

Ease of Doing Business and Economic Growth

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ABSTRACT

Using panel data for 155 countries obtained from the World Bank's *Doing Business* report for 2006 to 2016, I estimate the impact of ease doing business on the growth rate of GDP per capita. The study also considers other business climate factors and out-of-steady-state dynamics in its model specifications by including the Worldwide Governance Indicators (WGI) and the lagged value of log GDP per capita as additional explanatory variables. I obtain key evidence that the ease of doing business has an overall statistically significant effect on the annual growth rate of GDP per capita. However, the estimated coefficients of the *Doing Business* indicators for the full sample are statistically insignificant with no effect on the annual growth rate of GDP per capita, while the indicators for the subsamples have a statistically significant effect. Furthermore, when the dataset is subdivided based on country income group classifications the results were found to be mixed, with some indicators suggesting a negative relationship with the per capita GDP growth rate. Hypothetical predicted growth rates for 2006 calculated using the *Doing Business* indicators for 2016 suggest that in some countries, improvements in the ease of doing business have indeed contributed to economic growth. The results provide support for the claim that the ease of doing business is an important factor for economic growth, but that the effect varies across groups of countries.

1 INTRODUCTION

The World Bank's *Doing Business* reports have become a vital tool and a yardstick for determining business environment reforms by providing quantitative indicators on regulations affecting various areas of a business life. The *Doing Business* report was first published in 2003 and at present, the *Doing Business* report covers 48 economies in Sub-Saharan Africa, 32 in Latin America and the Caribbean, 25 in East Asia and the Pacific, 25 in Europe and Central Asia, 20 in the Middle East and North Africa, 8 in South Asia, and 32 OECD high-income economies. *Doing Business* looks at domestic small and medium-size companies (SMEs) and investigates the regulations that enhance business activity and those that limit it. As stated on the World Bank's *Doing Business* website, "the primary goal of the *Doing Business* report remains to provide an objective basis for understanding and improving the regulatory environment for business around the world."¹

In this paper, the World Bank's *Doing Business* indicators are used as the representation of business regulations. This paper aims to present new findings to verify whether ease of doing business factors are a significant and positive stimulus for economic growth, using more robust panel data that cover a longer period than previous studies such as Haidar (2012) and Ani (2015). Also, this study proposes to further investigate the link between ease of doing business and economic growth by grouping countries by income group. The goal is to see how these individual income groups are affected by the ease of doing business indicators. All these phases of the study are further explained in section 3 of this paper.

So far, the *Doing Business* report has recorded over 2,900 regulatory reforms in 186 economies since 2004, with central Asia and Europe being the regions with the highest number of

¹About Us: *Doing Business* (2017), retrieved November 23, 2017, from *Doing Business* Web site, <http://www.doingbusiness.org/about-us>.

reforms per economy. The latest report indicates that 96% of economies in these regions implemented at least one business regulatory reform over the 2006-2016 period. Promoting private sector-led growth is at the center of the development agenda; therefore, more economies over time have taken up the challenge by putting some level of priority on reforming their business regulations when designing their growth policy.

Over the past decade, a growing body of literature has used the *Doing Business* indicators to analyze economic outcomes and to identify reforms that have worked (Djankov et al. (2006), Eifert (2009), Jayasuriya (2011), Haidar (2012), and Ani (2015)). These studies assessed how the business environment affects a broad range of economic outcomes. Some earlier studies such as Scarpetta et al. (2002) and Desai et al. (2003) evaluated the correlation between the business environment and economic growth. They found a positive correlation between the business environment and economic growth; however, correlation does not mean causality.

Therefore, subsequent studies such as Djankov et al. (2006), Haidar (2012), and Ani (2015) investigated the causal link between the business environment and economic growth. Using the *Doing Business* report of the World Bank to represent the business environment, these studies of the causal links provide some fairly robust evidence of positive impacts of the business environment on economic growth in the countries analyzed. The academic literature suggests that identifying and implementing reforms can accelerate a country's economic growth. Taken together, the results are encouraging and show considerable evidence of the improved relevance of policy reforms in the areas measured by *Doing Business*. Therefore, these studies suggest that countries should put a priority on reforming their business regulations when designing growth policies. In other words, business regulations could be an important determinant of economic

growth, and through structural reforms countries can improve their economic outcomes. However, further research is needed to verify that this is indeed the case.

In this study, individually none of the indicators stand out as having a statistically significant effect on the growth rate of GDP per capita in the full sample. However, the study also reports the impact of the ease of doing business on the economic growth of countries in four different income groups. These results suggest that some ease of doing business indicators have a negative effect on the economic growth of some country groups, while others have a positive effect. Indicators such as “protecting minority investors” are negatively related to per capita GDP growth in both high and upper-middle-income economies, while “dealing with construction permits” is negatively related to per capita GDP growth in both high and low-income economies. Therefore, caution must be taken when implementing reforms in these areas. Finally, predicted growth rates for some economies in 2006 are estimated using the *Doing Business* indicator values for 2016. The results suggest an increase in the growth rate of those economies, due to changes in the level of the *Doing Business* indicators. It is worth mentioning that the estimated magnitude of the effects on those economies are relatively big, ranging from the minimum of 0.65 percentage points for Serbia to the maximum of 2.63 percentage points for Slovenia.

This paper is a contribution to the literature because it differs from other studies in several important aspects. The present paper looks not only at the impact of the World Bank’s *Doing Business* indicators on economic growth, but also considers a more general model that includes the Worldwide Governance Indicators (WGI) as control variables to capture other plausible effects related to the business climate on economic growth. Also, the study considers out-of-steady-state dynamics by including the lagged value of log GDP per capita in some specifications, and unlike

other studies, it covers a longer period of eleven years. Finally, as stated earlier, this study takes the further step of grouping countries based on their income level.

In order to conduct this analysis, the rest of the paper will be structured as follows. Section 2 provides a summary of the relevant empirical literature, including past and present research. Section 3 gives detailed information about the data sources and definitions, while section 4 describes the empirical specifications. The last two parts, sections 5 and 6, discuss the results of the panel estimation and the conclusions respectively.

2 LITERATURE REVIEW

The aim of this section is to discuss several significant bodies of work that are relevant to my research. The ease of doing business and its implications for countries' economy have been analyzed from different points of view by various researchers. Studies have extensively used the World Bank's Doing Business Rankings (DBR) and its components in the analysis.

The study by Djankov et al. (2006) observes the link between regulations governing business activity and the economic growth of countries. The study uses the 2004 *Doing Business* single cross-section data created by the World Bank to measure the business regulations for 135 countries, and the average annual growth rate of GDP per capita between 1993 and 2002 as their dependent variable. They establish that the relationship between better regulations and higher growth rates is consistently significant. In addition, the results indicate that the effects of improvements in primary school enrolment, secondary education, government consumption, and inflation are significantly lower than the impact of business regulations on the economic growth rate.

Subsequently, Haidar (2012) rigorously examines the impact of business regulatory reforms on economic growth. Unlike Djankov et al. (2006), he investigates the link between business regulatory reforms and economic growth in 172 countries over a five-year period of 2006 to 2010. The analysis uses data on microeconomic reforms obtained from various sources such as the World Bank's *Doing Business* reports, the World Development Indicators, Polity IV and Freedom House. The dependent variable is the growth rate of GDP per capita, while the main explanatory variable is the total number of reforms in each country during the period covered. Similarly, he uses nine control variables for his analysis (population, financial freedom, political stability, control of corruption, foreign direct investment, the average annual growth of gross fixed capital formation, trade, government spending). Haidar (2012) also ran ten separate regressions using as the main explanatory variable the number of reforms in each category of regulatory reforms. The results suggest fairly robust evidence of a significant and reasonably large positive impact of business regulatory reforms on economic growth.

On a related front, Ani (2015) aims at examining the effect of ease of doing business on economic growth in selected economies in Asia in the year 2014. The study covered 29 economies in East Asia, Southeast Asia, and South Asia. The indicators of ease of doing business used were the ten Doing Business Indicators (DBI) of the World Bank, while Gross Domestic Product (GDP) is used as the indicator for economic growth. To ascertain the effect of the ease of doing business on economic growth, the study uses multiple regression analysis.

