

The impact of institutions on energy supply capacity

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Abstract

Electricity availability and generation have a significant impact on the economies internationally. The understanding of the factors affecting the electricity supply sector is imperative towards improving the industry and achieving a sustainable energy future for all as per the United Nations Sustainable Development Goals (SDGs) to 2030. This study particularly focuses on the institutional quality factors that impact the electricity supply of twenty countries, representing various electricity market structures and supply mixes to derive holistic policy suggestions. Institutional quality will be represented as property rights, government efficiency, political stability and no violence, rule of law in the study. To do so, a Seemingly Unrelated Regression model will be used for the period 2003 to 2018. Results are expected to indicate that progress in institutional quality will lead to increased supply capacity.

Keywords: Energy; Institutions; Electricity generation capacity; Good governance; Electricity

1. Introduction

Energy availability and generation have a significant impact on economies internationally. The understanding of the factors affecting the energy supply sector is imperative towards improving the industry and achieving a sustainable energy future for all as per the United Nations Sustainable Development Goals (SDGs) to 2030. A sustainable energy future can be hindered by factors such as the quality of institutions in a country. This study particularly focuses on the institutional quality factors that impact the energy supply of twenty countries, representing various energy market structures and supply mixes to derive holistic policy suggestions. Institutional quality will be represented as property rights, government efficiency, political stability and no violence, rule of law in the study.

Acemoglu et al. (2005) indicated that economic institutions are of primary importance to economic outcomes. Institutions can impact the structures of economies in societies, furthermore, they play an important role in the efficient allocation of resources. Societies would experience enhanced efficiency of allocation of resources from higher-quality institutions, in turn affecting returns on investments and profits. Acemoglu et al., (2005) indicate that economies will thrive where institutions are encouraging factor accumulation, innovation and efficient allocation of resources. The efficient allocation of resources is important in the energy sector. If institutions in the electricity sector do not strive to encourage innovation, factor accumulation and efficient allocation of resources can lead to a shortage in energy generation capacity which can have significant negative impacts on economies.

Institutions have an important role to play in ensuring the provision of access to energy in all countries as well as developing the necessary energy generation infrastructure. These institutions are not necessarily physical and can be defined by Acemoglu et al., (2003) as *“a cluster of social arrangements that include constitutional and social limits on politicians’ and elites’ power, the rule of law”* as well as *“strong property rights enforcement, a minimum amount of equal opportunity and relatively broad-based access to education, etc”* while North (1990) defines institutions as *“the rules of the game in a society or, more formally, are the humanly devised constraints that shape human interaction.”*

The purpose of the study is to examine, estimate and compare the impact of various institutional factors on electricity supply in twenty countries¹ (selected IEA Countries along with Chile, Colombia and Israel) for the period 2003 to 2018. The quality of institutions can stabilize markets thereby

¹ Australia, Austria, Chile, Colombia, Czech Republic, France, Germany, Greece, Hungary, Ireland, Israel, Italy, Japan, Mexico, Poland, Portugal, South Africa, Spain, United Kingdom, United States

impacting the amount of electricity that needs to be supplied, furthermore these institutions quality can impact the efficiency of the energy sector thereby impacting the electricity generation capacity.

The results will provide insights for policymakers to improve certain institutional factors along with organisations in the electricity generation sector to ensure reliable and sustainable electricity supply for the future. Countries have different market structures. To ensure these different market structures are taken into account a variety of countries are used to investigate how different quality institutional factors affect the electricity generation capacity.

2. Literature review

Acemoglu et al. (2005) indicate that political power affects institutions and economic outcomes directly and indirectly. The author indicates that political power exists from two sources: the individuals that power the political institutions of a country and the individuals or groups who want to solve a collective problem in society through coups, riots and demonstrations. Acemoglu et al. (2005) explain that if through political institutions power is given to a small group of individuals, it will be hard to sustain the economic institutions that protect the rest of the population such as property rights and equal opportunity. Indirectly the political institutions affect the economic institutions which in turn will affect the economic outcome. Since political powers have conflicting interest over how the resources in the economy should be distributed, this indirectly affects the institutions in the economy. The latter can lead to economic inefficiencies and poverty. The reason for the institutions causing economic inefficiencies and poverty is due to commitment issues due to the use of political powers.

“Societies are economically successful when they have 'good' economic institutions and it is these institutions that are the cause of prosperity” -

Acemoglu, Johnson, & Robinson (2005)

According to the authors, there are three main reasons why these institutions are inefficient. The first reason why institutions are inefficient is due to the holdups that the institutions cause. Investors will make productive investments if there is an expected return in investment and secure property rights. Due to the failure of commitment from political institutions and their political power (Andersson & Lindvall, 2018), the latter will struggle to ensure secure property rights and enforcement of rule of law for the foreseeable future. The holdup dilemma occurs when one of the parties creates a holdup in the production process to capture some of the other parties returns on investment (Carnegie, 2014). This will discourage future possible investors. The problem arises due to monopoly powers. If there is no protection for property rights the productive investment does not occur leading to opportunities in the countries' economic growth going unexploited (Acemoglu, Johnson, & Robinson, 2005).

The second reason Acemoglu et al., (2005) gives for inefficient institutions are political losers. This is due to the political elite's desire to protect their political power. Acemoglu et al., (2005) indicate that political power provides income, rent and privileges to the political elites. If their political power declines their income, rent and privileges will start to decline. The threat of the latter may prevent better institutions and commitments for the future.

Suppositions that exist in society is considered the last cause by Acemoglu et al., (2005) for inefficient institutions. Suppositions can be considered as assumptions without proof. Institutions have different levels of income distribution. If there is a supposition about change that may negatively affect some economic groups it will hinder the evolution or change of the institution.

To incorporate good economic institutions there is a cluster of things needed. The correct involvement is needed where there exists an incentive for individuals to invest, innovate and participate in the country's economic activity. The economic environment mix is such that property rights of individuals are enforced, equality in the society will need to exist, etc. If such conditions exist good investment opportunities in the economy will be taken advantage of (Acemoglu, Johnson, & Robinson, 2005).

Acemoglu et al., (2005) present a few main arguments to why institutions play an important role in the economy: first because institutions influence economic growth through the incentives they create such as investment in physical and human capital as well as the method of production and the technology used in the markets. Secondly, the authors indicate that institutions are endogenous. These institutions are said to determine the collective choices of society and the economic consequences thereof. This does not mean that it represents every individual's choice but rather the larger segment of the group of individuals collective choice. Should two groups have opposite choices, the political power of each group will determine which group will triumph, therefore the group in the economy with the most political power will impose the set of institutions preferable to them. It should be noted that political power and the distribution of resources as variables can be considered state variable because they change relatively slowly as well as the fact that they can determine economic institution and their performance directly and indirectly.

Acemoglu et al. (2003) indicate colonist who experienced different mortality rates has different colonization strategies. Frequently with higher mortality rates, extractive institutions were found. An extractive institution is likely to protect private property and have institutions that encourage investment in their areas. Once the institutions' effect was controlled, it was clear that macroeconomic variables frequently have minor roles in volatility and economic crises. Effective institutions are found in societies where the elites and politicians of those societies are effectively constrained. The latter leads to more stable political institutions and the constraints will force them

to pursue more sustainable policies. Acemoglu et al., (2003) indicate why weak institutions lead to politically unstable institutions are due to a lack of constraints on politicians and the elite. The authors explain that due to this lack of constraints there is an increase of various groups in that society that may fight to gain power and exploit positions hence causing unstable political institutions. They then summarize why greater economic instability is to be expected from institutional findings. The authors indicate as already explained firstly it's due to weak constraints on elites and politicians and secondly the lack of effectiveness of these constraints. Thirdly due to shocks, contractual agreements are more susceptible to failure and that when political problems are experienced, the politicians and elite can may be forced to pursue the usage of unsustainable contracts and withdraw capital more aggressively which can lead to economic instability. Distortionary macroeconomic policies often reflect weak institutions or institutional problems as well (Acemoglu et al., 2003). As mentioned before macroeconomic policies may not even be the culprit to weak performance but rather the victim of the institutions in the country. To indicate the relationship between institutions and economic performance Acemoglu builds on his previous work (Acemoglu, Johnson, & Robinson, 2001). The latter study was used to develop an instrument for the historically determined component of institutions. This instrument is the mortality rate faced by European settlers.

Haydaroglu (2016) has indicated that even when developing countries have good policies it might not help them achieve the desired level of economic development due to poorly coordinated institutional structures. The author examines the relationship between property rights and economic growth. A Panel Autoregressive Distributed Lag (ARDL) model is used in the study. A country can change their position in society by changing its property rights system. Due to different social and economic conditions, different countries will have different property right systems. Should the property right system in a country function correctly it will enable citizens to use resources effectively. The author indicates when property right systems are set up in such a way that individuals cannot exclude others from their property right they want to purchase, they may end up not investing in it. To measure property rights for the study the author uses the International Property Right Index (IPRI). Three categories are used to evaluate countries for the IPRI: Political/ legal property rights, property rights itself and intellectual property rights. The authors used a Panel Border Test Analysis to investigate the relationship between property rights and economic development. The authors found that increasing development in property rights had a positive influence on growth.

2.1 Aspects of institutional quality on energy in the literature

The energy sector has been characterised to be targeted for corruption as well as being the source of corruption itself (Gennaioli & Tavoni, 2016). The author indicates that this is due to the availability of energy resources, the significant part that the government plays in the oversight of the energy generation sector and the possibilities of rent-seeking. In most countries, governments oversee the majority of the energy generation sector in the form of state-owned enterprises. The provision of electricity generation to a country's national grid usually requires a large infrastructural component. Mauro (1998) indicated that "it will be easier to collect substantial bribes on large infrastructure projects". It has also been indicated that when there is complicated regulation involved as well as public spending it establishes an incentive for corruption, and this is especially evident in the renewable energy sector (Gennaioli & Tavoni, 2016). This hinders the process for countries to address the energy economics of climate change mitigation where governments and energy service companies are required to decrease their carbon emissions by implementing a renewable energy distribution supply mix into their existing energy generation model. It also hinders countries' pathways to transition to more sustainable and environmentally responsible energy distribution mixes. Studies such as Tanzi and Davoodi (1997) have indicated a positive relationship between public investment and corruption in this regard. The World Bank has also recognized that corruption needs to be reduced when it finances the energy sector (Gennaioli & Tavoni, 2016) especially, in developing countries where corruption has a higher prevalence due to weaker institutional regimes.

Enforcements of the rule of law also have effects on the energy industry as they can limit private energy generation if these laws are deemed to be non-inclusive towards a broader, more diversified energy generation mix, notwithstanding the energy supply mix that is applicable. For instance, South Africa released its latest Integrated Resource Plan (IRP) in 2019. This policy indicates the estimated future energy generation supply mix. Energy power plants must follow the guidelines set out in the IRP according to the South African Energy laws and legislation. The enforcement of law further affects the generation industry, for example when procurement contracts are not enforced legally which causes reasons for potential investors to likely reconsider the cost-benefit analysis of embarking on an investment drive being aware of such institutional risks. Rule of law can also affect how effective the development is to resource allocation, equity in a country and the total factor productivity of a county (Lorizio & Gurrieri, 2014). How effective the rule of law ultimately affects economic growth which can affect electricity generation capacity.

Property rights can be defined as how political institutions decide to distribute limited resources through a process of providing these rights to citizens (Haydaroglu, 2016). Should property rights as

an institution not be of good quality this decreases the incentive for investors to invest and adopt more efficient technologies (Acemoglu, Johnson, & Robinson, 2005). Studies have been indicating that where entrepreneurs perceive their investments to be safe and the rule of law is robust, welfare tends to increase in those countries. Property rights are an important factor as a political institution in the sense that the government will limit the individual's property right usage. With stable and predictable environments property rights tend to be secure. When environments are unstable where risks such as land redistribution or land seizures without constitutional mandates exist, it may not be as attractive to investors to accommodate high levels of financial risks around property rights, since investors are not adequately ensured of their ownership of the physical, intellectual and digital property that may be created as a result of investments in the energy markets of a specific legal jurisdiction. Redistribution of property limits the property rights of individual citizens and creates scenario's where a trust deficit may occur between legislators, legal counsel and a public or private sector investor into the energy development business. Haydaroglu (2016) in the following quote states just how powerful these political institutions can affect an economy through property rights: *“a government that is powerful in terms of ensuring the formation and execution of property rights is also powerful when violating the same right. A government which enjoys monopoly rights leaves its citizens open to abuse, so it is vitally important that property rights should be limited for the government by means of protective laws for individuals”*

3. Methodology

3.1 Theoretical Framework

Various literature (Acemoglu et al., (2003); Acemoglu et al., (2005); Haydaroglu (2016), Tanzi and Davoodi (1997), Gennaioli and Tavoni (2016)) have indicated that the institutional factors taken into account when looking at their effect are corruption, rule of law, government efficiency, voice and accountability, violence, regulatory quality, freedom of trade and freedom of investment. Table 3 and 7 indicates the correlation matrix used to narrow down the six institutional factors that are used in this study. The study is based on the following theoretical equation:

Equation 1

$$Energy\ generation_{it} = F(X_{it}, GDP_{it}, PE_{it}, EC_{it}, FD_{it})$$

Where X is the Institutional factors as indicated in equation 2. GDP is the Gross Domestic Product per country and PE is the price of electricity. Electricity consumption is EC and FD is the financial development per country. The proxies for institutional factors in Equation 2 is shown as Property rights

(PR), Corruption (C), Voice and Accountability (VA), Government efficiency (GE), Rule of law (RL) and Regulatory quality (RQ).

Equation 2

$$X_{it} = F(PR_{it}, C_{it}, VA_{it}, GE_{it}, RL_{it}, RQ_{it})$$

3.2 Data

The institutional variables were chosen based on literature, originally 10 institutional variables data were collected however only six was used. From Table 3 the variables that were insignificantly correlated to the dependent variable electricity generation was not used and for the study of government efficiency rather than government, integrity was used. Table 1 and 2 gives the description and source of each variable

Table 1: Dependent and control variables

| Variable | Description | Source |
|--------------------------------------|--|-------------------------------------|
| Electricity generation sector | The variable is obtained from the energy balances electricity section. The total production figure is used. It is given in GWh but for the study's purposes are converted to TWh. | IEA (2021) |
| GDP | Real Gross Domestic Product in 2010 US\$ terms | WDI (World Bank, 2021) |
| Price of electricity | Due to a shortage in data for the price of electricity a proxy was used in the dataset. The proxy is the price inflation of energy in the form of annual percentage growth. CPI generally exist out of a basket of goods and services. Inflation for this variable is measured in terms of annual growth rate and index form with 2015 as the base year. | Energy Price Inflation (OECD, 2021) |
| Electricity consumption | The variable is obtained from the world energy balances. The total energy consumption figure is used per country. The figure is given in TWh. | IEA (2021) |
| Population | The total population per country is used. "Total population is based on the de facto definition of population, which counts all residents regardless of legal status or citizenship" | WDI (World Bank, 2021) |
| Financial development | "Domestic credit to private sector refers to financial resources provided to the private sector by financial corporations, such as through loans, purchases of nonequity securities, and trade credits and other accounts receivable, that establish a claim for repayment. For some countries, these claims include credit to public enterprises." | WDI (World Bank, 2021) |

Table 2: Institutional Variables

| Institutional variables | Description | Expectation | Source |
|-------------------------------------|---|--|---------------------------------|
| Property Rights | The economic freedom index states that when an individual has economic freedom they can produce, consume, work and invest as they want. These variables in the index format, indicates the economic freedom individuals have in each country. The index is ranked from 0 to 100. | An increase in the quality of these institutions can lead to an increase or decrease in the electricity generation capacity of a country. An increase in the electricity generation capacity can mean an improved market structure leading to an expansion in generation capacity. A decrease in electricity generation capacity can indicate an improved market structure as well where it can lead to more efficient demand, better technology etc. | Index of Economic freedom |
| Government Integrity | | | |
| Trade Freedom | | | |
| Investment Freedom | | | |
| Corruption | Transparency International's Corruption Perception Index was used to represent the corruption variable. The countries that perceive levels of public sector corruption is ranked on a scale from 0 to 100 where zero indicates that the country's perceived levels of public sector corruption are extremely high and a score near 100 indicated very low levels of corruption. | In the case of corruption, a perception index is used. An increase in the corruption perception index can lead to an increase in electricity supply capacity. This indicates a higher score on the perception index means less corruption occurs, therefore the quality of the institution increases causing electricity generation capacity to increase. | Transparency International |
| Voice and accountability | The World Wide Governance Index define governance as the "traditions and institutions by which authority in a country is exercised". They use these variables to monitor the governance by which society lives. These variables are rated from -2.5 to +2.5 in an index. | An increase in these institutional variables can increase or decrease the electricity capacity generation of a country. An increase in the quality of institutions can stabilize market structures and increase market capacity while a decrease in electricity capacity can indicate that an increase in the quality of institutions leads to a more efficient market structure involving electricity thereby decreasing the electricity generation capacity. | World Wide Governance Indicator |
| Government efficiency | | | |
| Political Stability and No Violence | | | |
| Rule of law | | | |
| Regulatory quality | | | |

