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THE IMPACT OF REGULATION ON ECONOMIC GROWTH IN THE CARIBBEAN:

A PANEL DATA INVESTIGATION

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ABSTRACT

The paper uses random effects models based on a sample of 14 Caribbean countries over the period 2004-2012 in order to investigate the impact of the aggregated as well as disaggregated levels of regulation on the economic growth performance in the region. The estimation results indicate that overall a heavy regulatory burden is a drag on the economies. This outcome also holds for the most part when the disaggregated measures of regulation are considered. Indeed, the longer it takes to start a business, a heavier tax burden, higher trading costs results in lower output; while the more effective the government, the higher the output. The study also reveals a positive relationship between regulation targeting enforcing contracts and economic growth. Additionally, gross capital formation and foreign direct investment positively affect economic growth. These results have policy implications.

Key words: Regulation, Economic Growth, Caribbean, Random effects model

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Introduction[1]

Unquestionably, the regulatory environment of an economy is an important ingredient that may spur or hinder economic growth. Indeed, its effectiveness depends on a host of factors. In the final instance, the outcome heavily hinges on the objective(s) or better the role(s) assigned to regulation in the economy chain. Is regulation geared to correct market imperfections, such as monopolistic and oligopolistic behaviours, negative externalities, imperfect information, ill-defined property rights, fraud and corruption or is it there for other reasons?

An optimistic outlook subscribes to the view that regulation is put in place by local authorities to address market imperfections that may negatively impact citizens (Guasch and Hahn, 1999). For example, negative externalities produced during the course of market activity (e.g., pollution) can be abated by regulatory stringency. Additionally, a regulatory environment that protects workers and investors via labour and property laws can be a major consideration for firms (Tannenwald, 1997).

Few scholars, however, put a significant amount of confidence in the benevolent government argument. Instead, regulation is seen as a tool used by regulatory bodies and incumbent firms to capture economic rents by limiting competition (Stigler 1971). By imposing significant barriers to entry, those firms that can potentially add to the productive capacity of the economy are restricted, and those that are added may not contribute to their optimal level because of resources and time being allocated to addressing regulatory procedures (Busse and Groizard 2008). Additionally, a regulatory environment rife with bribery and corruption may discourage potential investors from considering such countries for investment.

Another motivating factor influencing the effect regulation has on economic welfare involves the quality and efficiency of the institutions within the economy. Basically, high quality and efficient institutions are growth promoting. Acemoglu *et al*. (2004), nevertheless, point out that the values held by those in authority can influence the institutions of an economy and by extension its policies.

The effects of regulation, however, are not always clear cut. Indeed, there are some instances where the need for regulation seems clear, while there are other instances where the merits of regulation are not as clear cut. For instance, environmental regulation can protect the health and welfare of economic agents but may also reduce the productivity of firms (Féres and Reynaud 2012). Labour regulation can motivate workers (Bassanini and Ernst 2002) but can also reduce staff turnover, which may be necessary to introduce innovation through skilled labour which subsequently enhances productivity (Di Tella and MacCulloch 2005). In both contexts a closer look at the internal workings of an economy is essential before mandates of reform are given.

As a collection of small island developing economies, the Caribbean can therefore benefit from this policy debate as opportunities for growth can be exploited or negative repercussions

[1] This paper heavily borrows from Yearwood (2014). We acknowledge Simon Naitram's contribution and the comments made by the participants at the 34th Annual Review Seminar of the Central Bank of Barbados on an earlier version of the paper. All remaining errors are our own.

avoided. The region has been subjected to poor regulatory performance rankings by various organizations. While there has been some improvement in regulatory reform over the recent past, it does not appear to have had a substantial impact on economic growth. Investigating the issues as it relates to regulation within the Caribbean including the constraints as well as the sectors where reform is necessary can improve the regulatory environment, further enhancing the region's competitiveness.

In order for policymakers to make informed decisions there is a need of a rich literature to pull from. Unfortunately, this is not the case for Caribbean territories as it relates to regulation. Indeed, literature on regulation is scarce and highly disaggregated. Financial, labour or environmental regulations are addressed separately. To the best of our knowledge, there are only a handful of studies that have focussed on the overall business environment in the region. Precisely, there is a paucity of quantitative studies that have examined the impact of regulation on economic growth in the Caribbean context.

While we concede that labour and environmental regulations also touch the business environment, so too do a host of other policies that work in tandem to create the investment climate. As such it is important to pinpoint the regulatory hurdles that can dampen the competitiveness of the region and address them. It is equally important to identify those policies that benefit the welfare of the economy and hence of no need of grand reform.

This paper attempts to quantify and analyse the impact of regulation on the Caribbean economies. Precisely, using a sample of 14 Caribbean countries over the period of 2004-2012, an unbalanced random effects model is implemented in order to gauge the impact of regulation on the macroeconomic performance of the region at aggregated as well as disaggregated levels. Because of the shortness of time series period and challenges to collect regulatory data for 14 territories due to the differing levels of availability, it is beyond the scope of this paper to incorporate all measures of regulation. In order to provide a holistic picture of the regulatory framework, specifically as it relates to the business environment, this paper uses data from the World Bank Ease of Doing Business database. The subcomponents that we find most pertinent to the policy environment include regulations that deal with starting a business, registering property, trading across borders, protecting investors, enforcing contracts and paying taxes.

