Corruption's Impact on Government Health and Education Expenditures.

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Abstract:

The purpose of this paper it to identify how corruption can impact government expenditures, specifically education as a percentage of GDP, educational as a percentage of total government expenditures, health as a percentage of GDP, and health as a percentage of total government expenditures. The independent variables in which will be used for this model are: Corruption Perception Index, Worldwide Governance Indicators, and Polity IV. Through the time period of 2005 to 2014, this research is a global panel study that looks at income group and regional analysis. Comparisons will be made from the correlation of the variables between country groups and the global analysis to try and further understand on how corruption impacts countries differently.

Key words: Corruption, Government Expenditures, Region, Income

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1.0 Introduction

Corruption has many avenues for an individual to replace the benefit of people within a country with their own benefit. For example there is bribery of public officials/politicians for favors such as tax evasion, or other rents, or to even bypass regulation and create favored regulation. Corruption within the private economy induces economic cost of business which has a negative impact on the population as well. The creation of monopolies through government and private economic transactions make hard lines for entry to market. This hurts innovation for new business, labor productivity, and investment into firms within a county's economy (Chêne, 2014). But the corruption being looked at by this study is specifically government corruption that misallocated resources in tern altering the composition of government expenditures. These avenues are "white elephants", which are government contracts or projects that benefit the person through bribery or embezzlement far greater than say additional education labor (Mauro, 1995).

Due to corruption's negative impact on avenues of approach in social programs or poverty alleviation, the misallocation of resources to the most lucrative benefit of the individual creates a systemic hurdle for human development. The has a negative impact on income distribution in the form of the poor not getting economic opportunities as well as a middle income class that would under normal conditions use their taxes as leverage to hold a government accountable. For example in a panel data study by Gyimah-Brempong (2001), African countries that had a one point increase in the corruption index, had a seven point increase in the Gini coefficient with income inequality.

Research on corruption is important not only to expose corruption within countries but to help prevent it. Research that helps identify not only the impacts of corruptions but the determinates of corruption as well. For example aid in Africa. In the book Dead Aid by Moyo (2009), aid is shown to be a determinant of corruption. The book explains how aid is given to governments in hopes they use it to better human development and economic growth, but the reality is aid fosters government corruption. It gives a resource for the individual to embezzle rather than use it to better human development and economic development. Within the last 50 years over $1 trillion in aid has been given to African countries but income per capita is lower than it was in the 1970's as well as adult literacy rates. This book helps explain that mistakes made and ways to prevent the fostering of corruption at a systemic level. The aid is not reaching the resources
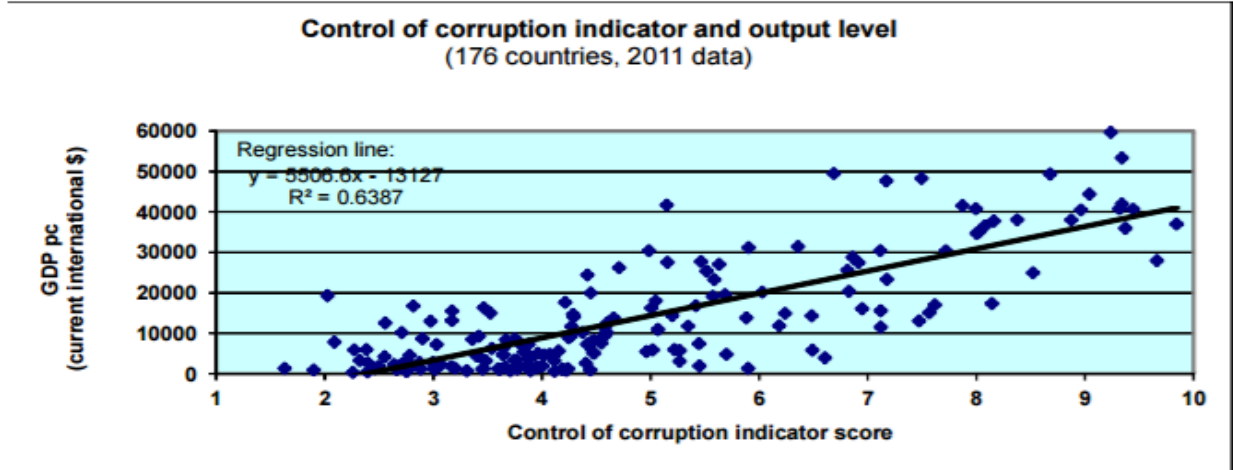
to help the people such as education and health which improve lives as it was intended for. This study will help contribute to the understanding of how corruption impacts the government not just within a global view but a view of region and income level as well.

2.0 Trends

The general trends for corruption often deterer many variables including economic output. Figure 1 from the World Bank explains the relationship between control of corruption, a variable used in this paper and GDP (current international $). Even in 2011 there are clear signs that corruption has a strong impact on a countries economy. And within that impact standards of living such as health and education worsen. Some believe that there is a reverse causality between these variables. The statement is that high quality institutions takes a lot more money to get that way, in turn being able to fight off corruption. That may be true, but later in this paper high income groups are found to have a stronger correlation with corruption and government expenditures than low income groups (OECD, 2014). This gives counter evidence to reverse causality theories.