The results show an overall significant effect of ease of doing business on economic growth. However, only “construction permits,” “getting credit,” “registering property,” and “trading across borders” had statistically significant coefficients. Ani's analysis reveals that “dealing with construction permits” and getting credit have negative effects on GDP, while “registering

property” and “trading across borders” have positive effects. Additionally, Ani (2015) tried to determine which indicators of ease of doing business affect the gross domestic product the most. To this end, the study uses backward stepwise regression. The results show that trading across borders has the greatest effect on GDP among the selected countries in Asia.

Furthermore, some studies also analysed the impact of the business environment on other economic growth factors such as Foreign Direct Investment (FDI), new firms entry and investment rates.

The paper by Jayasuriya (2011) aims to investigate whether an improvement in the ease of *Doing Business* ranking is likely to increase FDI into a country. The study uses panel data from 84 countries from 2006 to 2009 for its regression analysis. The World Bank’s Governance Indicators were used as control variables. He finds the relationship to be statistically significant for the average country. However, there appears to be no evidence to prove that on average, countries that undertake large-scale reforms relative to other countries in the *Doing Business* ranking attract significantly greater FDI inflows.

Also, Jayasuriya (2011) notes how improvements in the *Doing Business* ranking influence FDI inflows into countries of different economic sizes. Jayasuriya observes that when focusing on developing countries in isolation, the relationship is insignificant, though it is worth mentioning that Jayasuriya’s research is based on the average developing country across a four-year period. A similar study covering the longer period of 2004 to 2010 was conducted by Bayraktar (2013). In contrast to Jayasuriya (2011), Bayraktar (2013) finds that countries which have better records of doing business tend to attract more FDI and that an improvement in ease of doing business indicators in developing countries can be one of the important factors in determining higher FDI flows to the economies of these countries.

A recent paper by Vogiatzoglou (2016) examines in detail the effect of various business regulations on foreign direct investment (FDI) attraction across ASEAN member countries. The determinants of intra-ASEAN and extra-ASEAN FDI inflows were empirically examined using a dataset of eight ASEAN countries (Cambodia, Indonesia, Laos, Malaysia, Philippines, Singapore, Thailand, and Vietnam) over the period of 2003 to 2013. The results reveal that an efficient business regulatory environment is a significant FDI determinant, and is a particularly important determinant of the inward flow of FDI.

Klapper, Laeven, and Rajan (2004) conducted a study to determine the impact of the business environment on new firms' entry into an economy. They use cross-country data on firms in Western and Eastern Europe obtained from the Amadeus database. The study finds that high regulatory barriers to entry hinder entry, especially in industries that naturally should have high entry costs, such as communications (telephone, wireless, etc.) and computer services. However, they note that not all regulations affect firm entry, but excessive bureaucratic regulation of entry leans towards undesirable effects.

Research by Eifert (2009) aims to evaluate the impact of regulatory reform on investment rates and GDP growth conditional on investment rates. He uses an Arellano-Bond dynamic panel estimator to control for unobserved cross-country heterogeneity and the correlation between reform timing and the business cycle over the period 2003 to 2007. His empirical analysis of 90 countries over the five-year period reveals a positive impact of regulatory reforms in countries that are relatively poor (conditional on governance) and relatively well-governed (conditional on income). Also, the results show a significant increase in investment in both subgroups of countries investment in the subsequent year.

In addition, there are other relevant studies related to my research that were conducted from a different point of view. They serve to shed some light on other factors that could have an effect on the business environment of countries.

The idea of evaluating the link between good governance and the business environment was explored by Bota-avram (2014). The governance indicators capture six clusters of factors related to governance, while the quality of the business environment is captured by the ease of doing business ranking, both developed by the World Bank. She uses a cross-country empirical analysis of 181 countries classified by income group. Her findings show a significant influence of some governance indicators, such as government effectiveness and regulatory quality, on the ease of doing business for all countries. She also reveals that the rule of law, government effectiveness, regulatory quality, and control of corruption are the most key governance factors for the business environment, particularly for the economies of countries classified in the high-income category.

Are corruption and the ease of doing business correlated? Mongay and Filipescu (2012) answer this question by conducting a correlation analysis of 172 countries and examining its implications for international business. They analyze the corruption and ease of doing business variables using a bivariate correlation analysis. The 172 countries were analyzed by comparing their positions in the Corruption Perception Index (CPI) ranking and the ease of doing business ranking. They conclude that there is a high degree of the interdependency between the two variables analyzed. Therefore, corrupt nations are inclined to make business more difficult and complex for local or foreign investors and vice versa, though it is worth noting that some countries (such as Thailand) in their analysis did not show high interdependence.

The results of Manuel's (2015) review the evidence with respect to the causal mechanism between investment climate improvements and economic growth contrast with those of other

studies. She analyzes 180 economies that made it easier to do business by improving regulatory frameworks between 2003 and 2012. The overall findings of her examination of the causal link between investment climate reform and growth are revealed to be weak, with a lack of endogeneity making it difficult to verify patterns in findings across studies.

In summary, this section has shown that numerous studies suggest that favorable business environments are beneficial for the economic growth of countries. Drawing from the studies above, this paper aims to carry out a more robust analysis using panel data covering 2006 to 2016. Like Jayasuriya (2011), this study proposes to use the Worldwide Governance Indicator sourced from the World Bank as control variables. A lagged value of log GDP per capita will also be included in the models to account for out-steady-state dynamics, and the data will be further analyzed by grouping countries based on their income group classification.

3 DATA

This research is based on panel data from 155 countries for which information on each variable is available for the period 2006 to 2016. The data used for all the variables are sourced from the World Bank's World Development Indicators (WDI), *Doing Business* annual reports and Worldwide Governance Indicators (WGI). A summary of the data sources used is available in Table A1 in the Appendix.

The independent variables used in this study were obtained from the *Doing Business* annual report introduced by the World Bank in 2003. It is a report on important reforms to business regulations and the implementation of the regulatory processes involved in setting up and operating a business across economies. The *Doing Business* report presents data in two forms, the distance to frontier score and the ease of doing business ranking. This study uses the ease of doing business

indicators measured in terms of the Distance to Frontier (DTF) score. The DTF score is provided by the World Bank and it assesses the entire level of regulatory performance over time by showing the best performance observed on each of the *Doing Business* indicators across all economies. Basically, the DTF score of an economy is measured on a scale from 0 to 100, where 0 represents the lowest performance and 100 represents the frontier. The frontier represents the highest performance on each of the indicators across all economies. According to World Bank (2017b, 164), “the improvement in the distance to frontier score is used to identify the top improvers because this allows a focus on the absolute improvement in contrast with the relative improvement shown by a change in rankings that economies have made in their regulatory environment for business.”

Although ten indicators covering various aspects of the business climate are provided by the World Bank *Doing Business* annual report of 2017, this research will consider only the eight indicators that are available for the entire eleven-year period from 2006 to 2016. Specifically, the indicators used are “starting a business,” “dealing with construction permits,” “registering property,” “getting credit,” “protecting minority investors,” “paying taxes,” “trading across borders,” and “enforcing contracts.” The other two indicators not used are “getting electricity” and “resolving insolvency.” It is worth noting that the “getting electricity” indicator was first included in the *Doing Business* report in 2010. Details of the factors taken into account by each of the *Doing Business* indicators are listed in Table A2.

Furthermore, essential control variables considered for the model are the six dimensions of governance, as outlined by the World Bank. The Worldwide Governance Indicators (WGI) is a dataset that measures the quality of governance based on different data sources provided by organizations in both industrial and developing countries. The six composite indicators are “voice

and accountability,” “political stability and absence of violence/terrorism,” “control of corruption,” “government effectiveness,” “rule of law,” and “regulatory quality.” Good governance is likely to increase government effectiveness in formulating and implement sound policy reforms. For example, an increase in “regulatory quality” indicator should be complementary to the *Doing Business* because it “captures perceptions of the ability of the government to formulate and implement sound policies and regulations that permit and promote private sector development” (Kaufmann, Kraay and Mastruzzi 2010, 3). It is worth mentioning that the panel dataset reduces to 154 countries when the control variables are included due to unavailability of data. These six indicators are measured in terms of percentile rankings. The percentile rank indicates the country's rank among all countries covered by the aggregate indicator. It is measured on a scale from 0 to 100, with 0 corresponding to the lowest rank, and 100 to the highest rank. The paper by Kaufmann, Kraay, and Mastruzzi (2010) explains in detail how the governance indicators are constructed.

