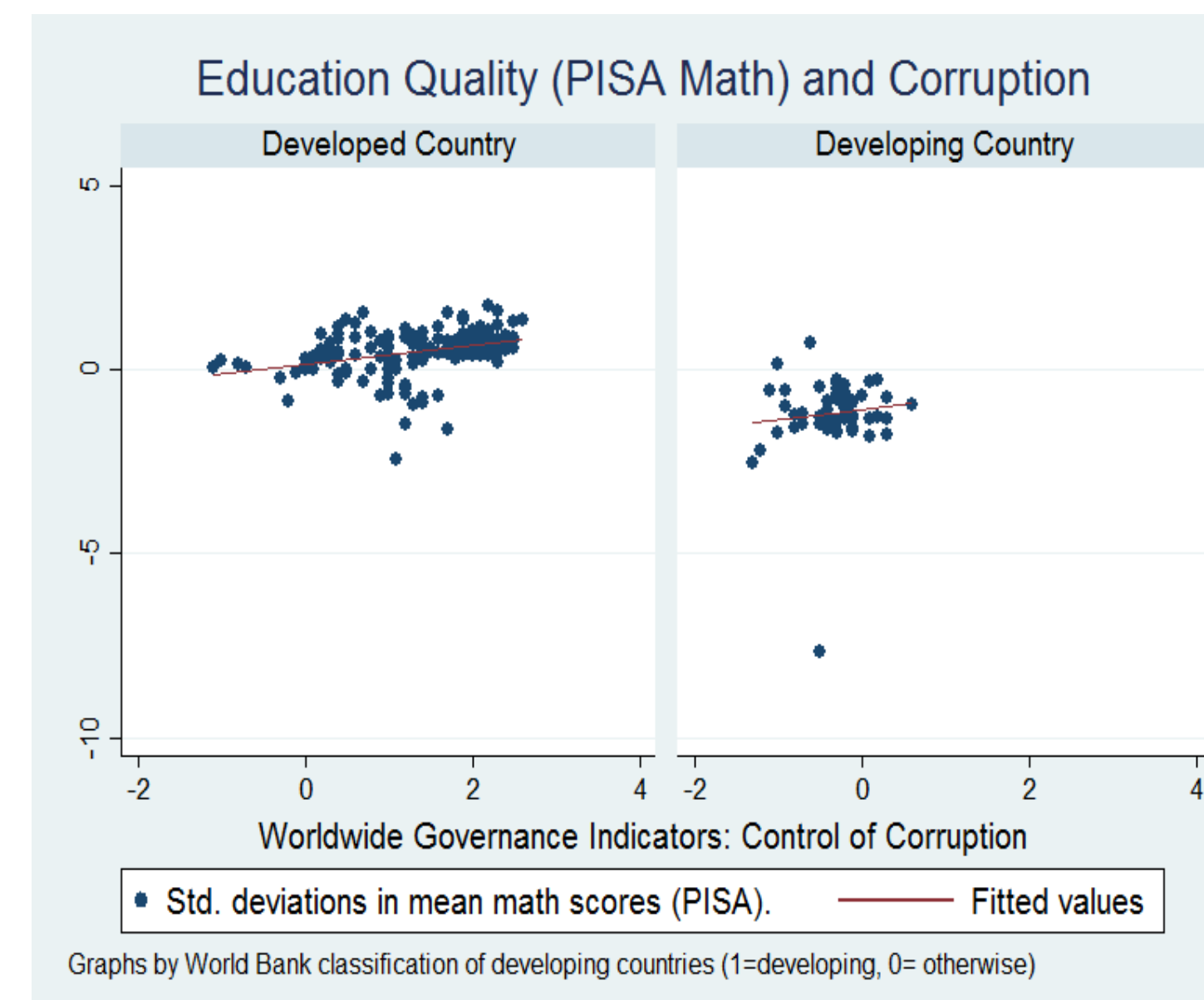
METHODS

- Used STATA as my analytical software (thanks to the APEC department!).

- Gathered a panel data set and standardized some variables. Ran tests for heteroskedasticity and adjusted for robust standard errors; the MWD test of functional forms and Ramsey's RESET test favored a linear model; and, the Hausman test favored a fixed effects model for most of my regressions.

- Ran GLS regressions with country fixed effects and time fixed effects.

- Created interactions in my regressions to investigate whether the effect of corruption in education is larger in developing countries.

EMPIRICAL RESULTS

GLS on PISA Outcomes (Std. Deviations)

	MATH		SCIENCE		READING	
	(1)	(2)	(3)	(4)	(5)	(6)
WGI corruption indicator*	0.230 *** (.087)	0.123 (.12)	0.195 *** (.076)	0.066 (.099)	0.291 *** (.110)	0.091 (.172)
Expenditure in education (% of GDP)		-0.100 ** (.04)		-0.060 (.038)		-0.114 ** (.043)
Mortality		-0.021 (.022)		0.0004 (.013)		-0.038 ** (.015)
GDP per capita		-0.002 (.004)		0.001 (.003)		0.002 (.004)
Constant	-0.328 * (.177)	0.733 ** (.355)	-0.289 * (.174)	0.300 (.245)	-0.413 ** (.194)	0.906 ** (.372)
Country fixed effects	No	Yes	No	Yes	No	Yes
Time fixed effects	-	Yes	-	Yes	-	Yes
Observations	218	155	218	155	217	154
R-squared (overall)	0.379	0.447	0.374	0.100	0.411	0.569