Corruption has also had a negative effect on the human development index. In figure 2 there correlation between HDI and Corruption Perception index from Transparency International is strong. A country with a higher CPI score will tend to have less corruption. Though there are solid differences in levels between different regions. Figure 3 shows the same strong correlation but between CPI and mean school years (Ospina and Roser, 2016).

Figure 1: Corruption and output levels

Control of corruption indicator and output level
(176 countries, 2011 data)

Regression line:
y = 5506.6x - 13127
R² = 0.6387

GDP pc (current international $)

Control of corruption indicator score

Source: IMF, WEO data base; World Bank, WGI data bank

Figure 2

Human Development Index vs. Corruption Perception Index, 2013

The vertical axis shows scores in the UN Human Development index (2013 data, lower values reflect lower development). The horizontal axis shows scores in Transparency International's Corruption Perception Index (2013 data, lower values reflect higher perceived corruption). Colors reflect world regions.
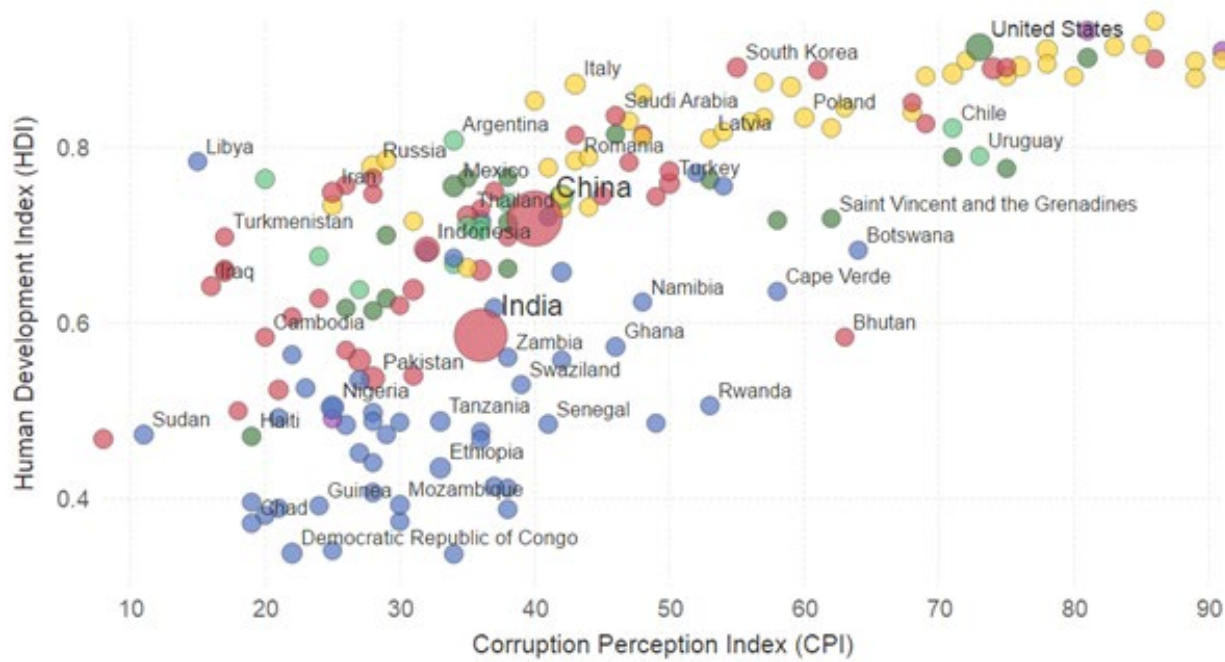
Figure 3