Also, as in Mankiw, Romer, and Weil (1992), this study includes the single lagged value of log GDP per capita (constant 2010 US\$) in its analysis so as to account for dynamics. That is, this study will explicitly take into account out-of-steady-state dynamics in its model.

As for the dependent variable, the annual rate of growth of GDP per capita (available for the period 2006 to 2016), measured as a percentage, will be used for the study. It is the annual percentage growth rate of GDP per capita measured in constant 2010 U.S. dollars. The data for this variable are obtained from the World Bank’s World Development Indicators (WDI). By way of context, 2006 to 2016 was a period of comparatively mixed (strong and weak) economic performance across the world.

Within this paper, the countries are further subdivided into income groups based on the World Bank's classification of the economies of all countries. This classification is set each year on July 1. This study uses the World Bank's classification as of July 1, 2016, which remained in effect until July 1, 2017. Within this classification, economies are divided into four income groups: low income, lower middle income, upper middle income and high income. The classification is based on gross national income (GNI) per capita in U.S. dollars and determined using the World Bank Atlas method.² A list of the countries in each income group is available in Table A3 in the Appendix.

Table 1 contains descriptive statistics for the full sample. The mean value of the percentage growth rate of GDP per capita is approximately 2.19, and its standard deviation is approximately 4.126. Also, it is interesting to note that it has a minimum value of approximately -36.83, for the The Central African Republic in 2013, and a maximum value of approximately 33.03, for Azerbaijan in 2006. Among the ease of doing business indicators, "starting a business" has the highest mean value of approximately 73.98, while "getting credit" has the highest standard deviation of 23.11. Lastly, of the Worldwide Governance Indicators, "regulatory quality" has the highest mean value of 50.55, while "control of corruption" has the highest standard deviation of 28.63.

4 EMPIRICAL SPECIFICATIONS

As mentioned in the previous section, this study uses a panel dataset consisting of 155 countries over the period 2006 to 2016, although the panel dataset reduces to 154 countries when the control

² A description of the World Bank's Atlas method can be found in World Bank (2017a).

variables are included in the model due to a lack of data for Cabo Verde. Many types of empirical approach can be used in cross-national comparative work using panel data. The two basic models are the random effects and fixed effects models. However, a Hausman test will be conducted to determine which of these two econometric models best fits the data.

The random effects model assumes that the country-specific effects are random and uncorrelated with the independent variables. The random effects model is econometrically represented by equation (1a) below:

$$\begin{aligned} y_{it} &= \alpha + X'_{it}\beta + u_i + \varepsilon_{it} \\ &= \alpha + X'_{it}\beta + \eta_{it} , \end{aligned} \tag{1a}$$

where i indexes the 155 countries and t indexes the eleven years. y_{it} represents the percentage growth rate of GDP per capita for country i at time t . In this model, $\alpha + u_i$ is the unobserved country effect, and X'_{it} represents the vector of eight time-varying ease of doing business indicators. Lastly, $\eta_{it} = (\varepsilon_{it} + u_i)$ embodies unobserved effects that vary across individuals and countries (ε_{it}) and unobserved country effects that do not vary over time (u_i). Both are assumed to be normally distributed and uncorrelated with X'_{it} .

On the other hand, the fixed effects model assumes that the country-specific effects are correlated with the explanatory variables. It can be represented econometrically by equation (1b) below:

$$y_{it} = \alpha_i + X'_{it}\beta + \varepsilon_{it} , \tag{1b}$$

in this equation, α_i represents the unobserved time-invariant individual effect and ε_{it} represents the error term.

Additionally, models (1a) and (1b) are augmented to include the six control variables and the lagged value of log GDP per capita as earlier discussed. These new models are specified in the equations below. The modified random effects models are:

$$y_{it} = \alpha + X'_{it}\beta + C'_{it}\delta + \eta_{it} \quad (2a)$$

$$y_{it} = \alpha + \mu \log(y_{i,t-1}) + X'_{it}\beta + C'_{it}\delta + \eta_{it} , \quad (3a)$$

while the fixed effects versions of these models are

$$y_{it} = \alpha_i + X'_{it}\beta + C'_{it}\delta + \varepsilon_{it} \quad (2b)$$

$$y_{it} = \alpha_i + \mu \log(y_{i,t-1}) + X'_{it}\beta + C'_{it}\delta + \varepsilon_{it} , \quad (3b)$$

where i indexes the 154 countries and C'_{it} represents the vector of time-varying control variables, i.e., the governance indicators. The control variables are included in the study to account for factors other than the ease of doing business variables that also affect GDP growth. $\log(y_{i,t-1})$ represents the lagged value of log GDP per capita (in constant 2010 US\$), which seeks to account for the out-of-steady-state dynamics. Theoretically, this equation implies that each country's GDP per capita is converging towards a steady state level defined by the other variables in the equation.³ Specifically, the major difference between the model specifications (1) and (2) is the inclusion of the controls that capture other plausible effects of the business climate on the economy, while equation (3) represents the transition dynamics equation.

Furthermore, for the purposes of this study, equations (1), (2) and (3) will also be estimated using subsamples of countries based on their World Bank income group classification in 2016-2017. The initial approach was to simply pool the data from all the individual country surveys, but examining the subsamples will enable the study to ascertain whether the effect of the business

³ See section III of Mankiw et al. (1992) for a discussion of the derivation of this type of equation.

climate differs across groups of countries. Also, this study will estimate a hypothetical predicted growth rate for 2006, to explore the effect on growth of changes in the levels of the *Doing Business* indicators between 2006 and 2016.

Finally, diagnostic tests for multicollinearity, cross-sectional dependence, heteroscedasticity, and autocorrelation will be conducted to ensure the validity of the models. It should also be noted that Driscoll and Kraay (1998) standard errors will be used to account for possible instances of cross-sectional dependence, heteroscedasticity, and autocorrelation in all models.⁴ This approach will ensure the validity of hypothesis tests as it corrects the estimated standard errors for nonspherical disturbances.

⁴ All calculations and estimations were carried out using Stata v.14.2. To compute the Driscoll-Kraay standard errors, the downloadable Stata command “xtscc” written by Hoechle (2007) is used.

