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Regulatory Independence and the Development of the Telecommunications Sector in The English- Speaking Caribbean

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Delreo A. Newman

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Walden University
2019

Abstract

Regulatory Independence and the Development of the Telecommunications Sector in The

English-Speaking Caribbean

by

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MA, Fordham University, 1987

BS, New York Institute of Technology, 1986

Dissertation Submitted in Partial Fulfillment

of the Requirements for the Degree of

Doctor of Philosophy

Public Policy and Administration

Abstract

Small developing states can use proper regulatory frameworks in policy and sector development to implement efficiency and consumer safeguards to the sector. However, sufficient research on the impact of telecommunications regulatory institutions on micro economies has not been conducted. Capture theory was used as the theoretical lens for this thesis. In doing so, a quantitative analysis was done using, cross-sectional pooled time series to determine how an independent telecommunications regulator impacted the telecommunications sector in the English-speaking Caribbean. All the data acquired for analysis were secondary yearly data collected from the International Telecommunications Union (ITU) from 1993 to 2012. Specifically, this study examined how prices, investment, infrastructure, and competition in the telecoms sector are affected by the type of regulatory regime (independent or non independent) for fixed line and mobile services. Results indicate that the type of regulatory regime has a statistically significant impact on fixed line services and price of the telecommunications sector ($p < .0001$). However, this regulation was absent in other areas such as cellular services, broadband usage, telecoms investment and competition. The potential for positive social change is tied to recommendations specific to developing countries to ensure their regulators have autonomy in making decisions regarding the volume, quality and costs of telecommunications services. Legislation must minimize any overlap in the roles of policy makers, legislators, administrators and regulators to ensure that the regulatory framework addresses the particulars conditions of the country in which it operates.

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Dedication

I dedicate this project to those I love: my wife, Rosemarie; the children, Elijah, Jevon, Helena, and Shakair; and my parents, Rupert and Violet Newman.

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First, I am grateful to the Almighty, for his mercy, grace and protection. Secondly, I am grateful to Drs V. Ferreros (my Chairperson) and G. Telleria (my Committee member) who have been more than patient in guiding me through this dissertation process. I also acknowledge and thank Dr T. Settles and Dr M. Devirgillo who contributed as my university research reviewer. I also want to thank Mr P. Cross and Mr S. Cadette formally and of the International Telecommunications Union, who have been more than helpful in my data collection process. To all those who have been kind enough to teach and guide me throughout my academic career, who are too numerous to mention, I am most grateful.

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Chapter 1: Introduction to the Study

Introduction

All modern economies are based on the backbone of information and communication technologies (ICTs), which is sometimes used interchangeably with the term telecommunications. For developing countries, there is a link between economic growth and living standards and the use of ICTs by those countries (Garbacz & Thompson, 2007). To optimize the benefits of using ICTs, the World Bank and other similar institutions have advocated that ICTs should be regulated. The International Telecommunications Union (ITU, 2014) stated, “[e]ffective regulation has proven to result in greater economic growth, increased investment, lower prices, better quality of service, higher penetration, and more rapid technological innovation in the sector” (p. 6.2.4). However, effective regulation means having an institution or a body that is not only independent of the sector it regulates, but is also independent of policy creation (Intven, Oliver, & Sepulveda, 2000). In this quantitative study, I examined the effects of the two types of telecommunications regulatory frameworks: those that are independent from policy creation and policy creators and those that are not. I examined the significance of these regulatory frameworks on economic growth by using a pooled, cross-sectional time series analysis.

Background

The Caribbean is an archipelago of islands south of the North American continent. Its history and cultural identity are more closely related to the Europeans who exerted control during the colonial period than to the North Americans who live in close

proximity to it. The type of regulatory framework that is created in these countries stands in contrast to North American regulatory institutions. Daintith indicated that both a “cultural and constitutional context” is important to explain the difference in regulatory frameworks (as cited in Ogus, 2002, p. 2). In addition, British jurisprudence is different from U.S. jurisprudence (White, 1976). The U.S. experience, which included the American Revolution, resulted in beliefs that “the law and legal institutions that were unique rather than derivative” (Ogus, 2002, p. 1212). The countries and dependencies that comprise the English-speaking Caribbean (either formerly of the British Empire or still territories of the United Kingdom) are as follows: Anguilla, Antigua and Barbuda, Bahamas, Barbados, Bermuda, British Virgin Islands, Cayman Islands, Dominica, Grenada, Jamaica, Montserrat, St. Kitts and Nevis, St. Lucia, St. Vincent and the Grenadines, Trinidad and Tobago, and Turks and Caicos (Meditz & Hanratty, 1989). When people think of the Caribbean, they usually think of the islands that are in the Caribbean Sea; however, the Caribbean is more than just those islands (Payne, 1995). The Caribbean also includes Guyana in South America and Belize, which is in Central America. Bermuda, although not located in the Caribbean Sea, is also considered part of the Caribbean, or a part of the British West Indies.

For many years, the primary economic activity for the majority of the English-speaking Caribbean has been agriculture, and over the past decade and a half, services (i.e., financial, tourism, etc.) have become a contributor to the economy (Beckford & Campbell, 2013). In 1998, throughout the Caribbean, there was a movement to reform the telecommunications sector. Similar to American Telephone and Telegraph (AT&T) in the

United States, within the English-speaking Caribbean, the telecommunications monopolies responded negatively to the call for reform, often referred to as liberalization. The industry's reform would not be driven by internal forces in the Caribbean countries. Instead, reform was driven by external bodies, such as the World Trade Organization (WTO), and by technological advances that were outside the span of control of the incumbent telephone companies and the local laws. Despite the lack of pressure from internal forces, the telecommunications monopolies were entrenched within these English-speaking Caribbean societies that telecommunications companies were still able to exert enough pressure on lawmakers to make policy change in telecommunications difficult to pass without the lawmakers consulting these companies (Stirton & Lodge, 2002).

Before the privatization efforts of the 1980s, the telephone companies in these Caribbean countries were government-owned, and they were, therefore, at first self-regulated. After the governments initially privatized the telephone companies, the companies continued to be self-regulated. The governments lacked the human capacity for regulating the industry. Cable & Wireless, a transnational British company, purchased most of the governments' telephone interests throughout most of the English-speaking Caribbean; Guyana, Belize, and the Bahamas were the only exceptions.

In 1989, the Caribbean Community and Common Market (CARICOM, 2013) heads of government established the Caribbean Telecommunications Union (CTU). Until this time, the role the governments played was limited to the price and availability of telephone services throughout the countries. In the mid-1990s, their interests soon

encompassed the broader telecommunications services. The formation of the CTU was driven by changes in telecommunications that began in the rest of the world. The Caribbean countries' political interests in telecommunications reform were driven by the desire to develop the ICT sector, but were also largely motivated by the desire to protect the agricultural base. Wanting continued access to worldwide markets, especially those of Europe where concessions were made for the banana and sugar industries, government officials opened trade in the ICT sector to continue protection for agriculture (Kwa, 1999; Raworth, 2005).

Competition is commonplace in the telecommunications sector. Spulber suggested that “economic textbooks have held up the telecommunications industry as the ideal model of a natural monopoly” (as cited in Thierer, 1994, p. 268). A natural monopoly occurs whenever “a single firm is able to control most, if not all, output and prices in each market due to the enormous entry barriers and economies of scale associated with the industry” (Thierer, 1994, p. 268). Telecommunications was considered a natural monopoly because of the cost associated with offering services, such as laying cables and building switching stations (Thierer, 1994, p. 268). Only governments or multinational firms that sought high rates of returns could afford the high cost of construction of networks, and they only built and expanded networks in what they perceived as the most economically viable areas.

The policymakers (political directorate) had the task of implementing a new competitive telecommunications sector. As Spiller and Sampson (1994) indicated, these policymakers, who initially privatized monopoly telecommunications companies because

they thought that having a private monopoly would be beneficial for their countries' economies, were faced with a monopolistic entity that wanted super profits with continuous price adjustments and limited oversight (p. 44). Caribbean policymakers did not introduce a change that would offer competition to the telecommunications sector.

The movement from a monopolistic telecommunications environment to a competitive market in the English-speaking Caribbean was not uniform. Government ministers throughout CARICOM formed a telecommunications body, the CTU, and this entity operated similar to ITU within the United Nations. The Treaty of Chaguaramas allowed for the formation of the CTU (2017). Although this treaty was intended to deal primarily with trade issues, the CARICOM created a body to deal with telecommunications even before the WTO was created. From the beginning, the CTU had limited powers in its ability to influence the policies of the countries it was designed to assist. The treaty was only ratified and accepted over a decade later (CARICOM, 2017). Ministers responsible for the telecommunications portfolio did not abide by the CTU's recommendations until 1999, when the possibility of a new telecommunications paradigm arose. St. Lucia's telecommunications monopoly license came to an end, and the WTO began using the CTU as a conduit for information. When the WTO partnered with the CTU, it brought the issues that the CTU was already advocating to the various Caribbean countries, and the governments were able to present a more unified and uniformed approach in their discussions with the incumbent providers of telecommunications.

St. Lucia's negotiations with its telecommunications monopoly provider was critical to the success of the whole region, because when St. Lucia's domestic license officially ended in September 2000, the St. Lucian government only extended it to March 2001 (Anthony, 2010). The St. Lucian government granted an extension for only 1 year to indicate to the monopolist provider, Cable & Wireless, that St. Lucia would not negotiate unless Cable & Wireless was also willing to negotiate simultaneously with the other English-speaking Caribbean countries. At the time, Cable & Wireless controlled telecommunications in nearly all of the English-speaking Caribbean with exclusivity licenses, with the exception of Belize, the Bahamas, and Guyana.

While Cable & Wireless was negotiating with the other islands, Marpin, a small provider in Dominica, decided to challenge that monopoly. Marpin "sought declaratory and other relief under the Fundamentals Rights Provision of the Constitution of Dominica" and "The High Court and later the Court of Appeal, agreed with Marpin that the exclusivity conferred by the licenses secured by Cable & Wireless was [indeed] in contravention of the Constitution" (Anthony, 2010, p. 8). Marpin's win meant that although Cable & Wireless had an exclusive license in place, communication was a right of any human being, and an exclusive license was unlawful and unenforceable.

From a regulatory perspective, Baldwin and Cave (1999) stated, "[r]egulation can be seen to be centrally concerned with the control of risks" (p. 138). St. Lucia attempted to minimize Cable & Wireless's impact on the country by including other countries in its negotiation. Cable & Wireless agreed to simultaneously negotiate with all the countries. The political risks associated with this new paradigm of moving away from

negotiating alone were minimized for St. Lucia and the rest of the Caribbean. The countries all agreed that a collective approach was the best strategy for bargaining with telecommunications providers.

Jamaica believed in the collective approach, but was further along than the rest of the Caribbean in the liberalization of the telecommunications sector; it had passed the necessary laws to establish an independent utilities regulator, the Office of Utilities Regulation (OUR). Other English-speaking Caribbean nations, as well as St. Lucia, were yet to establish or create terms of engagement (for negotiation) with the incumbent that had only agreed to the negotiated collective process in principle. Although all of these Caribbean countries are formally tied to CARICOM (which deals with these collective issues as a single entity), there was a degree of rivalry that existed between the countries. Jamaica, having the largest population, believed that it should lead the way in terms of negotiating with Cable & Wireless, and so began bilateral negotiations. If the negotiations proved unsuccessful, then Jamaica would join the collective negotiations with the other countries as a last resort.

Baldwin and Cave (1999) discussed the “regulatory challenges or risks” that needed to be minimized as a matter of priority if they are to meet “public approval” (p. 142). If the people of St. Lucia approved St. Lucia’s plan, no government that opposed the plan would have been willing to complain, because several other Eastern Caribbean countries had joined the collective bargaining. As Anthony (2010) indicated, Cable & Wireless “[was] the most hated company operating in St. Lucia,” and this was equally true in the other Caribbean countries where they operated (p. 8). Jamaica believed that the

public would consider the breaking of Cable & Wireless's exclusivity, which extended to the year 2038. Public opinion is classified as a "noneconomic consideration," and Kahn (1993) believed that "noneconomic considerations" are critical in making regulatory decisions and that "noneconomic considerations intrude" even when proper market and economic efficiency can be made (p. 189). For years, the costs of maintaining the monopoly did not matter to these Caribbean countries, as they believed they were obligated to honor the exclusive contract. According to Kahn, the idea of "social or political objectives" is oftentimes "brought to bear on public [decisions] and often involve, explicitly or implicitly, a purely economic judgment that the private market provides insufficient consumption because the external benefits are large" (p. 190). Kahn recognized that the politics intrude or even override proper economic principles. Hence, the plan by the minister in Jamaica to be the first Caribbean country to have bilateral negotiations with the incumbent while maintaining an alternative plan was a social objective in which there were external benefits. In addition, the minister knew he would have the support of the public and constituents. Reform of the telecommunications sector then became easier for the other governments.

Telecommunications reform would have been easier to achieve by the Caribbean policy makers. However, small island developing states (SIDS) are not studied as much, and it has been observed that the requirements for growth are different from larger countries. This study added to the body of knowledge and filled the gap in the existing literature as to the role that independent telecommunications regulator plays in the economy of SIDS of the English-speaking Caribbean.

Problem Statement

The WTO governs the trade agreements that various countries create. The WTO (2014) stated that a country must form a “regulatory body [that] is separate from, and not accountable to, any supplier of basic telecommunications services” (p. 5). On the other hand, the Organization for Economic Cooperation and Development (OECD), whose members are developed countries, promoted the idea that more effective regulation could be obtained with less “political interference” through “structural independence” by having independent regulators (Min, 2000, p. 4). Both organizations believe that telecommunications regulatory bodies should be autonomous in a way that is similar to those of developed countries, such as the United States, which has the Federal Communications Commission (FCC). However, in many Caribbean nations, any change in the political administration does not include an automatic change in the leadership of regulatory institutions. This lack of change in the regulatory body while political administrations change causes tension between the two entities. Additionally, not all countries of the Commonwealth created independent regulatory bodies (see Table 1); for example, the governments of Antigua and Barbuda and Bermuda have control of their telecommunications sector (ITU, 2004; Ministry of the Environment, Telecommunications & E-commerce, 2007).

Table 1

List of Caribbean Countries, the Type and Name of their Regulatory Body or Bodies, and their Creation Dates

Country	Type of Telecommunications Regulatory Framework	Agency Name	Date Created by Legislative Fiat
Anguilla	Independent	Public Utilities Commission	2003
Antigua & Barbuda	Dependent	Ministry of Telecommunications	1951
Bahamas	Independent	Utilities Regulation Competition Authority	2009
Barbados	Independent	Fair Trading Commission	2002
Belize	Independent	Public Utilities Commission	2001
Bermuda	Dependent/Independent	Department of Telecommunications/ Bermuda Telecommunication Regulatory Authority	1986/2011
British Virgin Islands	Independent	Telecommunications Regulatory Commission	2006
Cayman Islands	Independent	Information & Communication Technology Authority	2011
Dominica	Independent	Eastern Caribbean Telecommunications Authority (ECTEL)/ National Telecommunications Regulatory Commission (NTRC)	2000
Guyana	Independent	Public Utilities Commission	1999
Grenada	Independent	Eastern Caribbean Telecommunications Authority (ECTEL)/ National Telecommunications Regulatory Commission (NTRC)	2000
Jamaica	Independent	Office of Utilities Regulation	1997
St. Kitts & Nevis	Independent	Eastern Caribbean Telecommunications Authority (ECTEL)/ National Telecommunications Regulatory Commission (NTRC)	2000
St. Lucia	Independent	Eastern Caribbean Telecommunications Authority (ECTEL)/ National Telecommunications Regulatory Commission (NTRC)	2000
St. Vincent & the Grenadines	Independent	Eastern Caribbean Telecommunications Authority (ECTEL)/ National Telecommunications Regulatory Commission (NTRC)	2000
Montserrat	Independent	Montserrat Info-Communications Authority	2009
Trinidad & Tobago	Independent	Telecommunications Authority of Trinidad and Tobago	2001
Turks & Caicos Islands	Independent	Turks and Caicos Islands Telecommunications Commission	2004

The Caribbean countries that created independent regulators adopted the stance that independence meant autonomy in terms of WTO regulations. The idea of autonomy for regulatory bodies came from the OECD countries and institutions such as the World Bank, the International Development Bank, and the International Monetary Fund (IMF), to minimize governments' expediency. Those institutions pushed the idea onto various nations (Córdova-Novion & Hanlon, 2002; Intven et al., 2000). Although the WTO did not include the Commonwealth Caribbean within its trading framework, they were included incidentally because the United Nations views Latin American and Caribbean countries as one entity (United Nations, 2013).