Table 3: Descriptive statistics and correlation Matrix²

| | Electricity generation | Property Rights | Corruption | Voice and accountability | Government efficiency | Rule of law | Regulatory quality | GDP | Price of electricity | Energy consumption | Population | Financial development |
|---------------------------------|------------------------|-----------------|------------|--------------------------|-----------------------|-------------|--------------------|---------|----------------------|--------------------|------------|-----------------------|
| Obs | 320 | 320 | 320 | 320 | 320 | 320 | 320 | 320 | 320 | 320 | 320 | 320 |
| Mean | 5.1425 | 0.7141 | 0.6057 | 0.6966 | 0.7104 | 0.7004 | 0.7229 | 27.3572 | 4.4423 | 5.0877 | 17.2332 | 4.4335 |
| Std. Dev. | 1.2646 | 0.1609 | 0.1609 | 0.0828 | 0.1117 | 0.1393 | 0.0943 | 1.3010 | 6.7552 | 1.2522 | 1.1110 | 0.5939 |
| Min | 3.2263 | 0.3000 | 0.2800 | 0.4142 | 0.4508 | 0.3593 | 0.4824 | 25.5225 | -18.3972 | 3.1946 | 15.2009 | 2.5903 |
| Max | 8.4019 | 0.9380 | 0.8800 | 0.8248 | 0.9014 | 0.8920 | 0.8860 | 30.5166 | 28.7969 | 8.3638 | 19.6045 | 5.3311 |
| Electricity generation | 1 | | | | | | | | | | | |
| Property Rights | 0.2085* | 1 | | | | | | | | | | |
| Corruption | 0.2155* | 0.8791* | 1 | | | | | | | | | |
| Voice and accountability | 0.1744* | 0.7728* | 0.7863* | 1 | | | | | | | | |
| Government efficiency | 0.2999* | 0.8867* | 0.8932* | 0.8190* | 1 | | | | | | | |
| Rule of law | 0.2065* | 0.8954* | 0.8965* | 0.9008* | 0.9470* | 1 | | | | | | |
| Regulatory quality | 0.1781* | 0.8929* | 0.8757* | 0.8412* | 0.8914* | 0.9299* | 1 | | | | | |
| GDP | 0.9549* | 0.3083* | 0.3216* | 0.2721* | 0.3902* | 0.3155* | 0.2948* | 1 | | | | |
| Price of electricity | -0.0278 | -0.0933 | -0.1017 | -0.0906 | -0.1322 | -0.1337 | -0.1028 | -0.0753 | 1 | | | |
| Energy consumption | 0.9968* | 0.2139* | 0.2229* | 0.1950* | 0.3033* | 0.2187* | 0.1874* | 0.9596* | -0.0360 | 1 | | |
| Population | 0.9098* | -0.0682 | -0.0600 | -0.1481* | -0.0369 | -0.1324 | -0.1191 | 0.8542* | 0.0203 | 0.9056* | 1 | |
| Financial development | 0.4187* | 0.4959* | 0.5685* | 0.5865* | 0.5831* | 0.6064* | 0.4796* | 0.4419* | -0.0108 | 0.4348* | 0.1778* | 1 |

² *, ** and *** indicates significance at 10%, 5% and 1% respectively.

3.3 Prior expectations

An increase in the GDP variable is expected to increase electricity generation capacity unless efficiency increases. An increase in GDP indicates expansion in the country's economy which can indicate higher levels of production needed. To produce more, more electricity is needed. The latter can lead to electricity generation capacity increasing. In some cases, however market stabilizes and technological progress is made where less electricity is needed to produce or more electricity can be produced with less. In the latter case, the electricity generation capacity can decrease even when GDP increases.

The price of electricity is regulated in most of these countries which can lead to an insignificant coefficient however generally a price increase for electricity means a decrease in the production of electricity because demand decreases when price increases.

Should supply be unable to meet demand load shedding could be implemented. Load shedding is an "action to reduce the load on something, especially the interruption of an electricity supply to avoid excessive load on the generating plant" (Oxford Languages, 2021).

An increase in the population of a country is expected to increase the usage of electricity, *ceteris paribus*. This leads to an increase in the electricity generation capacity. More people in a population will mean higher demand for electricity as for an example more appliances will be used which means more electricity is needed.

Financial development can be expected to increase or decrease the electricity generation capacity. The financial development in the electricity sector can lead to building more capacity leading to an increase in electricity generation capacity. However, it can also be used to increase efficiency or replace old capacity with more efficient capacity. The latter reasons will mean that less capacity is needed to meet the electricity demand.

3.4 Econometric framework

The study's objective is to examine the effect institutional factors have on electricity generation capacity. The study will be conducted on twenty countries (Selected IEA countries along with Chile, Colombia and Israel) electricity generation sectors. A panel data set is used in the study. The empirical specifications will now be discussed. Chaudhry (2010) Fixed Effects (FE) model approach is followed in this paper. Rather than using a Pooled model, a FE is used. The reason for the latter is because a FE considers heterogeneity among the countries. Since no two countries in this study are alike a Fixed effects model will be more suitable for the study. The subscripts *i* and *t* indicate the country and time.

Equation 3: Fixed effects model

$$\ln EG_{i,t} = \beta_{i0} + \beta_{1,i} \ln X_{i,t} * \ln GDP_{i,t} + \beta_{2,i} \ln PE_{i,t} + \beta_{3,i} \ln EC_{i,t} + \beta_{4,i} \ln POP_{i,t} + \beta_{5,i} \ln FD_{i,t} + \varepsilon_{i,t}$$

Where the dependent term will be Electricity Generation (EG) and the independent variables will be the Institutional factors index (X), Gross domestic product (GDP), Price of energy (PE), Energy consumption (EC), Population (POP) and Financial development (FD) of the energy generation sector. The model will also include an i.i.d disturbance term $\varepsilon_{i,t}$.

The variable of interest are the institutional factors. The following Model A to E indicates the models in which the six proxies for institutions will be used.

Model A:

$$\ln EG_{i,t} = \beta_{0,i} + \beta_{1,i} \ln X_{i,t} + \beta_{2,i} \ln GDP_{i,t} + \varepsilon_{i,t}$$

Model B:

$$\ln EG_{i,t} = \beta_{0,i} + \beta_{1,i} \ln X_{i,t} + \beta_{2,i} \ln GDP_{i,t} + \beta_{3,i} \ln PE_{i,t} + \varepsilon_{i,t}$$

Model C:

$$\ln EG_{i,t} = \beta_{0,i} + \beta_{1,i} \ln X_{i,t} + \beta_{2,i} \ln GDP_{i,t} + \beta_{3,i} \ln PE_{i,t} + \beta_{4,i} \ln EC_{i,t} + \varepsilon_{i,t}$$

Model D:

$$\ln EG_{i,t} = \beta_{0,i} + \beta_{1,i} \ln X_{i,t} + \beta_{2,i} \ln GDP_{i,t} + \beta_{3,i} \ln PE_{i,t} + \beta_{4,i} \ln EC_{i,t} + \beta_{5,i} \ln POP_{i,t} + \varepsilon_{i,t}$$

Model E:

$$\ln EG_{i,t} = \beta_{0,i} + \beta_{1,i} \ln X_{i,t} + \beta_{2,i} \ln GDP_{i,t} + \beta_{3,i} \ln PE_{i,t} + \beta_{4,i} \ln EC_{i,t} + \beta_{5,i} \ln POP_{i,t} + \beta_{6,i} \ln FD_{i,t} + \varepsilon_{i,t}$$

Where PR represents property rights and C represents the corruption perception index of each country. Voice and accountability per country are represented by VA and government efficiency is represented by GE. Rule of law and Regulatory quality is shown as RL and RQ.

An index of the proxy institutional factor is created through the Principal Component Analysis (PCA). This method has been used in literature such as Bittencourt (2012) to create a proxy for political regime characteristics. The author explains that the proxy had more explanatory power. The PCA can assist in reducing the dimensions of data without much loss of data information. To use the PCA for indexing one needs a large sample because the PCA is based on a correlation matrix which requires a large sample size to stabilize the correlations. (Mahida & Ramadas, 2017). According to the authors of the latter, the rule of thumb is a minimum of 10 observation per variable which this study's sample size has in place. The variables will need to be normalized³ before testing and modelling can commence.

³ Normalisation = $\frac{\text{Max Value} - \text{Actual value}}{\text{Max value} - \text{Min Value}}$

Before models are estimated certain tests need to be done to ensure data will not provide biased estimates or spurious relationships. The following tests will be done cross-sectional dependence tests, slope homogeneity tests, unit root tests and cointegration tests. The cross-sectional dependence test that will be used is Friedman's test which is originally based on Spearman's rank correlation coefficient (De Hoyos & Sarafidis, 2006) The Friedman's tests' null hypothesis is that there is no cross-sectional dependence present (H_0 : *Cross – sectional dependece is not present*).

Slope homogeneity needs to be considered when dealing with panel data sets. Studies such as Ando and Bai (2015) have indicated that previous test available to test for slope homogeneity in panel data sets have not allowed for cross-sectional dependence and do not account for cross-sectional dependence or serially correlated errors. Ando and Bai (2015) suggest the usage of the Swamy test statistic to test for slope homogeneity (H_0 : $\beta_i = \beta$).

Unit root tests will first be used to determine which variables in the dataset is stationary or not. Should the variables not be stationary a cointegration test will be done to indicate whether long-run relationships exist. If a long-run relationship is present the study will proceed to the SUR model. Levin, et al., (2002) created a powerful unit root test that is used in the study to test for unit roots. The authors created a unit root test that will be powerful with the use of pooled cross-sectional time-series data. The null hypothesis for the LLC unit root test is used to test whether each "individual in the panel has integrated time series". The LLC allows for individual specific intercepts as well as time trends (Levin, Lin, & Chu, 2002). (H_0 : *Unit root is not present*).

A KOA cointegration test is used in this study. The KOA cointegration test can differentiate between cross-sections. The test does the latter by allowing for heterogeneous intercepts, however, coefficients are homogenous (Kao, 1999). The cointegration test will examine whether long-run relationships exist between variables. (H_0 : *No cointegration present*)

4. Empirical Results

Since unit root tests indicate that there are variables of order $I(1)$ and $I(0)$. A cointegration test is done to test for long-run relationships between variables to avoid spurious relationships. The Koa cointegration test does indicate that cointegration is present, the latter indicates that long-run relationships between variables do exist.

Table 4: Unit root test, cointegration tests, cross-sectional dependence test and slope homogeneity test

| Variables: ⁴ | LLC | | | |
|--|---------------|--------------------|---------------------------------------|-------------------------------|
| | Without trend | Include time trend | Suppress panel specific mean adjust t | Subtract cross-sectional mean |
| Electricity Generation | 0.0130** | 0.0000*** | 0.9893 | 0.1605 |
| Property Rights | 1.0000 | 0.9999 | 0.8077 | 0.9825 |
| Corruption | 0.0001*** | 0.0001*** | 0.0226** | 0.0008*** |
| Voice and Accountability | 0.0000*** | 0.0000*** | 0.0035*** | 0.2261 |
| Government Efficiency | 0.0000*** | 0.0000*** | 0.0009*** | 0.0001*** |
| Rule of Law | 0.0005*** | 0.0005*** | 0.3520 | 0.0078*** |
| Regulatory Quality | 0.0047*** | 0.0027*** | 0.1761 | 0.0103** |
| GDP | 0.0002*** | 0.0002*** | 1.0000 | 0.0002*** |
| Price of Electricity | 0.0000*** | 0.0000*** | 0.0000*** | 0.0000*** |
| Energy Consumption | 0.0367** | 0.0000*** | 0.9994 | 0.4225 |
| Population | 0.0000*** | 0.0000*** | 0.0048** | 0.0639** |
| Financial development | 0.0000*** | 0.0000*** | 0.3901 | 0.0017*** |
| KOA Cointegration | | | | |
| | | | Statistic | P-Value |
| Modified Dickey-Fuller t | | | -4.5211 | 0.000*** |
| Dickey-Fuller t | | | -4.2367 | 0.000*** |
| Augmented Dickey-Fuller t | | | -1.2807 | 0.100 |
| Unadjusted modified Dickey-Fuller t | | | -5.7139 | 0.000*** |
| Unadjusted Dickey-Fuller t | | | -4.6523 | 0.000*** |
| Friedman Cross-sectional independence tests | | | | |
| Value | | | | 24.454 |
| Pr | | | | 0.1793 |
| Swamy Slope homogeneity test | | | | |
| Adjusted delta | | | | 2.002 |
| Adjusted p-value | | | | 0.045** |

The quality of institutions overall affect the electricity generation capacity of a country, however, different institutional factors have a different effect on the electricity generation sector. This study examines six institutional factors which are proxies to assist in indicating the quality of institutions countries has. The study has five models of which the most robust is model D. Model A to E can be viewed in the appendix but since Model D will be discussed in the study it is shown in table 6. A summary of the results is shown in Table 6 is shown in Table 5.

⁴ *, ** and *** indicates significance at 10%, 5% and 1% respectively.

Table 5: Summary of Model D's Findings

| | Property rights | Corruption | Voice and Accountability | Government Efficiency | Rule of Law | Regulatory Quality |
|--------------------------|--|---|---|---|---|---|
| Positive and Significant | | Australia, Colombia, France, Ireland, SA, Spain, UK | Austria, Colombia, Germany, Greece, Spain | France, Greece, Israel, Italy | Greece, Spain | Greece, Hungary, Israel, Japan, Spain |
| Negative and Significant | Chile, Colombia, Czech, Israel, Italy, Japan, Poland, Spain | Chile, Japan, Poland, Portugal | Ireland, Israel, Japan, Poland, SA | Australia, Czech, Hungary, Ireland, Poland, UK | Australia, Austria, Chile, Ireland, Italy, Mexico, Poland, SA | Australia, Germany, Poland, Portugal, SA, UK, US |
| Insignificant | Australia, France, Germany, Greece, Hungary, Ireland, Mexico, Portugal, SA, UK, US | Austria, Czech, Germany, Greece, Hungary, Israel, Italy, Mexico, US | Australia, Chile, Czech, France, Hungary, Italy, Mexico, Portugal, UK, US | Austria, Chile, Colombia, Germany, Japan, Mexico, Portugal, SA, Spain, US | Colombia, Czech, France, Germany, Hungary, Israel, Italy, Japan, Portugal, UK, US | Austria, Chile, Colombia, Czech, France, Ireland, Italy, Mexico |

The results indicated that for 11 out of the 20 (Australia, France, Germany, Greece, Hungary, Ireland, Mexico, Portugal, South Africa, the United Kingdom and the United States) countries an increase in the quality of property rights as an institution has an insignificant impact on the electricity generation capacity of the respective countries. Eight⁵ (Chile, Colombia, the Czech Republic, Israel, Italy, Japan, Poland and Spain) countries experience a decrease in energy generation capacity when the quality of property rights increase. The more improved the quality of the property right institution the higher the social wealth as well as economic efficiency in a country (Jafee & Louziotis JR, 1996). As the authors indicate higher quality of property rights can give incentive to higher economic efficiency. Intellectual property protection is expected to encourage innovation, better technology and industrial development (Kumar, 2003). Kumar (2003) explain that in the early days of a countries development these rights may not be as strict but as their development progresses the intellectual property rights becomes stricter because these countries become more significant producers of innovation and invent new advanced technologies themselves. This can explain an efficiency gain as countries property right quality increases the efficiency gain can lead to less electricity needed to be supplied therefore decreasing the electricity generation capacity.

It is important to note here that an increase in the corruption variable simply means the corruption perception index score has improved. The latter indicates that an increase in the score means less corruption is perceived in the country. As mentioned above the electricity sector is a corruption-prone

⁵ Austria's property right's coefficient is omitted due to the fact that their property right rating on the index stayed approximately the same from 2003 to 2018 causing high collinearity.

sector due to the availability of resources, the large role of government oversight and the opportunities for rent-seeking (Gennaioli & Tavoni, 2016). An increase in the perception score of the country means that resources are allocated more efficiently and rent-seeking has decreased. This increased efficiency in the perception can lead to a decrease in the electricity generation capacity as seen by four (Chile, Japan, Poland and Portugal) of the twenty countries. With more stabilizing markets this can for instance lead to attracting new investors in the energy sector leading to building more capacity. Although this is just one of the reasons for increased capacity, seven (Australia, Colombia, France, Ireland, South Africa, Spain and the United Kingdom) out of the twenty countries experience increased electricity generation capacity when the corruption perception score increases. For the rest of the nine (Austria, Czech Republic, Germany, Greece, Hungary, Israel, Italy, Mexico and the United States) remaining countries, increasing the perception of corruption has an insignificant impact on the electricity generation capacity.

Holding firms accountable has assisted with their response to environmental, social and governance issues (Gilbert, Rasche, & Waddock, 2011). This variable measures “to what extent do citizens participate in the choice of their rulers, whether through the extent of their freedom of expression, of association, or that of the media?” (Omri, Kahia, & Kahouli, 2021). Although ten (Australia, Chile, the Czech Republic, France, Hungary, Italy, Mexico, Portugal, United Kingdom and the United States) out of the twenty countries electricity generation capacity would not be affected by an increase in the institutional quality of voice and accountability the other ten increases and decreases electricity generation capacity. Austria, Colombia, Germany, Greece and Spain will experience an increase in their electricity generation capacity should the quality of the voice and accountability institution increase in the respective country. The other five countries (Ireland, Israel, Japan, Poland and South Africa) will experience a decrease in their electricity generation capacity should the voice and accountability institutional quality increase. The latter is largely due to efficiency gains in the market structure occurring due to the institutional quality increase in voice and accountability.