GLS on Education Indicators
(Quality, Access, and Human Capital Stock)

	Dropout (%)		Enrollment (%)		Schooling (years)	
	(7)	(8)	(9)	(10)	(11)	(12)
WGI corruption indicator*	-4.671 *** (.926)	-3.15 * (1.67)	1.83 ** (.815)	-0.48 (.897)	0.259 (.232)	-0.037 (.118)
Mortality		-0.13 *** (.044)		-0.28 *** (.041)		-0.013 (.008)
GDP per capita		0.02 (.049)		-0.004 (.029)		0.001 (.004)
Constant	13.77 *** (.907)	19.97 *** (2.03)	90.12 *** (.892)	101.8 *** (1.7)	8.796 *** (.274)	9.014 *** (.366)
Country fixed effects	No	Yes	No	Yes	No	Yes
Time fixed effects	-	Yes	-	Yes	-	Yes
Observations	1071	1039	1441	1416	430	419
R-squared (overall)	0.123	0.143	0.137	0.598	0.362	0.323

*Increase in one σ in the **WGI** means **less** corruption.

Education Quality (PISA Math) and Corruption

Std. deviations in mean math scores (PISA). — Fitted values
Graphs by World Bank classification of developing countries (1=developing, 0= otherwise)

Education Quality (PISA Science) and Corruption

Std. deviations in mean science scores (PISA). — Fitted values
Graphs by World Bank classification of developing countries (1=developing, 0= otherwise)

Education Quality (PISA Reading) and Corruption

Std. deviations in mean reading scores (PISA). — Fitted values
Graphs by World Bank classification of developing countries (1=developing, 0= otherwise)

Interaction of Corruption in Developing Countries

$$Y_i = \alpha_i + \beta C_i + \gamma D_i + \delta(C*D)_i + \theta Z_i \, \varepsilon_i.$$

Education Quality	∂CPI			∂WGI		
	Developing	Developed	Ratio	Developing	Developed	Ratio
∂math	.06 + .416(1) = .422	.06 + .416(0) = .06	7.0	.151 + .467(1) = .618	.151 + .467(0) = .151	4.1
∂science	.184 + .148(1) = .332	.184 + .148(0) = .148	2.2	.292 + .261(1) = .553	.292 + .261(0) = .292	1.9
∂reading	.012 + .064(1) = .076	.012 + .064(0) = .012	6.3	.099 + .256(1) = .355	.099 + .256(0) = .099	3.6
∂dropout	1.39 - 3.61(1) = -2.22	1.39 - 3.61(0) = 1.39	-1.6	1.53 - 1.06(1) = .47	1.53 - 1.06(0) = 1.53	0.3
Access to Education						
∂enrollment	.367 - 3.52(1) = -3.15	.367 - 3.52(0) = .367	-8.6	-0.321 - 1.69*(1) = -2.01	-0.321 - 1.69*(0) = -0.321	6.3
Human Capital Stock						
∂schooling	-.083 + .456(1) = .373	-.083 + .456(0) = -.083	-4.5	-.008 - .148(1) = -.156	-.008 - .148(1) = -.008	19.5

DISCUSSION

- My analysis shows that a better governance score is associated with increased scores on the PISA examinations across countries; however, they are not significant after controlling for other variables. Education quality (dropout rate) shows a stronger and more significant relationship with corruption even after controlling for fixed effects and other variables.

- Access to education (enrollment rate) shows a 1.83 increase for a one σ increase in the corruption indicator. The effect becomes small and insignificant after controlling for fixed effects and other variables.

- Human capital stock as measured by the mean schooling years does not show a strong relationship with corruption.

- The effect of corruption in developing countries' education sectors is harsher in the aspects of quality than access, and the accumulation of human capital.

- One of the assumptions I make is that the overall perception of corruption implies that there is also corruption in the education sector. This may not be true for all cases, so I gathered data from Global Corruption Barometer survey (2004-2013) where people answered to this question: "To what extent do you perceive the following sectors in this country/territory to be affected by corruption?" (1: not at all corrupt, 5: extremely corrupt). This table shows the interactions of corruption within education in developing countries after controlling for time effects and other variables:

Global Corruption Barometer Surveys
Perception of Corruption within the sector of Education
(After controlling for other variables, no fixed effects)

	Developed	Developing
y = dropout	2.99	1.38
y = enrollment	-0.672	-0.749
y = schooling	-0.26	0.174

CONCLUSIONS & COMMENTS

- Corruption is associated with worse education quality. I cannot conclude that corruption is highly correlated with worse education access and less accumulation of human capital.

- Not clear stronger/weaker effect in developing countries.

- Corruption in general is associated with corruption within the education sector in specific; corruption within the sector is associated with worse qualitative. Cannot conclude the same about quantitative education outcomes.

- Better specifications (2SLS, non-linearities, etc.) and more comparable data across countries are needed.

- More research needed. Criticism on PISA as outdated exam and small sample. Control for students that took the test background questions.

- In the D.R., the fact that more resources are being spent in the education sector does not mean that all of these resources are being used effectively and honestly. Still, the country needs time to see if the money will be translated into better education. More data and research is needed to track the expenditures in education and how they are being utilized and managed. A country case study based on surveys such as PETS in Brazil (Ferraz et al, 2014) would shed light on the real situation of education in the D.R.