Developing countries are generally categorized by international agencies as only having varying degrees of poverty. As Torres (as cited in Courtright, 2004) explained that although international agencies view developing countries as unique, they consider the countries as "homogenized by poverty," with variations only existing in the size of the problem (p. 352). International agencies, such as the World Bank and the IMF, recommended that the Caribbean countries create the same regulatory institutional framework, namely a policy allowing for an independent telecommunications regulator, just as larger countries have. These external institutions neglected to perform a cost-benefit analysis to determine the value of these independent telecommunications regulatory institutions to each respective small economy. The WTO recognizes that small economies are different than larger ones and are, therefore, at a disadvantage by certain rules, such as having to implement telecommunications reform (Moore, 2001). Little is known about the impact that an independent telecommunications regulatory framework

or independent telecommunications regulator has on a small developing state in the English-speaking Caribbean (Symeou & Pollit, 2007; Sutherland, 2009). Scholars have primarily focused on larger, industrial or developing economies, and the positive impact the telecommunications regulatory institutions have on those economies. Sufficient research on the impact of telecommunications regulatory institutions on smaller economies has not been conducted. Therefore, this dissertation filled the gap that existed in the literature about the impact of independent telecommunications regulatory institutions on small economies, recognizing that such economies may have differing developmental national policies than their larger counterparts.

Purpose

The purpose of this quantitative study was to examine the effects of the two differing telecommunications regulatory regimes on telecommunications sector tariffs, telecommunications Internet services, telecommunications investment, and policy mechanisms of both independent and nonindependent regulators on small economies of the Commonwealth Caribbean. Knowledge of the effects of these differing regulatory regimes may help small country governments in creating policies that will be optimal for the development of their telecommunications and their economies. All of the Commonwealth Caribbean nations are considered small countries or even microstates. According to Ofa (2012), small economies have problems that are unique to them, especially regarding the ICT sector. Based on the findings of this study, I developed guidelines and recommendations for the regulatory body appropriate for the Commonwealth Caribbean. I determined whether it was prudent for Caribbean

governments that have not yet established any regulatory institutions to set them up, either as independent of the ministry or as a governmental department. Other governments may use the information from this study to determine whether to keep or make defunct existing independent telecommunications agencies. Additionally, the information may assist international institutions in revising their policies on independent telecommunications institutions for small states.

Research Questions and Hypothesis

The overarching question that guided this study was the following: How do independent regulators affect the economic development of the telecommunications sector in small developing island states?

1. How are telecommunications infrastructure in fixed line services affected by regulatory regime, population, telecommunications investment, competition in the telecoms sector, gross domestic product (GDP) and telephone tariffs?

H_0 1: The independent variables of regulatory regime, population, telecommunications investment, GDP, competition in the telecoms sector, and telephone tariffs do not have any effect on the dependent variable fixed line services.

H_1 1: The independent variables of regulatory regime, population, telecommunications investment, GDP, competition in the telecoms sector, and telephone tariffs do affect the dependent variable fixed line services.

2. How are telecommunications infrastructure in cellular services affected by the regulatory regime, population, telecommunications investment, competition in the telecoms sector, GDP and telephone tariffs?

H₀₂: The independent variables of regulatory regime, population, telecommunications investment, GDP, competition in the telecoms sector, and telephone tariffs do not have any effect on the dependent variable cellular services.

H₁₂: The independent variables of regulatory regime, population, telecommunications investment, GDP, competition in the telecoms sector, and telephone tariffs do affect the dependent variable cellular services.

3. How are telecommunications infrastructure in universal services (i.e., fixed lines and cellular services) affected by the regulatory regime, population, telecommunications investment, competition in the telecoms sector, GDP and telephone tariffs?

H₀₃: The independent of regulatory regime, population, telecommunications investment, GDP, competition in the telecoms sector, and telephone tariffs do not have any effect on the dependent variable universal services.

H₁₃: The independent of regulatory regime, population, telecommunications investment, GDP, competition in the telecoms sector, and telephone tariffs do affect the dependent variable universal services.

4. What is the relationship between prices in the telecoms sector (telephone tariffs) and the regulatory regime, population, telecommunications investment, competition in the telecoms sector, GDP?

H₀₄: Independent variables of the regulatory regime, population, telecommunications investment, GDP, and competition in the telecoms sector do not have any effect on the dependent variable prices.

*H*₁₄: Independent variables of the regulatory regime, population, telecommunications investment, GDP, and competition in the telecoms sector do affect the dependent variable prices.

5. What is the relationship between telecoms investment and the regulatory regime, population, telecommunications prices, competition in the telecoms sector, and GDP?

*H*₀₅: The independent variables of the regulatory regime, population, telecommunications investment, GDP, and competition in the telecoms sector do not have any effect on the dependent variable telecoms investment.

*H*₁₅: The independent variables of the regulatory regime, population, telecommunications investment, GDP, and competition in the telecoms sector does affect the dependent variable telecoms investment.

6. What is the relationship between broadband usage and the regulatory regime, population, telecommunications prices, competition in the telecoms sector, and GDP?

*H*₀₆: The independent variables of the regulatory regime, population, telecommunications investment, GDP, and competition in the telecoms sector do not have any effect on the dependent variable broadband usage.

*H*₁₆: The independent variables of the regulatory regime, population, telecommunications investment, GDP, and competition in the telecoms sector do affect the dependent variable broadband usage.

7. What is the relationship between competition in telecoms sector and regulatory regime, population, telecommunication prices, and GDP?

H₀₇: No relationship exists between independent variables of regulatory regime population, telecommunication prices, and GDP.

H₁₇: No relationship exists between independent variables of regulatory regime population, telecommunication prices, and GDP.

Theoretical Framework

The reason governments intervene in a market is usually explained through social theory (Posner, 1974). In economic regulation, intervention is mainly found in monopoly suppliers' arenas (Carpenter & Moss, 2013). Although there are several theories that could explain the differing regulatory frameworks of each country, in this study, I used capture theory. Capture theory is related to rent-seeking theory. Regulatory capture refers to when government corporations and regulatory bodies that were mandated to ensure that public needs are met act selectively to promote established players in the industry. This change to being captured in behavior that generally occurs over time (Etzioni, 2009).

The results of capture are a shift of the regulatory agencies' loyalty from the public to private interest and the loss of neutrality and impartiality. The ties that develop between regulatory officials and officials of private organizations can result in bias in executing regulatory duties, which will lead to favors and protection of these organizations being regulated at the expense of the public interest (Hamilton, 2013). Capture theory is used to explain how regulatory frameworks in each country was

developed, and it can be used as a foundation by a small developing countries/governments deciding whether or not to create an independent telecommunications regulatory agency. Regulatory capture involves the government or its agencies being beholden to other market players, which could include both private sector players and the government itself. The governments of small developing countries are often vulnerable to regulatory capture and rent seeking in the name of good governance.

Nature of the Study

I used an econometric approach to examine the relationship between the dependent and control variables; I used a cross-sectional time series model from 1993 to 2012. This model fits this research because only annual data were available, so the number of observations was limited. This methodology allows for a study of the variables that would not be readily available via a purely cross-sectional or time series model, because “variability is negligible, or not existent, across either time or space” (Podesta, 2000, p. 8). Because the observation period was limited to only 20 years, annual data box-Jenkins or auto regressive moving average were not suitable for the analysis. A cross-sectional panel model allows for the simultaneous capture of the variation over time and space. I also used a fixed-effects model to indicate that certain features do not change over time within a country but can be correlated with the regulatory regime and competition within said country. The regression equation is time-invariant, thereby addressing omitted variable bias (Borenstein, Hedges, Higgins, & Rothstein, 2009). The

data for this research came primarily from the ITU, the Central Intelligence Agency (CIA), the Caribbean Development Bank, and the World Bank.

Definitions

There were some key terms and definitions that were used in this study that may differ from general use outside of this public policy making context and academic study. The dependent and independent variables are defined in Chapter 3.

Eastern Caribbean Telecommunications Authority (ECTEL): The regulatory institution that is responsible for telecommunications in the Eastern Caribbean States that are members. “It is made up of three components – A Council of Ministers, a regional Directorate and a National Telecommunications Regulatory Commission (NTRC) in each Member State” (ECTEL, 2018, p. 2).

International Telecommunications Union (ITU): The U.N. agency for ICT. They are responsible for “global radio spectrum and satellite orbits, develop the technical standards that ensure networks and technologies seamlessly interconnect, and strive to improve access to ICTs to underserved communities worldwide” (ITU, 2018, p. 1).

National Telecommunications Regulatory Commissions (NTRC): The country-level regulators within the Eastern Caribbean member states of ECTEL. Their responsibility is to advise the responsible minister and process applications on the award of licenses (ECTEL, 2018).

Office of Utilities Regulation (OUR): The multisector regulator of Jamaica whose responsibility includes telecommunications, electricity, and water/sewage. It had also regulated transportation but that was removed from its remit in 2014 (OUR, 2018).

World Trade Organization (WTO): “The only global international organization dealing with the rules of trade between nations” (WTO, 2018, p. 1). Also, “it operates a global system of trade rules, it acts as a forum for negotiating trade agreements, it settles trade disputes between its members and it supports the needs of developing countries” (WTO, 2018, p. 1).

Assumptions

The data that were used in this study were numbers published by the institutions of the ITU, World Bank, and the local telecommunications regulators that would have access to said information. Although these data are also generally accepted by the institutions to be inherently correct, the local government institutions that report the information can have differing interpretations as to the definition used by the international institutions. As pointed out by the ITU (2018),

Data are available for over 200 economies. However, it should be noted that since ITU relies primarily on official economy data, availability of data for the different indicators and years varies. Notes explaining data exceptions are also included. The data are collected from an annual questionnaire sent to official economy contacts, usually the regulatory authority or the ministry in charge of telecommunication and ICT. Additional data are obtained from reports provided by telecommunication ministries, regulators and operators and from ITU staff reports. In some cases, estimates are made by ITU staff; these are noted in the database. (para. 4)

However, this information was assumed to be accurate and complete and was analyzed for any outliers as part of the general econometric data analysis.

Scope and Delimitations

The scope of this dissertation was limited to the available data. I selected all 17 of the English-speaking Caribbean countries and Bermuda, some of which are still dependencies of England, for the analysis. The data might be unreliable, because the government in power may sometimes under or overreport various statistics. Additionally, the methods used by various governments to collect data on the same indicator and the challenge of reliable data sources are problematic (Roshanthi & Rohan, 2013). Therefore, information given to the ITU is not as exact as it should be; therefore, a degree of bias exists. However, the cross-sectional component compensates for and corrects that bias.

I did not take into consideration the type of independence of each regulatory body. Both structural and functional independence exist; however, I only considered structurally independent bodies, and I defined them as any independent agency that is not directly funded by the central government and stands alone pursuant to some act or law.

Limitations

The limitations of this study included how the study was set up using panel data. In any given study, the results and analysis are only as valid as the type of data that are inputted. All useful econometric models require “valid, reproducible and accurate time series” (Alleman et al., n.d., p. 4.1). The data collected for this study were primarily from the ITU statistics, of which electronic sources may be different than the published version

of the same data. This panel data allowed me to look at each of the individual Caribbean countries in my sample over the given time period, in this instance 20 years.

Any pooled time series analysis begins with the general assumption that it behaves like a standard least-squares model. However, once the model is a pooled one, there is a correction for nonstochastic variables that are generally included (Sayrs, 1989). Additionally, pooling tends to cause the error to be contaminated from “time points within one cross-section” or from “correlation in the error” from differing “cross-sections at the same time point or from different cross-sections and different time points” (Sayrs, 1989, p. 13). The validity concerns will be addressed in Chapter 3.

Significance and Social Change Implications

SIDS, according to the United Nations Office of the High Representative for the Least Developed Countries, Landlocked Developing Countries, and SIDS (UN-OHRLLS, 2011), are a “distinct group of developing countries facing specific social, economic and environmental vulnerabilities” (p. 2). All of the English-speaking Caribbean countries are considered SIDS, either because of geography or population size. They are generally coerced into making policy decisions that are not necessarily sustainable or suitable. With the promise of certain concessions by larger countries, they usually accept these policies. Other SIDS adopted said policies in the hopes of also increasing social welfare for their citizens. However, policies that are reasonable for large countries do not necessarily impact SIDS in the same way. For example, the large countries that created independent telecommunication agencies have created a better telecommunications sector for themselves, but this may not necessarily be true for SIDS.

As various SIDS continue to contemplate the policy of an independent telecommunications regulator, the findings of this research should add to the debate in the country about the necessity of independent telecommunications regulators. Additionally, SIDS need to evaluate the cost benefit of implementing a policy creating a regulatory framework to accommodate an independent telecommunications agency and, if they do decide to implement such a policy, they need to ensure that it is tailored to reflect their circumstances.

Summary

This quantitative study comprised a public policy and administrative exploration into the challenge of determining the telecommunications regulatory framework that would be suitable for a SIDs. The overarching research question was the following: How do independent regulators affect the economic development of the telecommunications sector in small developing island states? A cross-sectional time series analysis was used to determine the possible relationships that may exist with these variables. By addressing this issue as a public policy concern, the study will add to the debate as to the best policy in determining what telecommunications framework would be optimal.

In Chapter 1, I presented the overview of the quantitative research study. Chapter 2 includes an exploration of regulatory theory of capture and external factors such as the WTO on telecommunications reform in the Caribbean, along with various reforms that have occurred, and the quantitative research design.

Chapter 2: Literature Review

Introduction

The telecommunications regulatory frameworks of independently regulated and government-regulated activity have differing effects on the small economies of the Commonwealth Caribbean. Regulatory theory is significant to public sector reforms and actions. Although there has been the creation of independent telecommunications regulatory institutions in many of the English-speaking Caribbean countries, the effectiveness of these institutions on the respective economies has not been measured. The theoretical lens through which I examined telecommunications reforms and the public policy actions was capture theory. In the literature review, I explain how the various telecommunications regulatory frameworks came about, and the rationale behind the statistical analysis that will be completed in the subsequent chapters. In Chapter 2, I will provide a synthesis of the literature reviewed and an overview of my research methodology. I will consider regulation as well as define independent regulation, and then provide a detailed analysis of the types of regulatory capture that can occur. I will follow with a historical context of independent regulation in the. At the end of Chapter 2, I will draw conclusions that will be applied to Chapter 3.

Literature Search Strategy

The use of the Internet was the principal search vehicle through which I obtained the literature for this review. This included the use of online libraries and academic research databases. Among the journal databases searched, those that generated the most applicable results were Sage, JSTOR, EBSCO, Wiley, and Elsevier. Key terms used in

the searches included *capture theory and independent regulatory agencies*, *regulatory capture and developing countries*, and *SIDS and capture theory*. I accessed a multitude of other databases during the search process as well. I selected the peer-reviewed feature to ensure that all of the literature generated would fit this designation.

I reviewed current literature containing empirical research in the relevant areas, which appeared in a range of publications, such as the *Journal of Economic Literature*, the *International Review of Social Sciences*, *Policy Studies Journal*, *Econ Journal Watch*, and the *American Political Science Review*. I identified articles in searches conducted using Google Scholar, with a preference for peer-reviewed journals, and through Internet search engines such as Google and Scirus, with a filter applied for peer-reviewed journals. Additionally, once I had identified key authors in this manner, the corpus of their work was reviewed for other relevant research, and other works cited by those authors were similarly reviewed. I reviewed identified journals, particularly in specifically-themed issues, for other relevant work.