5 RESULTS

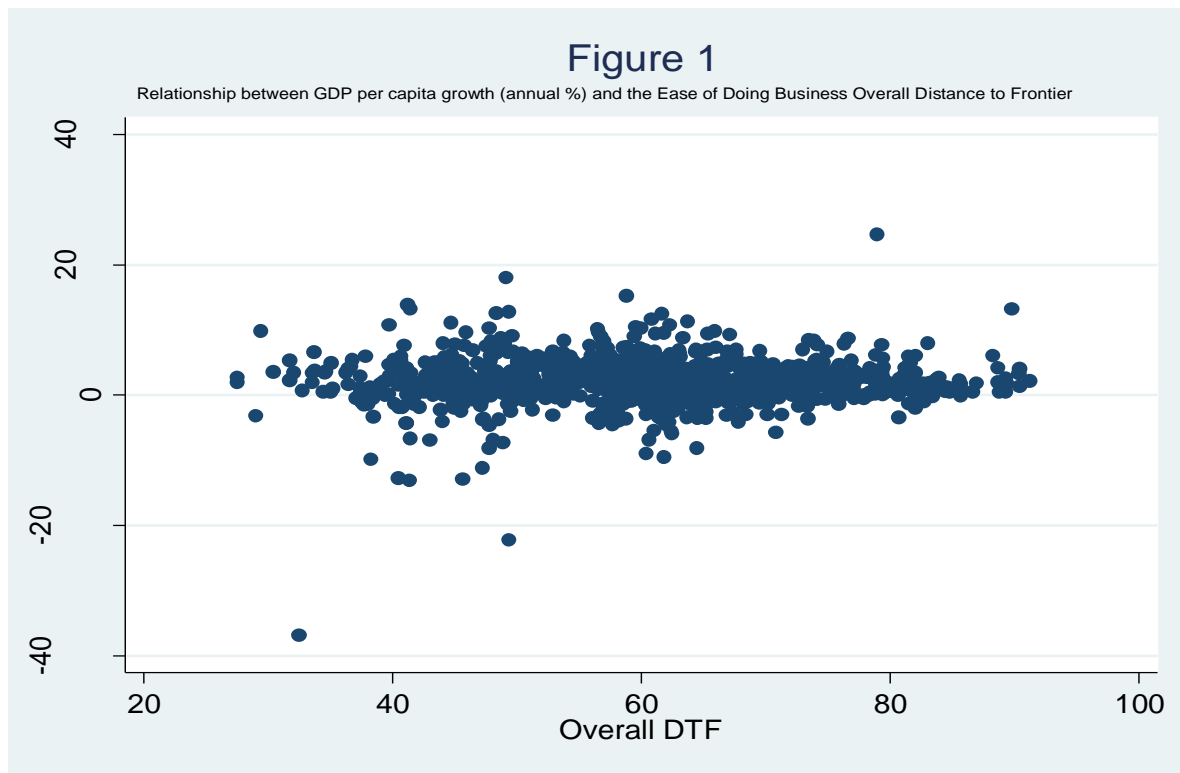


Figure 1 above provides a graphical representation of the relationship between GDP per capita growth (annual %) and the World Bank’s ease of doing business overall Distance to Frontier (DTF) measure for 155 countries between 2010 and 2016. The overall Distance to frontier is the aggregate DTF averaged across all indicators for an economy. It should be noted that this illustration only covers the period 2010 to 2016, due to the unavailability of the ease of doing business overall Distance to Frontier (DTF) measure for earlier years. The y-axis is the annual percentage growth rate of GDP per capita (PGDP), while the x-axis is the ease of doing business overall Distance to Frontier (DTF). This graph does not indicate a clear-cut correlation between the percentage growth rate of GDP per capita and the ease of doing business overall Distance to Frontier (DTF), with an estimated pairwise correlation coefficient of 0.014. However, countries

with higher ease of doing business overall DTF seem to be less prone to having a negative growth rate of GDP per capita.

5.1 Estimation Results

A number of diagnostic tests were conducted to check for the presence of multicollinearity, heteroskedasticity, autocorrelation and cross-sectional dependency across the models. First, no excessive presence of multicollinearity was found in the *Doing Business* indicators dataset. The pairwise correlation coefficients and Auxiliary R-squares support this conclusion, as the correlation coefficients for the eight *Doing Business* indicators are all less than 0.6 and then Variance Inflation Factors (VIF) are lower than 2.4 (see Tables 2 and 3 for the statistics). Though a condition index of 53.89 and some Auxiliary R-squares greater than 0.8 for some of the worldwide governance indicators suggest caution should be taken when trying to distinguish the effects of these particular variables from one another, these variables are not the main focus of the analysis and thus these strong correlations are not a reason for concern.

Next, a Wald test is conducted to check for the presence of groupwise heteroskedasticity, while the Wooldridge serial correlation test is used to check for the presence of AR(1) autocorrelation.⁵ Finally, the Pesaran test checks for the presence of cross-sectional dependence.⁶ As shown in Table 4, the p-values for these tests are less than the level of significance of 0.05 for almost all models estimated, which signifies the presence of groupwise heteroskedasticity, autocorrelation, and cross-sectional dependence respectively in the models. Therefore, as earlier discussed, Driscoll

⁵ The Wald test is performed by using the Stata command “xttest3” written by Baum (2001), while Wooldridge serial correlation test is done using the Stata command “xtserial” created by Drukker (2003).

⁶ The Pesaran test is implemented by using the Stata command “xtcsd” written by De Hoyos and Sarafidis (2006).

and Kraay (1998) standard errors are used to correct the estimated standard errors for nonspherical disturbances.

Also, a robust Hausman test proposed by Wooldridge (2002) is used to determine the ideal econometric model (fixed or random effects) for each equation and subsample.⁷ As shown in Table 4, varying results were obtained, with some samples more suited to the fixed effects model and others more suited to the random effects model. The notes below each table of coefficient estimates indicate the model used in each column.

Tables 5, 6 and 7 summarize the estimation results for each of the model specifications of interest. In each table, column (1) presents the baseline equation (1) results, while column (2) gives the estimation output when the control variables are added as in equation (2). More precisely, column (2) controls for variables other than the ease of doing business indicators that affect the business climate of the economy. The inclusion of these additional control variables is one way of checking the robustness of the results. Column (3) is the transitional dynamics equation (3). The results from column (3) will be the major focus of the study, since from an econometric point of view it is the best model. Column (3) is a more appropriate specification because the estimated coefficients of the lagged value of log GDP are significantly negative in Tables 5, 6 and 7, which implies that there is a significant tendency towards convergence for countries in the samples. This result is consistent with the findings of Mankiw, Romer, and Weil (1992), among others.

Table 5 examines the effects of ease of doing business indicators on per capita GDP growth in the full sample. In column (1), only three variables have statistically significant coefficients. “Starting a business,” “getting credit” and “trading across borders” are negatively related to the percentage growth rate of GDP per capita - i.e., an increase in either variable reduces the

⁷ The stata command “xtoverid” is used to do a robust Hausman test as proposed by Schaffer and Stillman (2006).

percentage growth rate of GDP per capita. As shown in Table 5, the results in column (2), which control for other economic climate variables by including the worldwide governance indicators in the model, are in line with the initial estimates in column (1). The coefficients of the ease of doing business indicators have the same significance level and approximately the same magnitudes as in column (1). However, when the lagged value of log GDP per capita is included in column (3), all the coefficients of the *Doing Business* indicators become statistically insignificant.

Additionally, in column (2), the coefficient of “voice and accountability” is the only statistically significant governance indicator, while in column (3) there are three statistically significant coefficients of governance indicators. The results in column (3) suggest “voice and accountability,” “political stability and absence of violence/terrorism” and “regulatory quality” as having a positive impact on the growth rate of GDP per capita. The coefficient estimates imply that a one percentage point increase in “voice and accountability,” “political stability and absence of violence/terrorism” and “regulatory quality” will increase the growth rate of GDP per capita by approximately 0.06, 0.05, and 0.08 percentage points respectively. Finally, as shown in Table 5, the p-values of the F-statistics of the models are all less than the 0.05 level of significance. This signifies that the models are overall significant.

An interesting finding that emerges in Table 5 is that the estimated coefficient of “getting credit” in column (2) is similar to that of Ani (2015). In both studies, “getting credit” appears to have a negative impact on the growth of economies. However, the estimated coefficients of all the ease of doing business indicators are statistically insignificant in column (3) when the lagged value of log GDP per capita is included in the model. It is notable that column (3) is a better-specified model as earlier stated, and this study uses panel data with a longer period of eleven years as compared to studies such as Djankov et al. (2006) and Ani (2015). Another reason for this

unexpected result could be that when the data are too aggregated, the effects of the *Doing Business* indicators on different economies cancel each other out, thus leading to statistically insignificant coefficients for the *Doing Business* indicators. This further strengthens the argument that the effects may be different for different groups of countries.

Tables 6 and 7 contain the estimation results for subsamples corresponding to income groups. As shown in Tables 6 and 7, the p-values of the F-statistics of the models for the income groups are all significant at the 5% level of significance. In general, this signifies that the models have overall explanatory power.

Table 6 evaluates the relationship between the ease of doing business indicators and per capita GDP growth for the high and upper-middle income groups. In the high-income category, column (1) shows three ease of doing business indicators have significant coefficient estimates. “Starting a business” and “paying taxes” are identified as having a negative effect on the economies of higher income countries, whereas “protecting minority investors” has a positive effect on the percentage growth rate of GDP per capita in these countries. However, when controls are included in column (2), the coefficient of the “paying taxes” variable becomes insignificant, while the coefficients of the other variables remain the same statistically.

In column (3), where the lagged value of log GDP per capita is included in the model, the coefficients of “starting a business,” “dealing with construction permits,” “getting credit,” “protecting minority investors,” “trading across borders” and “enforcing contracts” are statistically significant. According to the estimates, a one percentage point increase in “getting credit,” “protecting minority investors” (from the extent of conflicts of interest and shareholders governance) or “enforcing contracts” reduces the growth rate of GDP per capita by approximately 0.09, 0.05 and 0.14 percentage points respectively. In contrast, a one percentage point increase in

“starting a business,” “dealing with construction permits” or “trading across borders” increases the percentage growth rate of GDP per capita by the same magnitudes of approximately 0.04 percentage points respectively.