Average years of schooling vs. Corruption Perception Index, 2010 to 2012

Education in the vertical axis is measured using average years of schooling (2010 data). Corruption in the horizontal axis is measured using Transparency International's Corruption Perception Index (2012 data, lower values reflect higher perceived corruption). Colors reflect world regions.
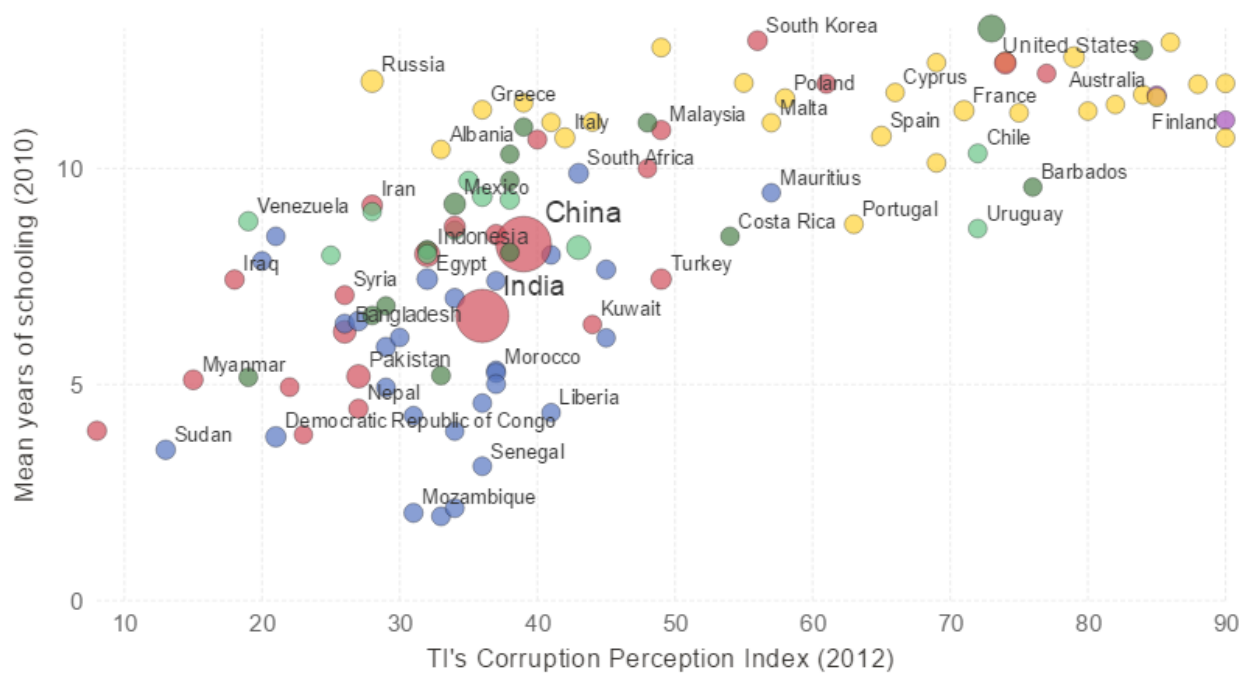
3.0 Literature Review

One of the first published studies to be done on corruptions impact on government expenditures was from Paola Mauro. His work throughout the 1990's shows the negative impacts of corruption on not only economic growth but government expenditures (Mauro, 1998). He used the Bureaucratic Efficiency Index to look at corruption, bureaucratic red tape, legal system, GDP per capita (1960-1985), and other variables to look at the correlation between corruption and his research. He also uses ethnolinguistic fractionalization as an instrument for likelihood two people of a country will have the same ethnicity, this is because he believes that the more homogeneous a country is the more corrupt they might be. The model was a paneled OLS average of 1970 to 1985 for a sampled 100 countries, which determined that there was a significant negative correlation even regardless of the bureaucratic red tape of different countries on government expenditures. (Mauro, 1995). The R-squared was around 26 percent. This was some of the first published evidence that corruption has a negative impact on government expenditures not only on health but on education.

Though a global empirical analysis is helpful, this study is designed to look at specific groups as well. For instance the OECD country's correlation between corruption and government expenditures. In a 21 country pooled panel from 1998 to 2011 by Jajkowicz and Drobiszová (2015) looked at the log of defense, education, public order, health, and other dependent variables with the independent variables of the log of CPI, GDPPC, and tax to find a relationship. The results showed a significance of less than .001 between the log of heath and CPI as well as tax. It also showed a significance at 10% for the log education and CPI. The study found that with an increase in CPI, meaning less corruption, there will be an increase of 0.25 p.b to health and 0.11 p.b to education. This is interesting as it shows a correlation between countries within different regions. It gave evidence that corruptions impact is wide spread even to developed countries globally.

To hone in on the correlation between corruption and government expenditures the next step was to look at regional study. Hashem (2014) published a study that looked at 13 Arab countries in a pooled panel from 1998 to 2008. Though due to data unavailability 1998 to 2008 had a total of 4 countries and 2003 to 2008 had the other 9. The study looked at the distortion of government expenditures in health and education not only as a percentage of GDP by a percentage of total government expenditures as well. The author talks about the backslides in CPI of certain

countries such as Egypt by also talks about the growth in countries such as Qatar increasing is country rank by 10 from 2003 to 2009. The results of the regional model of the dependent variables of government expenditures and CPI was determined to be significant with a probability of more than 95 percent in education and health expenditures. Meaning with an increase in CPI government health and education expenditures would increase as well. Though the percent of the data that is explained by the model is relatively low with an R-squared of .10 for education and .13 for health.

Another grouping this study tries to look at is countries grouped by income level. A study by Korneliussen (2009) broke down countries by income level and looked at corruptions impact on decentralization of fiscal government spending, and how decentralization effects the composition of government expenditures. This helped pave the way and give an interested variable of decentralization. The author makes the argument that decentralizing governments can lead to a decrease in social government spending. In the yard stick model explained that with an increase in taxes there is capital flight, so jurisdictions choose lower tax rates which could possible lead to lower government spending due to less tax revenue. An interesting non-direct effect of corruption of government expenditures could possible with that tax evasion creates less tax revenue for a government. The model is using CPI, government expenditures, tax, and if a country is a federal government. With an OLS model of 160 countries from 1984 to 2008, the author explains the weakness of the empirical analysis. Though there was some significance when grouped by income groups, the data availability for a global analysis create a barrier to further analysis of the author's model.