Government efficiency measures the quality of services yielded to the public. Some of the governments most significant challenges are to spend public funds in such a manner that the programs and projects they invest in are successful. It is important to have good governance in a country as it is essential for economic development (Albassam, 2020). When government efficiency increases the development also increases. This can lead to increases or decrease in the electricity generation capacity of a country. With the development in certain countries, more electricity would be needed therefore the electricity generation capacity can increase however in other countries markets can be more efficient leading to a decrease in the energy generation capacity. Four (France, Greece, Israel and Italy) out of the twenty countries will experience an increase in their energy generation capacity

when government efficiency increases however six (Australia, the Czech Republic, Hungary, Ireland, Poland and the United Kingdom) countries will experience a decrease in the energy generation capacity when the quality of government efficiency increases. The other countries electricity generation capacity will not be affected by an increase in the quality of government efficiency.

The quality of a legal system can have an impact on a country's development for instance equity and resource allocation (Lorizio & Gurrieri, 2014). An effective legal system can also assist with good governance and positive impacts on decreasing corruption in the country (Lu, et al., 2019). An increase in the quality of rule of law will increase the electricity generation capacity for Greece and Spain however the increase in rule of law can lead to a decrease in the electricity generation capacity of eight (Australia, Austria, Chile, Ireland, Italy, Mexico, Poland and South Africa) countries. This can be due to a more effective market structure because of the improvement in the rule of law institution. For the other 10 countries, electricity generation capacity will not be affected by an increase in the quality of the rule of law institution as the latter has insignificant coefficients.

Regulation in terms of an institution can improve or worsen a country's situation. This variable indicates how effective the government can promote private sector development through regulation and policies (Omri, Kahia, & Kahouli, 2021). The theory behind a state implementing regulations and acting as regulators is that the state gives production to the private sector, however, the state will assist and intervene through regulatory measure where significant market failures exist (Jalilian, Kirkpatrick, & Parker, 2007). Building an effective regulatory quality system can help markets be successive however the effectiveness of the system depends on the quality of regulatory institutions in the countries, furthermore the latter will also affect development and economic growth (Jalilian, Kirkpatrick, & Parker, 2007). The results indicate that five (Greece, Hungary, Israel, Japan and Spain) countries electricity generation capacity will increase should there be an increase in regulatory quality. Improved quality of regulation can lead to the development and stabilization of markets which explains the increased electricity generation capacity. Seven (Australia, Germany, Poland, Portugal, South Africa, United Kingdom, United States) countries will experience a decrease in their electricity generation capacity should regulatory quality increase. Due to efficiency gains from improved regulatory quality the markets will now need less electricity generation capacity. The remaining countries will experience no effect on their electricity generation capacity when there is an improvement in regulatory quality.

Table 6: Model D Results⁶

| | Australia | Austria | Chile | Colombia | Czech Republic | France | Germany | Greece | Hungary | Ireland | Israel | Italy | Japan | Mexico | Poland | Portugal | South Africa | Spain | Uk | US | |
|---------------------------------|------------|------------|-------------|-------------|----------------|-------------|-------------|------------|-------------|------------|------------|-------------|--------------|------------|-------------|-------------|--------------|------------|------------|------------|--|
| Property Rights | | | | | | | | | | | | | | | | | | | | | |
| PR | 0.0325 | Omitted | -0.1433*** | -0.1465** | -0.4592*** | 0.0948 | 0.1078 | -0.2011 | 0.1717 | -0.3258 | -0.2662*** | -0.0495*** | -0.3645*** | 0.1674 | -0.9011* | 0.6817 | 0.0076 | -0.5714** | -0.0858 | -0.0295 | |
| GDP | 0.2439** | -0.3068 | 0.5173*** | -0.0046 | -0.1751 | -0.2433 | 0.3960*** | 0.2906*** | -1.4215*** | 0.0622 | -0.2175*** | -0.0071 | 0.4879*** | -0.0983 | 0.7618 | -0.8367* | -0.1518** | -0.5315*** | -0.2396*** | -0.0740*** | |
| PE | 0.0003 | 0.0008 | -0.013*** | -0.0010 | -0.0007 | 0.0018** | -0.0015*** | 0.0015** | 0.0036** | 0.0006 | -0.0004* | 0.0000 | 0.0004 | -0.001 | 0.0056*** | 0.0006 | 0.0003** | 0.0000 | 0.0002 | -0.0004 | |
| Lnec | 0.9173*** | 1.1353** | 0.6447*** | 0.5693*** | 0.8491* | -0.0049 | 1.1240*** | 0.4285*** | 3.4277*** | 1.1391*** | 0.9271*** | 1.2167*** | 0.8958*** | 0.7844*** | 0.1247 | 1.6049*** | 0.9688*** | 1.4047*** | 0.9479*** | 10.0282*** | |
| Lnpop | -0.3998** | -0.2971 | -0.7451*** | 0.9749** | 1.0348 | 0.3792 | 0.7897*** | 1.0740 | 5.906*** | 0.0324 | 0.8178*** | 0.5593*** | -0.7130*** | 0.3897* | Omitted | -9.1558*** | 0.2937*** | 0.4693*** | -0.0026 | -0.8244 | |
| Constant | 0.4671233 | 12.3240 | 0.5383 | -15.1158*** | -10.9485 | 6.4307 | -26.6221*** | -22.6677* | -54.7493*** | -2.2547 | -6.6926*** | -11.1109*** | Omitted | -3.2436 | -15.6964** | 167.0559*** | -0.9035 | 4.4842*** | 7.3209 | 3.7015*** | |
| Corruption | | | | | | | | | | | | | | | | | | | | | |
| C | 0.2431*** | 0.0043 | -0.3236*** | 0.7760*** | -0.1843 | 0.2512* | -0.0749 | -0.1495 | 0.2386 | 0.5724*** | -0.0360 | -0.0020 | -0.0476*** | -0.1757 | -1.2665*** | -1.1203*** | 0.1371** | 0.2894*** | 0.1604* | 0.0087 | |
| GDP | 0.2361** | -0.2777 | 0.4355*** | 0.1811* | -0.0512 | -0.4052** | 0.3694*** | 0.3077*** | -1.2094*** | 0.14777** | -0.0674 | 0.0515 | 0.8414*** | -0.0838 | 1.7527*** | -0.9058** | -0.0671 | -0.5856*** | -0.4839*** | -0.0921*** | |
| PE | 0.0000 | 0.0004 | -0.0006*** | -0.0002 | 0.0011 | 0.0022*** | -0.0018*** | 0.0003 | 0.0052*** | 0.0014 | -0.0005 | -0.0002 | -0.0005 | -0.0002 | -0.0014 | 0.0032* | 0.0005*** | -0.0005* | 0.0004 | 0.0000 | |
| Lnec | 0.7606*** | 1.1393** | 0.5698*** | 0.5395*** | 0.5925 | -0.0820 | 1.2268*** | 0.2810** | 2.8429*** | 0.7295*** | 1.0198*** | 1.2775*** | 0.5531*** | 0.774*** | -0.9594 | 0.17212*** | 0.8750*** | 1.4290*** | 1.1229*** | 1.0256*** | |
| Lnpop | -0.1696 | -0.4130 | -0.1609 | 0.2867 | 1.0356 | 0.9942* | 0.7100*** | 1.1425 | 4.6858*** | 0.1629 | 0.3642 | 0.6225*** | -0.4239*** | 0.3697* | Omitted | -8.8357*** | 0.1953* | 0.8671*** | 0.7576 | -0.0058 | |
| Constant | -2.4315*** | 13.3729 | -6.6466*** | -8.1258** | -13.3529 | 0.3698 | -24.9027*** | -23.6562 | -51.3589** | -5.8731*** | -3.9651*** | -14.2816*** | -14.3900*** | -3.0839 | 36.7936*** | 164.4077*** | -0.9628 | -1.3762 | -0.5834 | 2.7426*** | |
| Voice and Accountability | | | | | | | | | | | | | | | | | | | | | |
| VA | -0.1114 | 2.1269*** | 0.0703 | 0.8860** | -0.4598 | 0.1505 | 0.2102* | 1.4504*** | 0.3987 | -1.3511*** | -0.5047*** | 0.0795 | -0.2559* | -0.1428 | -1.2846** | -0.7738 | -0.4912*** | 0.4524*** | -0.1749 | -0.0554 | |
| GDP | 0.1138 | -0.3169 | 0.3513*** | 0.0588 | -0.1987 | -0.3439 | 0.3569*** | -0.3032*** | -1.0238*** | 0.1323*** | 0.1904*** | -0.2536 | 0.6953*** | -0.1933 | 0.7930* | 0.0055 | -0.0709 | -0.7191*** | -0.2125** | -0.0800*** | |
| PE | 0.0004** | 0.0012 | -0.0009*** | -0.0011 | 0.0017* | 0.0020*** | -0.0029*** | -0.000379 | 0.0049*** | 0.0018* | -0.0008*** | 0.0002 | -0.0003 | 0.000 | 0.0018 | 0.0011 | 0.0005*** | -0.0038 | 0.0004 | 0.0000 | |
| Lnec | 0.9640*** | 0.7322* | 0.5816*** | 0.5931*** | 0.5570 | 0.0215 | 1.2292*** | 0.9359*** | 2.6023*** | 1.1850*** | 0.9873*** | 1.4367*** | 0.6333*** | 0.8206*** | -0.4230 | 1.1092** | 0.8165*** | 1.6125*** | 0.9235*** | 0.9915*** | |
| Lnpop | -0.2087 | 0.6346 | 0.1925 | -0.1908 | 1.6259* | 0.8618* | 0.5282*** | 2.9880*** | 3.11759 | -0.3305* | -0.0980 | 0.6305*** | -0.4214*** | 0.4683** | Omitted | -7.3136*** | 0.1741 | 0.8169*** | -0.1756 | -0.0273 | |
| Constant | 0.7098 | -2.2143 | -10.6619*** | 3.1760 | -18.6703 | 0.4232 | -21.4660*** | -41.1704** | -31.2241 | 2.0605 | -2.9588*** | -6.7418* | -10.5441*** | -2.1128 | -13.4218** | 118.2278*** | 0.1999 | 2.0787* | 9.8517** | 3.1260*** | |
| Government efficiency | | | | | | | | | | | | | | | | | | | | | |
| GE | -0.2821*** | 0.0389 | -0.0357 | -0.0099 | -0.9218*** | 1.02678*** | 0.0707 | 0.9883** | -1.6566*** | -1.1447*** | 0.1957** | 0.1962* | -0.0122 | 0.0070 | -1.3937* | -0.2807 | -0.0049 | -0.0829 | -0.3366*** | 0.0280 | |
| GDP | 0.1357 | -0.1904 | 0.4460*** | 0.0103 | -0.51948*** | -0.5156*** | 0.3463*** | -0.0139 | -1.4658*** | 0.0864* | -0.0216 | -0.0536 | 0.7773*** | -0.1112 | 0.7931 | -0.9181** | -0.0243 | -0.7134*** | -0.1957** | -0.1092*** | |
| PE | 0.0002 | -0.0007 | -0.0010*** | -0.0013 | 0.0002 | 0.0029*** | -0.0013*** | 0.0008 | 0.0030** | 0.0014* | -0.0002 | -0.0002 | -0.0005** | -0.0004 | 0.0039 | 0.0013 | 0.0004* | -0.0003 | -0.0003 | -0.0001 | |
| Lnec | 1.0628*** | 1.4105*** | 0.5562*** | 0.5177*** | 1.7127*** | -0.0067 | 1.0783*** | 0.6908*** | 3.5164*** | 1.0016*** | 0.9243*** | 1.5332*** | 0.6361*** | 0.8349*** | 0.0858 | 1.7909*** | 0.8795*** | 1.5680*** | 0.8986*** | 1.0451*** | |
| Lnpop | -0.3880*** | -1.1831 | -0.0758 | 0.8637* | 1.9925** | 2.1416*** | 0.6453*** | 0.6135 | 9.8276*** | -0.1332 | 0.3750** | 0.9803*** | -0.4544*** | 0.36666* | Omitted | -9.0002*** | 0.0992 | 0.5222*** | -0.4557 | 0.0204 | |
| Constant | 2.7469*** | 22.1495** | -8.4845*** | -13.40282** | -20.7589 | -18.2249*** | -22.2287*** | -8.9334 | -129.1097** | 0.7152 | -5.1281*** | -19.2975*** | -12.58555*** | -2.6564 | -15.9900** | 166.6231*** | -0.3548 | 7.7515*** | 14.6948** | 2.5706*** | |
| Rule of law | | | | | | | | | | | | | | | | | | | | | |
| RL | -0.2931*** | -2.0991*** | -0.3811*** | -0.3398 | 0.3755 | -0.4597 | 0.1157 | 0.7619** | 0.6498 | -0.6998** | -0.1246 | 0.2771** | 0.1113 | -0.5352*** | -1.6166*** | -0.0299 | -0.2081*** | 0.3015*** | -0.0164 | -0.0029 | |
| GDP | 0.2084** | 0.5203 | 0.5855*** | 0.2260 | -0.4476* | -0.3506 | 0.0362*** | -0.0460 | -1.2182*** | -0.0261 | 0.0055 | -0.0491 | 0.7141*** | -0.1102 | 1.4361*** | -0.8947** | 0.0702 | -0.6539*** | -0.2878*** | -0.1030*** | |
| PE | 0.0001 | 0.0007 | -0.0012*** | -0.0016 | 0.0018 | 0.0022 | -0.0017*** | 0.0009 | 0.0041** | 0.0007 | -0.0004 | -0.0002 | -0.0005 | -0.0004 | 0.0015 | 0.0020 | 0.0004** | -0.0005* | 0.0004 | -0.0001 | |
| Lnec | 0.9399*** | 0.5810 | 0.5014*** | 0.4871*** | 1.0769* | 0.0763 | 1.1980*** | 0.6500*** | 2.8222*** | 1.1808*** | 0.9991*** | 1.5572*** | 0.6168*** | 0.8147*** | -1.5103 | 1.7279*** | 0.9097*** | 1.5450*** | 1.0141*** | 1.0590*** | |
| Lnpop | -0.3715** | -1.4246* | -0.4367* | 0.3299 | 2.0285* | 0.7940 | 0.6025*** | -0.1283 | 2.8964 | 0.2925 | 0.2643 | 1.1998*** | -0.4660*** | 0.3019** | Omitted | -8.5457*** | -0.0962 | 0.6898*** | 0.1280 | -0.0003 | |
| Constant | 1.1336*** | 12.3938 | -5.6299** | -9.4291** | -21.4525 | 1.9704 | -22.6975*** | 4.2319 | -22.6930 | -3.7700* | -4.1456*** | -23.5378*** | -10.4942*** | -1.1566 | -25.1869*** | 158.7277*** | 0.5392 | 2.9824** | 5.8981 | 2.6979*** | |
| Regulatory quality | | | | | | | | | | | | | | | | | | | | | |
| RQ | -0.2276*** | 0.3209 | 0.0615 | -0.0867 | 0.0130 | -0.2570 | -0.2868* | 1.2493*** | 0.6387* | -0.4118 | 0.3660*** | 0.2553 | 0.3156*** | -0.1854 | -2.9773** | -1.3564*** | -0.2780*** | 0.1472** | -0.3520*** | -0.0542* | |
| GDP | 0.1331 | -0.7657 | 0.3740*** | 0.1671 | -0.2385 | -0.3178 | 0.4412*** | -0.2604*** | -1.3732*** | 0.1071* | -0.1699 | 0.1075 | 0.4970*** | -0.1147 | 1.0534* | 0.7990* | -0.0184 | -0.7011*** | -0.1764 | -0.0561* | |
| PE | 0.0002 | 0.0005 | -0.0008*** | -0.0015 | 0.0014 | 0.0025*** | -0.0018*** | 0.0010** | 0.0033*** | -0.0001 | -0.0002 | 0.0003 | -0.0002 | -0.0007 | 0.0006 | -0.0012 | 0.0004*** | -0.0005* | -0.0002 | 0.0000 | |
| Lnec | 1.0232*** | 1.5760*** | 0.5826*** | 0.4788*** | 0.6965 | 0.0540 | 1.1765*** | 0.9329*** | 3.3679*** | 1.2424*** | 0.9005*** | 1.0646*** | 0.7382*** | 0.8397*** | -0.5163 | 0.2029 | 0.7783*** | 1.5821*** | 1.1034*** | 1.0010*** | |
| Lnpop | -0.2160 | 0.0623 | 0.1072 | 0.5032 | 1.5040 | 0.6412 | 0.8288*** | -0.3021 | 3.6864** | -0.1401 | 0.5984*** | 0.7929*** | -0.3682*** | 0.3468* | Omitted | -5.4311*** | -0.0458 | 0.7168*** | 0.0651 | -0.0793 | |
| Constant | 0.0841 | 16.7215 | -9.8359*** | -10.9897 | -16.5768 | 3.7444 | -28.6420 | 11.2288 | -33.4698 | -1.0727 | -4.8106*** | -17.8667*** | -6.7584*** | -2.1075 | -18.8209** | 70.9507*** | 2.7732*** | 3.7303*** | 3.6124 | 3.3416*** | |

⁶ *, ** and *** indicates significance at 10%, 5% and 1% respectively.

Overall there was no obvious pattern found in the results that could predict what type of countries would be affected by a certain type of institution, however, at least ten out of the twenty countries were affected by each institution. Overall institutional quality increases have indicated that it stabilized markets and can even become more effective in increasing or decreasing electricity generation capacity.