Theoretical Foundation

The theoretical basis of this study was about the effectiveness of the English-speaking Caribbean independent telecommunications regulators within the public policy-making context of regulatory capture. However, it is important to understand why governments wish to intervene in certain sectors of the economy and regulate how companies in those sectors behave. According to Dudley and Brito (2012), governments intervene or regulate various economic sectors because of the perception that there is some market failure. Such market failures take the form of a deviation from a perfectly

competitive market. In trying to rationalize why regulation takes place, several conceptual frameworks have been developed, including a distinction between economic and social types of regulation (Viscusi, Harrington, & Vernon, 1996). Economic regulation includes aspects of entry into and exit from a market, prices on the market, and quality of service issues. Social regulation deals with environmental and consumer-related matters (Hertog, 1999). Economic regulation is generally imposed on monopoly suppliers, especially those specializing in public utilities. The theories can be further divided into “positive and normative theories” (Hertog, 1999, p. 224). The former is what truly occurs, and the latter reflects what should ideally occur (Felkins, 2013).

Regulation Defined

Although Hertog (1999) posited that there is no definition of regulation in any available economic and legal literature, McLean (2002) stated, “Regulation has been in existence for as long as governments have interfered in private actions: that is, forever” (p. 2). McLean also indicated that regulation started out as a good idea and was not the mere “naked expropriation of one group in favor of another” (p. 2).

According Baldwin and Cave (as cited in Baldwin, Scott, & Hood, 1998), regulation “is spoken about as if [it is] an identifiable and discrete mode of governmental activity” (p. 2). Selznick regarded it as “the sustained and focused control implemented by a public agency over actions that are valued by a community” (as cited in Baldwin & Cave, 1999, p. 2). However, this definition differs from Stigler’s (1971) definition. Stigler suggested that industries and the private sector have created their own standards of operation, which they then operate for their own benefit. Stigler believed that

industries need protection, probably from the community, while Baldwin and Cave (as cited in Baldwin, Scott, & Hood, 1998) perceived the community as needing protection from the industries.

Becker's views on regulation are not synonymous with Baldwin and Cave's. Becker (1976) stated, "A firm is said to be in a monopolistic position when its demand curve is negatively inclined in such a way that a monopolist would maximize his income at the output level where marginal revenue equals marginal cost" (p. 94). Government regulations arise when the government, or the regulator, plays the role of the market in determining the marginal prices that monopolistic companies should charge. Becker also discussed regulation. Becker stated:

For at least 200 years, economists have been trying to understand why some industries are competitive and others monopolistic. And for an almost equally long period, two competing explanations have been offered: one stresses the technological conditions that make monopoly inevitable, the other stresses the incentives to come together to suppress competition. (p. 95)

In each of these explanations offered by Becker, regulation must take place or, more specifically, governments have to regulate monopolistic firms to enjoy profits.

Kahn (1993) stated that regulation is generally viewed as "maintaining the institutions within whose framework the free market can continue to function; and enforcing, supplementing and removing the imperfections of competition" (p. 2). Kahn discussed regulation primarily in terms of public utilities, whose "acceptable performance is attributed not to competition or self-restraint but to direct government involvement in

the major aspects of their structures and economic performance” (p. 3). Without the government regulating monopolies, firms would strive to achieve high profits to the detriment of the public. Kahn also dealt with “the legal rationale” (p. 3). This is the right of a government to regulate monopolies. Kahn indicated that the right to regulate is driven by the fact that individual states within the United States had to give up the right of way when it came to public property; governments were, therefore, obliged to impose on the operators “various regulatory conditions” (Kahn, 1993, p. 3).

The following is a summary of the theoretical economic rationale behind regulation, as stated by Kahn (1993):

1. Monopolistic industries (especially public utilities) are important to the growth of the entire economy, because they contribute to the total national output. They also supply essential inputs to other industries.
2. Most of the utility companies are monopoly providers; therefore, their costs tend to be lower if they are the sole suppliers of a commodity in the market.
3. Due to a variety of possible reasons, competition does not work well in the sector.

With the exception of Stigler (1971), the aforementioned theorists all believe that government regulation of monopoly providers is there for the protection of consumers. Stigler, on the other hand, believed that it is the monopoly providers who need protection from society.

Independent Regulation

The concept of independent regulation stems from the idea of central bank independence (CBI), which refers to the separation of monetary policy makers from those

in political administration. Walsh (2005) reported that, during the 1970s and 1980s, industrialized economies had long inflationary periods because of the political authorities' short-term plans to meet expansionary goals at the expense of longer-term inflationary effects. Walsh stated, "If the ability of elected officials to distort monetary policy results in excessive inflation, then countries whose central banks are independent of such pressure should experience lower rates of inflation," and the empirical evidence suggests the same (p. 2). Hence, an independent regulatory body that is separated from the political directorate was needed for more stable inflation rates. Stern and Trillas (2001) reported that the effects of an independent central bank on the macroeconomic situation of a country are generally good for a country. Stern and Trillas also pointed out that there are similarities between independent central banks and independent telecommunications regulators: Both have a need for consistent policies and similar organizational design (Stern & Trillas, 2001). In order for an independent regulator to be successful, the political directorate should not interfere with its operations.

However, Hayo and Hefeker (2002) challenged the CBI idea and believed that, although there may be a statistical correlation between low inflation rates and perceived CBI, low inflation has more to do with the conservatism of a country and its political influence than with CBI. Hayo and Hefeker used Japan as an example, because it has low inflation rates, although its central bank works with the ministry of finance. Additionally, Cukierman, Webb, and Neyapti (1992) found that "Legal independence (of the Central Bank) is inversely related to inflation in industrial (countries)," but they further suggested that, for developing countries, "the more frequently the chief executive (of the central

bank) is changed, the higher the measure of its independence” (p. 353). Generally, in the Caribbean there is not independence in the activities of the central banks, because the banks’ chief executives rarely change.

Regulatory independence consists of three major elements: an independent relationship where the parties act in their own interests to regulate firms and consumers, political authorities, and organizational autonomy (Smith, 1997). Brown et al. (2006) described the idea of regulatory independence, indicating that it is merely “decision-making independence” in that the regulator does not consult any entity or person before making a decision, but may instead consult a court of law or an appellate body set up to oversee the regulatory institution (p. 50). Wu (2004) stated that the indicators of true independence have to do with “the stability of its leadership, the scope of its authority, and the independence of its funding” (p. 6). Regulatory independence is important because, without it, all of the identified entities (ie., regulated firms, consumers, and political authorities) would act in their own interests. An example of why self-interest should not be allowed to override public interests occurred when, as Jamison (2009) reported, the Iowa governor appointed Commissioner Dennis Nagel to the Iowa Utilities Board and asked Nagel not to do anything that would cost the governor the next election. The governor failed to mention the protection of shareholders or consumers, or even legal compliance (Jamison, 2009). The role of the regulator is a balancing act. Smith (1997) described it as “special challenges” that face a utility regulator; hence, a regulator needs to be independent in order to make the best decision (p. 3).

According to Brown et al. (2006), there are two main features to regulation: “Regulatory governance” and “regulatory substance” (p. 19). Regulatory governance includes ideas such as “accountability of the regulator” and “the relationship between policy makers and the regulator” (Brown et al., 2006, p. 19). Regulatory substance, on the other hand, deals with determining tariffs and the quality of service by the operator (Brown et al., 2006). Conversely, Smith (1997) believed that regulation has three main aims: to protect consumers from abuse by firms, to support firms or investors from arbitrary actions by government, and to promote economic efficiency. As Mohammed and Strobl (2011) stated, there is a positive effect on access to telephone services when there is an “independent regulator” and “privatization,” which form the basis of telecommunications reforms (p. 93-94). Mohammed and Strobl concluded that, for the “efficient development of the telecommunications industry in a developing country,” there must be a “separate regulatory body” and that this body must be functional (p. 95). The Caribbean countries that created independent telecommunications institutions did so through legislative means that made the regulatory governance transparent.

Research Design

There is a relationship between the independent telecommunications regulator and the various economic and telecommunications network variables. Income and market reform (i.e., competition) and the size of the network are among the primary drivers of growth (Banerjee & Ros, 2004). Mohamed and Strobl (2009) indicated that an independent regulator is also relevant and important for the growth of fixed networks (p. 92). Although there is research on fixed networks or mobile networks in developing

countries, these are substitutable, and mobile networks are fast replacing fixed networks, as copper is being replaced by wireless or mobile. There have been several quantitative studies on the relationship between the regulator and the telecommunications industry (Baudrier, 2001; Symeou & Pollit, 2007). Additionally, there have been several time series studies and panel data studies that relate to the choice of economic variables and the regulator, but these variables have been on developed and/or larger developing countries (Baudrier, 2001; Mohamed & Strobl, 2010; Ros & Banerjee, 2000; Trillas, 2010).

Time Series, Panel Data, and Variables

A precedent has been provided by using other times series and panel data analysis on the impact of a regulator (Mohammed & Strobl, 2011). I replicated previous studies, substituting data from the Caribbean countries. The independent regulator binary variable (1–yes, 0–no) was used as the explanatory variable. To take the panel structure of the data into account (repeated measures over countries and years), each regression also included country-fixed effects that allow the intercept of the regression model to vary by country, thus accounting for time-invariant, cross-country differences. The dependent variables were log-transformed, so that the effect of the regulator’s independence can be expressed in percentages.

The literature has given guidance on the variables of choice. The ITU dataset is annual, runs from 1993 to 2012, allows for a period of time during which the telecommunications framework was nonindependent, across the time period that an independent framework was created. Additionally, this fits in with the ITU data for their

given 20-year period. In some instances, the change in the regulatory framework would have been allowed to have existed for at least 10 years. One notable variable exception in the data is the existence of an external event that had the effect of almost destroying one of the islands, namely a volcano in Montserrat.

The main variable of interest for this research (i.e., the independent variable) was the telecommunications sector and the economy. Although there are many degrees of independence, such as functional independence, I was concerned only with statutory independence (i.e., independence created by legislative fiat). The decision as to the creation of an independent regulator is one of public record, primarily due to an act of the government. This variable was created as a simple 0-1 type dummy variable. The result would be 0 for each year before the legislative fiat for the creation of the regulator, and 1 for each year thereafter.

In accordance with standard practice and consistent with the hypothesis, the primary variable was the penetration level of basic telecommunications services (which was the sum of both fixed and mobile customers). I used data from both the World Bank and the ITU databases. Following standard practice, the dependent variable in the model specification was fixed/mainline per capita, and it represented the fixed level of penetration for telecommunications (Baudrier, 2001; Mohammed & Stobl, 2009; Wallsten, 2001). However, unlike what previous standard models have presented, the updated form of the model included information about mobile penetration, because it was a possible substitute for fixed lines (Van der Berg & Song, 2012; Ward & Woroch, 2004). Both the World Bank and the ITU have compiled data on both main/fixed lines

and mobile/cellular information. The sum of these two variables creates a dependent variable. Although cellular service was considered relatively new and less regulated, it was accepted as a viable solution in developing countries, because the infrastructure costs associated with wireless are less than the infrastructure costs of other network solutions.

Tariffs are considered the main reason for telecommunications regulators. The prices that consumers face can determine their demand for telecommunications services (Trillas, 2010); regulators tend balance between consumers and providers. Regulators ensure providers are compensated for their service, but also limit any super profits (Wheatley, 1999). There have been several studies relating to various tariffs (i.e., prices offered by providers to their customers).

Internet or Broadband usage is one of the cornerstones that richer nations have more of and poorer nations have less of, and it is believed that Internet services “has had measurable effects on economic growth for all nations” (Jorgenson & Vu, 2016, p. 384). Wallsten (2002) recognized that there is a correlation between the telecoms regulatory approach to Internet service providers and the number of Internet users (p. 14).

A regulatory framework and regulators impact both the telecoms investment and economic growth of a country (Telecommunications Development Sector of the ITU, 2012). According to the Telecommunications Development Sector of the ITU (2012), telecoms investment does have an impact on both developed and developing countries. Regulators do play a role as to the quantity and type of investment that occurs in a given country; this was also evident in the ECTEL countries (Gilchrist, 2015; Sridhar & Sridhar, 2008).

Regulatory Capture Theory

According to the theory of regulatory capture, the administrative agencies established to protect the interests of the general public from private business entities serve the benefits of those private bodies instead of safeguarding the rights and interests of the public (Schultz, 2004, p. 363). Such agencies are said to have been captured by private interests, and they start using regulation as a method of avoiding competition to maximize profits. Regulatory capture theory, mostly associated with Stigler, was initially developed as an alternative to public interest theory after the latter had been discredited (Hertog, 1999). Regulatory capture can be defined as regulators or regulatory agencies putting the interests of regulated industries ahead of the interests of the public or the consumers. This change in the regulator's behavior tends to occur over a long time (i.e., as the regulators develop and mature, they become captured; Etzioni, 2009). There are several other categories of regulatory capture, as identified by Mitnick (2011), who argued that regulatory capture is more complex than what has been generally put forward. Mitnick stated, "It is a set of behavior pattern and relationships that can be produced in many ways, often acting in conjunction with one another" (p. 37). Mitnick suggested that there are six categories of capture, which I will discuss in the proceeding paragraphs (p. 37).

Systemic Capture

The first category of capture as defined by Mitnick (2011) is systemic capture that takes place due to powers of certain interest groups propagating their interests in a manner that leads to bias by the regulatory institutions at the expense of other competing

interest groups. Interest groups have a tendency to strive for profit maximization, and one of the ways to do so is through influencing the regulatory process. However, some groups have more power than others, which leads to a misbalanced scale of competition. Truly democratic and pluralistic values can prevent this imbalance. Each group would consist of a small circle of active elites that would circulate instead of dominate due to consistent elections. However, in reality, power imbalances shield the interests of powerful interest groups. Generally, this phenomenon can be termed as imbalanced affective access politics, which leads to another form of systemic capture in the shape of subgovernmental institutionalization (Mitnick, 2011, p. 38).

Various terms have been used to describe this phenomenon, including issue network and advocacy coalitions. These subgovernments often exhibit a state of capture, with consistent actions by stable power actors to align their interests together. “Iron triangle” is the term used for the outcome, in which legislatures, bureaucracies, and interest groups start reinforcing mutual interests in a cyclic manner. The formation of such iron triangles is detrimental for the regulatory process, as formal institutional lines start to vanish and the governance becomes virtual. It leads to outcomes and policies that safeguard only the interests of the regulated industry, which is usually the real capturing interest group. One example of such an iron triangle is the military industrial complex, consisting of defense contractors such as the Pentagon, the Congress, and the executive branch (Greenwald, 2012).

Another form of systemic regulatory capture that Mitnick (2011) also identified is regulatory arbitrage (p. 39). Sometimes the mismatch between regulatory resources and

capabilities produces a space for regulated actors to use that space to their advantage. Examples include the banking sector, which is prone to regulatory arbitrage. Karolyi and Taboad (2015) stated that the large banks that operate globally can strategically choose their locations of operation, or engage in mergers and acquisitions where regulatory enforcement regimes are less strict and cheaper than their locations of origin (p. 1). Such activities can result in regulatory competition with “race-to-the-bottom” situations in the overall banking regulation, as well as threats to the international financial system. The acquiring bank has the opportunity to extract subsidies from the host regulator to pursue its weakly monitored activities (Hardy, 2006, p. 1).

A method used globally to address the issue of imbalance between interest groups producing systemic capture is “proxy advocates” or “consumer advocates.” These are formal agents who represent the interests of those groups that lack the power to bias the regulatory system. In the United States, most of these institutions were established in the 1970s to incorporate the feedback of utility consumers in legal and administrative proceedings. Consumer advocates argue on behalf of those consumers who are poorly organized to plead their case during regulatory hearings. One such group is residential utility consumers, whose membership numbers are much greater than those of industrial consumers, but their ability to collectively advocate for rights are much less. Through the efforts of consumer advocates, residential consumers were able to achieve lower rate rulings, and they resisted demands for raising utility tariffs (Holburn & Vanden Bergh, 2006, p. 61). Effective consumer empowerment programs have led to win-win situations for both the consumers and businesses, as consumers can relish product safety while

businesses enjoy increased consumer trust (Wood, 2017, p. 650). Overall, according to Schwarz (2013), consumer advocacy institutions are helpful in balancing the power difference between different interest groups and preventing systemic regulatory capture (p. 44).