In terms of the worldwide governance indicators, only “political stability and absence of violence” has a significant coefficient in column (2). However, only “regulatory quality” has an estimated coefficient that is statistically significant in column (3), with “regulatory quality” being positively related to the percentage growth rate of GDP per capita. A one percentage point increase in regulatory quality will increase the growth rate of GDP per capita by approximately 0.21 percentage points on average, holding all else constant. It is notable that the high-income group results are similar to those of Ani (2015). In both studies “getting credit” appears to have a negative impact on the growth of economies, while “trading across borders” is shown to be positively related to the growth of economies.

For the upper-middle income group, column (1) reports five significant coefficient estimates for the ease of doing business indicators. The results show that “starting a business,” “protecting minority interests” and “trading across borders” are negatively related to the per capita GDP growth rate. Conversely, “dealing with construction permits” and “enforcing contracts” have a positive effect on the growth rate of GDP per capita. The results in column (2) for the upper-middle income group are similar to those in column (1), with the exception of the coefficient of “dealing with construction permits,” which becomes statistically insignificant.

In column (3), only the coefficients of “getting credit” and “paying taxes” are statistically insignificant, while there is a change in the magnitudes of all coefficients as compared to the initial results in column (1). The column (3) results indicate that a one percentage point increase in “starting a business,” “registering property,” “protecting minority interests” or “trading across

borders” will reduce the growth rate per capita GDP by approximately 0.14, 0.07, 0.06 or 0.03 percentage points respectively. It is worth noting that the estimated coefficient of “starting a business” is relatively big, and therefore caution should be taken by policymakers in upper-middle income countries when introducing policies that affect this indicator. In contrast, a one percentage point increase in “enforcing contracts” is estimated to increase the growth rate of GDP per capita by approximately 0.16 percentage points. The relatively big estimated coefficient of “enforcing contracts” suggests it is a very important *Doing Business* indicator for the economic growth of upper-middle-income countries.

Also, the results for the worldwide governance indicators in column (3) show that “voice and accountability,” “political stability and absence of violence,” and “regulatory quality” have significant coefficients and are positively related to the growth rate of GDP per capita. The coefficient estimates suggest that a one percentage point increase in “voice and accountability,” “political stability and absence of violence,” or “regulatory quality” will increase the per capita GDP growth rate by approximately 0.09, 0.04 or 0.11 percentage points respectively.

Table 7 examines the relationship between the ease of doing business indicators and the percentage growth rate of GDP per capita for the lower and lower-middle income groups. For the lower-middle income group, column (1) contains five significant coefficients. “Dealing with construction permits,” “getting credit” and “paying taxes” have a negative relationship with the percentage growth rate of GDP per capita, but “registering property” and “protecting minority investors” have a positive impact.

The coefficient estimates in column (2) for the lower-middle income group, where I control for other business related economic variables, signify somewhat different results. They indicate that “paying taxes” is the only ease of doing business indicator with an insignificant coefficient. All

other coefficients are in line with the earlier result, with the same sign but a little variance in terms of coefficients' magnitudes. In column (3), "dealing with construction permits" and "protecting minority investors" are the only ease of doing business indicators with statistically significant coefficients, while all other *Doing Business* indicators have insignificant coefficients. The results suggest that a one percentage point increase in the value of "dealing with construction permits" will reduce the percentage growth rate of GDP per capita by approximately 0.06 percentage points. However, a one percentage point increase in "protecting minority investors" is estimated to increase the percentage growth rate of GDP per capita by approximately 0.03 percentage points.

For the governance indicators, the estimated coefficients of "voice and accountability" and "government effectiveness" were found to be statistically significant in column (2) but column (3) reports a different result, with only "political stability and absence of violence" and "regulatory quality" having statistically significant coefficients. "Political stability and absence of violence" and "regulatory quality" are positively related to the growth rate of GDP per capita, with a one percentage point increase in each indicator yielding increases of approximately 0.08 percentage points respectively in the rate of growth of GDP per capita. Also, it is worth noting that the negative relationship that "dealing with construction permits" has on the growth of economies in the low-middle income group is consistent with the results obtained by Ani (2015).

In the case of the low-income group, in column (1) only "enforcing contracts" has a statistically significant coefficient. It implies a negative relationship with the percentage rate of growth of GDP per capita. However, the inclusion of the control variables in the econometric model in column (2) leads to the coefficients of three ease of doing business indicators becoming statistically significant. When the lagged value of log GDP per capita is introduced in column (3) the results indicate that only the estimated coefficients of registering property and enforcing contracts are

statistically significant. The coefficient of “enforcing contracts” has a negative sign, with a one percentage point increase reducing the percentage growth rate of GDP per capita by approximately 0.25 percentage points. “Registering property” shows a positive relationship with the growth rate of per capita GDP, with a one percentage point increase in “registering property” increasing the percentage growth rate of GDP per capita by approximately 0.07 percentage points.

In addition, “voice and accountability” is the only control variable whose coefficient is statistically significant in column (2), while in column (3), the estimated coefficient of “regulatory quality” is also statistically significant. The “regulatory quality” coefficients have a negative sign, with a one percentage point increase leading to a reduction in the percentage rate of the growth of GDP per capita of approximately 0.08 percentage points. Inversely, “voice and accountability” is positively related to the percentage growth rate of GDP per capita. A one percentage point increase in “voice and accountability” increases the percentage growth rate of GDP per capita by approximately 0.14 percentage points. Similarly, the result of the low-income group agrees with Ani’s paper, with “registering property” having a positive impact on the growth of the economies.

It is worth mentioning that some of these results seem counterintuitive, but an explanation of the regression results may be that there is a disconnect between policy and policy implementation over the period reported. In line with this, it can be observed that some ease of doing business indicators have similar negative effects across some income groups. Improvements in “enforcing contracts” have a negative impact on both high and low income economies. Likewise, “protecting minority investors” has a negative effect on both high and upper-middle income economies. On the other hand, “dealing with construction permits” has a positive impact on both high and low income economies. It is also interesting to note that for the governance indicators, “regulatory quality” has a positive effect on high, upper-middle and low-middle income economies. This result

highlights the relative importance of “regulatory quality” for economic growth. Similarly, “political stability and absence of violence” has a positive impact on upper-middle and low middle-income groups. Also, “voice and accountability” has a positive impact on upper-middle and low income groups.

5.2 Simulation Results

Lastly, a hypothetical predicted growth rate for 2006 is computed for four countries. These hypothetical growth rates are computed using 2006 values for the governance indicators and lagged value of log GDP per capita, but 2016 values for all eight *Doing Business* indicators. The countries were selected due to their improvement in the *Doing Business* DTF over time. Slovenia and Serbia were selected from the high and upper-middle income groups, while Côte d'Ivoire and Burkina Faso were selected from the low-middle and low income groups. As shown in Table 8, predicted growth rate for Slovenia, Serbia, Côte d'Ivoire and Burkina Faso from 2006 to 2016 increases by 0.24, 0.22, 4.56 and 0.8 percentage points respectively when the growth rates are computed using actual data for each year.

However, when 2016 values of the *Doing Business* indicators are used to compute the predicted growth rate for 2006, the growth rates of Slovenia and Serbia for 2006 increase by 2.63 and 0.65 percentage points respectively, while the growth rates of Côte d'Ivoire and Burkina Faso increase by 1.97 and 1.99 percentage points respectively. These increases are solely due to changes in the *Doing Business* indicators from 2006 to 2016. These calculations suggest that if the *Doing Business* indicator values had remained at their 2006 levels, the predicted growth rates of Slovenia, Serbia, Côte d'Ivoire and Burkina Faso for 2016 would have been only 7.46, 1.49, 3.7 and 0.27 percent. Therefore, these results suggest that the economic growth rates for these countries would

not have increased between 2006 and 2016 if the ease of doing business had not improved over time. This further supports the claim that improvement in the ease of doing business increase growth rates, but the level of the effect is different for different groups of countries.