5. Conclusion:

Many reasons have been given as to why electricity sectors are different. This study however investigates whether the quality of institutions is the deeper cause to blame for why electricity sectors of countries differ and why some are more efficient. Effective institutions can improve the functioning of markets significantly while low-quality institutions can significantly increase the cost of the market, make the market ineffective and hinder economic activity (Koeniger & Silberberger, 2015). The latter affects the electricity generation capacity of a country. The study aimed to establish whether institutional factors affected twenty countries electricity generation capacity. The institutional factors used were property rights, corruption, voice and accountability, government efficiency, rule of law and regulatory quality. Property rights were found to affect only eight of the twenty countries electricity generation sector while eleven countries electricity generation sectors were significantly affected by an increase in the institutional quality of the corruption perception index. For voice and accountability, government efficiency and rule of law should institution quality increase then the electricity generation sector for ten out of twenty countries respectively would be affected. The last institutional factor regulatory quality seemed to influence most countries. Regulatory quality affects twelve countries electricity generation capacity. Overall the results suggest that improved institutional quality stabilises markets and can lead to increased efficiency in electricity generation capacity.

When a country assesses which institutional factors are a priority to improve electricity generation capacity, they should look at the stability and credibility of the institutions as well as the severity of the impact these institutions have on the sector. When implementing improved policies in place of distortionary policies they should account for the quality of the implementing policy as well as how it will affect the market around electricity generation capacity and make it more effective. Policies should also take into account how to use institutional factors such as rule of law to combat ineffective institutional factors making it easier for corruption. Lastly, policies should be stable, adaptable and coherent.

Each country has its market structure and the quality of their institutions are on different levels however progress in institutional quality in certain factors needs to occur to assist the electricity sector

with a sustainable transition forward. When institutional progress is made it should assist to reconcile economic growth and electricity supply in such a way that it will assist in reducing GHG emissions

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Appendix

Table 7: Correlation Matrix

| | Energy generation | Property Rights | Government Integrity | Trade Freedom | Investment Freedom | Corruption | Voice and accountability | Government efficiency | Political Stability and No Violence | Rule of law | Regulatory quality | GDP | Price of electricity | Energy consumption | Population | Financial development |
|-------------------------------------|-------------------|-----------------|----------------------|---------------|--------------------|------------|--------------------------|-----------------------|-------------------------------------|-------------|--------------------|---------|----------------------|--------------------|------------|-----------------------|
| Energy generation | 1 | | | | | | | | | | | | | | | |
| Property Rights | 0.2085* | 1 | | | | | | | | | | | | | | |
| Government Integrity | 0.2891* | 0.8858* | 1 | | | | | | | | | | | | | |
| Trade Freedom | 0.0802 | 0.3153* | 0.2804* | 1 | | | | | | | | | | | | |
| Investment Freedom | -0.0587 | 0.6052* | 0.4779* | 0.5150* | 1 | | | | | | | | | | | |
| Corruption | 0.2155* | 0.8791* | 0.9308* | 0.3355* | 0.5516* | 1 | | | | | | | | | | |
| Voice and accountability | 0.1744* | 0.7728* | 0.7697* | 0.3999* | 0.4044* | 0.7863* | 1 | | | | | | | | | |
| Government efficiency | 0.2999* | 0.8867* | 0.9184* | 0.3494* | 0.4600* | 0.8932* | 0.8190* | 1 | | | | | | | | |
| Political Stability and No Violence | 0.0629 | 0.5500* | 0.4800* | 0.3958* | 0.2264* | 0.4750* | 0.7736* | 0.5411* | 1 | | | | | | | |
| Rule of law | 0.2065* | 0.8954* | 0.9062* | 0.4087* | 0.4980* | 0.8965* | 0.9008* | 0.9470* | 0.6597* | 1 | | | | | | |
| Regulatory quality | 0.1781* | 0.8929* | 0.8697* | 0.4059* | 0.6092* | 0.8757* | 0.8412* | 0.8914* | 0.5894* | 0.9299* | 1 | | | | | |
| GDP | 0.9549* | 0.3083* | 0.3996* | 0.1704* | 0.0911 | 0.3216* | 0.2721* | 0.3902* | 0.1183 | 0.3155* | 0.2948* | 1 | | | | |
| Price of electricity | -0.0278 | -0.0933 | -0.0977 | -0.2295* | -0.1613* | -0.1017 | -0.0906 | -0.1322 | -0.1136 | -0.1337 | -0.1028 | -0.0753 | 1 | | | |
| Energy consumption | 0.9968* | 0.2139* | 0.2979* | 0.0973 | -0.0520 | 0.2229* | 0.1950* | 0.3033* | 0.0926 | 0.2187* | 0.1874* | 0.9596* | -0.0360 | 1 | | |
| Population | 0.9098* | -0.0682 | 0.0110 | -0.0855 | -0.1775* | -0.0600 | -0.1481* | -0.0369 | -0.1684* | -0.1324 | -0.1191 | 0.8542* | 0.0203 | 0.9056* | 1 | |
| Financial development | 0.4187* | 0.4959* | 0.6362* | 0.2800* | 0.2230* | 0.5685* | 0.5865* | 0.5831* | 0.3393* | 0.6046* | 0.4796* | 0.4419* | -0.0108 | 0.4348* | 0.1778* | 1 |

Table 8: Fixed effects with institutional variable property rights

| Dependent Variable: Electricity generation | | | | | |
|--|--------------|--------------|--------------|--------------|--------------|
| | Regression 1 | Regression 2 | Regression 3 | Regression 4 | Regression 5 |
| PR*LnGDP | 0.0134*** | 0.024*** | -0.0002 | -0.0003 | -0.0004 |
| | (0.0033) | (0.0033) | (0.0018) | (0.0017) | (0.0017) |
| PE | | -0.0003 | 0.0007* | 0.0009** | 0.0009** |
| | | (0.0007) | (0.0004) | (0.0004) | (0.0004) |
| Lnec | | | 0.8888*** | 0.8349*** | 0.8338*** |
| | | | (0.0306) | (0.0371) | (0.0402) |
| Lnpop | | | | 0.1837** | 0.1839** |
| | | | | (0.0729) | (0.0731)] |
| Lnfd | | | | | 0.0009 |
| | | | | | (0.0123) |
| Constant | 4.8796*** | 4.8792*** | 0.6205*** | -2.2677* | -2.2699* |
| | (0.0648) | (0.0649) | (0.1504) | (1.1567) | (1.1591) |
| F stat | 3108.93 | 3099.67 | 72.68 | 70.29 | 68.58 |
| | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| Observations | 320 | 320 | 320 | 320 | 320 |
| Groups | 20 | 20 | 20 | 20 | 20 |

Table 9: Fixed effects with institutional variable corruption

| Dependent Variable: Electricity generation | | | | | |
|--|--------------|--------------|--------------|--------------|--------------|
| | Regression 1 | Regression 2 | Regression 3 | Regression 4 | Regression 5 |
| C*GDP | 0.0006 | 0.0006 | 0.0014 | 0.0027 | 0.0027 |
| | (0.0035) | (0.0035) | (0.0017) | (0.0018) | (0.0018) |
| PE | | -0.0001 | 0.0007* | 0.0010** | 0.0010** |
| | | (0.0007) | (0.0004) | (0.0004) | (0.0004) |
| Lnec | | | 0.8884*** | 0.8254*** | 0.8276*** |
| | | | (0.0295) | (0.0367) | (0.0396) |
| Lnpop | | | | 0.2125*** | 0.2124*** |
| | | | | (0.0752) | (0.0753) |
| Lnfd | | | | | -0.0020 |
| | | | | | (0.0133) |
| Constant | 5.1324*** | 5.1329*** | 0.5965*** | -2.7665** | -2.7692** |
| | (0.0576) | (0.0579) | (0.1532) | (1.1994) | (1.2015) |
| Fstat | 3008.54 | 2998.17 | 72.64 | 71.29 | 69.42 |
| | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| Observations | 320 | 320 | 320 | 320 | 320 |
| Groups | 20 | 20 | 20 | 20 | 20 |

Table 10: Fixed effects with institutional variable voice and accountability

| Dependent Variable: Electricity generation | | | | | |
|--|--------------|--------------|--------------|--------------|--------------|
| | Regression 1 | Regression 2 | Regression 3 | Regression 4 | Regression 5 |
| VA*GDP | 0.0251*** | 0.0258*** | 0.0126*** | 0.0131*** | 0.0131*** |
| | (0.0082) | (0.0083) | (0.0041) | (0.0041) | (0.0041) |
| PE | | -0.0004 | 0.0006 | 0.0008** | 0.0007** |
| | | (0.0007) | (0.0004) | (0.0004) | (0.0004) |
| Lnec | | | 0.8786*** | 0.8202*** | 0.8155*** |
| | | | (0.0292) | (0.0361) | (0.0393) |
| Lnpop | | | | 0.1946*** | 0.1956*** |
| | | | | (0.0718) | (0.0719) |
| Lnfd | | | | | 0.0039 |
| | | | | | (0.0131) |
| Constant | 4.6626*** | 4.6528*** | 0.4305*** | -2.6375** | -2.6490** |
| | (0.1562) | (0.1574) | (0.1608) | (1.1423) | (1.1447) |
| Fstat | 2755.49 | 2747.3 | 70.15 | 72.01 | 71.20 |
| | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| Observations | 320 | 320 | 320 | 320 | 320 |
| Groups | 20 | 20 | 20 | 20 | 20 |

Table 11: Fixed effects with institutional variable government efficiency

| Dependent Variable: Electricity generation | | | | | |
|--|--------------|--------------|--------------|--------------|--------------|
| | Regression 1 | Regression 2 | Regression 3 | Regression 4 | Regression 5 |
| GE*GDP | 0.0128* | 0.0128* | 0.0115*** | 0.0153*** | 0.0156*** |
| | (0.0066) | (0.0066) | (0.0032) | (0.0033) | (0.0033) |
| PE | | -0.0001 | 0.0007** | 0.0010*** | 0.0010*** |
| | | (0.0007) | (0.0037) | (0.0004) | (0.0004) |
| Lnec | | | 0.8867*** | 0.8017*** | 0.7911*** |
| | | | (0.0289) | (0.0359) | (0.0393) |
| Lnpop | | | | 0.2838*** | 0.2876*** |
| | | | | (0.0737) | (0.0740) |
| Lnfd | | | | | 0.0085 |
| | | | | | (0.0129) |
| Constant | 4.8936*** | 4.8940*** | 0.4033** | -4.1306*** | -4.1846*** |
| | (0.1287) | (0.1289) | (0.1594) | (1.1876) | (1.1915) |
| Fstat | 2559.21 | 2544.45 | 76.65 | 73.72 | 71.49 |
| | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| Observations | 320 | 320 | 320 | 320 | 320 |
| Groups | 20 | 20 | 20 | 20 | 20 |

Table 12: Fixed effects with institutional variable rule of law

| Dependent Variable: Electricity generation | | | | | |
|--|--------------|--------------|--------------|--------------|--------------|
| | Regression 1 | Regression 2 | Regression 3 | Regression 4 | Regression 5 |
| RL*GDP | 0.0319*** | 0.0320*** | 0.0128*** | 0.0125*** | 0.0125*** |
| | (0.0071) | (0.0071) | (0.0036) | (0.0036) | (0.0036) |
| PE | | -0.0002 | 0.0007* | 0.0009** | 0.0009** |
| | | (0.0007) | (0.0004) | (0.0004) | (0.0004) |
| Lnec | | | 0.8697*** | 0.8187*** | 0.8214*** |
| | | | (0.0294) | (0.0360) | (0.0390) |
| Lnpop | | | | 0.1731** | 0.1725** |
| | | | | (0.0715) | (0.0717) |
| Lnfd | | | | | -0.0024 |
| | | | | | (0.0130) |
| Constant | 4.5294*** | 4.5293*** | 0.4676*** | -2.22487** | -2.2432** |
| | (0.1368) | (0.1370) | (0.1535) | (1.1328) | (1.1351) |
| Fstat | 3096.61 | 3083.85 | 74.95 | 74.37 | 72.68 |
| | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| Observations | 320 | 320 | 320 | 320 | 320 |
| Groups | 20 | 20 | 20 | 20 | 20 |

Table 13: Fixed effects with institutional variable regulatory quality

| Dependent Variable: Electricity generation | | | | | |
|--|--------------|--------------|--------------|--------------|--------------|
| | Regression 1 | Regression 2 | Regression 3 | Regression 4 | Regression 5 |
| RQ*GDP | 0.0344*** | 0.0346*** | 0.0108*** | 0.0111*** | 0.0111*** |
| | (0.0058) | (0.0058) | (0.0031) | (0.0031) | (0.0031) |
| PE | | -0.0004 | 0.0006* | 0.0008** | 0.0008** |
| | | (0.0007) | (0.0004) | (0.0004) | (0.0004) |
| Lnec | | | 0.8602*** | 0.8022*** | 0.7977*** |
| | | | (0.0300) | (0.0367) | (0.0399) |
| Lnpop | | | | 0.1920*** | 0.1929*** |
| | | | | (0.0714) | (0.0715) |
| Lnfd | | | | | 0.0037 |
| | | | | | (0.0130) |
| Constant | 4.4603*** | 4.4584*** | 0.5490*** | -2.4716** | -2.4810** |
| | (0.1148) | (0.1151) | (0.1487) | (1.1325) | (1.1347) |
| Fstat | 3055.98 | 3046.15 | 75.52 | 74.64 | 73.13 |
| | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| Observations | 320 | 320 | 320 | 320 | 320 |
| Groups | 20 | 20 | 20 | 20 | 20 |

Table 14: Model A to E for Australia and Austria⁷

| | Australia | | | | | Austria | | | | |
|---------------------------------|-------------|-------------|------------|------------|------------|-------------|-------------|-----------|------------|------------|
| Property Rights | Model A | Model B | Model C | Model D | Model E | Model A | Model B | Model C | Model D | Model E |
| PR | 0.1533 | 0.2018** | 0.1301*** | 0.0325 | 0.1522*** | Omitted | Omitted | Omitted | Omitted | Omitted |
| GDP | 0.3824*** | 0.3871*** | 0.0033 | 0.2439** | -0.1319 | 0.4549*** | 0.4902*** | -0.4592 | -0.3068 | -0.0705 |
| PE | | 0.0005 | 0.0006*** | 0.0003 | 0.0007*** | | 0.0003 | 0.0005 | 0.0008 | 0.0006 |
| Lnec | | | 1.0363*** | 0.9173*** | 0.9512*** | | | 1.2480** | 1.1353** | 1.1254** |
| Lnpop | | | | -0.3998** | 0.1099 | | | | -0.2971 | -0.8651 |
| Infid | | | | | 0.1337*** | | | | | Omitted |
| Constant | -5.2565*** | -5.4317*** | -0.3474 | 0.4671233 | 1.3510** | -7.9441** | -8.8866** | 11.1812 | 12.3240 | 15.1131 |
| Corruption | Model A | Model B | Model C | Model D | Model E | Model A | Model B | Model C | Model D | Model E |
| C | 0.8387*** | 0.8968*** | 0.3556*** | 0.2431*** | 0.3345*** | -0.2488 | -0.286 | -0.0013 | 0.0043 | -0.0259 |
| GDP | 0.6000*** | 0.6101*** | 0.1866*** | 0.2361** | -0.6742 | 0.0317* | 0.3176* | -0.6137 | -0.2777 | -0.2294 |
| PE | | -0.0001 | 0.0000 | 0.0000 | 0.0001 | | 0.0011 | 0.0004 | 0.0004 | 0.0011 |
| Lnec | | | 0.7337*** | 0.7606*** | 0.7200*** | | | 1.3692** | 1.1393** | 1.088** |
| Lnpop | | | | -0.1696 | 0.2312*** | | | | -0.4130 | -0.4266 |
| Infid | | | | | 0.1609*** | | | | | Omitted |
| Constant | -11.8713*** | -12.2007*** | -3.9721*** | -2.4315*** | -1.5093*** | -4.0557 | -4.0592 | 14.7915* | 13.3729 | 12.5409 |
| Voice and Accountability | Model A | Model B | Model C | Model D | Model E | Model A | Model B | Model C | Model D | Model E |
| VA | 0.1957 | 0.3516 | -0.0772 | -0.1114 | 0.4097*** | 2.8247*** | 2.4470*** | 2.2171*** | 2.1269*** | 1.9298*** |
| GDP | 0.3580*** | 0.3677*** | -0.0136 | 0.1138 | -0.0733 | 0.5165*** | 0.5328*** | -0.22062 | -0.3169 | 0.0683 |
| PE | | -0.0003 | 0.0004* | 0.0004** | 0.0002 | | 0.0002 | 0.0008 | 0.0012 | 0.0013 |
| Lnec | | | 1.0078*** | 0.9640*** | 0.9288*** | | | 0.9785** | 0.7322* | 0.7940* |
| Lnpop | | | | -0.2087 | -0.1570 | | | | 0.6346 | -0.4139 |
| Infid | | | | | 0.2510*** | | | | | Omitted |
| Constant | -4.5977*** | -4.9864*** | 0.4543 | 0.7098 | 3.5477*** | -11.7880*** | -11.9289*** | 3.8370 | -2.2143 | 4.1101 |
| Government efficiency | Model A | Model B | Model C | Model D | Model E | Model A | Model B | Model C | Model D | Model E |
| GE | 0.5014*** | 0.7981*** | -0.3307*** | -0.2821*** | -0.3020*** | -0.3914 | -0.1991 | 0.2896 | 0.0389 | -0.2182 |
| GDP | 0.4570*** | 0.4976*** | -0.1141*** | 0.1357 | -0.0898 | 0.3265* | 0.3855** | -0.7568** | -0.1904 | -0.2232 |
| PE | | 0.0003 | 0.0002 | 0.0002 | 0.0003* | | 0.0004 | 0.0003 | -0.0007 | 0.0001 |
| Lnec | | | 1.1433*** | 1.0628*** | 1.1098*** | | | 1.771*** | 1.4105*** | 1.2961*** |
| Lnpop | | | | -0.3880*** | -0.1265 | | | | -1.1831 | -1.0665 |
| Infid | | | | | 0.0810** | | | | | Omitted |
| Constant | -7.6153*** | -8.9938*** | 2.7255*** | 2.7469*** | 3.9598*** | -4.1874 | -5.9245 | 16.6664** | 22.1495** | 21.86157* |
| Rule of law | Model A | Model B | Model C | Model D | Model E | Model A | Model B | Model C | Model D | Model E |
| RL | -0.4992** | -0.7860*** | -0.3176*** | -0.2931*** | -0.2407** | -1.9608*** | -2.2965*** | -1.4364** | -2.0991*** | -2.1550*** |
| GDP | 0.3379*** | 0.3176*** | -0.0170 | 0.2084** | 0.1234 | 0.4086*** | 0.3883*** | -0.1454 | 0.5203 | 0.5560 |
| PE | | -0.0003 | 0.0001 | 0.0001 | 0.0001 | | 0.0008 | 0.0017 | 0.0007 | 0.0006 |
| Lnec | | | 0.9816*** | 0.9399*** | 0.9664*** | | | 0.7758* | 0.5810 | 0.7373* |
| Lnpop | | | | -0.3715** | -0.2895 | | | | -1.4246* | -1.8345** |
| Infid | | | | | 0.0426 | | | | | Omitted |
| Constant | -3.4570*** | -2.6462*** | 0.9094** | 1.1336*** | 1.7105*** | -4.9956 | -4.1631 | 6.0494 | 12.3938 | 17.3651* |
| Regulatory quality | Model A | Model B | Model C | Model D | Model E | Model A | Model B | Model C | Model D | Model E |
| RQ | 0.2753 | 0.4597** | -0.3137*** | -0.2276*** | -0.1327 | -0.4438 | -0.6291*** | 0.0529 | 0.3209 | 0.2372 |
| GDP | 0.3130*** | 0.2802*** | 0.0051 | 0.1331 | -0.0378 | 0.3953*** | 0.3489*** | -0.7111* | -0.7657 | -0.4924 |
| PE | | 0.0000 | 0.0003* | 0.0002 | 0.0004** | | 0.0008 | 0.00121 | 0.0005 | 0.0011 |
| Lnec | | | 1.0981*** | 1.0232*** | 0.9868*** | | | 1.5856*** | 1.5760*** | 1.2414** |
| Lnpop | | | | -0.2160 | -0.0523 | | | | 0.0623 | 0.0450 |
| Infid | | | | | 0.1070*** | | | | | Omitted |
| Constant | -3.4293*** | -2.6746** | -0.3494 | 0.0841 | 1.6630** | -5.9947 | -4.6101 | 16.4289** | 16.7215 | 11.1838 |