4.0 Model and Definition of Variables

The empirical model consist of a panel study from 2005 to 2014 as a random effect model. As a global model, random effect was used because variation across entities is random and uncorrelated within the model. The reason for this is to show the correlation of a global analysis between the independent and dependent variables. The model will also have dummy variables for income and region. This could show that countries within income and region groups have a much major difference in correlation due to the group they are in versus a global analysis. This process could give a better understanding of the correlation between corruption and government expenditures within region and income. The research that has been looked at mostly is comprised

of OLS and Pooled models which is not as accurate for controlling against omitted variable biases as fixed and random effect models. Since the independent variables of CPI and control of corruption are highly correlated they were not ran together as well as the independent variables control of corruption and government effectiveness. The model is below.

$$Gov\ Expend._{it} = \beta_0 + \beta_1 Control\ of\ Corr._{it} + \beta_2 CPI_{it} + \beta_3 Polity_{it} + \beta_4 gov\ effect_{it} + \varepsilon_{it}$$

The dependent variables consist of government expenditures in health and education. Though there is one model, it as ran for each dependent variable. Model 1.1 is government education expenditures as a percent of GDP. Model 1.2 is government health expenditures as a percent of GDP. Model 1.3 is education as a total percent of government expenditures. Model 1.4 is health as a total percent of government expenditures. The source of the data is from the World Bank. They collect data from many sources globally but the main source of health and education expenditure data collect was from United Nations Educational, Scientific, and Cultural Organization (UNESCO) Institute for Statistics and World Health Organization Global Health Expenditure database.

Polity as an independent variable is important to the understanding of government type. The source is from Center for Systemic Peace and looked at political regime characteristics for 167 countries from 1946 to 2015. The Polity IV Project measures a county's level of democracy within the definition of an institution which its people can express their preference and keep its government in check as a civil liberty. Its range is from an open democracy (2.5) to an autocracy (-2.5). An autocracy restrict government that limits the rights of its people with few institutional constraints. This measurement is important to understand how corruption acts within different forms of government.

Corruption Perception Index (CPI) as an independent variable looks at perceived corruption of countries. The source of this Index is from Transparency international look at 176 countries from 1996 to 2015. The index is a scale of 0 (highly corrupt) to 100 (very clean) for each country. This index is created using 13 different sources that capture the perceptions of corruption. A few example of these sources are the Political Risk Services International Country Risk Guide, Global Insight Country Risk Ratings, IMD World Competitiveness Yearbook, and World Bank - Country Policy and Institutional Assessment. This organization looks to shed light on corruption that undermines a countries growth in many areas.

Worldwide Governance Indicators are another important independent variable. The source of this data is from the World Bank but it takes from 30 different surveys, commercial business information providers, non-government organizations, and public sector organizations. They data collected if for a global index for over 200 countries from 1996 to 2015. The variables that are indexed are voice and accountability, political stability, government effectiveness, rule of law, and control of corruption. Some examples of the sources used are Global Integrity, Freedom House, French Ministry of Finance Institutional Profiles Database, Economist Intelligence Unit, Political Risk Services, and Gallup World Poll. Though one of the sources for control of corruption includes CPI, so a model cannot use both at the same time. The index for control for corruption takes into account many variables such as irregular payments in public contracts, public trust in politicians, diversion of public funds, and corruption among public officials. Control of corruption in my opinion has a better representation of corruption the CPI. But another variable to look at is government effectiveness which takes into account quality of primary education, coverage area: public school, satisfaction with education system, and government handling of public services: Health /Education.

5.0 Data and Empirical Results

Figure 4 shows the pooled data within the model. The scatter plot's correlation mostly shows a positive slope. As the score gets better for CPI, government effectiveness, polity, and control of corruption; expenditures on health and education increase. The figure even shows a clear visual understanding of how country income effects the correlation. The slope is very much different for each income grouping. And income groups are strongly grouped together within the plotting. Though the pooled data is not fully accurate. It will not show us what a random or fixed panel regression will, so further analysis is needed. Many countries have a severe lack of data to use this accurate model, which is why most of the literature is OLS or pooled based data analysis.

Though even within that limitation there is evidence backing up this study's hypothesis. The global random effects panel in table 1 gives said evidence from 2005 to 2014. It shows the four different dependent variables of health and education government expenditures with the independent variables showing the quality of government effectiveness, type of government, and corruption of country.