This paper makes two empirical contributions to the literature. First, this study constructs a regulatory index which is at the same time specific to the Caribbean and the first of this kind for the Caribbean. Second, to the best of our knowledge, this is the first study that quantitatively investigates the relationship between economic growth (GDP per capita) and the overall regulatory burden with the Caribbean.

Estimation results indicate that regulations that affect starting a business, paying taxes, and trading across borders significantly and negatively impact economic growth (real GDP per capita). However, the analysis also highlights that the regulatory burden as it relates to enforcing contracts significantly and positively affects real GDP per capita.

Beside regulations, three control variables of the model are significantly and positively related to real GDP per capita. There are: government effectiveness, private domestic investment, and foreign direct investment.

The paper proceeds as follows. Section 2 succinctly reviews the literature on regulation. Section 3 outlines the methodology. Section 4 presents the results and their interpretations. Section 5 contains concluding remarks and policy recommendations.

2. Literature Review

Countries adopt regulation to ensure equitable distribution of economic rents, efficient productivity in the market and to temper any negative externalities that may occur as due to economic activities (Guasch and Hahn 1999). It is, however, often the case that government intervention leads to market distortions that impair the productive capacity of firms and thereby the competitiveness of the economy. Arguably, the greater goal of regulation is to ensure that the overall welfare of citizens is met and so reduced economic income is perhaps a cost worth incurring (Swanson 2008). Additionally, countries with sound regulations ensuring protection of property rights, safe working conditions and efficient institutions may attract workers and investment which contributes to growth (Tannenwald 1997).

Regulation theories, which by and large have microeconomic foundations, can be divided into the public interest and the capture theory. Proponents of the public interest or helping hand theory most associated with Pigou (1938) see the government as a benign institution that implements restrictions in an effort to protect individuals within the economy from negative externalities associated with market failure.

Others are sceptical of the seeming benevolence of regulators and instead propose that regulation is instituted in an effort to capture rents. The Capture Theory (Grabbing Hand Theory) states that firms take advantage of the coercive power of the state to implement tariffs, licenses or price controls to make it economically infeasible for new entrants to gain profits and so capture those potential profits for themselves (Stigler 1971). While these ideologies focus on the demand for misappropriated favours, it is equally important to note the role that regulators or agents of regulators play in facilitating the misallocation of economic rents. Regulatory agents show certain industries favour in exchange for political support (De Soto 1990). This strain of the "capture" or "grabbing hand" theory of regulation emphasizes the corruptive ability of the government. While the capture theory seems feasible, and even seems to reflect the regulatory environment in many developing countries, closer inspection reveals some limitations.

Another criticism of the capture theory is the assumption of a fully effective regulatory framework. It has been argued that government bodies would adjust or reform regulations if they were aware of the inefficiencies in the regulatory framework. Laffont and Tirole (1991) asserted that the theory negates the importance of information asymmetries between regulators and their agencies as well as regulators and firms.

Investigating how regulation, whether through benevolent intervention or deliberate misallocation, affects the productive capacity of an economy, entails using the microeconomic foundations in a macroeconomic context. There is no known macroeconomic theory of regulation and output, however. Dawson and Seater (2013) attempted to model regulation within a macroeconomic construct by capturing its level, growth rate and transition dynamic effects and how these impact macroeconomic output. Most other studies investigate how regulation affects the firm and by extension the economy. For example, Frye and Shleifer (1997) determined that the small businesses in Moscow, Russia, were less productive due to the grabbing hand of the

regulatory environment when compared to the seemingly more helping hand regulation in Warsaw, Poland. In a more recent study, using a sample of 75 countries, Djankov *et al*. (2000) found that stricter regulations were associated with corruptive government, lending to the capture theory of regulation.

A consensus on the impact of regulation on economic growth has yet to be reached. Country specific characteristics (such as income level) only add to the ambiguity of the results pertaining to the economic impact of regulation. Disaggregated measures of regulation including environmental, labour and product market regulation do not yield conclusive impact on growth either. For example, the literature asserts that environmental regulation can promote productivity in firms that were operating at subpar levels before policy implementation but also acknowledge that regulation can also drive up internal costs due to pollution abatement strategies (Féres and Reynaud 2012).

Labour policies are subject to inconclusive results as well. The hiring and firing of persons can restrict investment in research and development due to high compliance costs and restrictions on labour allocation which is important for productivity and therefore growth (Bassanini and Ernst 2002). However, it can also negatively affect the employment rates (see Di Tella and MacCulloch 2005) – an important indicator of economic growth. Within the Caribbean context, Downes *et al*. (2004) found that labour market legislation in the Caribbean was not a significant determinant of employment. On the other hand, labour regulation that provides incentives to workers through autonomy in the work place and tenure can increase labour productivity growth (Storm and Naastepad 2007). Still, some scholars have disregarded the inconsistent results and have asserted that whether or not regulation may hinder income growth should not be the main principle guiding government policy decisions. Instead, attention should be paid to the wider social advantages of regulation that lead to economic development.