⁷ *, ** and *** indicates significance at 10%, 5% and 1% respectively.

Table 15: Model A to E for Chile and Colombia⁸

| | Chile | | | | | Colombia | | | | |
|---------------------------------|-------------|-------------|-------------|-------------|------------|-------------|-------------|------------|--------------|------------|
| Property Rights | Model A | Model B | Model C | Model D | Model E | Model A | Model B | Model C | Model D | Model E |
| PR | -0.1653*** | -0.1668*** | -0.0315 | -0.1433*** | -0.1997*** | 0.2113* | 0.1693 | -0.0752 | -0.1465** | -0.1137* |
| GDP | 0.9306*** | 0.9129*** | 0.0396*** | 0.5173*** | 0.4699*** | 0.7848*** | 0.7900*** | 0.1445* | -0.0046 | -0.2920** |
| PE | | -0.0015*** | -0.0009*** | -0.013*** | -0.0015*** | | -0.0045 | 0.0003 | -0.0010 | -0.0017** |
| Lnec | | | 0.5894*** | 0.6447*** | 0.7964*** | | | 0.6430*** | 0.5693*** | 0.6032*** |
| Lnpop | | | | -0.7451*** | -1.4183*** | | | | 0.9749** | 0.7949** |
| Infid | | | | | 0.1001*** | | | | | 0.1852*** |
| Constant | -20.0136*** | -19.5423*** | -8.5614*** | 0.5383 | 11.9582*** | -16.6845*** | -16.7922*** | -2.1999 | -15.1158*** | -5.1512 |
| Corruption | Model A | Model B | Model C | Model D | Model E | Model A | Model B | Model C | Model D | Model E |
| C | -0.7423*** | -0.6755*** | -0.3168*** | -0.3236*** | -0.2992*** | 0.3725 | 0.3525 | 0.7223*** | 0.7760*** | 0.4891*** |
| GDP | 0.8804*** | 0.8889*** | 0.4242*** | 0.4355*** | 0.3906*** | 0.9092*** | 0.9056*** | 0.2579*** | 0.1811* | -0.2968** |
| PE | | -0.0008** | -0.0006*** | -0.0006*** | -0.0007*** | | -0.0010 | 0.0009 | -0.0002 | -0.0014** |
| Lnec | | | 0.5343*** | 0.5698*** | 0.6155*** | | | 0.5508*** | 0.5395*** | 0.5856** |
| Lnpop | | | | -0.1609 | -0.2276 | | | | 0.2867 | 0.5401** |
| Infid | | | | | 0.0220 | | | | | 0.2235*** |
| Constant | -18.3196*** | -18.5844*** | -8.8910*** | -6.6466*** | -4.6674* | -20.0129*** | -19.9031*** | -5.1333*** | -8.1258** | -0.8308 |
| Voice and Accountability | Model A | Model B | Model C | Model D | Model E | Model A | Model B | Model C | Model D | Model E |
| VA | 0.1273 | 0.0073 | 0.0998 | 0.0703 | 0.0548 | -0.7037* | -0.7096* | 0.6417*** | 0.8860** | 0.3147 |
| GDP | 0.9808*** | 0.9720*** | 0.3771*** | 0.3513*** | 0.3184*** | 1.0185*** | 0.9943*** | 0.0595 | 0.0588 | -0.3273** |
| PE | | -0.009* | -0.0008*** | -0.0009*** | -0.0008*** | | -0.0013 | -0.0011 | -0.0011 | -0.0019** |
| Lnec | | | 0.6215*** | 0.5816*** | 0.6514*** | | | 0.5787*** | 0.5931*** | 0.6078*** |
| Lnpop | | | | 0.1925 | -0.1395 | | | | -0.1908 | 0.2798 |
| Infid | | | | | 0.0774* | | | | | 0.2223*** |
| Constant | -21.5594*** | -21.2401*** | -8.3122*** | -10.6619*** | -4.9004 | -22.4249*** | -21.7747*** | -0.0298 | 3.1760 | 4.5114 |
| Government efficiency | Model A | Model B | Model C | Model D | Model E | Model A | Model B | Model C | Model D | Model E |
| GE | -0.2724** | -0.2875*** | -0.0417 | -0.0357 | -0.1783*** | -0.5284*** | -0.5404*** | -0.3356*** | -0.0099 | -0.0450 |
| GDP | 0.9503*** | 0.9371*** | 0.4158*** | 0.4460*** | 0.3797*** | 0.9148*** | 0.8909*** | 0.2254*** | 0.0103 | -0.4486*** |
| PE | | -0.0014*** | -0.0008*** | -0.0010*** | -0.0009*** | | -0.0022** | -0.0005 | -0.0013 | -0.0017** |
| Lnec | | | 0.5730*** | 0.5562*** | 0.6396*** | | | 0.5580*** | 0.5177*** | 0.5703*** |
| Lnpop | | | | -0.0758 | -0.3860** | | | | 0.8637* | 0.7445** |
| Infid | | | | | 0.0828*** | | | | | 0.2914*** |
| Constant | -20.4707*** | -20.1079*** | -9.0230*** | -8.4845*** | -2.1995 | -19.7787*** | -19.1158*** | -3.8630** | -13.40282*** | -0.4001 |
| Rule of law | Model A | Model B | Model C | Model D | Model E | Model A | Model B | Model C | Model D | Model E |
| RL | -0.6115*** | -5.8699*** | -0.1942** | -0.3811*** | -0.4822*** | -1.0964*** | -1.4230*** | -0.4192** | -0.3398 | -0.1968 |
| GDP | 0.9359*** | 0.9280*** | 0.4896*** | 0.5855*** | 0.5246*** | 1.0477*** | 1.0301*** | 0.3454*** | 0.2260 | -0.4780*** |
| PE | | -0.0013*** | -0.0009*** | -0.0012*** | -0.0012*** | | -0.0038*** | -0.0010 | -0.0016 | -0.0027*** |
| Lnec | | | 0.4833*** | 0.5014*** | 0.5888*** | | | 0.4756*** | 0.4871*** | 0.5586*** |
| Lnpop | | | | -0.4367* | -0.8450*** | | | | 0.3299 | 0.6607** |
| Infid | | | | | 0.1089*** | | | | | 0.3412*** |
| Constant | -19.8311*** | -19.6364*** | -10.4663*** | -5.6299** | 1.9839 | -23.0772*** | -22.4473*** | -6.6909*** | -9.4291** | 1.7924 |
| Regulatory quality | Model A | Model B | Model C | Model D | Model E | Model A | Model B | Model C | Model D | Model E |
| RQ | -1.0024*** | -0.9521*** | -0.05944 | 0.0615 | -0.1830 | -1.2022*** | -1.4330*** | -0.3547** | -0.0867 | 0.3316 |
| GDP | 0.9492*** | 0.9214*** | 0.4422*** | 0.3740*** | 0.3637*** | 1.1067*** | 1.1034*** | 0.3687*** | 0.1671 | -0.6952 |
| PE | | -0.0012*** | -0.0007*** | -0.0008*** | -0.0007*** | | -0.0037*** | -0.0010 | -0.0015 | -0.0022** |
| Lnec | | | 0.5446*** | 0.5826*** | 0.6330*** | | | 0.4612*** | 0.4788*** | 0.6355*** |
| Lnpop | | | | 0.1072 | -0.2366 | | | | 0.5032 | 1.1923 |
| Infid | | | | | 0.0682** | | | | | 0.2779*** |
| Constant | -19.8528*** | -19.4514*** | -9.5808*** | -9.8359*** | -4.1646 | -24.4280*** | -24.1899*** | -7.2288*** | -10.9897 | -2.1940 |

⁸ *, ** and *** indicates significance at 10%, 5% and 1% respectively.

Table 16: Model A to E for the Czech Republic and France⁹

| | Czech Republic | | | | | France | | | | |
|---------------------------------|----------------|------------|------------|-------------|------------|-----------|------------|------------|-------------|-------------|
| Property Rights | Model A | Model B | Model C | Model D | Model E | Model A | Model B | Model C | Model D | Model E |
| PR | -0.3813*** | -0.3746*** | -0.3729*** | -0.4592*** | -0.5143*** | 0.1627 | 0.0445 | 0.1742** | 0.0948 | -0.0831 |
| GDP | 0.1414*** | 0.1478*** | 0.0162 | -0.1751 | -0.1588 | -0.1563 | -0.0308 | -0.2009* | -0.2433 | -0.2612 |
| PE | | -0.0003 | -0.0007 | -0.0007 | -0.0007 | | 0.0024*** | 0.0015*** | 0.0018** | 0.0025*** |
| Lnec | | | 0.4753* | 0.8491* | 0.8332* | | | 0.0898 | -0.0049 | 0.0470 |
| Lnpop | | | | 1.0348 | 1.5861 | | | | 0.3792 | 1.8678 |
| Infid | | | | | -0.5844 | | | | | -0.2885*** |
| Constant | 1.0270 | 0.8574 | 2.2930** | -10.9485 | -19.9601 | 10.6855* | 7.1760*** | 11.3930*** | 6.4307 | -18.7226* |
| Corruption | Model A | Model B | Model C | Model D | Model E | Model A | Model B | Model C | Model D | Model E |
| C | -0.2818* | -0.4100*** | -0.2982** | -0.1843 | 0.6703 | 0.2285* | 0.2056** | 0.0671 | 0.2512* | 0.1973 |
| GDP | 0.2460*** | 0.2971*** | 0.1555* | -0.0512 | -0.2339 | 0.0395 | 0.0403 | 0.0191 | -0.4052** | -0.2739 |
| PE | | 0.0009 | 0.0003 | 0.0011 | 0.0011 | | 0.0019*** | 0.0015*** | 0.0022*** | 0.0022*** |
| Lnec | | | 0.4070 | 0.5925 | 0.5043 | | | 0.0924 | -0.0820 | 0.0381 |
| Lnpop | | | | 1.0356 | 1.9779 | | | | 0.9942* | 1.4098*** |
| Infid | | | | | -0.2651 | | | | | -0.1980** |
| Constant | -1.8281 | -3.0983* | -1.1678 | -13.3529 | -23.4718 | 5.0470** | -2.5148*** | 5.1668** | 0.3698 | -10.6750** |
| Voice and Accountability | Model A | Model B | Model C | Model D | Model E | Model A | Model B | Model C | Model D | Model E |
| VA | -1.0579*** | -0.8526* | -0.5652 | -0.4598 | -0.7962 | 0.3068 | 0.0277 | 0.0367 | 0.1505 | 0.0616 |
| GDP | 0.1338*** | 0.1279*** | 0.1172 | -0.1987 | -0.2830 | 0.0993 | 0.0100 | -0.0040 | -0.3439 | -0.2158 |
| PE | | 0.0003 | 0.0010 | 0.0017* | 0.0006 | | 0.0022*** | 0.0016*** | 0.0020*** | 0.0023*** |
| Lnec | | | 0.0715 | 0.5570 | 0.5758 | | | 0.1764 | 0.0215 | -0.0420 |
| Lnpop | | | | 1.6259* | 1.4766 | | | | 0.8618* | 1.1232** |
| Infid | | | | | 0.0383 | | | | | -0.1556* |
| Constant | 1.6980 | 1.7072 | 1.4818 | -18.6703 | -14.0423 | 3.2660 | 6.0230*** | 5.3279** | 0.4232 | -6.7841 |
| Government efficiency | Model A | Model B | Model C | Model D | Model E | Model A | Model B | Model C | Model D | Model E |
| GE | -0.8090*** | -0.8679*** | -0.8394*** | -0.9218*** | -1.1478*** | 0.9024*** | 0.5666*** | 0.6565*** | 1.02678*** | 0.9097*** |
| GDP | 0.1676*** | 0.1566*** | -0.0150 | -0.51948*** | -0.5098** | 0.4036*** | 0.2432*** | 0.2624*** | -0.5156*** | -0.4452*** |
| PE | | 0.0018** | 0.0013 | 0.0002 | 0.0003 | | 0.0017*** | 0.0014*** | 0.0029*** | 0.0027*** |
| Lnec | | | 0.6838** | 1.7127*** | 1.6168** | | | 0.2631** | -0.0067 | 0.0323 |
| Lnpop | | | | 1.9925** | 1.3349 | | | | 2.1416*** | 1.9591*** |
| Infid | | | | | 0.0466 | | | | | -0.0274 |
| Constant | 0.6368 | 0.9568 | 2.5456** | -20.7589 | -10.0001 | -5.9343** | -1.0806 | -3.3266 | -18.2249*** | -16.9797*** |
| Rule of law | Model A | Model B | Model C | Model D | Model E | Model A | Model B | Model C | Model D | Model E |
| RL | 0.1459 | 0.3323 | 0.6354** | 0.3755 | 0.7318** | 0.0463 | -0.4561 | -0.8223** | -0.4597 | -0.0193 |
| GDP | 0.0695 | 0.08183 | -0.0659 | -0.4476* | -0.5851** | 0.0087 | 0.0566 | 0.0117 | -0.3506 | -0.2346 |
| PE | | 0.0019* | 0.0010 | 0.0018 | 0.0012 | | 0.0021*** | 0.0019*** | 0.0022*** | 0.0022*** |
| Lnec | | | 0.3904 | 1.0769* | 1.3924** | | | 0.3369** | 0.0763 | 0.0555 |
| Lnpop | | | | 2.0285* | 1.9442 | | | | 0.7940 | 1.2199** |
| Infid | | | | | -0.0048 | | | | | -0.1825** |
| Constant | 2.5297* | 2.0755 | 4.0804** | -21.4525 | -18.0565 | 6.0519** | 5.0696*** | 4.5623** | 1.9704 | -8.4065 |
| Regulatory quality | Model A | Model B | Model C | Model D | Model E | Model A | Model B | Model C | Model D | Model E |
| RQ | 0.1238 | 0.1055 | -0.0032 | 0.0130 | -0.0832 | 0.1375 | -0.3264 | -0.6116*** | -0.2570 | 0.6039 |
| GDP | 0.0966* | 0.1014** | 0.1476 | -0.2385 | -0.4144 | 0.0477 | -0.0008 | -0.1504** | -0.3178 | -0.3389 |
| PE | | 0.0008 | 0.0016 | 0.0014 | 0.0020 | | 0.0024*** | 0.0022*** | 0.0025*** | 0.0026*** |
| Lnec | | | -0.1402 | 0.6965 | 0.8351 | | | 0.2190 | 0.0540 | -0.1564 |
| Lnpop | | | | 1.5040 | 2.5339* | | | | 0.6412 | 2.1324*** |
| Infid | | | | | 0.0049 | | | | | -0.2806*** |
| Constant | 1.8372 | 1.7223 | 1.1840 | -16.5768 | -29.1646 | 4.8728 | 6.5940*** | 9.7335*** | 3.7444 | -20.5474** |

⁹ *, ** and *** indicates significance at 10%, 5% and 1% respectively.