Chronical Capture

A form of regulatory capture was observed in post-Communist states due to previous power imbalances. Highly centralized systems of governance were a source of these imbalances, negatively affecting the administrative and economic reforms that took place in the states and attempted to liberalize their economies during the 1990s. The outcomes of these impaired reforms led to the formation of state capture in which interest groups were able to hold the legislature, the executive offices, and the judiciary under their control. Laws and regulations were shaped to benefit a concentrated segment of regulated industries, which were able to draw monetary and political profits at the expense of smaller groups and the overall economy. Scholars have studied the dominance of the corporate sector that produced state capture in all of the European states with Communist inclinations (Mitnick, 2011, p. 45).

Early policy choices made by these transitioning states into a crucial factor in deciding the fate of the entire regulatory reform process, as they had an irregularly high influence on the outcomes of reforms (Young, 2010, p. 3). Wrong choices in the early years of transition led to the foreclosure of certain options that were previously open. Policy choices made at the later stages had a lesser influence on the reform process, as they could not alter the path already adopted. Once an opportunity window was missed,

profiteering business interest groups were able to trap such transitioning nations into a vicious cycle. Young (2010) further argued that such an institutional capture had more detrimental consequences for the macroeconomic outlook of a country, when compared with the impacts of high-level corruption committed with the objective of one-time gains (p. 3). Institutional capture regularizes the imbalance by shaping the rules of business, benefitting the captors.

Romania experienced state capture during the first 7 years of transition, in which the former Communist bureaucracy remained at the forefront, mainly due to their relationship with the ruling political parties (Vachudova, 2005, p. 50). The privatization of state entities on a broad scale without the due transparency process lay the ground for regulatory capture during the early years of transition. The Social Democratic Party dominated the Romanian power scene between 1990 and 1996, and again between 2000 and 2004. Grodeland (2007) stated that during the days of Communism, a distinct form of political culture evolved in many such countries, including Romania, in which party secretaries had powers to handle issues of every type (p. 250). Later on, these public perceptions of party secretaries led to the belief that the problems that could previously be solved through contacts with party secretaries could now be solved through informal contacts with elected representatives. Interest groups made use of these informal networks for personal profits in situations where weak, contradictory, and excessive regulations did not allow legitimate outcomes to be achieved. Informal networks are defined as an “informal circle of people joining together with the intention of extracting benefits out of their association and to persist with this association over time”

(Grodeland, 2007, p. 220). Countries such as Bulgaria and Romania had more widespread usage of informal networks by regulated industries to achieve hidden ambitions.

Klimina (2009) stated that since the early 1990s, researchers from various multilateral institutions, such as the IMF and the World Bank, have been applying the neoclassical institutionalist approach to research the patterns of a nexus between state capture, a weak institutional framework, and rent-seeking interest groups (p. 373). The causes of state capture in these states have been a history of undemocratic governments coupled with an institutionalized bias of incentive structure towards individualistic associations and inappropriate costs to rent-seeking, which ease the way for increased corruption.

Relational Capture

Elected officials exert control over bureaucracies. This pattern of control is not limited to the appointments of officials and how the oversight proceedings of regulatory agencies are conducted, but extends to budgetary controls, forging the behavior of an agency, procedural manipulations, media coverage, influences from chief executives, altering the decision-making costs, and taking actions to affect the prominence of certain regulatory officials. The principal-agent model has been presented to explain the relationship between legislatures and heads of regulatory bodies. Now, for regulatory capture to occur, the agency must be able to go beyond this political clout and create an affiliation with the regulated industry that is based on a consistent bias towards the industry's interests.

Getting reelected is a basic desire of any legislator, and for that purpose, electoral campaigning requires funds. Regulated industries can fund the electoral campaigns of influential politicians, especially those who oversee the working of regulatory agencies. Legislators are obligated to listen to these industries in their constituencies and help them by originating legislations that protect and promote their interests. On the other hand, regulators depend on legislators for the funding of their agencies, which are directly linked to their reputation as regulators. The regulated industry can affect their reputation by making direct complaints to legislators about their performance shortcomings (Mitnick, 2008, p. 1197). This type of relational governance works on the flow of incentives between the three corners of the iron triangle.

The general target of any capturing entity is to install biased governance in place of a neutral governance. There are many methods to achieve this objective, including the usage of incentives to change the favors of the existing regulatory officials, using power to substitute unbiased managers with biased ones, changing the locations of regulators so that they are unable to detect regulatory violations, draining the human resources of an agency through forcing out regulators with technical expertise, and by shifting the control of regulation to other governments that lack enforcement capabilities due to their political sensitivities.

Better employment prospects for any regulatory agency official can act as a catalyst for the capture of that agency. The regulated industry has an interest in human resources with in-depth knowledge of the industry and the right connections with influential persons in the legislature and allied bureaucracy. This need for regulatory

capital leads to the development of a “revolving door,” where regulated industries hire regulators with good reputes to help them deal with the regulatory process. The incentives of lucrative employment opportunities for regulatory officials in the regulated industry can produce leniency in the regulations or utilities pricing procedures. Law and Long (2012) found that laws designed to curb this phenomenon through post government employment restrictions in various U. S. states did not reduce residential or commercial electricity prices, but did reduce industrial electricity prices for a short period of time, indicating that such laws can only temporarily slow down the process of regulatory capture (p. 434). Dal Bo (2006) also found that those commissioners appointed to the FCC that had a broadcasting industry background voted in favor of the industry on several occasions, illustrating how the revolving door works (p. 217). The revolving door is not limited to agency officials joining the regulated industry, but also includes congressional staffers being appointed as commissioners as a favor for their services to legislators.

Functional Capture

Regulators require information about industrial processes to perform their regulatory decision making. The regulated industry is considered to be the best source of that information. However, the industry has a tendency to filter the amount and quality of information reaching the regulator in accordance with their interests. The regulatory process can become captured if the information quality and interpretation is determined by the providers of the information, especially in regulatory determinations (Croley, 2011).

Excessive information can be fed in the disguise of transparency, making pluralistic participation difficult for smaller interest groups with fewer resources. Time-consuming and costly regulatory processes (ie., hearings, briefings, public notice periods, etc.) create impediments for marginalized interest groups, while protecting the interests of incumbent firms already relishing the benefits of regulation. Purely legal systems may have the necessary safeguards against this “filter failure.” but administrative rule-making often lacks such mechanisms. Such a system that can place the deciding authority at the mercy of an unstoppable flow of information from an unopposed group, which also has the capability to strengthen its submissions by a litigation threat, is said to be captured by information (Mills & Koliba, 2014)

The magnitude of regulatory capture increases with the degree of complexity and technicality involved in the information, as it can overwhelm an under resourced agency. One such example is that of the Minerals Management Service (MMS) in the wake of the Deepwater Horizon disaster. The agency was facing difficulties due to the complexities of deep-water drilling operations, as well as a lack of resources dedicated towards training and inspection functions (Wagner, 2010, p. 11). Drilling companies were involved in unsafe cost-cutting techniques, which could have been curbed if the MMS had inducted safety experts capable of making the required risk analysis. Overall, this informational disadvantage suffered by the agency allowed the regulated industry to proceed with their unsafe practices, leading to the catastrophic disaster. One of the methods that can be employed by regulatory agencies to reduce this informational disadvantage is the use of an incident reporting system where industry employees can

report regulatory violations in return for immunity and confidentiality (Wagner, 2010, p. 17).

Regulatory agencies benefit from the perceptions of their superior expertise in dealing with the complex technical affairs of the industries under their regulation. One of the basic motives behind the creation of regulatory bodies is that they will consist of permanent staff with expertise regarding the regulated industry that is missing in the legislature or judiciary, and that the regulatory body will enjoy public support due to this perceived strength. Such competency myths become mandatory for agencies working in resource-constrained environments, or in scenarios where multiple agencies regulate multiple aspects of an industry's behavior. The hype surrounding the effectiveness of agencies helps to improve industry compliance, especially when credence goods are involved, for which customers lack the skills to assess their true utility. Carpenter (2013) argued that the Federal Drug Authority in the United States, which is mainly tasked with regulating the pharmaceutical industry, has thrived based on its superior reputation over time and has been able to accumulate power due to this quality.

Individual Capture

Regulators working in different agencies have individualistic goals regarding their profession, apart from the usual objectives of their agencies. Such tendencies make these organizations a collection of unitary actors who act in a rational manner. Such individualistic aspirations are similar to those of legislators who intend to get reelected. Common assumptions about regulators include a hassle-free managerial life and lucrative employment opportunities once they leave the agency. Representatives of the regulated

industry try to incentivize agency officials to protect the interests of their industry.

Influencers from the industry are assumed to be “perfect agents,” while regulators are not (Mitnick, 2011, p. 42).

The outcome of this individualistic incentive model is the iron triangle, in which the interests of industries, regulators, and legislators are affiliated. Legislators need votes and money to get reelected. Regulated industries help them with campaign funds. In return, legislators serving on oversight committees facilitate the industry’s agenda. Legislators have an influence over regulators, as they have budgetary controls and can expose flaws in their management. Therefore, regulators are careful to cater to the preferences of legislators, or else they end up facing costly interventions that can hamper their individual and collective prospects.

To regulate industries, regulators are in need of information about the industry. Regulators prefer to interact with industry officials to get the information they require for their own working, as most of the time it is costly to extract information by means other than from the industry itself. The industry is aware that having good relations with the regulators will help them during regulatory monitoring and evaluations. Reed (2009) argued that banks with less conflict with regulators, and a greater investment in the relationship with regulators, receive better evaluations (p. 171). Such banks with less negative attention from the regulators are able to invest their resources into other areas, helping them to improve their customer reputation in the market. Regulators start learning ways in which their regulatory capital can help them in the future, such as

working for the industry and dealing with the regulatory process themselves. This situation produces regulatory capture due to the circulation of individual incentives.

Capture is further enhanced when a small set of regulators interacts with only a few firms in an industry, have been trained by the same industry, have fewer prospects of job promotion in their agencies, or are compensated poorly. Three types of patterns emerge from this individualistic analysis of regulatory capture. First, the regulators can be offered monetary incentives in the form of bribes. The second scenario involves a group of regulators facing resource constraints, short deadlines, and complex tasks; they are forced to maintain close relationships with industry personnel with whom they must meet to streamline regulatory processes, which leads to a reduction in the stringency of the regulatory enforcement. The third scenario revolves around the difficulties faced by regulators trained in the same industry having trouble extracting credible competing information about the industry. With the passage of time, all three scenarios lead to a situation in which the behaviors and attitudes of regulators become indistinguishable from the regulated industry individuals. Overall, the result is regulatory capture (Mitnick, 2011, p. 42).

Constitutional Capture

Regulatory capture can emerge due to certain systemic biases, resulting in outcomes mainly due to biased laws, legislative actions, or other faulty regulations that produce benefits for interest groups at the expense of others. This effect complements the systemic capture or imbalanced affective access politics aspect where different interest groups have varying degrees of power to affect the regulatory process. The concept of

state capture also refers to the capturing of “rules of the games,” which were discussed under the chronical effects producing regulatory capture in post-Communist European states.

Several researchers have studied the relationship between corruption and regulatory governance. Most of them focus on the conventional form of corruption, involving bribes being paid by private entities to public servants in order to fulfill the interests of their firms (Kauffman, 2004, p. 90). The public sector is not the only shaper of the investment outlook of a country. There is a complicated framework of reciprocation between the corporate and public sectors during the policy-making process, whereby influential regulated industrial sectors exert pressure to shape legislation, rules, and public policy forming the rules of the game and the business environment within which those sectors operate (Kauffman, 2005, p. 88). There is increasing focus on acts of corruption that may be legal in some countries, but are causing regulatory capture. Such acts stem from unbalanced playing fields, where laws and institutions have been shaped in a manner to protect vested interests.

An example of such legal provisions that lead to corruption is the exploitation of legal loopholes to engage in political funding. Such funding can produce influence on policy-shaping institutions and regulatory agencies, helping the interests of contributing private bodies at the cost of larger public interests. Another example of such legal corruption is the favoritism observed during the procurement process conducted by the public or private sectors, in which there may be no involvement of illegal bribery but the

procurement rules lack transparency, and the level playing field may be absent (Kauffman, 2004, p. 90).

The World Trade Organization

The WTO is an international institution that seeks to regulate trade and liberalize various sectors of a country's economy to facilitate easy trade between countries. It was created on February 15th, 1997, by 69 nations during the Uruguay Round of the General Agreement on Tariffs and Trade (GATT) negotiations (WTO, 2014). The GATT was not as far-reaching or encompassing as the WTO, because it excluded trade in services, intellectual property, and technology. As part of the services agreement, telecommunications were among the first sectors to be regulated under the WTO guidelines. In addition to regulating trade, the WTO settles disputes between countries, monitors rules governing trade, and also facilitates capacity-building for less-developed countries (WTO, 2014).

Countries that committed to the WTO had to agree to the "Reference Paper," which formed the guiding principles and definitions for the regulatory framework of the telecommunications sector. The countries had to guarantee interconnection between each other (i.e., the physical or logical linking of networks), employ anticompetitive precautions, and set up independent regulators (WTO, 2014). The WTO intentionally left out the definition of an independent regulator. The WTO's only requirement concerning the regulator was that it should not be involved in the business of telecommunications (WTO, 2014). Historically, few governments of developing countries had any interest in telecommunications, except for the pricing of local services, and these governments

never linked this to any form of trade. The first telecommunications companies in the English-speaking Caribbean developing countries were self-regulated; they determined the quality of services they offered, allocated and licensed the radio frequency spectrum, and determined the prices for international services. However, with the respective governments complying with the WTO agreements, the companies now had to be subjected to government oversight.

The WTO (2014) discovered that its developing country members had difficulties adhering to the WTO guidelines due to a lack of resources, including finances and qualified personnel (WTO, 2014). The WTO allowed special provisions and exceptions to these developing countries (e.g., longer time periods to implement agreements and commitments) and offered technical assistance from the WTO itself. Jawara and Kwa stated “developing countries were bullied and coerced into complying with agreements that most of them strongly disagreed with,” and that the benefits resulting from complying with the WTO’s guidelines were not felt by the developing countries (as cited in Staiger, 2009, pp. 2-3). Staiger (2009) concluded that the WTO was not equipped to handle small developing countries’ problems. Additionally, as Sampson and Chambers (2008) explained, after compliance, the only benefits arising from the free-trade that the developing countries could enjoy was in the long-term. In the short-term, however, the costs of structural adjustments and a loss of trade preferences were high; therefore, the developing countries required additional financial help, but the WTO could not provide them with monetary assistance (Sampson & Chambers, 2008).

Small Island Developing States and the World Trade Organization

Although the WTO was created with the objective of ensuring that all countries participate on one level, the problems faced by developing countries, such as those in the SIDS regions, concerning issues with trade agreements were difficult. Small economies faced challenges meeting their trade obligations because of their “lack of economies of scale, limited resources and high transport costs” (WTO, 2014, p. 1). Although there is still no single definition of SIDS, scholars associate the word small in SIDS with population size, the size of the country, and its economic activity as defined by the GDP. According to Read (2001), the idea of small continues to evolve in the literature, ranging from 10 to 15 million people; although, in the 1970s, the World Bank adopted 1 million as the upper end of small (Read, 2001). According to the World Bank (2013), small states share some distinct characteristics; among them are limited access to capital and income volatility. Also, from the perspective of the ECLAC (2000), the Caribbean SIDS, in particular, were vulnerable due to certain socioeconomic and natural characteristics, identified as follows:

- Environmental/ecological vulnerability, particularly high exposure to natural, climatic catastrophes
- Limited land resources and difficulties with waste disposal management
- Geographic remoteness and isolation
- Limited diversification and open economies
- Weak institutional capacities and high costs of basic infrastructure
- Special social vulnerabilities. (para. 5)

For this study, although not every one of these descriptors may be applicable, they were a reminder of the challenges facing SIDS. These vulnerabilities are not unique to SIDS; however, developing countries in general experience the same issues to varying degrees (ECLAC, 2000).