Figure 4
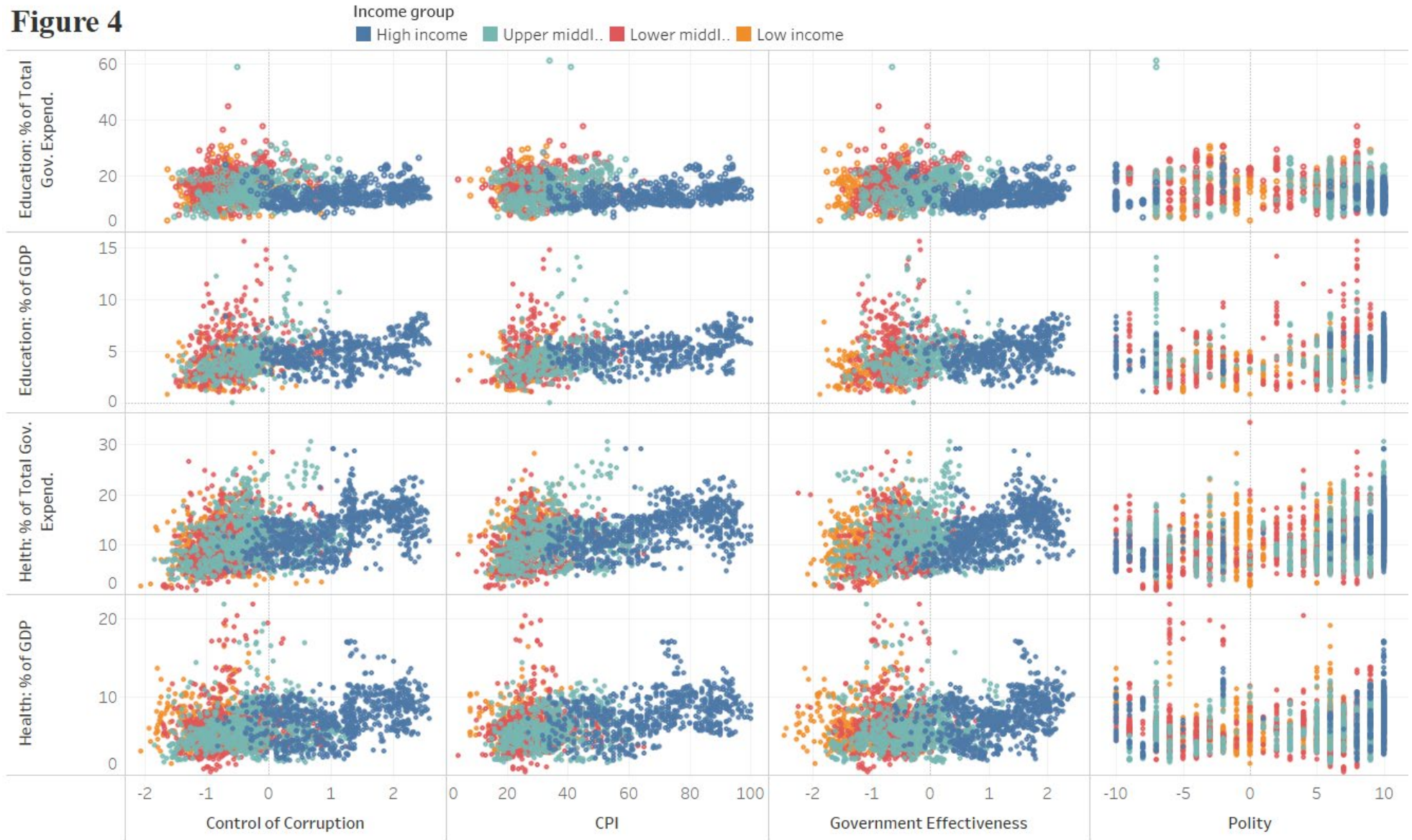
Source: Author's own Calculations in Tableau

Within table 1 model 1.1 evaluates the significance of the dependent and independent variable. Government education expenditures as a percentage of GDP is significant below 0.05 level with control of corruption and a 0.10 level with CPI. The non-highly significance and the 20 percent R-squared show that though there is a correlation between the variables it does not explain the full story of determinates of government education expenditures. This is a sharp contrast to model 1.2 which is government health expenditures which shows a 0.05 P-value or less for all the independent variable accept polity. Model 1.3 shows no significant correlation what so ever, also a contrast to model 1.4 which is strongly correlated with the exception of CPI. This is evident that with one increase in the standards deviation of the strongly correlated independent variables there will be in increase in government health expenditures as a percent of GDP and as a percent of total government expenditures. The R-squared is relatively small, but fits the pattern of the literature reviewed. Health expenditures has a stronger correlation that education but both have an R-squared of below 35 percent and the R-squared is relatively low in the other studies reviewed. Though education seems to not have a strong correlation the paper will break the global model down to show that is not the case, especially when looking at Africa and high income countries.

The global model does have a major limitation and that is unbalanced data on a global scale. Health data has over four times as much observation as education data. The lack of data within the education expenditures limits the accuracy of the model. The unbalanced representation of global data could also skew the results, for instance lower income and middle lower income countries had the least observations but within those observations alone the correlation between the dependent and independent variables could be much higher. Education in North America did meet the required accuracy the model required, so U.S. and Canada were excluded. CPI in the U.S. has been in the 70's range since 1996 and in 2016 was 74. This could have been valuable to see how the U.S. compares to other developed countries such as Canada which had an 82 on the CPI index in 2016. Table 2 represents the distinct count by income and region for each regression ran. The description gives a unique understanding of the data. There is a lack of observations in general for low income grouped countries, both in health and education expenditures. Another observation from the table 2 is that Europe and Central Asian have the most observations in every regression.