6 CONCLUSION

A significant number of policymakers are taking up the challenge of expanding business regulatory reforms by putting some level of priority on reforming their business regulations when designing their growth policy. This has led to a renewed interest in the link between the ease of doing business and economic growth.

In this paper, I examined in detail the importance, significance, and effect of various business regulations on economic growth using panel data for approximately 155 countries from 2006 to 2016. In general, the study examined the impact of ease of doing business indicators on the annual growth rate of GDP per capita. To capture other economic factors related to the business climate and economic growth, the Worldwide Governance Indicators were included in the study. Lastly, the study also considered out-of-steady-state dynamics by including the lagged value of the log of GDP per capita in some models, and unlike other studies, it covered a longer period of eleven years. Additionally, countries were grouped into subsamples based on their income group classification.

The key empirical findings established in this paper suggest that although none of the ease of doing business coefficients appear to have statistically significant coefficients in the pooled sample, they do in the subsamples. According to individual tests of significance, the estimated coefficients of the *Doing Business* indicators are statistically insignificant for the full sample, with no effect on the annual percentage growth rate of GDP per capita. However, for the subsamples,

the indicators did have statistically significant effects. Consequently, this supports the claim that the effects of the *Doing Business* indicators are different for different groups of countries, and when the data are too aggregated the effects cancel each other out.

It is also important to state that some estimated coefficients of the worldwide governance indicators such as “voice and accountability,” “regulatory quality,” and “political stability and absence of violence” also had statistically significant impacts on economic growth. Furthermore, across all four income groups there emerged some interesting findings, with the estimated coefficients of the ease of doing business indicators displaying some mixed results. Taken together, some estimated coefficients suggest a negative relationship with the annual growth rate of GDP per capita, while other indicators were found to have a positive impact on economic growth. Also, a hypothetical predicted growth rate for 2006 which isolates the impact of the *Doing Business* indicators revealed an increase in the growth rate of the economies examined due to changes in the ease of doing business between 2006 and 2016.

In conclusion, caution should be taken when implementing reforms to better improve some *Doing Business* indicators in the various income groups. Further improvements in some *Doing Business* indicators seem to be counter-productive, since they appear to be having negative effects in the economies of those income groups. That is, allowing some business procedures to become too easy to achieve may result in limited resources being taken away from more productive businesses; this, therefore, leads to decreasing returns of reforms in those economies. Hence, these results raise important concerns to be considered in the design and implementation of business regulatory reforms. Indeed, this study suggests that a country’s regulation of business is a relative determinant of economic growth, and not all reforms are worth implementing. That is,

policymakers should put a priority on properly identifying and implementing needed reforms when designing growth policies in order to ensure an increase in economic growth.

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Appendix

TABLE A1: DATA SUMMARY

Variable	Data Source
Starting a business (SB)	World Bank's Doing Business Annual Report. Available at: http://www.doingbusiness.org/data/~media/WBG/DoingBusiness/Documents/Miscellaneous/DB17-Distance-to-Frontier-historical-dataset.xlsx http://www.doingbusiness.org/Custom-Query , Viewed 8 July 2017.
Dealing with construction permits (DCP)	
Registering property (RP)	
Getting credit (GC)	
Protecting minority investors (PMI)	
Paying taxes (PT)	
Trading across borders (TAB)	
Enforcing contracts (EC)	
Voice and accountability (VA)	World Bank Group: Worldwide Governance Indicator. Available at: http://info.worldbank.org/governance/wgi/index.aspx#home , Viewed 29 September 2017
Political stability and absence of violence/terrorism (PV)	
Control of corruption (CC)	
Government effectiveness	
Rule of law (RL)	
Regulatory quality (RQ)	
GDP per capita growth (annual %) (PGDP) and GDP per capita	World Bank's World Development Indicators (WDI). Available at: https://data.worldbank.org/indicator/NY.GDP.PCAP.KD.ZG , Viewed 19 August 2017.

Table A3: Doing Business Methodology Definitions

Doing Business (DB) Years	Doing Business Indicators									
	Starting a Business	Dealing with Construction Permits	Getting Electricity	Registering Property	Getting Credit	Protecting Minority Investors	Paying Taxes	Trading across Borders	Enforcing Contracts	Resolving Insolvency
DB05-14	<ul style="list-style-type: none"> · Procedures · Time · Cost · Paid-in minimum capital 	<ul style="list-style-type: none"> · Procedures · Time · Cost 	<ul style="list-style-type: none"> · Procedures · Time · Cost 	<ul style="list-style-type: none"> · Procedures · Time · Cost 	<ul style="list-style-type: none"> · Strength of legal rights index · Depth of credit information index 	<ul style="list-style-type: none"> · Extent of conflict of interest regulation index 	<ul style="list-style-type: none"> · Payments · Time · Total tax rate 	<ul style="list-style-type: none"> · Documents to export · Time to export · Cost to export · Documents to import · Time to import · Cost to import 	<ul style="list-style-type: none"> · Procedures · Time · Cost 	<ul style="list-style-type: none"> · Recovery rate
DB14-15										
DB15-17		<ul style="list-style-type: none"> · Quality of the land administration index expanded to cover equal access to property rights 	<ul style="list-style-type: none"> · Added: · Post filling index 	<ul style="list-style-type: none"> · Documentary compliance · Border compliance - Time to import · Documentary compliance · Border compliance - Cost to import · Documentary compliance · Border compliance 	<ul style="list-style-type: none"> · Expansion: · Quality of judicial processes index expanded to cover weight of women's testimony in court 					
DB16-17										

Source: World Bank's Doing Business report 2017.

TABLE A2: COUNTRIES CATEGORISED BY INCOME GROUP

Low income (27)	Lower middle income (41)	Upper middle income (42)	High income (45)
Afghanistan	Armenia	Algeria	Antigua and Barbuda
Bangladesh	Bhutan	Angola	Argentina
Benin	Bolivia	Azerbaijan	Australia
Burkina Faso	Cabo Verde	Belize	Austria
Burundi	Cambodia	Bosnia and Herzegovina	Belgium
The Central African Republic	Cameroon	Botswana	Canada
Chad	Congo, Rep.	Brazil	Chile
Comoros	Côte d'Ivoire	Bulgaria	Croatia
Congo, Dem. Rep.	Egypt, Arab Rep.	China	Czech Republic
Ethiopia	El Salvador	Colombia	Denmark
Gambia, The	Ghana	Costa Rica	Estonia
Guinea	Guatemala	Dominica	Finland
Guinea-Bissau	Honduras	Dominican Republic	France
Haiti	India	Ecuador	Germany
Madagascar	Indonesia	Equatorial Guinea	Greece
Malawi	Kenya	Fiji	Hong Kong SAR, China
Mali	Kiribati	Gabon	Hungary
Mozambique	Kyrgyz Republic	Georgia	Iceland
Nepal	Lao PDR	Grenada	Ireland
Niger	Lesotho	Guyana	Israel
Rwanda	Mauritania	Iraq	Italy
Senegal	Moldova	Jamaica	Japan
Sierra Leone	Mongolia	Jordan	Korea, Rep.
Tanzania	Morocco	Kazakhstan	Latvia
Togo	Nicaragua	Lebanon	Lithuania
Uganda	Nigeria	Macedonia, FYR	Netherlands
Zimbabwe	Pakistan	Malaysia	New Zealand
	Philippines	Mauritius	Norway
	Samoa	Mexico	Poland
	Solomon Islands	Namibia	Portugal
	Sri Lanka	Palau	Russian Federation
	Sudan	Panama	Saudi Arabia
	Swaziland	Paraguay	Seychelles
	Tajikistan	Peru	Singapore
	Tonga	Romania	Slovak Republic
	Tunisia	Serbia	Slovenia
	Ukraine	South Africa	Spain
	Vanuatu	St. Lucia	St. Kitts and Nevis
	Vietnam	St. Vincent and the Grenadines	Sweden
	West Bank and Gaza	Suriname	Switzerland
	Zambia	Thailand	Trinidad and Tobago
		Turkey	The United Arab Emirates
			United Kingdom
			United States
			Uruguay

Source: World Development Indicators (WDI).