Another difficulty SIDS face is the problem of good governance. Duncan and Chand stated that when educated persons control all aspects of the economy, ranging from the judiciary, to the police, the army and the senior bureaucracy, and are related through family ties or have gone to the same schools, then the idea of having checks and balances becomes difficult to implement (as cited in Ofa, 2012, p. 15). However, in spite of the challenges SIDS face, they can still prosper. As Ofa (2012) and Moreira and Mendoza (2007) explained, SIDS are not different from larger, more developed countries in their need for economic growth; therefore, they should be treated similarly to the larger countries. Although there are similarities with larger, developed countries with regards to growth, Ofa and the WTO (2013) concluded that SIDS must be treated in a special way regarding their policy reform processes.

Telecommunications Reform

Several factors drive telecommunications reform, also referred to as telecommunications liberalization. Chief among these are technological innovations, both in wireless and new data transmission techniques. With the onset of the Modified Final Judgment that went into effect in 1984, a U.S. court ordered telecommunications giant AT&T to break up into smaller entities. This breakup showed that the provision of telecommunications services no longer had to be within the domain of a single integrated

monopoly. Britain soon adopted this model; thereafter, regulators all over the world accepted the idea that competition in the telecommunications sector resulted in the provision of better quality services to customers, more investment, and more innovations (Intven et al., 2000). These reforms in the telecommunications sector led to more investment, which then led to both an improvement in the quality of the services offered and a lowering of the prices charged (Armstrong & Sappington, 2006; Wallsten, 2001).

The key areas of telecommunications reform were privatization, the creation of an independent regulator, and competition (Li & Xu, 2004; Ofa, 2012; Wallsten, 2001, 2002; Ros, 1997). Although it might be too early to tell whether the telecommunications reform within the Caribbean has been beneficial, there is evidence to suggest that the process has not achieved the levels of efficiencies, even within the European Union (Flacher, Jennequin & Ugur, 2009, Conclusion, para. 1). Flacher et al. (2009) suggested that the process of reform has largely ignored the “complex set of issues such as imperfect competition, imperfect information, and consequences that are likely to limit or prevent the achievement of efficiency and welfare gains” (p. 1). Telecommunications reform did not deal with the issues Flacher et al. discussed, and these issues are more prominent in smaller countries that do not have the economies of scale compared to larger, more developed countries.

The number of independent telecommunications regulators in the world has grown. Wu (2004) analyzed the World Telecommunications Development Report and found that there were 13 independent regulators in 1990 (p. 4). However, in 2004, there were more than 100 established independent regulators, in order to meet obligations to

the WTO (Wu, 2004). Many researchers agree that independent regulators are necessary in order for countries to provide a degree of certainty to the sector (Levy & Spiller, 1994; Stern & Trillas, 2002; Wallsten, 2003). However, the literature only deals with regulators for large countries with large populations. For example, Brown, Stern, Tenenbaum, and Gencer (2006) stated that the primary reason a country should implement and justify economic regulation is if the regulation in question produces better sector outcomes. The country must perform better after implementing the regulatory reforms (Brown et al., 2006). Good regulatory systems encourage economic growth (Jalilian, Kirkpatrick, Parker, & Centre on Regulation and Competition, 2006). Eberhard (2007) indicated that part of the telecommunications reform process involves the establishment of independent regulators. However, Eberhard also added that “mantras tend to substitute thinking – and may not always fit all settings” (p. 4). Eberhard stated that the best outcome for a proper regulatory framework is dependent on a country’s ability to commit the necessary institutional resources to it, and “to select from a menu of regulatory options to create hybrid models that best fit its own circumstances and challenges” (p. 1). In addition, Eberhard stated that “designing and implementing legitimate, competent regulatory institutions in developing countries will always be a dynamic challenge” (p. 1). Developing countries will continue to create these regulatory institutions, with varying degrees of independence, in order to meet their WTO obligations.

Telecommunications Reform in the Caribbean

Caribbean states have witnessed liberalization and competition growth in the telecommunications sector since the year 2000. Prior to the opening up of this sector to

new entrants, it was dominated by monopolizing companies that pitched their services to the elites instead of the mass market (Galperin & Mariscal, 2007). Cable & Wireless (C&W), a company operating within the British colonial framework, had exclusive rights under the Caribbean constitutional arrangement to provide telecommunication services across the majority of British Caribbean countries. National governments in those days did not have the technical expertise to contest the requests forwarded by C&W, and the perception developed that they rubber-stamped every proposal extended by the company's management (Favaro & Winter, 2008). The telecommunications operators regulated themselves, with a modicum of national government involvement.

Formation of Eastern Caribbean Telecommunications Authority

In addition to the pressure from the WTO, two events contributed towards the formation of a regional regulatory body in the form of the ECTEL. Marpin Telecommunications, getting the license to provide Internet services in Dominica, was the first one. In the beginning, Marpin provided its Internet services through leased lines acquired by C&W, but, in 1998, Marpin acquired an international gateway that bypassed C&W's network. This caused resentment within the C&W management, and they decided to challenge Marpin's move, citing their exclusive control over telecommunication resources, outlined by the Dominican law. After receiving several rulings in the lower judiciary, the case finally reached the highest court for all the East Caribbean nations (i.e., the Privy Council of the United Kingdom). The council ruled in favor of Marpin Telecommunications, stipulating that C&W's monopoly was against the constitutional rights of the citizens (Abraham, 2010).

The second event that led to the regional unity required for the formation of a strong regional regulator was the confrontation between the St. Lucian government and C&W, in the year 2000. C&W made threats to withdraw to the St. Lucian government. This resulted in a common regional reaction against the C&W management. The governments of Grenada, St. Vincent and the Grenadines, Dominica, and St. Kitts and Nevis stated that if C&W left St. Lucia, then the company would be forced to leave their territories as well.

The Organization of Eastern Caribbean States (OECS) played a role in the formation of ECTEL. OECS's joint program with the World Bank, called the OECS Telecommunications Reform Project, helped pave the way for the creation of a regional regulator that would allow the liberalization of the overall telecommunications sector. ECTEL was created in May 2000, and it opened its headquarters in St. Lucia in 2002. It encompasses five members of the OECS, and it has become the world's first multilateral telecom regulator (Plaidy et al., 2003). Each member state formulated the National Telecommunications Regulatory Commissions (NTRCs) by enacting the Telecommunication Acts. These NTRCs operate at national level, while ECTEL works at the regional level (Minges, Cross, & Gray, 2004).

There are several benefits to having a multinational regulatory agency such as the ECTEL: Martin and Sohail (2005) stated, that it allows the development of a regulatory approach that can address "cross-cutting technical issues," along with the provision of "high-level technical expertise common to all the member states" (p. 63). Greater investor confidence in the stability and objectivity of regulatory bodies will generate

more private investment. Despite several advantages of regional cooperation, there is a range of potential hurdles that can impede the integration process. These hurdles exist at the regional and national levels, and they include deteriorating political will, changes in integration strategies, technical lacunas, and national rivalries. Often, the integration process is undermined, as national interests start taking precedence over regional ones. This is especially true if member states are at varying levels of development and feel obstructed by the requirements of fewer countries (Lewis, 2000).

The Eastern Caribbean Telecommunications Authority's role is divided between the activities that it performs itself and the guidance it provides to contracting states. It is responsible for several different tasks, such as developing and maintaining an integrated radio plan, reviewing applications for licenses, designing and operating tender procedures for individual licenses, and coordinating with other organizations (Tremolet, Shukla, & Venton, 2004). Still, the bulk of its work is to provide guidance to contracting states related to technical standards, policy, and licensing issues (Tremolet, 2007). Overall, since ECTEL's establishment, there has been a growth in competition in the mobile and fixed-line markets, which has led to lowered prices and increased investment.

Jamaican Telecom Regulation and the Office of Utilities Regulation

The OUR was established by the Office of Utilities Regulation Act, issued by the Jamaican government in order to regulate all major utilities in a collective manner. These utilities include telecommunications, electricity, water/sewerage, and transportation. Before that, C&W's monopoly remained entrenched within Jamaican territory, especially in respect of the wired networks. There was a backlog of nearly 217,000 requests for

fixed-line telephone connections that C&W could not fulfill during the late 1990s. Internet service providers started offering phone calls over the Internet, which challenged C&W's monopoly. Initially, C&W went into legal battle with the Jamaican government, but subsequently agreed to an out-of-court settlement. This agreement allowed the Jamaican government to promulgate the Telecommunication Act of 2000, replacing the 1893 Act (Roberts-Brown & Golding, 2013).

The Telecommunication Act of 2000 was instigated due to the WTO's international pressure, as the Jamaican government is a signatory to the WTO and is bound by its decisions (Hillman & Braithwaite, 2004). This act helped to end C&W's monopoly in the telecommunications sector, which stretched over decades. The Telecommunication Act of 2000 stipulated that entities in the telecommunications sector can be held accountable by the OUR to improve overall efficiency and service delivery. The enactment of the Fair Competition Act (FCA) in 1993 also helped with the liberalization of the telecommunications sector. The FCA protects the interests of the general public, through provisions directed against monopolistic tactics employed by the utilities and other companies. These highly anticompetitive practices include price-fixing, collusive tendering, and bid-rigging, all of which are harmful to the public interest (Hillman & Braithwaite, 2004). Jamaica adopted a multisector approach for regulating utilities through a single regulator. This approach is less costly compared with the approach of having a regulator for every utility sector. All the technical and administrative resources of the OUR are pooled, leading to cost reductions.

In the initial years of regulation, the single-sector approach may be more helpful in developing that regulator's sector, but it can lead to regulatory capture due to increased interaction with the regulated industry. Jamaica's multisector approach helps in this regard, as it checks misappropriations through closer scrutiny, reducing the chances of partial treatment.

Caribbean Countries without Reform

Despite the numerous reforms that have taken place throughout various islands, including the territories that are still controlled by the British, there are still a few island countries that have made no changes towards telecommunications reform or their regulatory frameworks. In Antigua and Barbuda, where the public utilities (water, electricity, and telecommunications) are still controlled by the government (APUA, 2017), it has been challenging for them to introduce any kind of independent telecommunications regulator. It has almost become an annual routine for the various ministers of government to indicate that a change will occur, but, as of this writing, it is still outstanding (*Daily Observer*, 2014). It must be noted that Antigua and Barbuda introduced competition in the telecommunications sector via wireless, but the country has not introduced a new framework to govern the sector.

The other country that, up until 2013, had not introduced an independent telecommunications regulator was Bermuda (Bermuda Regulatory Authority, 2017). Although it started the reform process back in 1986, the government still had direct oversight of the telecommunications sector. However, like Antigua and Barbuda, it had introduced competition in the sector, but delineated between the differing portions of

telecommunications services. Although there could be Internet Service Providers (ISP), they could not provide their own link to the home. A consumer in Bermuda would get two distinct bills: one from the ISP and the other from the company that provided the link between the consumer and the ISP.

Summary

Capture theory is used to explain the development, creation, and effectiveness of the telecommunications regulatory institutions or framework. In developing countries, a breakthrough in telecommunications is an opportunity for economic improvement. Social and cultural impacts brought about by telecommunications services are being felt. However, these advances can be threatened by the impact of regulatory capture (Stirton & Lodge, 2002). Regulatory capture, if it occurs, can have a negative impact on the telecoms sector. As Baudrier (2001) stated, capture of the regulator can occur due to “poor bureaucratic norms and incentives, lack or asymmetry of information” (p. 6). Galal and Nauriyal (1995) argued that regulatory regimes and the telecoms sector go hand in hand. Galal and Nauriyal posited that the telephone service provider’s performance is dependent on the credibility of the government, which in turn is dependent on certain safeguards that include an independent regulator.

Regulatory capture theory also adds to the understanding of reforms in telecommunications institutions. Richter (2015) asserted that regulatory capture undermines public sector reforms, resulting in instability and mistrust by the public. Corruption has been cited as one of the reasons why the economic capture of a country’s regulatory agencies occurs. However, capture does not necessarily mean corruption

(Schacklock & Galtung, 2016). One example of capture can be seen in the case when Guyana's Public Utilities Commission failed to grant the incumbent operator any rate increases, even after 14 years, in spite of the obligation pursuant to the license of the incumbent (Guyana Public Utilities Commission, 2015). However, the general elections of the country were held at the same time. The Public Utilities Commission preferred to lose credibility, rather than to embarrass the administration and have it be one of the causes for them losing the election. The Commission later revised its position without any further evidence and at the same incumbent's request (Guyana Public Utilities Commission, 2017).

Scholars have advocated for the creation and development of independent regulatory reforms throughout the English-speaking Caribbean countries. There are several factors that affect how scholars view regulation. These factors are not only explained by using theoretical models, but also through the study of historical evolutionary processes.

Because the majority of the island states are former colonies of Great Britain, they have a tendency to mimic their former colonial master. Despite this tendency, there are unique natural geographic and socioeconomic features that set them apart from each other. Because the island states predominantly depended on agriculture, they were slow to recognize the impact of ICTs and to adopt any telecommunications reform processes. Therefore, moving from a monopoly-based telecommunications environment to a competitive one required the external influence of the WTO. Although these countries adopted WTO principles, they did this not to enhance their ICT sectors, but to increase

and protect their own agricultural outputs, because the WTO could not protect their other trade interests if they did not open up their telecommunications markets.

Once the English-speaking Island states of the Caribbean realized the benefits that could be gained from implementing the WTO principles, many did so, because they had already begun the reform process, starting with privatization. Soon after the Caribbean countries began developing independent regulatory agencies, the WTO recognized that both developing countries and SIDS needed special considerations regarding the implementation of its rules. While some of these countries forged ahead with setting up independent regulatory agencies, others slowed the process down or simply failed to set them up, and instead chose to follow the WTO guidelines by ensuring the regulatory entity was separated from the telecommunications sector by creating distinct, unrelated regulatory ministries. As identified by Jordana, Levi-Faur, and Marin (2011), regulatory agencies have grown and developed through an “global diffusion” process by changes that have occurred in the bureaucracies, policy-making, and the roles of the state, resulting in changes that are yet to be completely understood (Jordana et al., 2011, p. 19).

In the Eastern Caribbean (i.e., Dominica, Grenada, St. Kitts and Nevis, St. Lucia, and St. Vincent and the Grenadines), countries created the ECTEL treaty (2013). This is a regulator similar to their Eastern Caribbean Central Bank. At the same time, they also created a local regulator, the NTRC. The only country in the Eastern Caribbean that did not sign the treaty and still remained a member of the Eastern Caribbean Central Bank was Antigua and Barbuda. The only other country that did not create an independent regulator at the time others in the region did so was Bermuda, but it did so in 2012

(Bermuda Regulatory Authority, 2014). All the other Caribbean countries created single, impartial, independent regulators.

A country's decision to adopt a new telecommunications regulatory policy reform or framework is based on several factors. Developing a telecommunications regulatory policy is difficult, because social and cultural norms come into play, combined with political will. In addition, what other countries are doing is important, and so too are the wishes of the public (Berry & Berry, 1999). Developing states are under the influence of the larger, more developed countries, because they have a stronghold on agencies such as the WTO. SIDS, such as those of the English-speaking Caribbean, have difficulty following these agencies' policies. Countries that make up SIDS have not had a choice with regards to independent telecommunications regulation; they have been forced to adopt a regulatory model created by others. However, the regulatory theory discussed in this literature also helps to explain telecommunications reforms and the speed with which they are implemented.

In Chapter 3, I discuss the study variables and the choice of quantitative methodology.

Chapter 3: Research Method

Introduction

The purpose of this study was to discover the impact that the creation of independent telecommunications regulators has on SIDS of the Caribbean. Scholars have focused on the importance of regulators in general, but have not focused on regulators in SIDS. As Ofa (2012) explained, the telecommunications reform of the small developing island countries gained credibility once the countries signed on to the WTO, which mandated the inclusion of independent regulators in the sector as part of telecommunications reform (p. 23).

Wallsten (2002) found that telecommunications reform that included competition and independent regulatory bodies had the greatest economic benefits to a country, even more so than privatization and regulation (p. 6). Additionally, Galal and Nauriyal (1995), Hoffman (2008), and Mohamad (2014) found that in some countries, telecommunications reform was implemented, but in others, it failed. Scholars recognized that SIDS do not necessarily need the same factors in place to have the same kind of economic growth that the larger countries do. Researchers have not studied SIDS as they pertain to telecommunications regulatory reform, and research on telecommunications regulatory reform does not distinguish between larger states and SIDS. Dhafer (2011) stated, telecommunications regulatory frameworks in large states do not take the economic characteristics of small states under consideration, which resulted in problems with regard to market structure and competition and a higher cost of implementing regulations compared to their benefits. (p. 2).