Table 17: Model A to E for Germany and Greece¹⁰

| | Germany | | | | | Greece | | | | |
|---------------------------------|-----------|-----------|-------------|-------------|-------------|------------|------------|------------|-------------|-------------|
| Property Rights | Model A | Model B | Model C | Model D | Model E | Model A | Model B | Model C | Model D | Model E |
| PR | 0.2405* | 0.2065 | -0.3234*** | 0.1078 | 0.1601 | -0.0985 | -0.2018 | -0.2018 | -0.2011 | -0.1908* |
| GDP | 0.3140*** | 0.3262*** | 0.2750*** | 0.3959*** | 0.5374*** | 0.4619*** | 0.4381*** | 0.3673*** | 0.2906*** | -0.2173** |
| PE | | 0.0016** | -0.0027*** | -0.0015*** | -0.0017*** | | 0.0015* | 0.0016** | 0.0015** | 0.0015** |
| Lnec | | | 1.4636*** | 1.1240*** | 1.084*** | | | 0.4605*** | 0.4285*** | 0.8927*** |
| Lnpop | | | | 0.7897*** | 0.5900* | | | | 1.0740 | 3.4477*** |
| Infid | | | | | 0.0859 | | | | | -0.2116*** |
| Constant | -2.8355 | -3.1612 | -10.5153*** | -26.6221*** | -27.2460*** | -8.0687*** | -3.1612*** | -7.4115*** | -22.6677* | -48.6966*** |
| Corruption | Model A | Model B | Model C | Model D | Model E | Model A | Model B | Model C | Model D | Model E |
| C | 0.1413 | 0.2543 | 0.0526 | -0.0749 | 0.4824 | -0.2048* | -0.1961 | -0.3657** | -0.1495 | 0.1597 |
| GDP | 0.2972*** | 0.3032*** | 0.3422*** | 0.3694*** | 0.4968*** | 0.4616*** | 0.4408*** | 0.3703*** | 0.3077*** | -0.2422 |
| PE | | 0.0013* | -0.0015*** | -0.0018*** | -0.0021*** | | 0.0002 | 0.0003 | 0.0003 | 0.0003 |
| Lnec | | | 1.0219*** | 1.2268*** | 1.2715*** | | | 0.3823*** | 0.2810** | 0.8268*** |
| Lnpop | | | | 0.7100*** | 0.3811 | | | | 1.1425 | 3.9297** |
| Infid | | | | | 0.0808 | | | | | -0.2021*** |
| Constant | -2.2473 | -2.51148 | -9.9788*** | -24.9027*** | -23.3335*** | -8.0209*** | -7.4789*** | -7.1053*** | -23.6562 | -55.7807*** |
| Voice and Accountability | Model A | Model B | Model C | Model D | Model E | Model A | Model B | Model C | Model D | Model E |
| VA | -0.0278 | -0.0874 | 0.1550 | 0.2102* | 0.2020* | -0.2250 | -0.2276 | 1.0366*** | 1.4504*** | 0.5544 |
| GDP | 0.2643*** | 0.2817*** | 0.3471*** | 0.3569*** | 0.5166*** | 0.4675*** | 0.4392*** | -0.0187 | -0.3032*** | -0.3452*** |
| PE | | 0.013* | -0.0016*** | -0.0019*** | -0.0021*** | | 0.0010 | 0.0004 | -0.0003789 | 0.0001 |
| Lnec | | | 1.1907*** | 1.2292*** | 1.2663*** | | | 0.9632*** | 0.9359*** | 0.9751*** |
| Lnpop | | | | 0.5282*** | 0.3101 | | | | 2.9880*** | 3.8904*** |
| Infid | | | | | 0.0917 | | | | | -0.1442 |
| Constant | -1.1637 | -1.6238 | -11.2732*** | -21.4660*** | -22.7469 | -8.1126*** | -7.3720*** | -0.0720 | -41.1704*** | -53.5984*** |
| Government efficiency | Model A | Model B | Model C | Model D | Model E | Model A | Model B | Model C | Model D | Model E |
| GE | 0.4710*** | 0.7436*** | 0.2549 | 0.0707 | 0.0714 | -0.0324 | -0.0065 | 0.8788** | 0.9883** | -0.7728** |
| GDP | 0.1593*** | 0.1481** | 0.2769*** | 0.3463*** | 0.4124*** | 0.4313*** | 0.4257*** | 0.0596 | -0.0139 | -0.2010** |
| PE | | 0.0021*** | -0.0011* | -0.0013*** | -0.0014** | | 0.0010 | 0.0008 | 0.0008 | 0.0008 |
| Lnec | | | 0.9314*** | 1.0783*** | 1.0544*** | | | 0.7138*** | 0.6908*** | 0.6581*** |
| Lnpop | | | | 0.6453*** | 0.5195* | | | | 0.6135 | 5.0896*** |
| Infid | | | | | 0.0436 | | | | | -0.2776*** |
| Constant | 1.14603 | 1.5547 | -7.6842*** | -22.2287*** | -21.8882*** | -7.2900*** | -7.1643*** | -0.9551 | -8.9334 | -74.1107*** |
| Rule of law | Model A | Model B | Model C | Model D | Model E | Model A | Model B | Model C | Model D | Model E |
| RL | 0.4249** | 0.4829*** | 0.0411 | 0.1157 | 0.0241 | 0.4861* | 0.5144 | 0.9080*** | 0.7619** | 0.4558 |
| GDP | 0.2955*** | 0.3132*** | 0.3445*** | 0.0362*** | 0.3925*** | 0.1857* | 0.1609 | -0.1384 | -0.0460 | -0.3229*** |
| PE | | 0.0015** | -0.0015*** | -0.0017*** | -0.0018*** | | 0.0015** | 0.006 | 0.0009 | 0.0006 |
| Lnec | | | 1.1238*** | 1.1980*** | 1.2089*** | | | 0.7030*** | 0.6500*** | 1.0328*** |
| Lnpop | | | | 0.6025*** | 0.5473** | | | | -0.1283 | 2.3926** |
| Infid | | | | | 0.0218 | | | | | -0.1440*** |
| Constant | -2.4415 | -3.0059* | -10.6855*** | -22.6975*** | -22.6684*** | -1.1319 | -0.5074 | 4.2831 | 4.2319 | -30.531 |
| Regulatory quality | Model A | Model B | Model C | Model D | Model E | Model A | Model B | Model C | Model D | Model E |
| RQ | 0.4411 | 0.7447*** | 0.4802*** | -0.2868* | -0.2258 | 0.4082* | 0.6232*** | 1.0915*** | 1.2493*** | 0.7656*** |
| GDP | 0.1591 | 0.1322 | 0.2218*** | 0.4412*** | 0.6138*** | 0.2393** | 0.1501* | -0.1841** | -0.2604*** | -0.3260*** |
| PE | | 0.0021*** | -0.008* | -0.0018*** | -0.0024*** | | 0.0010 | 0.0009** | 0.0010** | 0.0012** |
| Lnec | | | 1.1239*** | 1.1765*** | 1.2676*** | | | 0.8300*** | 0.9329*** | 0.9856*** |
| Lnpop | | | | 0.8288*** | 0.451 | | | | -0.3021 | 1.3634 |
| Infid | | | | | 0.1127 | | | | | -0.1046** |
| Constant | 1.4893 | 2.0128 | -7.5036*** | -28.6420*** | -28.1362*** | -2.5046 | -0.2945 | 4.8377** | 11.2288 | -13.4788 |

10 *, ** and *** indicates significance at 10%, 5% and 1% respectively.

Table 18: Model A to E for Hungary and Ireland¹¹

| | Hungary | | | | | Ireland | | | | |
|---------------------------------|-------------|-----------|------------|--------------|--------------|------------|------------|------------|------------|------------|
| Property Rights | Model A | Model B | Model C | Model D | Model E | Model A | Model B | Model C | Model D | Model E |
| PR | 0.5091*** | 0.0644 | 0.2694** | 0.1717 | -0.1207 | 0.3099 | 1.0712*** | -0.0188 | -0.3258 | -0.4452 |
| GDP | -0.1034 | -0.1516 | -1.6397*** | -1.4215*** | -0.9780*** | 0.3163*** | 0.3575*** | 0.1111** | 0.0622 | -0.0591 |
| PE | | 0.0096*** | 0.0070*** | 0.0036** | 0.0036*** | | 0.013 | 0.0007 | 0.0006 | 0.0017 |
| Lnec | | | 2.8815*** | 3.4277*** | 2.8231*** | | | 1.1245*** | 1.1391*** | 1.4297 |
| Lnpop | | | | 5.906*** | 5.9589*** | | | | 0.0324 | -0.0006 |
| Infid | | | | | 0.1136*** | | | | | -0.0463 |
| Constant | 5.854057 | 7.3336** | 34.8050*** | -54.7493*** | -78.16*** | -5.2477*** | -7.0132*** | -3.2700** | -2.2547 | 0.7890 |
| Corruption | Model A | Model B | Model C | Model D | Model E | Model A | Model B | Model C | Model D | Model E |
| C | -0.6370** | 0.4108*** | 0.3786** | 0.2386344 | -0.3531*** | 0.7944*** | 0.8049*** | 0.5666*** | 0.5724*** | 0.4647* |
| GDP | -0.3740** | -0.0196 | -0.9555*** | -1.2094*** | -0.9046*** | 0.3456*** | 0.3648*** | 0.1816*** | 0.14777** | 0.1511 |
| PE | | 0.0111*** | 0.0099*** | 0.0023*** | 0.0023** | | 0.0018* | 0.0012 | 0.0014 | 0.0022** |
| Lnec | | | 1.4387** | 2.8429*** | 2.7770*** | | | 0.7733*** | 0.7295*** | 0.7680* |
| Lnpop | | | | 4.6858*** | 6.0783*** | | | | 0.1629 | 0.0424 |
| Infid | | | | | 0.1295*** | | | | | -0.0140 |
| Constant | 13.4433*** | 3.7792 | 22.5250*** | -51.3589** | -81.7338*** | -6.3332*** | -6.8523*** | -4.4067*** | -5.8731*** | -4.1037 |
| Voice and Accountability | Model A | Model B | Model C | Model D | Model E | Model A | Model B | Model C | Model D | Model E |
| VA | 1.5630*** | 0.3680 | 1.0832*** | 0.3987 | 0.5923 | -0.3683 | -0.9000** | -1.1635*** | -1.3511*** | -1.2063*** |
| GDP | 0.6743*** | 0.0878 | -1.1588*** | -1.0238*** | -0.8936*** | 0.2645*** | 0.2876*** | 0.0811** | 0.1323*** | 0.1420 |
| PE | | 0.0084*** | 0.0047*** | 0.0049*** | 0.00031*** | | 0.0023* | 0.0020** | 0.0018* | 0.0023** |
| Lnec | | | 2.9243*** | 2.6023*** | 2.8056*** | | | 1.0690*** | 1.1850*** | 1.1563** |
| Lnpop | | | | 3.1759 | 3.1660 | | | | -0.3305* | -0.2545 |
| Infid | | | | | 0.1012*** | | | | | 0.0063 |
| Constant | -14.7997*** | 0.9968 | 21.7819*** | -31.2241 | -35.6555 | -3.3291*** | -3.5325*** | -1.4235 | 2.0605 | 0.5936 |
| Government efficiency | Model A | Model B | Model C | Model D | Model E | Model A | Model B | Model C | Model D | Model E |
| GE | 1.1226*** | -0.0740 | 0.2869 | -1.6566*** | -0.7330* | -1.2330*** | -1.2869*** | -1.0949*** | -1.1447*** | -1.0675*** |
| GDP | 0.0314 | -0.0732 | -1.4450*** | -1.4658*** | -0.9799*** | 0.2174*** | 0.2695*** | 0.0805** | 0.0864* | 0.2524* |
| PE | | 0.0103*** | 0.0073*** | 0.0030** | 0.0029*** | | 0.0032*** | 0.0016** | 0.0014* | 0.0017** |
| Lnec | | | 2.3430** | 3.5164*** | 2.81333*** | | | 0.8536*** | 1.0016*** | 0.6971** |
| Lnpop | | | | 9.8276*** | 7.41999*** | | | | -0.1332 | -0.2098 |
| Infid | | | | | 0.0884*** | | | | | 0.0386 |
| Constant | 2.0144 | 5.4092* | 31.7787*** | -129.1097*** | -101.1156*** | -1.3938 | -2.7323*** | -0.7245 | 0.7152 | -1.7024 |
| Rule of law | Model A | Model B | Model C | Model D | Model E | Model A | Model B | Model C | Model D | Model E |
| RL | 1.5727*** | 0.8697*** | 1.1127*** | 0.6498 | -0.7531* | -0.1566 | -0.1118 | -0.4077 | -0.6998** | -1.1807*** |
| GDP | 0.2421* | 0.0801 | -1.2140*** | -1.2182*** | -0.5968** | 0.3136*** | 0.2987*** | 0.0557 | -0.0261 | 0.1750 |
| PE | | 0.0068*** | 0.0047*** | 0.0041** | 0.0044*** | | 0.0023 | 0.0005 | 0.0007 | 0.0008 |
| Lnec | | | 2.3598*** | 2.8222*** | 2.4815*** | | | 1.1606*** | 1.1808*** | 0.7181 |
| Lnpop | | | | 2.8964 | 8.4188*** | | | | 0.2925 | 0.3594 |
| Infid | | | | | 0.1239*** | | | | | 0.0753 |
| Constant | -3.6934 | 0.8840 | 25.2670*** | -22.6930 | -125.9406 | -4.7714*** | -4.4269*** | -1.6101 | -3.7700* | -8.4959** |
| Regulatory quality | Model A | Model B | Model C | Model D | Model E | Model A | Model B | Model C | Model D | Model E |
| RQ | 1.8635*** | 0.9437*** | 1.0296*** | 0.6387* | -0.7632** | 0.6030*** | 0.8573*** | -0.2155 | -0.4118 | -0.2052 |
| GDP | 0.4628*** | 0.2419* | -1.0625*** | -1.3732*** | -0.9270*** | 0.2889*** | 0.2984*** | 0.1055* | 0.1071* | -0.0654 |
| PE | | 0.0070*** | 0.0058*** | 0.0033*** | 0.0029*** | | 0.0023* | 0.0005 | -0.0001 | 0.0012 |
| Lnec | | | 2.4464*** | 3.3679*** | 2.9545*** | | | 1.1259*** | 1.2424*** | 1.5911*** |
| Lnpop | | | | 3.6864** | 8.6554*** | | | | -0.1401 | -0.1074 |
| Infid | | | | | 0.1367*** | | | | | -0.6265 |
| Constant | -9.6291** | -3.3581 | 21.0648*** | -33.4698 | -123.0198*** | -4.7573*** | -5.2285*** | -2.9613** | -1.0727 | 1.9120 |

11 *, ** and *** indicates significance at 10%, 5% and 1% respectively.