Available at: <https://siteresources.worldbank.org/DATASTATISTICS/Resources/CLASS.XLS>

TABLE 1: DESCRIPTIVE STATISTICS

Variable	N	Mean	Std. Dev.	Min	Max
Percentage Growth Rate of GDP Per Capita	155	2.18541	4.126456	-36.8299	33.03049
Starting a business	155	73.98329	17.9502	2.21	99.96
Dealing with construction permits	155	63.87863	16.19563	4	94.28
Registering property	155	63.31638	16.96979	14.11	99.87
Getting credit	155	51.02764	23.11112	0	100
Protecting minority investors	155	51.31308	15.86266	10	96.67
Paying taxes	155	64.49168	19.09269	11.98	99.44
Trading across borders	155	64.36426	22.60085	0	100
Enforcing contracts	155	56.74436	13.88273	20.82	93.36
Voice and accountability	154	50.06016	27.44306	1.877934	100
Political stability and absence of violence/terrorism	154	46.21847	27.67607	0	100
Government effectiveness	154	49.74199	27.992	0	100
Regulatory quality	154	50.54649	27.183	0	100
Rule of law	154	49.03843	27.984	0.469484	100
Control of corruption	154	48.60115	28.63388	0	100
Lagged value of log GDP Per Capita	154	8.421757	1.484792	5.389923	11.42512

TABLE 2: CORRELATION MATRIX OF EXPLANATORY VARIABLES

	SB	DCP	RP	GC	PMI	PT	TAB	EC	VAR	PVR	GER	RQR	RLR	CCR	LOGGDP
SB	1.0000														
DCP	0.3654	1.0000													
RP	0.4712	0.2955	1.0000												
GC	0.5356	0.2588	0.4733	1.0000											
PMI	0.5327	0.2863	0.3052	0.5607	1.0000										
PT	0.5301	0.3647	0.3937	0.3822	0.4609	1.0000									
TAB	0.4923	0.4326	0.3263	0.5083	0.4416	0.4398	1.0000								
EC	0.4870	0.2331	0.5558	0.4763	0.3732	0.3935	0.4106	1.0000							
VAR	0.5090	0.3846	0.2649	0.4970	0.4525	0.4313	0.6242	0.4100	1.0000						
PVR	0.4465	0.4363	0.3292	0.3847	0.3548	0.4856	0.5289	0.4984	0.7319	1.0000					
GER	0.6221	0.4083	0.4715	0.6163	0.5620	0.5684	0.7098	0.6111	0.7656	0.6884	1.0000				
RQR	0.6136	0.3727	0.4922	0.6714	0.5795	0.5274	0.7065	0.5960	0.7633	0.6309	0.9211	1.0000			
RLR	0.5965	0.4431	0.4207	0.5360	0.5313	0.6012	0.6970	0.5767	0.8323	0.7847	0.9258	0.8800	1.0000		
CCR	0.5566	0.4492	0.3904	0.5306	0.5130	0.5752	0.6854	0.5426	0.8053	0.7619	0.9139	0.8532	0.9400	1.0000	
LOGGDP	0.5668	0.4194	0.4592	0.5772	0.4913	0.5168	0.6741	0.5709	0.7005	0.6471	0.8348	0.8044	0.7906	0.7676	1.0000

TABLE 3: COLLINEARITY DIAGNOSTICS

Variable	VIF	SQRT VIF	Tolerance	R- Squared
SB	2.08	1.44	0.4812	0.5188
DCP	1.44	1.20	0.6942	0.3058
RP	1.80	1.34	0.5550	0.4450
GC	2.26	1.50	0.4420	0.5580
PMI	1.82	1.35	0.5506	0.4494
PT	1.85	1.36	0.5402	0.4598
TAB	2.33	1.53	0.4291	0.5709
EC	2.05	1.43	0.4888	0.5112
var	4.16	2.04	0.2406	0.7594
pvr	3.28	1.81	0.3047	0.6953
ger	14.17	3.76	0.0706	0.9294
rqr	8.83	2.97	0.1133	0.8867
rlr	15.63	3.95	0.0640	0.9360
ccr	10.60	3.26	0.0944	0.9056
loggdp	3.83	1.96	0.2609	0.7391
Mean VIF	5.08			

	Eigenval	Cond Index
1	14.9344	1.0000
2	0.4632	5.6784
3	0.1446	10.1628
4	0.0792	13.7355
5	0.0734	14.2667
6	0.0568	16.2168
7	0.0489	17.4702
8	0.0392	19.5109
9	0.0371	20.0603
10	0.0278	23.1830
11	0.0243	24.7805
12	0.0226	25.7038
13	0.0177	29.0280
14	0.0138	32.8805
15	0.0119	35.4739
16	0.0051	53.8978

Condition Number 53.8978

Eigenvalues & Cond Index computed from scaled raw sscp (w/ intercept)

Det (correlation matrix) 0.0000

TABLE 4: DETAILS OF DIAGNOSTICS TESTS

		Test for Heteroskedasticity	Test for Autocorrelation	Test for Cross- sectional Dependence	Hausman's Test
Full Sample					
Equations:	(1)	120000***	37.319***	79.115***	38.11***
	(2)	75360.60***	34.079***	77.916***	54.63***
	(3)	11622.36***	164.064***	78.019***	207.88***
High Income- Group					
Equations:	(1)	3226.13***	37.581***	55.081***	10.59
	(2)	2761.15***	37.809***	54.101***	16.70
	(3)	2056.61***	73.061***	44.831***	94.44***
Upper-Middle Income-Group					
Equations:	(1)	3379.80***	13.327***	21.938***	60.90***
	(2)	1047.81***	13.493***	21.741***	50.38***
	(3)	649.08***	34.086***	21.912***	73.59***
Low Middle Income-Group					
Equations:	(1)	57064.73***	19.718***	12.102***	10.72
	(2)	15330.39***	16.604***	10.587***	12.80
	(3)	9224.74***	46.081***	11.772***	36.40**
Low Income-Group					
Equations:	(1)	28755.46***	1.80	1.737	23.63***
	(2)	6122***	1.084	1.623	25.55**
	(3)	5069.24***	3.411***	39.578***	41.95***

TABLE 5: RELATIONSHIPS BETWEEN EASE OF DOING BUSINESS INDICATORS AND GDP PER CAPITA GROWTH

Independent Variable	Dependent Variable: GDP per capita growth (annual %)		
	(1)	(2)	(3)
Starting a business	-0.0495*** (0.0091)	-0.0472*** (0.0083)	0.0089 (0.0108)
Dealing with construction permits	-0.0214 (0.012)	-0.02 (0.014)	0.0037 (0.0153)
Registering property	0.0239 (0.0178)	0.0252 (0.0173)	0.0074 (0.0126)
Getting credit	-0.02039** (0.0082)	-0.0274** (0.0098)	-0.013 (0.0144)
Protecting minority investors	0.0145 (0.0112)	0.0118 (0.0131)	0.0013 (0.0144)
Paying taxes	-0.0414 (0.0373)	-0.0368 (0.0352)	0.0052 (0.0328)
Trading across borders	-0.0236*** (0.00071)	-0.0233*** (0.0066)	0.0029 (0.0084)
Enforcing contracts	-0.0334 (0.0264)	-0.0323 (0.0274)	-0.0318 (0.0316)
Voice and accountability		0.0334** (0.0124)	0.0639** (0.0218)
Political stability and absence of violence/terrorism		0.0231 (0.0154)	0.046** (0.0155)
Control of corruption		0.0231 (0.022)	0.0199 (0.0186)
Government effectiveness		-0.0034 (0.0086)	-0.0088 (0.014)
Rule of law		-0.0388 (0.0241)	0.011 (0.0261)
Regulatory quality		0.055 (0.0129)	0.083*** (0.0118)
Lagged value of Log GDP per capita			-15.4227*** (2.9302)
Constant	12.0881** (4.2864)	7.304193** (4.299159)	122.03*** (19.5492)
Number of observations	1705	1694	1694
Number of countries	155	154	154
F-Statistic	115.45	81.76	272.52

* $p < 0.1$ ** $p < 0.05$ *** $p < 0.01$

Driscoll-Kraay robust standard errors in parentheses. Based on appropriate test fixed effects model is used for estimation.