Table 1: Random Effects Panel Regression

VARIABLES	Model 1.1 Government Expenditures: Education as a Percent of GDP	Model 1.2 Government Expenditures: Health as a Percent of GDP	Model 1.3 Government Expenditures: Education as a Percent of Total Government Expenditures	Model 1.4 Government Expenditures: Health as a Total Government Expenditures
Control of Corruption	0.3767415**	0.3320713***	-0.2395856	1.214436***
	(0.1558)	(0.1167)	(0.8231)	(0.2248)
Corruption Perception Index	0.0170345*	0.0111244**	0.0122382	-0.0269132
	(0.0097)	(0.0056)	(0.0336)	(0.0126)
Polity	0.0353574	0.0135208	-0.0750845	0.1042175***
	(0.0224)	(0.0138)	(0.0791)	(0.0300)
Government Effectiveness	0.0803	0.3769415***	0.0470233	1.858604***
	(0.2469)	(0.3143)	(0.8539)	(0.3057)
Constant	3.3461***	3.52558***	15.22675***	12.18864***
	(0.4676)	(0.3011)	(1.6138)	(0.6062)
Observations	306	1379	304	1480
Countries	34	138	34	148
R-squared	0.200	0.1401	0.0288	0.22.5

Notes: standard errors in parentheses. Control of corruption ran separately from other independent variables.
Source: Author's calculations from Stata
*** $p<0.01$, ** $p<0.05$, * $p<0.1$

Table 2: Distinct Count of Model's Representation for Region and Income

| Region and Income	Model 1.1	Model 1.2	Model 1.3	Model 1.4
Region				
East Asia & Pacific	6	16	6	17
Europe & Central Asia	9	37	11	41
Latin America & Caribbean	6	24	6	24
Middle East & North Africa	3	14	3	17
North America	0	2	0	2
South Asia	1	6	1	6
Sub-Saharan Africa	9	39	9	41
Income				
High income	11	37	12	43
Low income	5	25	5	25
Lower middle income	6	38	7	40
Upper middle income	12	38	12	40

Source: Author's calculations from excel

A graphical example to demonstrate these grouping differences is below in figure 5. Model 1.1 is broken down by region and filtered by income. Lower income and lower middle income is filtered and the regions are separated to show that regionally corruption effects government expenditures differently. Sub-Saharan Africa is the perfect example. The R-Squared for the model in Sub-Saharan Africa is over 52 percent and highly significant compared to the non-significant 20 percent R-squared of the global model. This is due to the difference on how corruption effects government within different regions. In Africa aid funding often promotes corrupt governments and in lower income countries the output is reduced because the money transferred from the state to the individual. Nigeria president Sani Abacha embezzled $5 billion from his country. Africa also has widespread institutional decay to due conflict and corrupt public officials. It shows a major contrast to the other lower income regions of the world. Though due to data availability it is more difficult to analyze and compare the regional differences to get a full picture.

Another grouping breakdown through the Table three's panel regression with income levels as a dummy variable gives proof that corruption has different effects on countries within income levels. The global model 1.3 had no significant correlation between variables, but the model accounting for the dummy variable within income groupings show a different story. Control or corruption and CPI become significant at a 95 percent or higher level. Also high income countries become highly correlated with the model compared to any other income levels. With the addition of figure six, evidence of the difference between income grouping and the global model further support that hypothesis that corruption acts differently between region and income. This gives possible evidence for a counter argument of those who believe in the reverse causality between corruption and economic output. Where high income countries spend more money to create higher quality institutions. If that were the case then the model would show a weaker correlation between high income groups corruption and government expenditures. The quality of the institutions system would be able to fight corruption better. But that is not the case within the evidence given.