Economy wide regulatory research is less divergent in its findings. This form of regulation focuses on the business environment of an economy and, by and large, leads us to conclude that excessive regulation deters growth. Djankov *et al*. (2006), using a sample of 135 countries of differing levels of development and sourcing from the World Bank Ease of Doing Business Index, found that those countries with "less burdensome regulation" grew faster than those with restrictive policies. Others suggest that time consuming or costly policies can deter potential investors that could contribute significantly to capital and labour productivity through competition as well as technological spill over effects. Similarly, Busse and Groizard (2008) found that those countries that had high amounts of regulation had less positive effects from foreign direct investment and hence less growth. According to the study, regulatory barriers prevented useful productive foreign technology being assimilated into the local economy.

A major shortcoming of these studies however is the underlying assumption that the institutions in the developed world work the same way as those in developing countries. In reality, regulatory reform may be less effective in lesser developed economies due to major structural inefficiencies found within the regulatory networks. Important studies include Estache and Wren-Lewis (2009), Gorgens et al. (2005) and Petreski (2014).

Like many developing economies, Caribbean countries are plagued by underdeveloped institutions. Indeed, the Caribbean countries lack a sufficiently good environment for business as a result of their weak institutions (IDB 2009). The latter IDB report indicates that in the

Caribbean legal systems are costly and outdated, regulation is burdensome and taxes are discriminatory. Additionally, there is a shortage of persons with the requisite skill to work within the regulatory sector (Downes and Husbands 2003). These inefficiencies make it difficult for regulatory reform to have its intended impact. Downes *et al*. (2004) underlined the importance of the labour market for economic growth and specially ascertained that it was imperative that the Caribbean countries of Jamaica, Barbados and Trinidad and Tobago correct the inefficiencies in the labour market system before they could benefit from the institutional reform found in countries with higher levels of development.

The level of regulation can also affect growth in developing countries through the development of informal economies. The more restrictive the regulatory environment within the formal economy, the more individuals may choose to operate within the informal (Loayza *et al*. 2005). Informal economies can hinder growth by reducing the tax base (Loayza *et al*. 2005), or by not using public services efficiently (Schneider and Enste 2000). A reduction in the level of regulation in countries would therefore reduce incentive to participate in the informal sector and likely induce growth. These studies view the informal economy as having a negative impact on growth largely due to their lack of regulatory policy.

In developing countries, informal institutions have their own regulatory framework separate from those within the formal industry. The argument is that firms within the informal institutions follow their own procedures that dictate acceptable behaviour. By forfeiting the "regulatory protection" of contracts and credit informal institutions are vulnerable to business risks. To account for this, firms create their own informal procedures that aid in addressing such risks. Seibel (2001) found that some informal financial institutions have written regulations that specified rules of repayment and even penalties if persons failed to repay borrowed funds in time. In a study done in India, it was found that informal regulation was based on good reputation, as an unspoken contract. Those who break this contract risk being excluded from the group (Hariss-White 1997). Additionally, the repressive, stringent regulation that can be found within some formal institutions has led to the formation of alternative means to allow accessibility to funds.

A useful add-on concerning informal institutions and economies is that there is a bourgeoning literature on environmental performance which is centered on the role of informal regulation epitomized by the role of communities and capital markets that could be exploited by the mainstream literature. Mamingi *et al*. (2008), Dasgupta *et al*. (2006), Dasgupta *et al*. (2001), Lanoie *et al*. (1998), Konar and Cohen (1997), Pargal and Wheeler (1996) and Hamilton (1995) are a good representative of that literature.

Empirically, there is the issue of scarcity of regulatory data that needs to be underlined as this limits the ability to capture static and dynamic effects of regulation on economic growth (Busse and Groizard 2008). Additionally, most studies use qualitative data often amalgamated from business surveys and other indicators and composited into indices to reflect regulatory quality and stringency (Nicoletti *et al.* 2000, etc.). Most of those data do not pass the scientific rigor test. Not surprisingly, many studies have adopted the use of the World Bank Doing Business indicators which are more objective (SAGPA 2010; Djankov *et al*. 2000 for studies including developing nations). As it relates to informal policy selecting an appropriate proxy presents a challenge. Féres and Reynaud (2012) used the percentage of persons belonging to a trade union,

number of complaints filed by NGOs as well as the percentage of exports to international countries as an indicator of pressure to comply with regulation (Féres and Reynaud 2012).

At the very least, two lessons emerge from the literature review. First, the impact of regulation on output is really an empirical matter. Second, there is no thorough analysis of the impact of regulation in the large sense on output for the Caribbean.