Table 19: Model A to E for Israel and Italy¹²

| | Israel | | | | | Italy | | | | |
|---------------------------------|-------------|-------------|------------|------------|------------|-------------|-------------|------------|-------------|-------------|
| Property Rights | Model A | Model B | Model C | Model D | Model E | Model A | Model B | Model C | Model D | Model E |
| PR | -0.3680* | -0.3801* | -0.1605*** | -0.2662*** | -0.2578*** | -0.0662** | -0.1031*** | -0.0414* | -0.0495*** | -0.0212 |
| GDP | 0.7586*** | 0.7760*** | 0.1968*** | -0.2175*** | -0.1755* | 1.2232*** | 0.9712*** | 0.2373 | -0.0071 | -0.2323 |
| PE | | 0.0009 | -0.0044* | -0.0004* | -0.0003 | | 0.0018*** | 0.0007* | 0.0000 | 0.0000 |
| Lnec | | | 0.9043*** | 0.9271*** | 1.0063 | | | 0.7489*** | 1.2167*** | 1.4618*** |
| Lnpop | | | | 0.8178*** | 0.6176*** | | | | 0.5593*** | 0.7310** |
| Infid | | | | | -0.0646 | | | | | -0.01977 |
| Constant | -15.5489*** | -15.9993*** | -4.5589*** | -6.6926*** | -4.6628*** | -28.9869*** | -21.9128*** | -5.3405 | -11.1109*** | -9.1354** |
| Corruption | Model A | Model B | Model C | Model D | Model E | Model A | Model B | Model C | Model D | Model E |
| C | 0.1344 | -0.0635 | 0.1132*** | -0.0360 | -0.0240 | -0.1601*** | -0.1596*** | -0.1424** | -0.0020 | 0.0081 |
| GDP | 0.7512*** | 0.7493*** | 0.1551*** | -0.0674 | -0.2142 | 1.2424*** | 1.1831*** | 0.5527** | 0.0515 | -0.0781 |
| PE | | 0.0014** | -0.0005** | -0.0005 | 0.0002 | | 0.0012*** | 0.0003 | -0.0002 | -0.0001 |
| Lnec | | | 0.9591*** | 1.0198*** | 1.0365*** | | | 0.6502*** | 1.2775*** | 1.3621*** |
| Lnpop | | | | 0.3642 | 0.5549** | | | | 0.6225*** | 0.678* |
| Infid | | | | | -0.1721*** | | | | | -0.0113 |
| Constant | -15.7002*** | -15.5331*** | -3.8705*** | -3.9651*** | -2.4909*** | -29.4969*** | -27.8175*** | -13.6822** | -14.2816*** | -12.0475* |
| Voice and Accountability | Model A | Model B | Model C | Model D | Model E | Model A | Model B | Model C | Model D | Model E |
| VA | -0.3036 | -0.0126 | -0.4225*** | -0.5047*** | -0.0145*** | -0.6384*** | -0.1109 | -0.1152 | 0.0795 | 0.4374** |
| GDP | 0.7438*** | 0.7776*** | 0.1455*** | 0.1904*** | 0.1017 | 1.3905*** | 1.1106*** | 0.3117* | -0.2536 | -0.03000 |
| PE | | 0.0020** | -0.0006*** | -0.0008*** | -0.0005* | | 0.0014*** | 0.0002 | 0.0002 | 0.0009* |
| Lnec | | | 0.9731*** | 0.9873*** | 1.0314*** | | | 0.75800*** | 1.4367*** | 1.0755*** |
| Lnpop | | | | -0.0980 | 0.0179 | | | | 0.6305*** | 0.2349 |
| Infid | | | | | -0.0277 | | | | | 0.0648* |
| Constant | -15.2308*** | -16.3069*** | -3.3351*** | -2.9588*** | -2.5890*** | -33.3248*** | -25.7532*** | -7.4477* | -6.7418* | -4.4610 |
| Government efficiency | Model A | Model B | Model C | Model D | Model E | Model A | Model B | Model C | Model D | Model E |
| GE | 0.6293*** | 0.7580*** | 0.1456** | 0.1957** | 0.1424 | -0.0460 | -0.11050 | -0.1537* | 0.1962* | 0.2691* |
| GDP | 0.7135*** | 0.7427*** | 0.2088*** | -0.0216 | -0.1887 | 1.1280*** | 0.8615*** | 0.08886 | -0.0536 | 0.0890 |
| PE | | 0.0024*** | -0.0021 | -0.0002 | 0.0002 | | 0.0020*** | 0.0005 | -0.0002 | -0.0002 |
| Lnec | | | 0.8513*** | 0.9243*** | 0.9836*** | | | 0.8469*** | 1.5332*** | 1.3930*** |
| Lnpop | | | | 0.3750** | 0.5659*** | | | | 0.9803*** | 0.7682** |
| Infid | | | | | -0.1521** | | | | | 0.0403 |
| Constant | -15.1072*** | -15.9722*** | -4.8915*** | -5.1281*** | -3.3299*** | -26.2966*** | -18.7007*** | -1.6192 | -19.2975*** | -18.9577*** |
| Rule of law | Model A | Model B | Model C | Model D | Model E | Model A | Model B | Model C | Model D | Model E |
| RL | -0.3380 | -0.1911 | -0.0136 | -0.1246 | 0.1399 | 0.1420 | 0.1415 | -0.1790* | 0.2771** | 0.5530*** |
| GDP | 0.7455*** | 0.7653*** | 0.1651*** | 0.0055 | -0.0958 | 1.1035*** | 0.9140*** | 0.1061 | -0.0491 | -0.5612** |
| PE | | 0.0012 | -0.0005* | -0.0004 | 0.0000 | | 0.0014*** | 0.0001 | -0.0002 | -0.0014*** |
| Lnec | | | 0.9287*** | 0.9991*** | 1.0351*** | | | 1.0124*** | 1.5572*** | 2.4532*** |
| Lnpop | | | | 0.2643 | 0.2753* | | | | 1.1998*** | 2.4513*** |
| Infid | | | | | -0.1869*** | | | | | -0.0898*** |
| Constant | -15.2347*** | -15.8589*** | -3.9311*** | -4.1456*** | -1.2006 | -25.7099*** | -20.3335*** | -3.0568 | -23.5378*** | -36.3349*** |
| Regulatory quality | Model A | Model B | Model C | Model D | Model E | Model A | Model B | Model C | Model D | Model E |
| RQ | 0.8224*** | 0.5544*** | 0.1675** | 0.3660*** | 0.2750*** | -0.0059 | 0.1569 | -0.2831** | 0.2553 | 0.4787** |
| GDP | 0.5978*** | 0.6579*** | 0.1502*** | -0.1699 | -0.2405** | 1.2076*** | 0.9010*** | 0.0156 | 0.1075 | 0.1746 |
| PE | | 0.0013** | -0.0006** | -0.0002 | 0.0002 | | 0.0012*** | *0.0005735 | 0.0003 | 0.0007 |
| Lnec | | | 0.9018*** | 0.9005*** | 0.9018*** | | | 1.2670*** | 1.0646*** | 0.9785*** |
| Lnpop | | | | 0.5984*** | 0.6889*** | | | | 0.7929*** | 0.9192** |
| Infid | | | | | -0.1513*** | | | | | 0.0383 |
| Constant | -12.1991*** | -13.5821*** | -3.5663*** | -4.8106*** | -3.6956*** | -28.5776*** | -19.9889*** | -1.8718 | -17.8667*** | -21.8538*** |

¹² *, ** and *** indicates significance at 10%, 5% and 1% respectively.

Table 20: Model A to E for Japan and Mexico¹³

| | Japan | | | | | Mexico | | | | |
|---------------------------------|------------|------------|------------|--------------|--------------|-------------|-------------|------------|------------|------------|
| Property Rights | Model A | Model B | Model C | Model D | Model E | Model A | Model B | Model C | Model D | Model E |
| PR | -0.1212 | -0.1663** | -0.2967*** | -0.3645*** | -0.2872*** | -0.0374 | -0.1307 | 0.2728 | 0.16745 | -0.0036 |
| GDP | 0.0941 | 0.0631 | 0.3598*** | 0.4879*** | 0.4884*** | 0.9903*** | 0.9943*** | -0.0328 | -0.0983 | -0.1184 |
| PE | | 0.0020*** | 0.0007* | 0.0004 | -0.0001 | | -0.0002 | -0.0016 | -0.001 | -0.0001 |
| Lnec | | | 0.7900*** | 0.8958*** | 1.0905*** | | | 0.9394*** | 0.7844*** | 0.7497*** |
| Lnpop | | | | -0.7130*** | -0.8962*** | | | | 0.3897* | 0.3803 |
| Infid | | | | | 0.3897*** | | | | | 0.0325 |
| Constant | 4.1304 | 5.2547 | -8.8590*** | Omitted | Omitted | -21.7936*** | -21.8558*** | 1.2712 | -3.2436 | -2.3435 |
| Corruption | Model A | Model B | Model C | Model D | Model E | Model A | Model B | Model C | Model D | Model E |
| C | -0.1325*** | -0.1465*** | -0.0484 | -0.0476*** | -0.0273* | -0.7486*** | -0.5676*** | -0.2472** | -0.1757 | -0.13777 |
| GDP | 0.2807* | 0.3099** | 0.1002 | 0.8414*** | 0.9918*** | 0.8917*** | 0.8803*** | 0.1492* | -0.0838 | -0.0532 |
| PE | | 0.0015*** | 0.0007 | -0.0005 | -0.0005** | | -0.0018** | -0.0004 | -0.0002 | -0.0003 |
| Lnec | | | 0.7670*** | 0.5531*** | 0.6630*** | | | 0.7694*** | 0.774*** | 0.744*** |
| Lnpop | | | | -0.4239*** | 8.9106*** | | | | 0.3697* | 0.0498 |
| Infid | | | | | 0.6783*** | | | | | 0.0641 |
| Constant | -1.1889 | -2.0397 | -1.2688 | -14.3900*** | -196.5349*** | -18.8319*** | -18.5629*** | -2.6297 | -3.0839 | 1.7909 |
| Voice and Accountability | Model A | Model B | Model C | Model D | Model E | Model A | Model B | Model C | Model D | Model E |
| VA | -0.5204 | -1.1411*** | -1.0545*** | -0.2559* | -0.8864*** | 0.8029* | 1.1316*** | -0.0364 | -0.1428 | -0.1155 |
| GDP | -0.1592 | -0.3217** | -0.0910 | 0.6953*** | 0.0654 | 1.1806*** | 11.2975*** | 0.0475 | -0.1933 | -0.1266 |
| PE | | 0.0026*** | 0.0008* | -0.0003 | 0.0002 | | -0.0035*** | -0.0001 | 0.000 | -0.0002 |
| Lnec | | | 0.8043*** | 0.6333*** | 1.0691*** | | | 0.8751*** | 0.8206*** | 0.0786*** |
| Lnpop | | | | -0.4214*** | -0.2104* | | | | 0.4683** | 0.3805 |
| Infid | | | | | 0.4262*** | | | | | 0.0105 |
| Constant | 12.0303*** | 17.2371*** | 4.8070* | -10.5441*** | Omitted | -27.5081*** | -3.8968*** | -0.4542 | -2.1128 | -2.1887 |
| Government efficiency | Model A | Model B | Model C | Model D | Model E | Model A | Model B | Model C | Model D | Model E |
| GE | -0.3808*** | -0.2764*** | -0.2739* | -0.0122 | -0.0489 | 0.3039* | 0.4813*** | -0.1056 | 0.0070 | 0.0322 |
| GDP | 0.1155 | 0.1163 | 0.2346 | 0.7773*** | 1.0712*** | 0.9941*** | 0.9729*** | 0.0002 | -0.1112 | -0.0865 |
| PE | | 0.0008* | -0.0008 | -0.0005** | -0.0006** | | 0.0008 | -0.0004 | -0.0004 | 0.0000 |
| Lnec | | | 0.9507*** | 0.6361*** | 0.6616*** | | | 0.9253*** | 0.8349*** | 0.7347*** |
| Lnpop | | | | -0.4544*** | 10.0427*** | | | | 0.36666* | 0.3137 |
| Infid | | | | | 0.7203*** | | | | | 0.0426 |
| Constant | 3.8970 | 3.7893 | -6.3009 | -12.58555*** | -220.1795*** | -22.0805*** | -21.5902*** | 0.6217 | -2.6564 | -1.9615 |
| Rule of law | Model A | Model B | Model C | Model D | Model E | Model A | Model B | Model C | Model D | Model E |
| RL | -0.7572*** | -0.7934*** | -0.3491 | 0.1113 | -0.4248*** | -0.4710* | -0.4116 | -0.4900*** | -0.5352*** | -0.4715*** |
| GDP | 0.4257** | 0.3288* | 0.1903 | 0.7141*** | 0.3419*** | 0.9128*** | 0.9178*** | 0.0457 | -0.1102 | -0.1504 |
| PE | | 0.0014** | 0.0006 | -0.0005 | 0.0000 | | -0.0019* | -0.0004 | -0.0004 | -0.0004 |
| Lnec | | | 0.7183*** | 0.6168*** | 0.9950*** | | | 0.8505*** | 0.8147*** | 0.8416*** |
| Lnpop | | | | -0.4660*** | -0.6320*** | | | | 0.3019** | 0.5187** |
| Infid | | | | | 0.4191*** | | | | | -0.0411 |
| Constant | -4.9398 | -2.0652 | -3.3332 | -10.4942*** | Omitted | -19.4759*** | -19.6245*** | -0.0912 | -1.1566 | -4.1060 |
| Regulatory quality | Model A | Model B | Model C | Model D | Model E | Model A | Model B | Model C | Model D | Model E |
| RQ | -0.2699* | -0.1506 | 0.7202*** | 0.3156*** | 0.2104** | -0.4928** | -0.15233** | -0.2040** | -0.1854 | -0.1941 |
| GDP | -0.0785 | -0.1273 | -0.2553** | 0.4970*** | 0.8364*** | 1.0329*** | 1.0110*** | 0.0404 | -0.1147 | -0.0827 |
| PE | | 0.0017** | 0.0006 | -0.0002 | -0.0004 | | -0.0018 | -0.0002 | -0.0007 | -0.0004 |
| Lnec | | | 1.0129*** | 0.7382*** | 0.7787*** | | | 0.8836*** | 0.8397*** | 0.8168*** |
| Lnpop | | | | -0.3682*** | 8.7560*** | | | | 0.3468* | 0.1198 |
| Infid | | | | | 0.6666*** | | | | | 0.0490 |
| Constant | 9.4912** | 10.8344** | 6.9093** | -6.7584*** | -189.9987*** | -22.7156*** | -22.0797*** | -0.2080 | -2.1075 | 1.1889 |

13 *, ** and *** indicates significance at 10%, 5% and 1% respectively.

Table 21: Model A to E for Poland and Portugal¹⁴

| | Poland | | | | | Portugal | | | | |
|---------------------------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
| Property Rights | Model A | Model B | Model C | Model D | Model E | Model A | Model B | Model C | Model D | Model E |
| PR | -0.0374 | -0.6232*** | -0.5512** | -0.9011* | -1.1623*** | -0.4128* | 3.1640** | 3.4045* | 0.6817 | -0.2131 |
| GDP | 0.9903*** | 0.7627*** | 0.1840 | 0.7618 | 1.2573** | 0.7306*** | 0.9357* | -0.2545 | -0.8367* | -0.5336 |
| PE | | 0.0034 | 0.0048 | 0.0056*** | 0.0046 | | -0.0072** | -0.0041 | 0.0006 | 0.0013 |
| Lnec | | | 1.4127 | 0.1247 | 0.2439 | | | 1.8128** | 1.6049*** | 1.6105*** |
| Lnpop | | | | Omitted | Omitted | | | | -9.1558*** | -11.1532*** |
| Infid | | | | | -0.2852*** | | | | | 0.2181 |
| Constant | -21.7936*** | -15.2516*** | -6.7675 | -15.6964** | -28.4008*** | -14.4955*** | -22.7101* | 1.1263 | 167.0559*** | 190.9478*** |
| Corruption | Model A | Model B | Model C | Model D | Model E | Model A | Model B | Model C | Model D | Model E |
| C | -0.7486*** | -1.6203*** | -1.3623*** | -1.2665*** | -1.4478*** | -1.5644*** | -0.6414 | 0.0341 | -1.1203*** | -1.6561*** |
| GDP | 0.8917*** | 1.5999*** | 1.8826*** | 1.7527*** | 1.9725*** | 1.5912*** | 0.8349 | 0.3564 | -0.9058** | -0.9642* |
| PE | | 0.0007 | 0.0032 | -0.0014 | -0.0039 | | -0.0070* | -0.0059** | 0.0032* | 0.0043** |
| Lnec | | | -0.8867 | -0.9594 | -1.2885 | | | 1.1897 | 01.7212*** | 1.6070*** |
| Lnpop | | | | Omitted | Omitted | | | | -8.8357*** | -8.0975*** |
| Infid | | | | | 0.0009 | | | | | -0.1003 |
| Constant | -18.8319*** | -37.2872*** | -40.6156*** | 36.7936*** | -40.9675*** | -37.0808*** | -17.4885 | -10.0516 | 164.4077*** | 155.2746*** |
| Voice and Accountability | Model A | Model B | Model C | Model D | Model E | Model A | Model B | Model C | Model D | Model E |
| VA | 0.8029* | -1.7000*** | -1.8082** | -1.2846** | -1.4986** | -1.7147*** | -1.5597*** | -1.98174 | -0.7738 | 0.4161 |
| GDP | 1.1806*** | 0.6446*** | 0.9896* | 0.7930* | 0.3827 | 0.5896*** | 0.8215* | 1.3867 | 0.0055 | -0.4639 |
| PE | | 0.0046 | 0.0047 | 0.0018 | 0.0025 | | -0.0047* | -0.0039 | 0.0011 | 0.0010 |
| Lnec | | | -0.7281 | -0.4230 | 0.1588 | | | -0.0196 | 1.1092** | 1.6007** |
| Lnpop | | | | Omitted | Omitted | | | | -7.3136*** | -11.6514 |
| Infid | | | | | 0.7996 | | | | | 0.2404 |
| Constant | -27.5081*** | -11.2611*** | -16.8408** | -13.4218** | -5.4373 | -9.7544*** | -16.3969 | -30.8034 | 118.2278*** | 196.6485* |
| Government efficiency | Model A | Model B | Model C | Model D | Model E | Model A | Model B | Model C | Model D | Model E |
| GE | 0.3039* | -2.7248*** | -1.8142** | -1.3937* | -1.2754 | -1.9218*** | 1.4290** | 2.6060*** | -0.2807 | 0.2125 |
| GDP | 0.9941*** | 0.9344*** | 0.4970 | 0.7931 | 0.8491 | 0.9006*** | 0.49771 | -0.3665 | -0.9181** | -0.1962 |
| PE | | -0.004 | 0.0014 | 0.0039 | 0.0039 | | -0.0045 | 0.0001 | 0.0013 | 0.0003 |
| Lnec | | | 0.8667 | 0.0858 | 0.0796 | | | 1.8493*** | 1.7909*** | 1.4285** |
| Lnpop | | | | Omitted | Omitted | | | | -9.0002*** | -9.6577** |
| Infid | | | | | -0.0451 | | | | | 0.1336 |
| Constant | -22.0805*** | -18.5225*** | -11.6440 | -15.9900** | -17.3697 | -18.1129*** | -10.1048 | 4.4129 | 166.6231*** | 158.7700*** |
| Rule of law | Model A | Model B | Model C | Model D | Model E | Model A | Model B | Model C | Model D | Model E |
| RL | -0.4710* | -1.3520*** | -1.6856*** | -1.6166*** | -1.9532*** | -1.4334*** | -1.2870 | 3.5339*** | -0.0299 | 2.2177*** |
| GDP | 0.9128*** | 0.7537*** | 1.1076** | 1.4361*** | 0.6995 | 0.7771*** | 1.2395** | -1.2303 | -0.8947** | -0.4183 |
| PE | | 0.0011 | 0.0024 | 0.0015 | -0.0072*** | | -0.0066** | -0.0047 | 0.0020 | 0.0043** |
| Lnec | | | -0.6377 | -1.5103 | -0.63777 | | | 3.4195*** | 1.7279*** | 2.3260*** |
| Lnpop | | | | Omitted | Omitted | | | | -8.5457*** | -13.6289*** |
| Infid | | | | | 0.1026* | | | | | 0.4513* |
| Constant | -19.4759*** | -14.5172*** | -20.6563*** | -25.1869*** | -9.8627 | -15.0913*** | -27.571* | 20.2166 | 158.7277*** | 222.2472*** |
| Regulatory quality | Model A | Model B | Model C | Model D | Model E | Model A | Model B | Model C | Model D | Model E |
| RQ | -0.4928** | -1.6308** | -2.8203** | -2.9773 | -2.8520** | -1.7571** | -1.7016*** | -2.3895*** | -1.3564*** | -2.0517*** |
| GDP | 1.0329*** | 0.7976*** | 1.2365** | 1.0534* | 0.6604 | 0.7820*** | 1.2845*** | 2.6449*** | 0.7990* | 0.1329 |
| PE | | 0.0033 | 0.0032 | 0.0006 | 0.0022 | | -0.0032* | -0.0057*** | -0.0012 | -0.0043*** |
| Lnec | | | -0.8341 | -0.5163 | 0.2388 | | | -1.2639** | 0.2029 | 0.6596 |
| Lnpop | | | | Omitted | Omitted | | | | -5.4311*** | 5.5319* |
| Infid | | | | | 0.0402 | | | | | -0.7145*** |
| Constant | -22.7156*** | -15.4355*** | -22.2794** | -18.8209** | -12.2513 | -14.9197*** | -28.4995*** | -58.6753*** | 70.9507*** | -86.6238* |