TABLE 6: RELATIONSHIPS BETWEEN EASE OF DOING BUSINESS INDICATORS AND GDP PER CAPITA GROWTH BY INCOME GROUP

Independent Variable	Dependent Variable: GDP per capita growth (annual %)					
	High Income			Upper Middle Income		
	(1)	(2)	(3)	(1)	(2)	(3)
Starting a business	-0.0495** (0.0185)	-0.0563** (0.0248)	0.0430** (0.0181)	-0.2469*** (0.027)	-0.251*** (0.0275)	-0.1477*** (0.0468)
Dealing with construction permits	-0.009 (0.0136)	0.0022 (0.013)	0.0442** (0.0189)	0.081** (0.0362)	0.089 (0.0498)	0.1204** (0.4185)
Registering property	0.0141 (0.0108)	0.0068 (0.0099)	0.0681 (0.0403)	-0.0439 (0.0349)	-0.047 (0.0343)	-0.0688** (0.0258)
Getting credit	0.003 (0.0080)	0.0015 (0.0107)	-0.0925*** (0.0255)	0.0070 (0.0126)	-0.0051 (0.0175)	0.0007 (0.0086)
Protecting minority investors	0.0367*** (0.0092)	0.04*** (0.0114)	-0.0459** (0.0189)	-0.0848** (0.0275)	-0.0675** (0.0286)	-0.0635* (0.0309)
Paying taxes	-0.0403* (0.0214)	-0.0251 (0.0232)	-0.0221 (0.0463)	-0.0099 (0.0309)	-0.0122 (0.0307)	0.0432 (0.0302)
Trading across borders	-0.0029 (0.0244)	0.0079 (0.029)	0.0434* (0.0224)	-0.0392* (0.0190)	-0.0424** (0.0172)	-0.0321* (0.0162)
Enforcing contracts	0.0382 (0.0255)	0.0508 (0.0295)	-0.1386* (0.0686)	0.1667** (0.0555)	0.1634** (0.0616)	0.1903** (0.0718)
Voice and accountability		0.0095 (0.0119)	0.045 (0.087)		0.0664 (0.0465)	0.093* (0.0436)
Political stability and absence of violence		0.0167** (0.0057)	0.0699 (0.0538)		0.0033 (0.0193)	0.0392** (0.0171)
Control of corruption		-0.0086 (0.0466)	-0.0344 (0.1002)		0.0518** (0.0174)	0.0214 (0.0192)
Government effectiveness		-0.0341 (0.0604)	-0.0411 (0.0623)		-0.0514 (0.0335)	-0.0322 (0.0255)
Rule of law		-0.0625 (0.0496)	0.0777 (0.0626)		-0.0055 (0.034)	0.0322 (0.0511)
Regulatory quality		0.0423 (0.03)	0.2063** (0.0325)		0.0708** (0.0314)	0.1077** (0.0344)
Lagged value of log GDP per capita			-28.455*** (6.4806)			-16.65*** (4.9491)
Constant	3.5026 (3.5243)	2.5794 (3.8962)	271.3846*** (53.0986)	16.6994** (5.7573)	10.4403* (5.747)	134.858*** (34.2923)
No. of obs.	495	495	495	462	462	462
No. of countries	45	45	45	42	42	42
F-Statistic	214.80***	45.24***	997.48***	7345.45***	229.46***	100.32***

* $p < 0.1$ ** $p < 0.05$ *** $p < 0.01$

Driscoll-Kraay robust standard errors in parentheses. Based on appropriate test fixed effects and pooled OLS estimating model is used for upper-middle Income and high-income group respectively but fixed effects model is used for column (3) of the high-income group.

TABLE 7: RELATIONSHIPS BETWEEN EASE OF DOING BUSINESS INDICATORS AND GDP PER CAPITA GROWTH BY INCOME GROUP

Independent Variable	Dependent Variable: GDP per capita growth (annual %)					
	Low Middle Income			Low Income		
	(1)	(2)	(3)	(1)	(2)	(3)
Starting a business	-0.0145 (0.0163)	-0.017* (0.0084)	-0.0365 (0.0258)	-0.0243 (0.017)	-0.0329** (0.0155)	-0.0066 (0.0167)
Dealing with construction permits	-0.0195** (0.0075)	-0.0305** (0.0116)	-0.0626** (0.0203)	-0.0096 (0.0352)	0.0063 (0.0361)	0.0261 (0.0349)
Registering property	0.0519*** (0.0099)	0.0315** (0.011)	0.0065 (0.0189)	0.038 (0.0517)	0.0455 (0.0543)	0.0697*** (0.0221)
Getting credit	-0.0167*** (0.0050)	-0.0233*** (0.0063)	-0.0017 (0.0107)	-0.0094 (0.0395)	0.0001 (0.0382)	-0.0039 (0.0183)
Protecting minority investors	0.0179** (0.0072)	0.0181*** (0.0047)	0.0289** (0.0105)	0.0444 (0.0326)	0.0716* (0.0371)	0.0562 (0.0521)
Paying taxes	-0.0021 (0.0098)	-0.0003 (0.0118)	0.0423 (0.0347)	-0.0181 (0.0561)	-0.0082 (0.0512)	0.0066 (0.0553)
Trading across borders	-0.0209** (0.0071)	-0.0383** (0.0137)	-0.0066 (0.0118)	-0.0389 (0.0299)	-0.047 (0.0328)	-0.0277 (0.0201)
Enforcing contracts	-0.0194 (0.0147)	-0.0416*** (0.01)	0.0093 (0.0586)	-0.2459** (0.0908)	-0.2575** (0.095)	-0.2543*** (0.0715)
Voice and accountability		-0.0268*** (0.0064)	0.0376 (0.0223)		0.1449** (0.0731)	0.14*** (0.04)
Political stability and absence of violence		0.0275 (0.016)	0.0802*** (0.0198)		0.0159 (0.0308)	0.0047 (0.0208)
Control of corruption		-0.0172 (0.016)	0.0293 (0.0318)		-0.0634 (0.0483)	-0.0216 (0.0223)
Government effectiveness		0.0704*** (0.0136)	0.0188 (0.0156)		0.0215 (0.0567)	-0.0024 (0.0557)
Rule of law		-0.0071 (0.0245)	0.0069 (0.048)		-0.0206 (0.0629)	0.0395 (0.0631)
Regulatory quality		0.0188 (0.0235)	0.0847** (0.0367)		-0.0645 (0.0497)	-0.0761* (0.0372)
Lagged value of log GDP per capita			-11.9255*** (2.7087)			-12.424*** (4.9077)
Constant	4.2634*** (0.7958)	6.418*** (0.9157)	80.8362*** (15.9968)	14.2259*** (2.1622)	11.0651*** (3.7478)	83.1078*** (29.525)
No. of obs.	451	440	440	297	297	297
No. of countries	41	40	40	27	27	27
F- Statistic	121.78***	174.50***	99.97***	5.73***	6.66***	55.54***

* $p < 0.1$ ** $p < 0.05$ *** $p < 0.01$

Driscoll-Kraay robust standard errors in parentheses for low-middle and low income group but basic robust standard errors are used for column (1) and (2) of the low-income group due to the presence of only heteroskedasticity. Based on appropriate tests fixed effects and pooled OLS estimating model is used for low income and low middle-income group respectively but fixed effects model is used for column (3) of low-middle income group.

TABLE 8: PREDICTED GROWTH RATE OF GDP PER CAPITA

Income Groups	Percentage Growth Rate of GDP Per Capita		
	Predicted Values Based on		
	Doing Business (DB)	Actual Predicted Values	
	Values for 2016	2006	2016
	(1)	(2)	(3)
High-Income Group: Slovenia	12.473522	9.845177	10.08821
Upper-middle Income Group: Serbia	2.572107	1.919622	2.141129
Low-middle Income Group: Côte d'Ivoire	3.0817385	1.116487	5.672492
Low Income Group: Burkina Faso	3.4542523	1.462037	2.261244

Note: The predicted growth rate is based on the coefficients estimates from column (3) for each income group. Column (1) is the hypothetical predicted growth rate of 2006 assuming that only the Doing Business indicators have changed to 2016 level. Column (2) and (3) assume that all independent variables equal their actual values in the specified year.