3. Methodology

This section aims at developing the methodology to quantify the impact of regulation on macroeconomic performance in the Caribbean as well as describing the data used for such an enterprise. Thus, a growth model is proposed and utilized. It comprises regulatory indicators as well as control variables for 14 Caribbean countries over the time period 2004 – 2012. The countries of interest are: Antigua and Barbuda, Belize, Barbados, Dominica, Dominican Republic, Grenada, Guyana, Jamaica, St. Kitts and Nevis, St. Lucia, St. Vincent and the Grenadines, Suriname and Trinidad and Tobago. Panel data is useful as it boosts the sample size. This is important since there is a paucity of time series data in the Caribbean. In fact, the panel data used here is unbalanced due to the issue of different degrees of availability of data at the country levels. Because the study is interested in not only the overall impact of regulation on growth but also how the components of regulation individually relate to growth, separate regressions were run; one using aggregate measure of regulation and the other disaggregate measures.

3.1. Data

Data used to compile the key regulatory variables were sourced from the World Bank Ease of Doing Business index. This World Bank index ranks countries from 1 to 189 and is constructed by aggregating the percentile ranks of countries based on 10 sub-indices. This databank was chosen in lieu of the many other regulatory indicators available because of its objectivity as well as the availability of a disaggregated component that could provide insight for policy purposes. Additionally, finding a relevant regulatory proxy that provided sufficient data for all 14 countries posed a challenge. Though the rankings provided by the index were insufficient for panel modelling (time span of 2 years for most Caribbean territories), the underlying data used to construct the index seemed more promising since it was available over a longer period. In light of this, an alternative index was constructed, using information from the database for the relevant regulatory subcomponents used in the analysis. Still, the number of observations for the respective countries was small and uneven. As a result, the panel model was unbalanced so as not to constrict the data further.

Of the 10 sub-indices that comprise the World Bank Ease of Doing Business index, the 6 that seemed the most relevant and simultaneously contained the most observations were utilized. These subcomponents included starting a business, registering property, protecting investors, paying taxes, trading across borders and enforcing contracts.

Starting a business measure captures the regulatory burden of entering into the business environment within respective countries. This includes the number of procedures as well as the

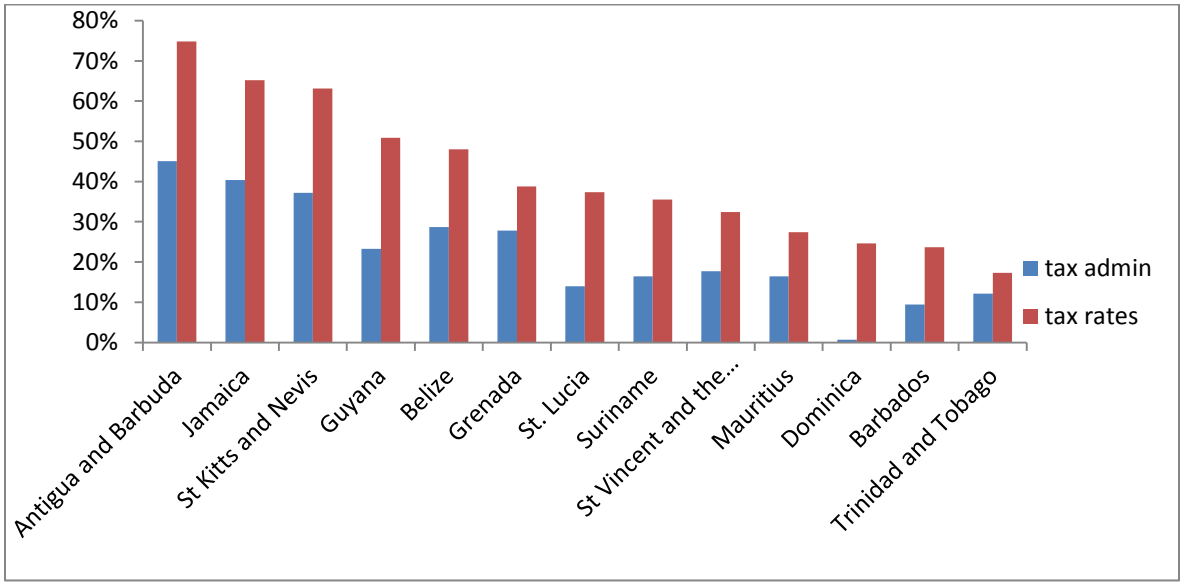
time and cost required to meet government requirements to operate a business. The relationship between entry regulation and macroeconomic performance of an economy depends on the theory one subscribes to. If the public interest theory holds, then a positive relationship is expected; on the contrary, if the capture theory is applicable, then a negative relationship is expected.

Registering property encapsulates the security of the property laws of a country. This measure includes regulations pertaining to procedures necessary for an investor to buy and transfer the property title from the seller (World Bank 2014e). The transfer of property rights is important for investor incentive since it ensures that investment returns are allocated correctly. Property acquired may be necessary for the expansion of capital or the provision of collateral which may both be needed for added firm productivity (IDB 2009). The World Bank Ease of Doing Business report has identified the time and cost of registering property in the Caribbean as being a constraint within the region. Elias (2012) noted that the report ranked Trinidad and Tobago almost last in this sub-category while Holden and Holden (2005) asserted that Jamaica's Torrens system was expensive and slow, making the registering process unattainable by the average citizen. Burdensome regulation can therefore deter firms from pertinent investment opportunities and as such a negative correlation with macroeconomic performance is expected.