Figure 5

Model 1.1: Lower Income & Lower Middle Income

Region
■ East Asia & Pacific ■ Europe & Central Asia ■ South Asia
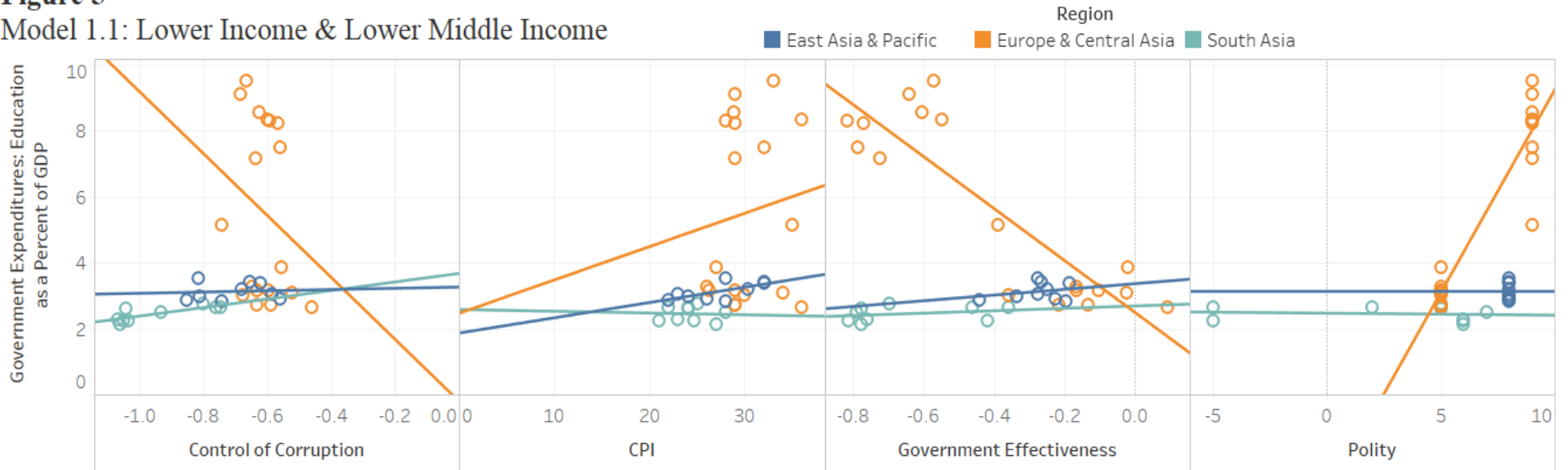
Model 1.1: Lower Income & Lower Middle Income for Sub-Saharan Africa
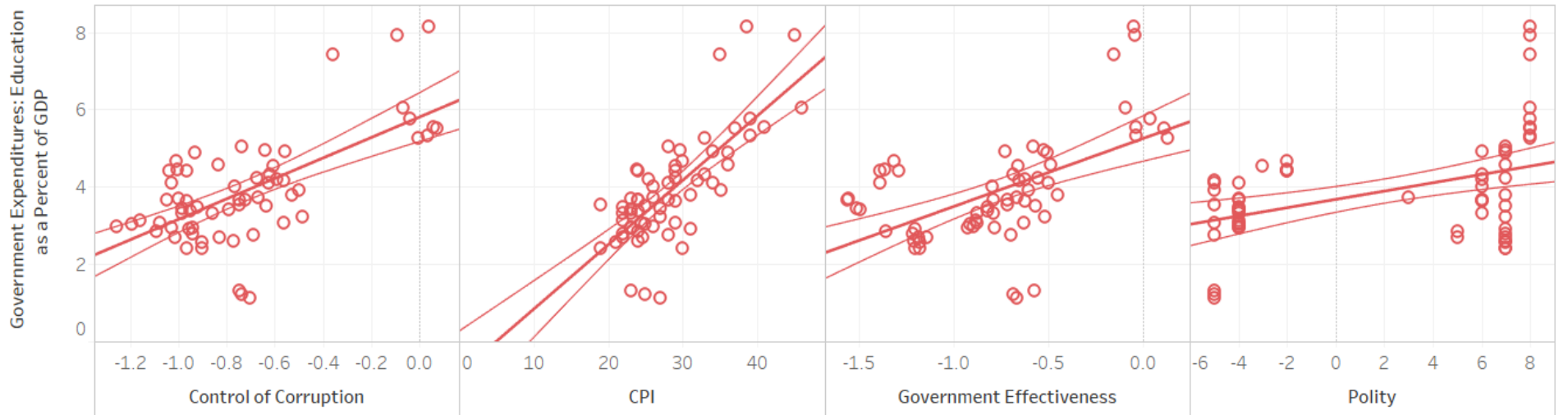
Source: Author's calculations in Tableau

Table 3: Random Effects Panel Regression with Dummy Variable

| VARIABLES	Model 1.3 Government Expenditures: Education as a Percent of Total Government Expenditures
Control of Corruption	2.084976***
	(0.7214)
Government Effects	1.893142*
	(0.9653)
CPI	0.0622986**
	(0.0361)
polity2	-0.0697084
	(0.0753)
High Income	-7.794649***
	(2.4168)
Low Income	3.413909
	(2.1815)
Lower Middle Income	3.36908*
	(1.9603)
Constant	13.71092
	(1.7114)
Observations	304
Countries	34
R-squared	0.023

Notes: standard errors in parentheses. Control of corruption ran separately from other independent variables.
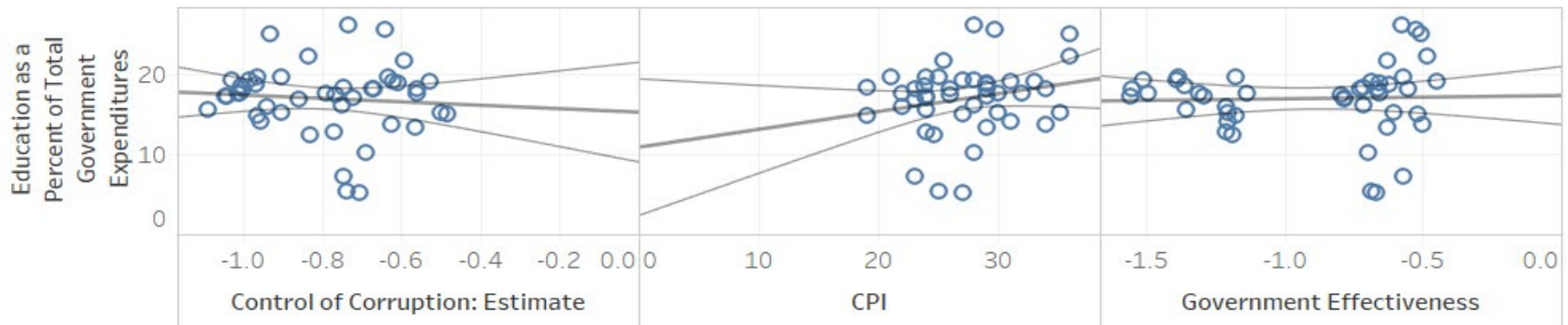
Source: Author's calculations from Stata and Tableau