14 *, ** and *** indicates significance at 10%, 5% and 1% respectively.

Table 22: Model A to E South Africa and Spain¹⁵

| | South Africa | | | | | Spain | | | | |
|---------------------------------|--------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|
| Property Rights | Model A | Model B | Model C | Model D | Model E | Model A | Model B | Model C | Model D | Model E |
| PR | -0.0057 | -0.0016 | 0.0261 | 0.0076 | 0.0275 | -2.6585*** | -3.0817*** | -1.0613** | -0.5714** | -0.0416 |
| GDP | 0.2142*** | 0.1794*** | 0.0247 | -0.1518** | 0.0772 | 0.5561*** | 0.5584*** | -0.1853* | -0.5315*** | -0.3880*** |
| PE | | 0.0018*** | 0.0003 | 0.0003** | 0.0002 | | 0.0028*** | -0.0002 | 0.0000 | 0.0000 |
| Lnec | | | 0.7973*** | 0.9688*** | 0.8136*** | | | 1.2071*** | 1.4047*** | 1.1550*** |
| Lnpop | | | | 0.2937*** | -0.0841 | | | | 0.4693*** | 0.3358*** |
| Infid | | | | | 0.0097 | | | | | 0.0672*** |
| Constant | -0.1725 | 0.7375 | 0.5314 | -0.9035 | 0.4884 | -8.0235** | -7.8037** | 4.8794** | 4.4842*** | 3.9869*** |
| Corruption | Model A | Model B | Model C | Model D | Model E | Model A | Model B | Model C | Model D | Model E |
| C | 0.2714*** | 0.3405*** | 0.1065* | 0.1371** | 0.1371** | 0.2013 | 0.2559* | -0.4425*** | 0.2894*** | 0.1431 |
| GDP | 0.2047*** | 0.1715*** | 0.0491*** | -0.0671 | -0.0429 | 0.5135*** | 0.4252*** | -0.7610*** | -0.5856*** | -0.3310*** |
| PE | | 0.0017*** | 0.0005** | 0.0005*** | 0.0006*** | | 0.0019** | -0.0001 | -0.0005* | -0.0001 |
| Lnec | | | 0.7094*** | 0.8750*** | 0.7284*** | | | 1.7711*** | 1.4290*** | 1.0602*** |
| Lnpop | | | | 0.1953* | 0.1576 | | | | 0.8671*** | 0.4808*** |
| Infid | | | | | 0.0414 | | | | | 0.0727*** |
| Constant | -0.0434 | 0.7958 | 0.3231 | -0.9628 | -0.3482 | -8.8278** | -6.3984* | 17.3794*** | -1.3762 | 0.0989 |
| Voice and Accountability | Model A | Model B | Model C | Model D | Model E | Model A | Model B | Model C | Model D | Model E |
| VA | -1.5735*** | -1.4476*** | -0.3646** | -0.4912*** | -1.0130*** | 0.2243 | 0.0180 | -0.2815 | 0.4524*** | 0.3303*** |
| GDP | 0.1340*** | 0.1220*** | 0.04866*** | -0.0709 | -0.2258* | 0.3455*** | 0.4237*** | -0.4606*** | -0.7191*** | -0.4404*** |
| PE | | 0.0014*** | 0.0005*** | 0.0005*** | 0.0006*** | | 0.0022*** | -0.0004 | -0.0038 | 0.0000 |
| Lnec | | | 0.6510*** | 0.8165*** | 0.7015*** | | | 1.3930*** | 1.6125*** | 1.1950*** |
| Lnpop | | | | 0.1741 | 0.4230* | | | | 0.8169*** | 0.5475*** |
| Infid | | | | | 0.0508 | | | | | 0.0580*** |
| Constant | 2.9472*** | 3.1763*** | 0.9268* | 0.1999 | 0.6072 | -4.1647 | -6.2117* | 11.0059*** | 2.0787* | 1.1564 |
| Government efficiency | Model A | Model B | Model C | Model D | Model E | Model A | Model B | Model C | Model D | Model E |
| GE | -0.1772 | -0.5488** | -0.0032 | -0.0049 | 0.1757 | -0.7396*** | -0.7097*** | -0.3311*** | -0.0829 | 0.0050 |
| GDP | 0.1521** | 0.0668 | 0.0349 | -0.0243 | -0.0100 | -0.2420* | -0.2175* | -0.5509*** | -0.7134*** | -0.4074*** |
| PE | | 0.0017*** | 0.0003 | 0.0004* | 0.0003 | | 0.0023*** | -0.0002 | -0.0003 | 0.0000 |
| Lnec | | | 0.8165*** | 0.8795*** | 0.8287*** | | | 1.2854*** | 1.5680*** | 1.1577*** |
| Lnpop | | | | 0.0992 | 0.1210 | | | | 0.5222*** | 0.3726*** |
| Infid | | | | | 0.0421 | | | | | 0.0705*** |
| Constant | 1.5853 | 4.0594** | 0.1701 | -0.3548 | -1.1631 | 12.9702*** | 12.2546*** | 14.1669*** | 7.7515*** | 3.6976** |
| Rule of law | Model A | Model B | Model C | Model D | Model E | Model A | Model B | Model C | Model D | Model E |
| RL | -0.1235 | -0.0505 | -0.1811** | -0.2081*** | -0.4146*** | 0.2231 | 0.1297 | -0.0878 | 0.3015*** | -0.0596 |
| GDP | 0.2170*** | 0.1781*** | 0.01690 | 0.0702 | 0.0990 | 0.3939*** | 0.3840* | -0.4512*** | -0.6539*** | -0.3414*** |
| PE | | 0.0017*** | 0.0003 | 0.0004** | 0.0004** | | 0.0016* | -0.0009* | -0.0005* | 0.0004 |
| Lnec | | | 0.8566*** | 0.9097*** | 0.7917*** | | | 1.6125*** | 1.5450*** | .9467*** |
| Lnpop | | | | -0.0962 | -0.1678 | | | | 0.6898*** | 0.3456** |
| Infid | | | | | 0.0394 | | | | | 0.0897*** |
| Constant | -0.1852 | 0.7996 | 0.5255 | 0.5392 | 1.5959** | -5.5152 | -1.1044 | 9.3823*** | 2.9824** | 3.4516*** |
| Regulatory quality | Model A | Model B | Model C | Model D | Model E | Model A | Model B | Model C | Model D | Model E |
| RQ | -0.0629 | -0.1606 | -0.3169*** | -0.2780*** | -4.669*** | 0.2575 | 0.0695 | -0.3270*** | 0.1472** | 0.0441 |
| GDP | 0.1832*** | 0.1314** | -0.0819*** | -0.0184 | -0.0470 | 0.338*** | 0.2362* | -0.5960*** | -0.7011*** | -0.4492*** |
| PE | | 0.0013*** | 0.0003** | 0.0004*** | 0.0007*** | | 0.0009 | -0.0008** | -0.0005* | -0.0001 |
| Lnec | | | 0.9218*** | 0.7783*** | 0.6350*** | | | 1.17516*** | 1.5821*** | 1.2394*** |
| Lnpop | | | | -0.0458 | -0.1062 | | | | 0.7168*** | 0.4272*** |
| Infid | | | | | 0.0637*** | | | | | 0.0562*** |
| Constant | 0.6881 | 2.1147 | 2.8961*** | 2.7732*** | 5.1793*** | -9.4542*** | -0.9982 | 12.8300*** | 3.7303*** | 3.4938** |

¹⁵ *, ** and *** indicates significance at 10%, 5% and 1% respectively.

Table 23: Model A to E for the United Kingdom and the United States¹⁶

| | United Kingdom | | | | | United States | | | | |
|---------------------------------|----------------|------------|------------|------------|------------|---------------|------------|------------|------------|------------|
| Property Rights | Model A | Model B | Model C | Model D | Model E | Model A | Model B | Model C | Model D | Model E |
| PR | 0.0884 | 0.1248 | -0.0760 | -0.0858 | 0.0744 | 0.0002 | 0.0794 | 0.0084 | -0.0295 | -0.0609** |
| GDP | -0.7859*** | -0.7694*** | -0.2724*** | -0.2396*** | -0.2177* | 0.1922*** | 0.2596*** | -0.0766*** | -0.0740*** | -0.1132*** |
| PE | | 0.0031*** | 0.00005 | 0.0002 | -0.0001 | | 0.0010*** | -0.0001 | -0.0004 | -0.0000 |
| Lnec | | | 0.9152*** | 0.9479*** | 0.8850*** | | | 0.9856*** | 10.0282*** | 1.0319*** |
| Lnpop | | | | -0.0026 | -0.1718 | | | | -0.8244 | -0.0197 |
| Infid | | | | | 0.0475*** | | | | | 0.0220 |
| Constant | 28.2849*** | 27.7651*** | 8.3924*** | 7.3209 | 9.7218** | 2.5306 | 0.4098 | 2.4892*** | 3.7015*** | 3.5469*** |
| Corruption | Model A | Model B | Model C | Model D | Model E | Model A | Model B | Model C | Model D | Model E |
| C | 0.2104** | 0.2123*** | 0.0144 | 0.1604* | 0.3820*** | -0.7367*** | -0.6102*** | 0.0089 | 0.0087 | 0.0110 |
| GDP | -0.7097*** | -0.6526*** | -0.2642*** | -0.4839*** | -0.0583*** | 0.1752*** | 0.1880*** | -0.0902*** | -0.0921*** | -0.1065*** |
| PE | | 0.0038*** | 0.0002 | 0.0004 | 0.0003 | | 0.0005*** | -0.0001 | 0.0000 | 0.0000 |
| Lnec | | | 0.9622*** | 1.1229*** | 1.0271*** | | | 1.0311*** | 1.0256*** | 1.0055*** |
| Lnpop | | | | 0.7576 | 0.9987*** | | | | -0.0058 | 0.0495 |
| Infid | | | | | 0.0767*** | | | | | 0.0282* |
| Constant | 26.0175*** | 24.3640*** | 7.8038*** | -0.5834 | -2.0916 | 3.5887*** | 3.1048*** | 2.5242*** | 2.7426*** | 2.1323*** |
| Voice and Accountability | Model A | Model B | Model C | Model D | Model E | Model A | Model B | Model C | Model D | Model E |
| VA | 0.3338 | -0.1612 | -0.1773* | -0.1749 | 0.0381 | -0.213 | -0.5258*** | -0.01911 | -0.0554 | 0.0666 |
| GDP | -0.7925*** | -0.7617*** | -0.2819*** | -0.2125** | -0.1321 | 0.1585*** | 0.1485*** | -0.0875*** | -0.0800*** | -0.1042*** |
| PE | | 0.0039*** | 0.0005 | 0.0004 | 0.0000 | | 0.0010*** | -0.0000 | 0.0000 | 0.0000 |
| Lnec | | | 0.9408*** | 0.9235*** | 0.8153*** | | | 0.9970*** | 0.9915*** | 1.0144*** |
| Lnpop | | | | -0.1756 | -0.4182 | | | | -0.0273 | 0.0639 |
| Infid | | | | | 0.0357* | | | | | 0.0360* |
| Constant | 28.2958*** | 27.7750*** | 8.5784*** | 9.8517** | 12.2053*** | 3.6999*** | 4.2371*** | 2.7482*** | 3.1260*** | 1.6105 |
| Government efficiency | Model A | Model B | Model C | Model D | Model E | Model A | Model B | Model C | Model D | Model E |
| GE | -0.0608 | 0.2364*** | -0.2389*** | -0.3366*** | -0.1856* | 0.1379 | -0.1823 | 0.03709 | 0.0280 | 0.0319 |
| GDP | -0.8127*** | -0.6211*** | -0.3191*** | -0.1957** | -0.1655* | 0.2000*** | 0.2125*** | -0.0953*** | -0.1092*** | -0.1170*** |
| PE | | 0.0039*** | -0.0002 | -0.0003 | -0.0001 | | 0.0007*** | -0.0001 | -0.0001 | -0.0005 |
| Lnec | | | 1.0050*** | 0.8986*** | 0.8763*** | | | 1.0417*** | 1.0451*** | 1.0191*** |
| Lnpop | | | | -0.4557 | -0.4196 | | | | 0.0204 | 0.0649 |
| Infid | | | | | 0.0182 | | | | | 0.0214 |
| Constant | 29.1802*** | 23.4405*** | 9.3337*** | 14.6948*** | 13.0970*** | 2.1803 | 2.0584* | 2.5702*** | 2.5706*** | 2.0396*** |
| Rule of law | Model A | Model B | Model C | Model D | Model E | Model A | Model B | Model C | Model D | Model E |
| RL | -0.4540* | -0.1992 | -0.1414 | -0.0164 | -0.1419 | -0.0914 | 0.0454 | -0.0219 | -0.0029 | -0.0188 |
| GDP | -0.7147*** | -0.7247** | -0.2583*** | -0.2878*** | 0.2691*** | 0.2489*** | 0.2453*** | -0.0822*** | -0.1030*** | -0.1017*** |
| PE | | 0.0030*** | 0.0002 | 0.0004 | -0.0002 | | 0.0010*** | -0.0000 | -0.0001 | 0.0000 |
| Lnec | | | 0.9549*** | 1.0141*** | 0.7120*** | | | 1.0043*** | 1.0590*** | 1.0016*** |
| Lnpop | | | | 0.1280 | -1.3104*** | | | | -0.0003 | 0.0394 |
| Infid | | | | | 0.0863*** | | | | | 0.0197 |
| Constant | 26.7131*** | 26.7678*** | 7.8108*** | 5.8981 | 17.2681*** | 0.8835 | 0.8764 | 2.5233*** | 2.6979*** | 2.2685*** |
| Regulatory quality | Model A | Model B | Model C | Model D | Model E | Model A | Model B | Model C | Model D | Model E |
| RQ | 0.6303*** | 0.5935*** | -0.3260*** | -0.3520*** | -0.16888* | 0.0631 | -0.2112** | -0.0226 | -0.0542* | -0.0281 |
| GDP | -0.9351*** | -0.8700*** | -0.1905*** | -0.1764 | -0.1146 | 0.2356*** | 0.2459*** | -0.0884*** | -0.0561* | -0.0636 |
| PE | | 0.0029*** | 0.0001 | -0.0002 | -0.0002 | | 0.0011*** | 0.0000 | 0.0000 | 0.0000 |
| Lnec | | | 1.0171*** | 1.1034*** | 0.9280*** | | | 1.0129*** | 1.0010*** | 0.9951*** |
| Lnpop | | | | 0.0651 | -0.2924 | | | | -0.0793 | -0.0484 |
| Infid | | | | | 0.0349* | | | | | 0.0120 |
| Constant | 32.0936*** | 30.2482*** | 5.6646*** | 3.6124 | 8.9642** | 1.1619 | 1.0621 | 2.6464*** | 3.3416*** | 2.9281*** |

¹⁶ *, ** and *** indicates significance at 10%, 5% and 1% respectively.