The Protecting investors' proxy aims to capture the strength of protection provided to ensure that minority shareholders are protected against potential self-seeking majority holders (World Bank 2014a). These regulatory requirements (securities regulations, civil procedures, etc.) are important for stock market development of an economy which provides efficient credit for firms to invest (Djankov *et al*. 2008). A lack of investor protection is seen as negatively related to economic growth.

Paying Taxes measures the tax contributions as well as the tax burden associated with the firms within the respective economies and include profit, property, labour taxes, etc. (World Bank 2014b). Of note, taxes act as a disincentive for firms which minimize investment and income (Djankov *et al.* 2008). An initial investigation into the tax environment suggests that though the governments of the respective countries place some emphasis on taxing firms, the tax administration burden is not high relative to other small open economies, for example, Mauritius. This observation is confirmed when firms are asked to comment on the extent to which both the tax rates and tax administration are a burden. Figure 1 depicts the percentage of firms in the respective countries that views the tax rates and tax administration as a major obstacle to the operation of their firms. It is clear that a larger percent of firms find the tax rates to be burdensome. This is not surprising given the high tax to profit ratios found within the territories the highest belonging to St Kitts and Nevis at 52.7 % especially when compared to the comparator country whose tax rate was identified as 28.2% of profits. Trinidad ranks the best within the region largely because of its low tax rate (29.1 %) which is comparatively low due to the significant government revenue created by the oil and gas sector of that economy (Elias 2012).

Figure 1: Firms Describing Tax Rates and Tax Administration As Major Constraint



Source: World Bank Enterprise Survey

Trading across borders captures the procedures, cost and time needed to export and import a cargo of goods via ship (World Bank 2014c). Trading costs can deter trading with partners. Rigid, costly regulation can deter investment, innovation and subsequently economic growth. Small open economies like those found in the Caribbean, are heavily reliant on foreign investment and technology to bolster their economies, and so, the level of bureaucracy and stringency of the regulatory process can hamper the business environment for firms.

According to World Bank survey, firms in Jamaica and Suriname take the longest to clear customs (13 days). Firms in Guyana also have a lengthy process where, on average, they spend 12 days to complete customs procedures. These numbers compare unfavourably to other comparator countries. For example, in Mauritius it takes 9 days for the average firm to clear customs. A large number of the other territories however seem to have less burdensome restrictions when compared to Mauritius.

When asked the extent to which customs and trade regulations provide a major obstacle to the operation of their businesses, the firms provided surprising responses. One would expect that those that identified lengthy processes to clear customs would find the system the most burdensome. However, only 14% of the firms from Jamaica identified trade and customs regulation to be a major or severe obstacle to the operation of their firms. Surprisingly, a majority of the firms from Antigua and Barbuda which had considerably less days to clear customs (6 days) identified customs and trade regulations to be a binding constraint. One possible explanation for this is that those businesses that are constantly confronted with tedious procedures may become desensitized to them and so put less emphasis on them when considering the operation of their firms. Another possible conclusion is that those firms that face lengthy procedures may have found ways to circumvent such restrictions, making it less pivotal in the everyday operation of their businesses

Concerning the time spent dealing with regulatory protocol, the Survey indicates that in the Caribbean the mean and mode percentage of time spent addressing government regulations compare favourably on average to that of the comparator country (Mauritius), where most surmise that on average less than 9% of senior management time was spent on government regulation. The only territory whose average was above that of Mauritius was Guyana where 13% of senior management time was spent processing government regulation. In fact, using the mode, we realize that Guyana performs considerably better than other Caribbean countries. Guyana even outperforms Barbados and Jamaica whose firms identify 10% of management time being the mode.

Enforcing contracts is a measure of the effectiveness of the legal framework of an economy (World Bank 2014d). Court systems generally aim at ensuring fair judgments by fair-staffing against errors and possible corruption which can result in many procedures. The survey indicates that less than 5% of firms in Dominica describe the court system as presenting a major obstacle to the operation of their business. This phenomenon however, does not extend to Suriname. In fact, 44% of the firms interviewed in Suriname expressed that the court system was at least a major obstacle for business. According to an IDB (2009) report, it takes the court on average three to four years to deliver verdicts due largely to issues highlighted above as well as a sense of ambiguity on the balance of power between the arms of the government.

As it relates to judicial independence, the Caribbean has performed relatively well. The survey results indicate that in spite of the slow judicial process present in most Common wealth countries, most firms are confident in the efficiency and reliability of the legal system to render fair judgments. Indeed, more than 50% of the firms interviewed within the respective countries with the exception of Grenada, St Vincent, Trinidad and Tobago and Guyana, describe the court system as fair and impartial. Barbados had the highest rank within the region where 60% of firms interviewed express confidence in the judicial process. Guyana, in contrast, had the lowest ranking relative to its compatriots, with only 29% of firms expressing some level of agreement in terms of the efficiency of the legal framework.

However, too many protocols can be cumbersome and costly and so deter potential investors, causing a negative correlation with income (Djankov *et al.* 2003). In spite of cumbersome and lengthy judicial procedures, it can be argued that the length of time can ensure fair judgements and so can positively affect economic growth.