Additionally, Dhaher pointed out that both “lack of experience” and “weak institutional experience” had an adverse effect on any reform (p. 2).

Technology is a determinant of growth. New technologies reduce the prices of goods and services to which they are applied. They also lead to the creation of new products. Consumers benefit from these improvements, regardless of whether they live in rich or poor countries (Rodrik, 2018). Competition along with leapfrogging technologies like mobile telephony, local wireless loops, and mobile banking all have potential impact on economic development. The ability to access and adapt technologies enables social inclusion for the poor to escape the economic stratification in lesser developed countries (Warschuer, 2004, p. 8).

In order to answer the overarching question regarding the impact of independent telecommunications regulatory bodies, I asked the following questions:

1. How are telecommunications infrastructure in fixed line services affected by regulatory regime, population, telecommunications investment, competition in the telecoms sector, GDP/income per capita and telephone tariffs?

H_0 1: The independent variables of regulatory regime, population, telecommunications investment, GDP/income per capita, competition in the telecoms sector, and telephone tariffs do not have any effect on the dependent variable fixed line services.

H_1 1: The independent variables of regulatory regime, population, telecommunications investment, GDP/income per capita, competition in the telecoms sector, and telephone tariffs do affect the dependent variable fixed line services.

2. How are telecommunications infrastructure in cellular services affected by the regulatory regime, population, telecommunications investment, competition in the telecoms sector, GDP/income per capita and telephone tariffs?

H₀₂: The independent variables of regulatory regime, population, telecommunications investment, GDP/income per capita, competition in the telecoms sector, and telephone tariffs do not have any effect on the dependent variable cellular services.

H₁₂: The independent variables of regulatory regime, population, telecommunications investment, GDP/income per capita, competition in the telecoms sector, and telephone tariffs do affect the dependent variable cellular services.

3. How are telecommunications infrastructure in universal services (i.e., fixed lines and cellular services) affected by the regulatory regime, population, telecommunications investment, competition in the telecoms sector, GDP/income per capita and telephone tariffs?

H₀₃: The independent of regulatory regime, population, telecommunications investment, GDP/income per capita, competition in the telecoms sector, and telephone tariffs do not have any effect on the dependent variable universal services.

H₁₃: The independent of regulatory regime, population, telecommunications investment, GDP/income per capita, competition in the telecoms sector, and telephone tariffs do affect the dependent variable universal services.

4. What is the relationship between prices in the telecoms sector (telephone tariffs) and the regulatory regime, population, telecommunications investment, competition in the telecoms sector, GDP/income per capita?

H₀₄: Independent variables of the regulatory regime, population, telecommunications investment, GDP/income per capita, and competition in the telecoms sector do not have any effect on the dependent variable prices.

H₁₄: Independent variables of the regulatory regime, population, telecommunications investment, GDP/income per capita, and competition in the telecoms sector do affect the dependent variable prices.

5. What is the relationship between telecoms investment and the regulatory regime, population, telecommunications prices, competition in the telecoms sector, and GDP/income per capita?

H₀₅: The independent variables of the regulatory regime, population, telecommunications investment, GDP/income per capita, and competition in the telecoms sector do not have any effect on the dependent variable telecoms investment.

H₁₅: The independent variables of the regulatory regime, population, telecommunications investment, GDP/income per capita, and competition in the telecoms sector does affect the dependent variable telecoms investment.

6. What is the relationship between broadband usage and the regulatory regime, population, telecommunications prices, competition in the telecoms sector, and GDP/income per capita?

H₀₆: The independent variables of the regulatory regime, population, telecommunications investment, GDP/income per capita, and competition in the telecoms sector do not have any effect on the dependent variable broadband usage.

H₁₆: The independent variables of the regulatory regime, population, telecommunications investment, GDP/income per capita, and competition in the telecoms sector do affect the dependent variable broadband usage.

7. What is the relationship between competition in telecoms sector and regulatory regime, population, telecommunication prices, and GDP/income per capita?

H₀₇: No relationship exists between independent variables of regulatory regime population, telecommunication prices, and GDP/income per capita.

H₁₇: No relationship exists between independent variables of regulatory regime population, telecommunication prices, and GDP/income per capita.

Research Design

Scholars define the term independence in several ways; I, however, examined purely statutory independence that is defined as “the operational separation of the regulator from the government and from those it regulates” (Mohammed & Strobl, 2010, p. 96). This definition is accepted throughout the telecommunications industry.

The WTO Agreement on Basic Telecommunications defined an independent regulator as an entity that is separate only from the incumbent operator. However, according to Nikolinakos (2006), the European Open Network Provision Framework Directive has a different definition. Independence is to “create seamless interoperability of services between interconnected networks” (Nikolinakos, 2006, p. 50). The European

Open Network informed its member states that, in retained ownership in telecommunications services or networks, there must be a structural separation between the entities providing such services and the national regulatory authority (Kirkham & Swaminathan, 1996). Throughout the English-speaking Caribbean, whenever governments use the term independent telecommunications regulator, they are referring to a corporate body established through legislative process; therefore, the corporate body fits both the WTO and the European Union recommendations.

In this study, I measured the impact of independent and nonindependent regulators, tariffs, universal services, broadband usage, GDP per capita, and telecoms investment and competition on various aspects of the telecommunications sector. The hypothesis was that countries that do introduce an independent regulator and competition into the telecommunications sector have performed better in terms of infrastructure deployment (i.e., universal services), telecoms tariffs, and telecoms investment. Figure 1 shows how a country decides on a regulatory framework and its subsequent impact.

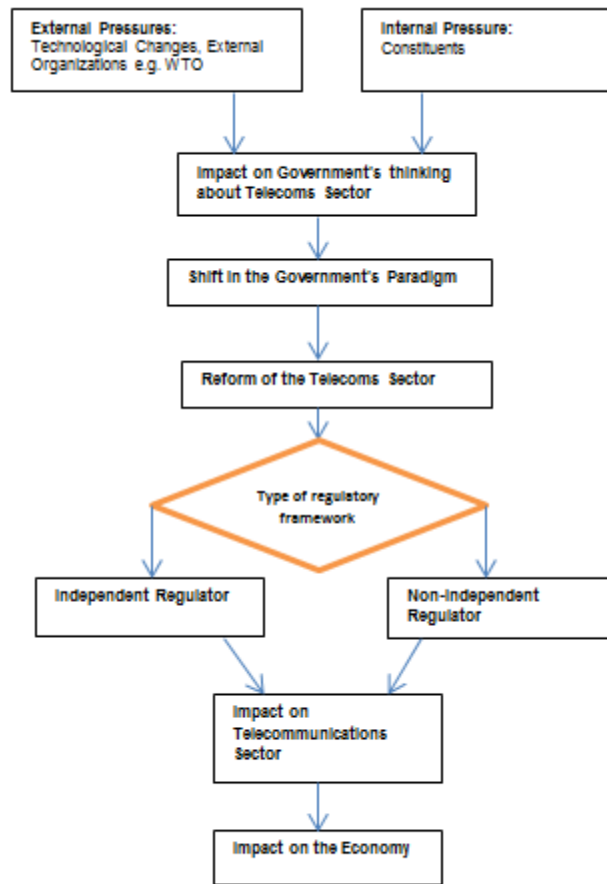


Figure 1. A diagram of how countries choose a regulatory framework and the framework's subsequent impact.

Governments adopt certain policies because states have a tendency to follow each other, especially when they are ideologically similar (Grossback, Nicholson-Crotty, & Peterson, 2004). However, the adoption of a policy is also based on the pressures the government faces at any given time. Whether an English-speaking Caribbean country adopts a particular telecommunications regulatory framework is determined by several factors, including what its neighboring countries are doing and the perceived internal and external pressures that it may be facing. The country has to decide whether it will establish an independent or nonindependent regulator, which has implications on the telecommunications sector and the economy. I employed a quantitative, experimental design. This design was appropriate because of the research questions, essentially testing the importance of the independent regulator and its impact on the telecommunications sector as described by the telecommunications infrastructure (fixed and cellular services), telecoms investment, and so forth.

Methodology

The methodological approach primarily included a cross-sectional, time-series analysis to compare the countries that operate under differing regulatory frameworks. This design was appropriate because as Sayrs (1989) suggested, “pooling is useful...when length of the time series is abbreviated and/or the sample of cross-sections is modest in size” (p. 7). The purpose of this approach was to measure the effects that independent regulatory institutions, as previously defined, have on the telecommunications sector in small English-speaking Caribbean countries and to attribute any changes to the type of regulatory system in place. The sample of countries is small,

yet encompasses all of the countries in the English-speaking Caribbean. These countries are dissimilar with respect to factors such as their GDP or their income per capita and their telecommunications sector.

The specification of the model for my econometric analysis is from the theory described in Chapter 2.

Dependent variable = $b_0 + b_1 * \text{Independent regulator} + b_2 * \text{Competition} + b_3 * \text{other country effects} + \text{error}$

Equation 1

In these equations, independent variables were tariffs, investments, and so forth.

There were three models to test the hypothesis of an independent regulator being a necessary factor in telecoms infrastructure deployment (dependent variable). The first model was where the telephones in services would be fixed lines in services. This has been the standard model. However, the second model included only cellular service, and the third model was a composite variable (i.e., the sum of cellular and fixed lines services).

$\text{Log (Telephones in service)}_{it} = b_0 \text{ constant} + b_1 \log (\text{population})_{it} + b_2 (\text{regulatory regime})_{it} + b_3 \log (\text{tariffs})_{it} + b_4 \log (\text{telecoms investment})_{it} + b_5 \log (\text{income per capita})_{it} + b_6 (\text{competition})_{it} + \varepsilon$

Equation 2

The composite variable represented the level of telecommunications penetration or the accessibility of telephones throughout the countries. It was the sum of the fixed telephones in service and the amount of cellular subscribers.

The next variable was the regulatory variable, which was a binary regressor. This measured whether there was an independent regulator in the country or whether the regulator is a part of a ministry (nonindependent). Generally, this measure indicated that a greater level of penetration occurs with an independent regulator; hence, the coefficient of the sign will be positive.

The tariff variable was one of the average prices for service relative to the other countries. Although it may be difficult to create a single index, the ITU has created an ICT price basket that I used as a proxy to develop this tariff variable. The ICT price basket includes both fixed and mobile telephone and fixed broadband service (ICT Data & Statistical Division, 2012). I expected that the coefficient of this variable will be positively related to growth in the sector.

The other critical variable was the telecommunications regulator, which was independent of any ministerial portfolio of the government. In the Caribbean, prior to the creation of the regulator, the ministry had general oversight of the industry, and a permanent secretary within the ministry oversaw operations while the minister generally oversaw policies or critical and politically sensitive matters such as tariffs. Also, in the Caribbean, there was no differentiation between functional or statutory independence because such independence was already established via statute or legislative fiat for all the countries that created a regulator. Although it may be possible to create degrees of independence of countries based on some qualitative factors, doing so would result in an arguable and controversial scale. Therefore, I made independence one-dimensional in order to ensure a total capture of the nature of this variable. In using this approach, more

refined issues of the regulatory design were not be captured (ie., a single regulator as opposed to a commission of regulators could impact the telecommunications sector differently). However, the variable was independence as defined by statute or nonindependence, meaning it resides solely within the responsible ministry of the government.

Another binary variable had to be introduced for the country of Monserrat because of a volcano that destroyed half the island in 1995, and from which it has never fully recovered.

The final variable, competition, was also another binary variable. This measurement indicated when competition in the telecommunications sector was introduced into the respective country.

There were also four other models that were employed to test the significance of the independent regulator (IR); these were also be cross-sectional pooled time series model. The models were as follows:

The first tested if prices (tariffs) in the telecoms sector are affected by IR from theory.

Equation 3

$$\text{Log (prices in the telecoms sector)}_{it} = b_0 \text{ constant} + b_1 \text{ log (population)}_{it} + b_2 \text{ (regulatory regime)}_{it} + b_3 \text{ log (infrastructure deployment i.e. composite variable)}_{it} + b_4 \text{ log (telecoms investment)}_{it} + b_5 \text{ log (income per capita)}_{it} + b_6 \text{ (competition)}_{it} + \varepsilon$$

The second model tested telecoms investment and IR.

Equation 4

$$\text{Log (telecoms investment)}_{it} = b_0 \text{ constant} + b_1 \text{ log (population)}_{it} + b_2 \text{ (regulatory regime)}_{it} + b_3 \text{ log (tariffs)}_{it} + b_4 \text{ log (infrastructure deployment i.e. composite variable)}_{it} + b_5 \text{ log (income per capita)}_{it} + b_6 \text{ (competition)}_{it} + \varepsilon$$

The third model tested broadband usage and IR.

Equation 5

$$\text{Log (Broadband usage)}_{it} = b_0 \text{ constant} + b_1 \text{ log (population)}_{it} + b_2 \text{ (regulatory regime)}_{it} + b_3 \text{ log (tariffs)}_{it} + b_4 \text{ log (telecoms investment)}_{it} + b_5 \text{ log (income per capita)}_{it} + b_6 \text{ (competition)}_{it} + b_7 \text{ log (infrastructure deployment i.e. composite variable)}_{it} + \varepsilon$$

The fourth and final model tested competition and IR.

Equation 6

$$\text{Log (competition)}_{it} = b_0 \text{ constant} + b_1 \text{ log (population)}_{it} + b_2 \text{ (regulatory regime)}_{it} + b_3 \text{ log (tariffs)}_{it} + b_4 \text{ log (infrastructure deployment i.e. composite variable)}_{it} + b_5 \text{ log (income per capita)}_{it} + b_6 \text{ (telecoms investment)}_{it} + \varepsilon$$

Data Description

The primary data analyzed for this study included panel data from the ITU, on 18 English speaking countries from the Caribbean and Latin American region, covering the period from 1993 to 2012. Panel data, also referred to as longitudinal data or cross-sectional time-series data, are a type of pooled data that may contain both cross-section (i.e., data on one or more variables collected at a single point in time) and time series (data that are collected over a time interval [i.e., weekly, quarterly or annually]). For example, if there are 10 years of annual data for 17 different countries, using panel data, there would be 170 observations. According to Paul (n.d.), there are several reasons for

using panel data including mitigating against the challenges of resulting from parameter heterogeneity and selectivity bias:

1. Because the panel data relate to factors such as individuals, firms, states, and countries, over time, the presence of heterogeneity in these units is a natural phenomenon. The techniques of panel data estimation take such heterogeneity into account by allowing for individual variables.
2. By combining time series of cross section observations, panel data give “more informative data, more variability, less collinearity among variables, more degrees of freedom and more efficiency.”
3. By studying the repeated cross section of observations, panel data are better suited to study dynamics of change.
4. Panel data can better detect and measure effects that cannot be observed in pure cross section or time series data.
5. Panel data enables researchers to study more complicated behavioral models.
6. By making data available for several thousand units, panel data minimize the bias that might result when researchers aggregate individuals or firms into broad aggregates. (pp. 1-2)

Analytical Framework

The number of mobile and fixed telephone lines was compared by groups based on competition and IRs using independent samples to test to see whether there was a

significant difference between these groups. In order to control for possible confounding factors, and given the panel structure of the data, I fit the regression models in the form:

Equation 7

$$y_{it} = \alpha + x_{it}\beta + u_i + \varepsilon_{it}$$

In this model, y was the dependent variable, x_{it} was the vector of independent (explanatory) variables, $u_i + \varepsilon_{it}$ was the error term in which I had minimal interest. I wanted estimates of β - parameter estimates vector. u_i was the unit-specific (in this case, state-specific) error term: it differed between units, but for any particular unit, its value was constant. This error component captured all individual country effects that were country-specific, but time-invariant (e.g., propensity of people to adopt innovations, historical and institutional factors for countries that might influence telecommunication market, etc.).

OLS regressions were estimated with country dummy variables among independent variables so that each country's unobserved influence on the dependent variable was accounted for. It was important to include these country-specific effects to avoid biased estimates of the key parameters of interest (the coefficients of competition and independent regulator dummy variables).