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$
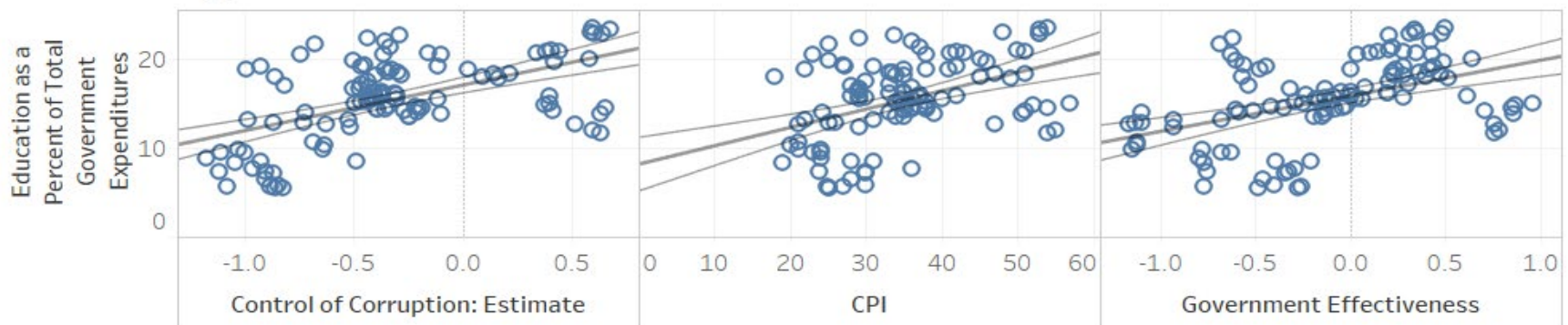
Figure 6

Model 1.3 High Income
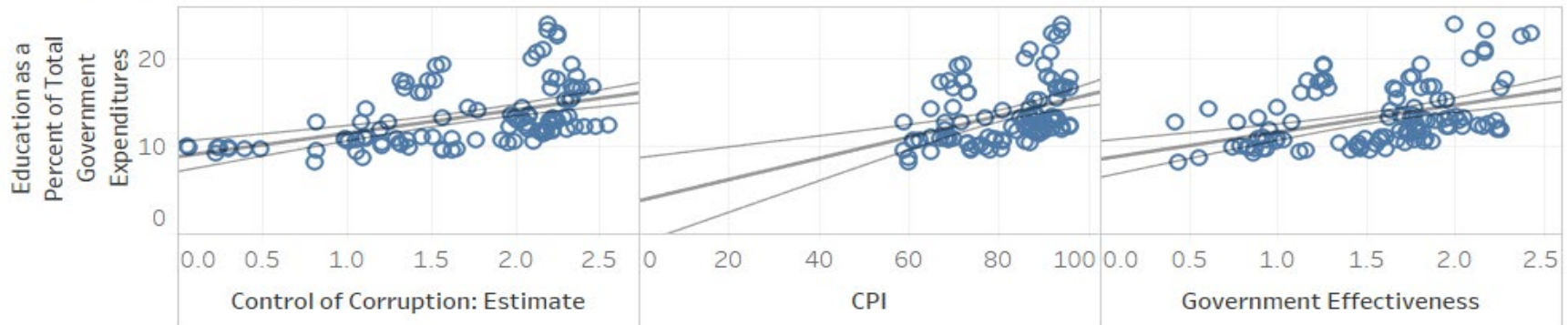
Model 1.3 Low Income

Model 1.3 Upper Middle Income

Conclusion

The model within this paper has been accurate, but there are limitation of data availability. Further research would have to be done to not only obtain missing data but to also further explain how corruption acts different within regions and income levels. This paper's objective was to show that there are differences and provide evidence. The independent variable polity did not have any real impact on the dependent variables so this would not be included in future research. This is very interesting due to the nature that a stable government democratic government has the image of a more secure public expenditure system to benefit the welfare of its people.

Using a more accurate panel model for 2005 to 2014 (2005 to 2013 for education expenditures) improved the understanding of the variable relationships. The dummy variables in model 1.3 further proved that each income level and region have to be researched specifically. A global analysis of corruption is important, but the purpose of research is to expose and prevent. The same methods cannot be used as a blanket plan of action to reduce corruptions effects. U.S. corruption versus Gambia corruption have different perceptions, determinants, and even effect a country differently. Most literature does just this, from looking at OECD countries or Arab countries. Though with possible omitted variable biases, evidence was found. The evidence of corruptions relationship with government expenditures on health and education on a global spectrum as well as by region and income.

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