We follow the methodology devised by Loayza *et al.* (2004) to create an index for the subcomponents of regulation (Starting a business, protecting investors etc.) in an effort to glean the regulatory performance of the respective Caribbean countries in relation to the world. In order to do this, the index is constructed using the values for the subcomponent for each country for each year under study. Additionally, the minimum and maximum values for each regulatory subcomponent for each respective year for the world are also used. The formula for the index is presented below and ranges from 0 to 1 where values closer to one indicate heavier regulatory burdens. The index is derived from the following expressions:

$$\frac{x_{ij}-\min[X_w]}{\max[X_w]-\min[X_w]};$$

$$\frac{\max[X_w]-x_{ij}}{\max[X_w]-\min[X_w]};$$

where higher values of X in the first expression indicate larger regulatory burden; lower values of X in the second expression indicate larger regulatory burden; *i* stands for country and *j* represents the year; x_{ij} represents the value of each subcomponent for each year for the respective country; $\min[X_w]$ and $\max[X_w]$ represent the min and max value of each subcomponent for all countries in the world for every respective year.

A simple average was then taken to create the aggregate index value attributed to each Caribbean country where higher values connote heavier regulatory burden.

Government effectiveness was chosen from among the six governance indicators provided by World Wide Governance indicators, as it most reflects the institutional component important in developing countries. Government effectiveness captures perceptions on the quality of public policy, government processes as well as the independence of the civil servants from political pressure (Jalilian *et al.* 2006, World Bank 2013). A positive sign is expected.

Real GDP per capita has been found suitable to capture economic growth here rather than its growth counterpart singularly because regulation tends to remain constant over long periods of time. In addition to the regulatory indicators, GDP per capita is also dependent on various control variables included in the regression analysis. These comprise foreign direct investment measured as net FDI inflows as a percentage of GDP, the investment ratio proxied as gross capital formation as well as population growth. These indicators were all sourced from the World Bank development indicators database in an attempt to reduce data inconsistencies. In addition, natural disasters variable captured as a dummy variable with 1 if the event occurs in a particular year and 0 otherwise was also of interest. The variable was sourced from em.dat.

3.2. Methodology

The paper uses the panel data regression of the form

$$y_{it} = \alpha + X_{it}\beta + \nu_{it} \qquad (1)$$

where *i* denotes the cross section component, *t* represents the time index, α denotes the constant, X is the matrix of explanatory variables, β is the vector of slope coefficients, and

$$\nu_{it} = \alpha_i + \upsilon_{it} \qquad (2)$$

where α_i represents the unobservable individual-specific effect and υ_{it} stands for the usual stochastic disturbance term.

This paper assumes that the individual-specific effect is random and independent of υ_{it}. Because of the dearth of data the random effects model is chosen so as not to lose excessive degrees of freedom. Additionally, as it is well known, the random effects model is appropriate when making inferences about a population. In this case, the model seeks to determine the relationship between regulation and growth in the Caribbean using a subset of the territories within the region.

To repeat, two regressions were run, the first explaining the relationship of the disaggregated measures of regulation and income per capita and the other including an aggregate regulatory measure and income.

The first equation is written as follows

$$LGDP_{it} = \alpha + \beta_1 SB_{it} + \beta_2 RP_{it} + \beta_3 PI_{it} + \beta_4 EC_{it} + \beta_5 TB_{it} + \beta_7 GE_{it} + \beta_8 LIR_{it} + \beta_9 PopG_{it} + \beta_{10} LFDI_{it} + \beta_{11} DU_{it} + \upsilon_{it} \quad (3)$$

where *SB* connotes regulation for starting a business measure, RP represents regulation for registering property, *PI* stands for regulation for protecting investors, *PT* is measure for paying taxes, *EC* captures measure for enforcing contracts, *TB* is measure for trading across borders, *GE* captures government effectiveness, *LIR* is logged domestic private investment as a percentage of GDP, *PopG* is population growth, *LFDI* is logged foreign direct investment as a percentage of GDP, *DU* is dummy variable capturing the incidence of natural disasters (1 if natural disasters occur in a given year in a given country and 0 otherwise) and υ denoting the error term.

The second equation is written as follows:

$$LGDP_{it} = \alpha + \beta_1 AR_{it} + \beta_2 GE_{it} + \beta_3 LFDI_{it} + \beta_4 POPG_{it} + \beta_5 LRI_{it} + \beta_6 DU_{it} + \upsilon_{it} \quad (4)$$

where *AR* denotes the aggregate regulatory measure and other variables are defined as above.

Models (3) and (4) are random effects models estimated with the generalized least squares (GLS) method using robust standard errors to take care of heteroscedasticity and autocorrelation.

An issue that has not been addressed is that of endogeneity. It is possible that wealthier countries have better institutions, specifically as it relates to regulation. Most studies approach this issue by applying two stage least squares method or IV Hausmann-Taylor estimation procedure. Finding accurate instrumental variables, however, is problematic given the nature of regulation, and also because of a very short-time series dimension in the Caribbean. This issue of endogeneity is not pursued here with the belief that the qualitative results are not affected by it.