Robust standard errors (Huber/White/sandwich variance–covariance matrix estimator) of the coefficients that are identical to those obtained by clustering on the panel variable state were reported. Clustering on the panel variable produces an estimator

that is robust to cross-sectional heteroscedasticity and within-panel (serial) correlation that is asymptotically equivalent to that proposed by Arellano (1987).

The fraction of error variance that was attributed to u_i (i.e., to country-specific effects) was also reported. The larger this proportion was, the higher the importance of country-specific unobserved heterogeneity that was, however, accounted for by the fixed effects model.

Double log specifications were used, common in related literature, leaving only dummy variable untransformed. In $\log y = a + bx$ specification b is interpreted as follows: “when x goes up by 1, y increases by $(\exp(b)-1)*100\%$ ”.

Essentially, two different approaches—the fixed effects model or the random effects model—were applicable to this research. The model a researcher selects depends on the available data and his or her belief about the models. For example, Kennedy (1998) argued that fixed and random effects models are usually used “when the number of cross-sectional units is large and the number of time periods over which those units are observed is small” (p. 231). However, as to the exact choice of models, Clark and Lizner (2012) and Borenstein et al. (2009) stated that how a researcher determines which model is best remains unclear because scholars give contradictory advice (p. 29). If a researcher is unsure of what model to use, he or she should administer the recommended Hausman specification test in order to “test for orthogonality of the common effects and the regressors” (Greene, 2008, p. 208). However, both Greene (2008) and Clark and Lizner (2012) agreed that the Hausman test is not a reliable tool for identifying bias nor does it give any further information as to the balance of bias and variance between the two

modelling approaches. However, it is the least complicated of the tests than can be run to give the experimenter some guidance.

According to Borenstein et al. (2009) scholars generally use the fixed-effect model when “all studies in the analysis are functionally identical and the goal is to compute the common effect size for the identified population, and not to generalize to other populations” (p. 83). Hsiao (2003) also suggested that a fixed-effects model is best when the observations in an experiment are not randomly sampled but are all available and used. The use of the fixed effects is also based on the belief or assumption that the omitted variables effects are correlated with the variables that are included within the equation (Greene, 2008).

A fixed model includes dummy variables within the equation to control for both the unobservable and observable differences that could reduce the omitted variable bias. Simultaneously, changes in time in the unobservable variables should not correlate with the included variables; if so, then the omitted variable bias would still be present. The impact of each of the predictor variables is assumed to be exact across all the groups, and the regression equation reports only the average of the within-group effects. Finally, in order for the fixed-effects model to be successful,

each individual in the sample must have two or more measurements on the same dependent variable, and [on] at least some of the individuals in the sample, the values of the independent variable(s) of interest must be different on at least two of the measurement occasions. (Allison, 2005, p. 2)

Interaction of Variables

The interaction of variables sometimes occurs whenever there is a combined effect on the dependent variable. The effect of one policy variable could change whenever it is implemented at the same time as another policy. In this study, the dependent variables were the implementation of an IR and the introduction of competition into the telecommunications sector, and the two were dummy variables. If these two variables interacted with each other, it would have a significant implication and it would be difficult to determine how best to interpret the results. A two-way interaction term needed to be created to test the interaction of both the IR and competition. An *F*-statistic test should be undertaken to determine if the coefficients on the interaction terms together equal 0. The null hypothesis was that if there is no difference between the interaction variables, the test will result in a significant *F*-statistic. This is applicable to the regression coefficients, which is generally in the parameter estimates table, and not to the analysis of variance (ANOVA) table, although “the same principles apply to the interpretation of the results in the ANOVA” (Taylor, 2007, p. 1).

Policy makers, while tending to be conservative by nature, usually try to meet a series of social objectives (for example, allowing cross subsidies and universal service) in order to maximize social welfare for the population. Policy makers expect the introduction of both competition and the IR will increase the efficiency of service, lower prices, and increase universal service. Therefore, I expected that the interaction of these two variables will have a positive impact on the telecommunications services in general.

Missing Data

Generally, research is limited by data that are available, and this reality is true for developing countries. Comparable data were not available for all the variables and all the countries. To compensate for the missing data, contact was made with the individual governments and regulatory bodies to acquire the required information. However, in the instances where governments or private entities could not provide data, the model was not be affected. I analyzed the panel as unbalanced and assumed the missing data were random; therefore, the results can still be generalized.

Threats to Validity

Internal validity refers to the confidence a scholar has in the experiment and that the relationship between the variables that was established is indeed causal (Shuttleworth, 2009). Although it is not possible to completely eliminate threats to internal validity, a researcher can minimize those threats. Trochim and Donnelly (2007) suggested that three conditions must be met before a scholar can conclude that there exists “a cause and relationship” (p. 232). These conditions are covariation, temporal precedence, and no plausible alternative explanations (Trochim & Donnelly, 2007). In establishing that there is no other explanation that can be concluded, telecommunications are one of those utilities that is subject to technological innovation. During the last decade, the industry has evolved from wired to wireless platforms, which required significant technological shifts (ITU, 2004). Tullock, Seldon, and Brady (2005) suggested that shifts are also a result of factors including legislative and technological changes. However, although there may be some conflating of results with technology, the advent of an IR may contain the

impact. I assumed that technological changes were constant across all the examined countries because the same telecommunications company exists in nearly all of the examined countries. Consequently, the impact of the causal effect of technology on the industry could be safely eliminated. The need to establish legislation and implement legislative changes is responsible for the creation of IRs. With IRs, changes in legislation have little to no impact. Hence, I am confident that this investigation was internally consistent and valid.

External validity is the ability to generalize the results of the findings (Trochim & Donnelly, 2007). The data from this investigation concerned only English-speaking countries of the Caribbean; as such, the data should not be used to predict outcomes for other jurisdictions. Thus, I did not claim external validity. There are too many other socioeconomic and cultural differences that could have an impact on other countries' results.

Ethical Procedures

The data that were obtained were available from public sources including Internet sites, regulatory institutions, and companies that collect the data. I did not imperil the privacy, safety and welfare rights of any person from institutions that provided me with the information. The same information could be obtained from the various institutions upon request. The data obtained may be manipulated in ways such as being aggregated to address the questions in the study. The data were archived on a personal computer and were publicly accessible. There were no human subjects that were involved in the

quantitative research design. I ensure that I received institutional review board approval before proceeding with study.

Summary

In this chapter, I introduced the theoretical framework and the research design the analysis was built on, the policy variables, and the description of the various variables that were used in the analysis. I outlined the relationship between the IR/independent framework and various elements generally associated with the development of the telecoms sector, and specifically in the English-speaking Caribbean. The theoretical framework in which the relationship of the regulator was examined was capture theory. I also described the data and the inherent drawbacks of using said data. In addition, I explained the methodology of cross-sectional pooled fixed-effects model and the argument in support of this model. Based on the information presented, I chose the correct econometric analysis and technique, and the research design is adequate to answer the research questions.

In Chapter 4, I will present the results of the panel data models along with all the statistical analysis performed.

Chapter 4: Results

Introduction

The purpose of this chapter is to present the results of the quantitative study. I assessed the impact of an IR or framework on the telecommunications sector of the English-speaking Caribbean. There were seven questions that were used to make a determination about the impact of the independent regulator and they are as follows:

1. How are telecommunications infrastructure in fixed line services affected by regulatory regime, population, telecommunications investment, competition in the telecoms sector, GDP and telephone tariffs?

H_01 : The independent variables of regulatory regime, population, telecommunications investment, GDP, competition in the telecoms sector, and telephone tariffs do not have any effect on the dependent variable fixed line services.

H_11 : The independent variables of regulatory regime, population, telecommunications investment, GDP, competition in the telecoms sector, and telephone tariffs do affect the dependent variable fixed line services.

2. How are telecommunications infrastructure in cellular services affected by the regulatory regime, population, telecommunications investment, competition in the telecoms sector, GDP and telephone tariffs?

H_02 : The independent variables of regulatory regime, population, telecommunications investment, GDP, competition in the telecoms sector, and telephone tariffs do not have any effect on the dependent variable cellular services.

H₁₂: The independent variables of regulatory regime, population, telecommunications investment, GDP, competition in the telecoms sector, and telephone tariffs do affect the dependent variable cellular services.

3. How are telecommunications infrastructure in universal services (i.e., fixed lines and cellular services) affected by the regulatory regime, population, telecommunications investment, competition in the telecoms sector, GDP and telephone tariffs?

H₀₃: The independent of regulatory regime, population, telecommunications investment, GDP, competition in the telecoms sector, and telephone tariffs do not have any effect on the dependent variable universal services.

H₁₃: The independent of regulatory regime, population, telecommunications investment, GDP, competition in the telecoms sector, and telephone tariffs do affect the dependent variable universal services.

4. What is the relationship between prices in the telecoms sector (telephone tariffs) and the regulatory regime, population, telecommunications investment, competition in the telecoms sector, GDP?

H₀₄: Independent variables of the regulatory regime, population, telecommunications investment, GDP, and competition in the telecoms sector do not have any effect on the dependent variable prices.

H₁₄: Independent variables of the regulatory regime, population, telecommunications investment, GDP, and competition in the telecoms sector do affect the dependent variable prices.

5. What is the relationship between telecoms investment and the regulatory regime, population, telecommunications prices, competition in the telecoms sector, and GDP?

H₀5: The independent variables of the regulatory regime, population, telecommunications investment, GDP, and competition in the telecoms sector do not have any effect on the dependent variable telecoms investment.

H₁5: The independent variables of the regulatory regime, population, telecommunications investment, GDP, and competition in the telecoms sector does affect the dependent variable telecoms investment.

6. What is the relationship between broadband usage and the regulatory regime, population, telecommunications prices, competition in the telecoms sector, and GDP?

H₀6: The independent variables of the regulatory regime, population, telecommunications investment, GDP, and competition in the telecoms sector do not have any effect on the dependent variable broadband usage.

H₁6: The independent variables of the regulatory regime, population, telecommunications investment, GDP, and competition in the telecoms sector do affect the dependent variable broadband usage.

7. What is the relationship between competition in telecoms sector and regulatory regime, population, telecommunication prices, and GDP?

H₀7: No relationship exists between independent variables of regulatory regime population, telecommunication prices, and GDP.

*H*₁₇: No relationship exists between independent variables of regulatory regime population, telecommunication prices, and GDP.

Data Collection

The data were collected and analyzed as indicated in Chapter 3. The dependent variables were fixed lines, cellular lines, a universal service (i.e., summary of both cellular and fixed lines), prices of the telecoms services, telecoms investment, broadband usage, and competition, which are all presented and summarized in the table below.

Table 2

Variables Names, Characteristics and Source of the Data

Variable Name	Variable Description	Number of Values	Number of missing values	Source
State	Name of Country	18	0	
Year		20	0	
GDP_USD	GDP in US dollar, constant 2010 prices	360	0	UN Data
GDP_Capita	GDP per capita	360	0	UN Data
Population	Population of Country	359	1	ITU
Fixed_Tel	Number of Main telephone lines (fixed lines) in operation	341	19	ITU
Fixed_Tel_100	Number of Main telephone lines (fixed lines) in operation per 100 persons	341	19	ITU
Fixed_Install	Residential telephone connection charge (US\$)	211	149	ITU
Fixed_Sub	Residential monthly telephone subscription (US\$)	219	141	ITU
Mobile_Tel	Number of mobile telephones in operation	317	43	ITU
Mobile_Tel_100	Number of mobile telephones in operation per 100 persons	317	43	ITU
Mobile_Install	Mobile cellular connection charge (US\$)	183	177	ITU
Mobile_Sub	Mobile cellular monthly subscription (US\$)	168	192	ITU
Mobile_Min	Mobile cellular – price of 3-minute local call (peak – US\$)	215	145	ITU
Total_Sub	Total telephone subscribers (includes fixed and mobile)	343	17	ITU
Internet_100	Number of internet users per 100 persons	274	86	ITU
Total_Invest	Total annual investment in telecom (US\$)	111	249	ITU
Regulator	Binary variable indicating the presence of an independent regulator	360	0	
Regulator_Lag	Binary variable indicating the presence of an independent regulator at lag one	360	0	
Competition	Binary variable indicating the presence of competition	360	0	
Volcano	Binary variable indicating effects of a volcano present	360	0	

Note. *ITU = International Telecommunication Union

To compensate for the largeness of some of my variables, relative to others in the equations, I made a log-log transformation for each of the equations.

Results

I present the results of each of the equations in the order of the questions. A transformation of the data occurred using a log-log equation that helped in decreasing the variability and have it conform more closely to a normal type distribution. For Research Question 1, Tables 3 and 4 present the model.

Equation 7

$$\begin{aligned} \text{Log (fixed_tel)}_{it} = & b_0 \text{ constant} + b_1 \log (\text{population})_{it} + b_2 (\text{regulator})_{it} + b_3 \log \\ & (\text{fixed_install})_{it} + b_4 \log (\text{fixed_sub})_{it} + b_5 \log (\text{total_invest})_{it} + b_6 \log (\text{GDP_capita})_{it} + \\ & b_7 (\text{competition})_{it} + \varepsilon \end{aligned}$$

Table 3

Model 1

Variable	Estimate	Std Error	t-value	Pr (> t)
Intercept	-3.326**	5.683	-5.899	7.83
Population	5.199**	1.048	4.961	1.50
Regulator	2.749**	1.220	2.253	0.030094
Fixed Install	9.574**	3.738	2.561	0.014514
Price				
Fixed_Sub	-3.202**	1.560e+04	-2.052	0.047059
Total_Invest	-3.301	6.513	-0.507	0.615151
GDP	2.937**	5.223	5.625	1.86
Competition	1.118	1.457	0.767	0.447884

*Note. Durbin-Watson Test Statistic = 0.21497, P-Value <0.0001, ** significant*

Table 4

Model 1 Multicollinearity Test

Variable	VIF
Population	1.466209**
Regulator	6.545489**
Fixed_Install	3.685174**
Fixed_Sub	4.752718**
Total_Invest	8.622352**
GDP	4.517927**
Competition	7.308518**

Note. ** significant

The residual standard error: 19900 on 38 degrees of freedom the adjusted R -square: 0.9801, F -statistic: 103.5 on 35 and 38 DF , p -value: $< 2.2e-16$

It must be noted that the null hypothesis was rejected. Penn State Science (2018) stated,

The variance inflation factors for a regression model measures the variance of the estimated regression coefficient b_k is 'inflated' by the existence of correlation among the predictor variables in the model. A VIF of 1 means that there is no correlation among the k^{th} predictor and the remaining predictor variables, and hence the variance of b_k is not inflated at all. The general rule of thumb is that VIFs exceeding 4 warrant further investigation, while VIFs exceeding 10 are signs of serious multicollinearity requiring correction. (p. 8)

Based on the model results, the independent variables were highly collinear with each other. Although this would present an issue if the model was being used for forecasting, the inclusion of variables tended to follow each other, such as income per capita and population and competition and the introduction of the regulator. The multicollinearity would not necessarily have any adverse effect and can be ignored. For Research Question 2, Tables 5 and 6 show the results of the model.

Equation 8

$$\begin{aligned} \text{Log (mobile_tel)}_{it} = & b_0 \text{ constant} + b_1 \log (\text{population})_{it} + b_2 (\text{regulatory regime})_{it} \\ & + b_3 \log (\text{mobile_install})_{it} + b_4 \log (\text{mobile_min})_{it} + b_5 \log (\text{mobile_sub})_{it} + b_6 \log \\ & (\text{total_invest})_{it} + b_7 \log (\text{GDP_capita})_{it} + b_8 (\text{competition})_{it} + \varepsilon \end{aligned}$$

Table 5

Model 2

Variable	Estimate	Std Error	<i>t</i> -value	Pr (> <i>t</i>)
Intercept	-1.750	6.187	-2.828	0.013413
Population	4.502**	1.312	3.432	0.004046
Regulator	9.105	1.441	0.430	0.673534
Mobile_Install	9.105	1.441	0.632	0.537707
Mobile_Sub	-7.611	4.388	-1.734	0.104812
Mobile_Min	-1.458e+01	8.206	1.776	0.097411
GDP	1.725**	8.576	2.011	0.063952
Competition	7.445	3.509	0.212	0.835021

Note. Durbin-Watson Test Statistic = 0.78617, *P*-Value <0.0001, ** significant

Table 6

Model 2 Multicollinearity Test

Variable	VIF
Population	1.449616**
Regulator	1.218196**
Mobile_Install	8.404583**
Mobile_Sub	5.321162**
Mobile_Min	2.345336**
Total_Invest	5.962430**
GDP	8.605018**
Competition	1.309294**

Note. ** significant

The residual standard error: 2.032 on 14 degrees of freedom, the adjusted *R*-squared: 0.9829, *F*-statistic: 89.31 on 26 and 14 *DF*, *p*-value: 1.313e-11

It must be noted that the null hypothesis was accepted. For Research Question 3, Tables 7 and 8 show the results.