4. Model Estimation, Results, and Interpretations.

Table 1 deals with the results of the estimation of model (3), the disaggregate model. The table uses the following regulatory indices: starting a business, registering property, protecting investors, paying taxes, enforcing contracts and trading across borders. The model passes the overall chi-square test as the size of the p-value indicates. Otherwise, the estimation results are the following. Regulatory indices measuring starting a business, paying taxes, enforcing contracts as well as Trading across borders were found to all significantly impact GDP per capita. As per a priori expectations, all disaggregated measurements with the exception of the registering property and enforcing contracts regulatory proxies were negatively correlated with growth.

Table 1: Random Effects Regression: Disaggregated Regulatory Model (3) for the Caribbean, 2004-2012.

Dependent variable: GDP per capita (2005 US)		
variables	coefficient	standard error
C	7.689 *	.678
WB Starting a business	-1.124***	.702
WB Registering Property	.300	.635
WB Protecting Investors	-.263	.275
WB Paying Taxes	-.632**	.273
WB Enforcing Contracts	2.755**	1.242
WB Trading across Borders	-1.090*	.478
Government Effectiveness	.1891**	.135
Logged Domestic Investment	.085**	.040
Population growth	.0746	.090
Logged Foreign Direct investment	.0.051*	.017
Natural Disasters dummy	.007	.009
p-value of Chi squared (0.000)		

* significant at the 1% level;
** significant at the 5% level;
*** significant at the 10% level.

Note: variables are explained in the text.

As mentioned before, cumbersome regulation negatively impacts economic performance. Time and cost factors largely impact investor decisions. The negative correlation between starting a business and income levels within the Caribbean context emphasizes this point. In fact, a 1% reduction in the regulatory burden as it relates to starting a business leads to a .56% increase in real GDP per capita levels.[2] For most Caribbean territories the number of procedures to start a business is not as cumbersome and as much of a constraint when compared to the time and cost

[1] Elasticity is computed as $\beta\bar{Y}$ where $\bar{Y}$ is the mean of the variable of interest. For Log-log relationship, elasticity is rather straightforward.

to complete these procedures. It took 694 days to complete all the necessary requirements to start a business in Suriname for the year 2013. This represents the worst in the region and is way above the world minimum of 5 days. Holden and Holden (2005) noted that registering a business in Jamaica is unreasonable and expensive, so much so that it has forced businessmen to operate within the informal economy, emphasizing the similarly drawn conclusions by Djankov *et al*. (2002).

The paying taxes measure indicates that the tax burden is also a constraint within the Caribbean. To corroborate, from Table 1, we conclude that a 1% increase in the tax burden leads to a 0.32% decrease in real GDP per capita. Note that as seen above the tax burden is associated more so with the high tax rates characteristics of the region rather than administrative issues.

Regulation associated with trade can also prove to be detrimental to growth. Excessive procedures and licenses can mean higher producer costs. This form of regulatory burden seems to be particularly important in determining macroeconomic performance in the Caribbean given the large coefficient and high level of significance of the trading across borders proxy. In fact, when considering the elasticity, a 1% increase in trading across borders regulation leads to a .54% decrease in income. This seems to be in keeping with Djankov *et al*. (2010) who assert that delays in exports can deter trade and by extension income levels across countries. The results match those from the enterprise survey. Indeed, according to the latter, businessmen within the region identified customs and trade regulation as major obstacles in the operation of their businesses. A reduction of these regulations will therefore benefit growth.

The enforcing contracts regulatory measure is positively and significantly correlated with growth. The result implicitly shows that a 1% increase in regulations relating to contract enforcement leads to a 1.38% increase in real GDP per capita. Although unconventional, this result can nevertheless be justified to the extent that long procedures within the legal system safeguard against errors in verdicts as well as minimize opportunities for coercion. This seems to confirm the opinion of most Caribbean businessmen in that the court systems are fair and uncorrupted and so create a good investment climate.

Though a lack of investor protection is seen as negatively correlated with real GDP per capita, the results indicate that this regulatory measure is not significant in the Caribbean context. Government effectiveness carries its expected a priori relationship with growth. That is, a positive increase in Government effectiveness leads to an increase in real GDP per capita. Indeed, a 1% increase in government effectiveness yields a 0.09% increase in real GDP per capita. This qualitative result matches that of the literature which points out those well-functioning institutions lead to increased economic welfare and thereby productivity growth. The regression estimated also indicated that both foreign direct net inflows and domestic investment proxied by gross capital formation as a percentage of GDP were both significant determinants of growth. The dummy variable capturing natural disasters was not significant. While the disaggregated measures provided insight into the relationship between specific aspects of regulation and growth, it is also useful to determine the overall effect regulation has on growth. In this connection, model (4) is of interest. Precisely, the logarithm of real GDP per capita was regressed against an aggregate regulatory measure constructed from the World Bank Ease of Doing Business database along with control variables. Before delving into the analysis of results, it is important to note the limitations of the results. The model was regressed with and

without robust standard errors and while the robust model is insignificant, the model without robust standard errors has a high degree of significance.

We present the results of the regression estimation of model (4) with robust standard errors. The model reveals a significant negative relationship between the aggregate regulatory measure and logged real GDP per capita. Indeed, a 1% increase in the regulatory burden leads to a 0.96% decrease in real GDP per capita. This confirms the conclusion reached by Djankov *et al*. (2006) according to which countries with higher regulatory burden do not perform economically as well as those that do not. The result also matches the conclusion by IDB (2009) that the regulatory burden in the Caribbean can be a major constraint on growth. Government effectiveness, private domestic investment and foreign direct investment positively and significantly impact economic growth.

Table 2: Random Effects Regression: Aggregated Regulatory Model (4) for the Caribbean, 2004-2012.

Dependent variable: logged GDP per capita(2005 US)		
Variables	coefficient	standard error
C	8.994*	.251
WB aggregate	-1.925*	.523
Government effectiveness	.190**	.081
population growth	-.006	.084
logged domestic investment	.061**	.033
logged foreign direct investment	.048*	.021
Natural Disasters Dummy	-.003	.006
p value of chi squared (.1156)		

* significant at the 1% level;
** significant at the 5% level;
*** significant at the 10% level.

5. Conclusion and Policy Recommendations

This paper examines the relationship between regulation and economic growth in the Caribbean over the period 2004-2012. Precisely, the paper studies the extent to which aggregated and disaggregated regulations are really binding constraints to economic growth in the Caribbean context.

Using an unbalanced panel of 14 countries over the period 2004-2012, the Generalized Least Squares (GLS) estimation of random effects models yields the following results: (i) overall aggregate regulation negatively and significantly affects economic growth; (ii) the regulatory burden of starting a business, paying taxes and trading across borders each adversely affects economic growth; (iii) the burden of enforcing contracts positively and significantly affects economic growth; (iv) government effectiveness positively and significantly impacts economic growth; (v) foreign direct investment and private domestic investment positively and significantly affect economic growth.

Overall, the results seem to support the view that too much regulation adversely affects the macroeconomic performance of an economy. For sure, there is room for policy reform within the respective Caribbean countries. Nevertheless, care must be taken to not only address regulatory inefficiencies but also institutional weaknesses. For instance, while the regression estimation has validated the usefulness of lengthy procedures in an effort to curb corruption, granular analysis suggests that there are shortcomings within the system that need to be addressed. Providing sufficient funding or increasing salaries in occupations within legal institutions may encourage burgeoning talented legal workers to fill the staffing shortage within such systems. Such an adjustment can lead to quicker verdicts and perhaps a fairer distribution of access. As such, addressing inefficiencies in the court systems can aid in the effectiveness of regulation within the Caribbean context.

As it relates to the regulatory burden faced by potential firms in starting a business, obvious policy recommendations include decreasing the number of procedures necessary to register a business or reducing costs. However, these vague policy prescriptions have not led to significant changes in the productive performance of Caribbean economies. In this connection, we recommend policies adapted to the Caribbean experience. For instance, a majority of the main regulatory offices are located in the capital cities of these countries. Depending on investor location, it becomes cumbersome to make multiple trips to address relevant paper work. Decentralizing these bodies in an effort to make them more accessible may be a feasible solution. Even further, decentralization can be applied where online applications and processing can reduce time and cost constraints (Holden and Holden 2005). As such, documents can be scanned or mailed, reducing travel costs. Automated systems can further reduce the regulatory burden.

Constraints placed on the tax environment may prove to be more complicated to address. As noted above, the tax burden is largely as a result of high tax rates and not necessarily cumbersome administration. The solution however cannot be as rudimentary as employing huge tax cuts, as developing countries depend heavily on this form of revenue. Budget constraints and high fiscal debt exacerbate the situation. Clearly, we do not recommend that governments significantly cut taxes with no opportunity for revenue. We rather favor policies that work in tandem. Reducing taxes as well as revisiting the economic agents that are taxed may be a better alternative. For example, many Caribbean economies offer exorbitant concessions and act as tax havens for offshore firms. Reducing these concessions (including those that supply an exemption

from corporate tax), while reducing the high tax rates of domestic firms may enhance investment activity.

Similarly, addressing issues as it relates to the cost and time of trading may induce incentives to invest domestically. Time as well as transportation costs are high in the region often due to a lack of an efficient interregional transport system. Often, goods are shipped to a port in the US before then making their way to the respective ports throughout the region. Addressing customs procedures at multiple ports may undermine the value of time sensitive goods (Holden and Holden 2005) and as such raise the cost of doing business. Addressing the constraints faced by domestic investors as it relates to a poor interregional transportation network is critical in addressing the costs and length of time associated with these regulatory burdens.

This exploratory study has, however, at least two major limitations. First, data unavailability has sensibly reduced the data time series dimension and the overall size of the sample. Second, it was not possible to use more robust techniques (for example, error components 2SLS) due mainly to data limitations. Despite these shortcomings, the study is still informative about the relationship between regulation and economic growth in the Caribbean.

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