Equation 9

$$\begin{aligned} \text{Log (total_tel)}_{it} = & b_0 \text{ constant} + b_1 \text{ log (population)}_{it} + b_2 \text{ (regulator)}_{it} + b_3 \text{ log} \\ & \text{(fixed_install)}_{it} + b_4 \text{ log (fixed_sub)}_{it} + b_5 \text{ log (mobile_install)}_{it} + b_6 \text{ log} \\ & \text{(mobile_min)}_{it} + b_7 \text{ log (mobile_sub)}_{it} + b_8 \text{ log (telecoms investment)}_{it} + b_9 \text{ log (GDP per} \\ & \text{capita)}_{it} + b_{10} \text{ (competition)}_{it} + \varepsilon \end{aligned}$$

Table 7

Model 3

Variable	Estimate	Std Error	<i>t</i> -value	Pr (> <i>t</i>)
Intercept	2.956	1.124	2.631	0.02514
Population	9.827**	1.573	6.249	9.52
Regulator	-8.534	1.996	-0.428	0.67798
Fixed Install Price	-9.601**	1.209	-7.943	1.25
Mobile_Install	-7.482**	1.015	-7.371	2.39
Mobile_subs	1.308**	3.816	3.427	0.00647
Mobile_min	1.109	6.834	1.623	0.13558
Total_Invest	6.547	1.474	0.444	0.66641
GDP	3.347	8.625	.388	0.70608
Competition	2.024	2.900	.698	0.50107

Note. Durbin-Watson Test Statistic = 0.25991, *P*-Value <0.0001, ** significant

Table 8

Model 3 Multicollinearity Test

Variable	VIF
Population	5.090**
Regulator	2.081
Fixed_Install	2.415
Fixed_Sub	7.312**
Mobile_Install	1.228
Mobile_Sub	1.043
Mobile_Min	4.375
Total_Invest	7.506**
GDP	2.581
Competition	2.768

Note. ** significant

The residual standard error: 11510 on 10 degrees of freedom, Adjusted *R*-squared: 0.9976

F-statistic: 573.7 on 28 and 10 *DF*, *p*-value: 7.93e-13

It must be noted that the null hypothesis must be accepted.

For Research Question 4, Tables 9 through 11 show the results.

Equation 10

$$\begin{aligned} \text{Log (prices in the telecoms sector)}_{it} = & b_0 \text{ constant} + b_1 \text{ log (population)}_{it} + b_2 \\ & \text{(regulatory regime)}_{it} + b_3 \text{ log (infrastructure deployment i.e. composite variable)}_{it} + b_4 \\ & \text{log (telecoms investment)}_{it} + b_5 \text{ log (income per capita)}_{it} + b_6 \text{ (competition)}_{it} + \varepsilon_{it} \end{aligned} \quad 4a.$$

This model created a new price variable that was intended to broadly represent prices for fixed telephone lines. Monthly price of subscription was added to the cost of installation.

Table 9

Model 4a

Variable	Estimate	Std Error	t-value	Pr (> t)
Intercept	2.380	6.777	3.512	0.001166
Population	6.364	9.445	0.674	0.504501
Regulator	3.826**	1.399	2.736	0.009408
Mobile_Tel	-2.151**	5.064	-4.247	0.000135
Fixed_Tel	-7.404**	1.658	-4.466	6.92
Total_invest	-2.037	7.299	-0.279	0.7817
GDP	1.582**	7.202	2.196	0.034265
Competition	4.545**	1.617	2.811	0.007764

Note. Durbin-Watson Test Statistic = 1.09, *P*-Value <0.0001, ** significant

Table 10

Model 4a Multicollinearity Test

Variable	VIF
Population	9.900**
Regulator	7.148**
Mobile_Tel	3.817
Fixed_Tel	8.359**
Total_Invest	9.001**
GDP	7.142**
Competition	7.476**

Note. ** significant

The residual standard error: 2.182 on 38 degrees of freedom, adjusted R -squared: 0.9978 and the F -statistic: 961.9 on 35 and 38 DF , p -value: $< 2.2e-16$. The null hypothesis must be rejected.

Table 11

8 Model 4b

Variable	Estimate	Std Error	<i>t</i> -value	Pr (> <i>t</i>)
Intercept	-1.459	6.695	-2.179	0.03545
Population	1.826	1.241	1.471	0.1494
Regulator	1.564	1.783	0.877	0.38575
Mobile_Tel	-6.542	3.452	-1.895	0.06549
Fixed_Tel	-1.451	1.894	-0.766	0.44833
Total_invest	-8.2392	1.046	-0.788	0.43574
GDP	1.784**	7.65	2.332	0.02495
Competition	3.265	1.736	1.881	0.06749

*Note. Durbin-Watson Test Statistic = 0.86472, P-Value < 0.0001, ** significant*

Table 12

9 Model 4b Multicollinearity Test

Variable	VIF
Population	1.309110
Regulator	9.109**
Mobile_Tel	3.989
Fixed_Tel	7.484**
Total_Invest	1.343
GDP	8.150**
Competition	7.994**

Note. ** *significant*

The residual standard error: 0.2506 on 39 degrees of freedom, adjusted *R*-squared: 0.908

5, *F*-statistic: 22 on 35 and 39 *DF*, *p*-value: < 2.2e-16

The null hypothesis must be accepted.

For Research Question 5, Tables 12 and 13 show the results.

Equation 11

$$\text{Log (telecoms investment)}_{it} = b_0 \text{ constant} + b_1 \text{ log (population)}_{it} + b_2 \text{ (regulatory regime)}_{it} + b_3 \text{ log (tariffs)}_{it} + b_4 \text{ log (infrastructure deployment i.e. composite variable)}_{it} + b_5 \text{ log (income per capita)}_{it} + b_6 \text{ (competition)}_{it} + \varepsilon$$

Table 12

10 Model 5

Variable	Estimate	Std Error	t-value	Pr (> t)
Intercept	2.272	1.689	1.345	0.2016
Population	3.631	3.135	1.158	0.2676
Regulator	3.300	2.853	1.157	0.2682
Fixed Price	3.946	2.828	1.396	0.1862
Mobile_Price	-1.349**	5.346	-2.523	0.0255
Total_subs	-1.740	9.741	-1.786	0.0974
GDP	1.335	3.175	1.118	0.2386
Competition	3.552	3.175	-0.588	0.5665

Note. Durbin-Watson Test Statistic = 0.70479, *P*-Value <0.0001, ** significant

Table 13

11 Model 5 Multicollinearity Test

Variable	VIF
Population	9.409**
Regulator	5.877**
Fixed_Price	4.663**
Total_Sub	1.809
GDP	4.113**
Competition	6.536**

Note. ** significant

From the model the residual standard error is 0.2607 on 13 degrees of freedom.

The adjusted R -square is .9436 and the F -statistic is 26.42 with the p -value 1.482e-07.

The null hypothesis must be accepted.

For Research Question 6, Tables 14 and 15 show the results.

Equation 12

$$\text{Log (Broadband usage)}_{it} = b_0 \text{ constant} + b_1 \log (\text{population})_{it} + b_2 (\text{regulatory regime})_{it} + b_3 \log (\text{tariffs})_{it} + b_4 \log (\text{telecoms investment})_{it} + b_5 \log (\text{income per capita})_{it} + b_6 (\text{competition})_{it} + b_7 \log (\text{infrastructure deployment i.e. composite variable})_{it} + \varepsilon$$

Table 14

12 Model 6

Variable	Estimate	Std Error	t-value	Pr (> t)
Intercept	-3.134	1.196	-2.621	0.03062
Population	-8.599	1.716	-0.501	0.62976
Regulator	-1.623	3.238	-0.501	0.62971
Fixed Price	2.090**	4.657	4.488	0.00204
Mobile_Price	4.410	8.562	0.515	0.62045
Total_Invest	1.990	2.696	0.738	0.48156
GDP	1.474	1.439	1.025	0.33556
Competition	-4.176	3.617	-1.155	0.28152

Note. Durbin-Watson Test Statistic = 1.0103, P -Value <0.0001, ** significant

Table 15

13 Model 6 Multicollinearity Test

Variable	VIF
Population	7.316353
Regulator	5.096912
Fixed_Price	2.043038
Total_Invest	1.228998
GDP	5.329163
Competition	7.136291

*** significant*

From the model, the residual standard error is 2.386 on 8 degrees of freedom. The adjusted *R*-square is .9801 and the *F*-statistic is 66.53 with the *p*-value 8.069e-07.

For Research Question 7, Tables 16 and 17 show the results.

Equation 13

$$\begin{aligned} \text{Log (competition)}_{it} = & b_0 \text{ constant} + b_1 \text{ log (population)}_{it} + b_2 \text{ (regulatory regime)}_{it} \\ & + b_3 \text{ log (tariffs)}_{it} + b_4 \text{ log (infrastructure deployment i.e. composite variable)}_{it} + b_5 \text{ log} \\ & \text{(income per capita)}_{it} + b_6 \text{ log (telecoms investment)}_{it} + \varepsilon \end{aligned}$$

This model regression was a deviation from the standard pooled time series model, which was used to assess the other independent variables. The type of regression being done was a logistic regression. The reason for this deviation was that the dependent variable competition was a binary variable. It was 0 when no competition was within the

telecommunications sector at the time or it was 1 whenever competition entered the specific market.

Table 16

14 Model 7

Variable	Estimate	Std Error	Z value	Pr (> z)
Intercept	8.643	2.17	0	1
Population	1.351	3.83	0	1
Regulator	-5.773	3.60	0	1
Fixed_Price	-7.415	3.50	0	1
Mobile_Price	5.908	7.09	0	1
Total_Invest	3.683	3.08	0	1
GDP	-7.170	2.26	0	1

Note. Durbin-Watson Test Statistic = 0.25991, *P*-Value <0.0001, ** significant

Table 17

15 Model 7 Multicollinearity Test

Variable	VIF
Population	2.081
Regulator	2.415
Fixed_Price	7.312**
Mobile_Price	1.228
Total_Invest	1.043
GDP	4.375**

Note. ** significant

From the *R* output presented above, the call function indicated the options specified while running the model in *R*. The distribution of the deviance residuals was also summarized to have minimum value of -0.00000613 and maximum value of 0.00000681 individual cases used in the model.

The subsequent table summarizes the coefficient and test of significance which made use of the standard errors, the *z*-statistic and associated *p*-values.

From the model, it can be observed that all of the parameters under study (IR, population, telecommunication prices, telecoms investment, and GDP/income per capita) have significant effect on competition in telecommunication studies. The logistic regression coefficients estimated the change in log odds of the outcome variable competition in telecommunication industry for a one unit increase in any of the predictor variables. Due to the insignificance of the model parameters, the model was considered to be invalid when predicting relationship between competition in telecommunication sector and IR, population, telecommunication prices, telecoms investment, and GDP.

Summary

The research results were mixed for the relationship between various aspects of the telecoms sector within the Caribbean and the IR. I found that the regulator was influential in the amount of subscribers for fixed lines, but that did not hold true for cellular subscribers or even for overall subscribers (that is the sum of fixed and cellular subscribers). I found that the regulator plays a role in prices for fixed services, but not for cellular service. Additionally, both broadband usage and Telecoms investment did not seem to be affected by any role played by the regulator. As for competition in the

telecoms sector, there did appear to be a relationship between competition and the regulator, but that relationship may be as per the design of the variables, hence difficult to interpret. Both the regulator and competition were setup as two dummy variables.

In Chapter 5, I will address a discussion and interpretation of these research findings. Finally, the limitations to the research, along with recommendations for possible additional study, will be discussed and some positive conclusions will be made for social change.

Chapter 5: Discussion, Conclusions, and Recommendations

Introduction

The purpose of this quantitative study was to determine if the English-speaking Caribbean has same telecommunications regulatory institutions as larger countries. I used a cross-sectional, time series analysis to see whether independent variables, especially that of the IR, were related to the dependent variables in the telecoms sector, such as prices, growth and investment in the sector, and competition. I found that there was no relationship between the IR and mobile growth, telecoms investment, broadband growth, and competition. I will provide an interpretation of these research findings. Additionally, consideration will be given to the implications of the research for positive social changes and suggestions and recommendations made for action and continued research.

Interpretation of Findings

The findings of the quantitative research project extended the knowledge in the discipline of telecommunications regulation in the small English-speaking countries of the Caribbean. I demonstrated that there were no relationships existing in which regulators typically have control in larger developed countries. As was pointed out by Reynolds (2014),

having *de facto* independent bodies to oversee mergers, licences, and spectrum management, does not assure regulatory independence. Jamaica's legislation still empowers the Minister to make decisions regarding licence approval, a process which does not allow for the standard of regulatory independence. (p. 11)

The systems of government and regulatory institutions in Jamaica are similar if not the same as the other English-speaking Caribbean countries as they are based on the Commonwealth legal system. The minister or the political directorate are the ones who generally direct the regulatory institutions.

Regulatory capture may not be the only reason why the IR variable was insignificant in several questions such as mobile infrastructure, telecoms investment, and telecoms pricing. From a legislative standpoint, the telecommunications IRs in the English-speaking Caribbean make them susceptible to regulatory capture. Although capture is rarely associated with governments, it does occur. Mitnick (2011) identified this as relational capture. However, the other two types of capture that could occur in these developing countries are individual and functional capture. Even the most perceived independent of the telecommunications regulators in the Caribbean (i.e., the Office of Utility Regulation) has recently been restructured to accommodate the thinking of the government by creating the equivalent of a board. The other major regulatory body that is the ECTEL has two boards that it reports to. The first level of reporting is the board of directors, all whom are appointed by ministers of the respective countries, and the second is the Council of Ministers that is another board but this one is made up of the ministers (Ectel's Treaty).

SIDs have challenges that are inherent because of their size, as Ofa (2012) pointed out. Throughout the English-speaking Caribbean, the majority of the heads of these regulatory organizations were previously from the institutions that they now regulate. Additionally, because of the size of these small countries, there is a lack of or minimal

industry and commerce; hence, professional jobs are not easily obtainable. In the country of Guyana, the incumbent operator was refused a rate increase. The incumbent telephone operator was refused because the increase was called for during the same year an election was called, and the regulator could not afford to be perceived as taking sides either for or against the government. After the elections, the same application without any changes was resubmitted to the regulatory body, and a major rate increase was granted.

Regulatory bodies have a deficiency in terms of their operations. There are generally no formal ways to lobby a regulator, and the thinking of many of the regulatory institutions is unknown as no formal consultative documents are issued, so that operators and consumers can make a determination as to the thinking of the regulator in certain matters. Nor is there a formal process for comments to be made by any interested parties in the decisions of these regulators. This leaves the regulator open and susceptible to the other forms of capture. In Anguilla, the regulator consisted of himself and one support staff. The regulatory bodies are evolving, and most try to have at least one engineer, one consumer advocate, and the regulator who would be responsible for making the regulatory decisions. Additionally, most of the regulators studied have no rules outlining ex parte discussions; hence, the lack of transparency can cause capture of the regulator. Finally, the socioeconomic structure of the English-speaking Caribbean, which is a small population, makes it difficult for varying degrees of capture not to occur.

Limitations of Study

The limitations of this study were as discussed in Chapter 1. There are limitations when using pooled time series regression analysis. In addition, the use of a fixed effects

model that does not allow for the control of variables that changes over time was a limitation. I did compensate for any omitted variable bias by measuring for changes that may occur across time. If the unobservables are not time invariant, then there still could be a problem with omitted variable bias. All of the variance inflation factors indicated a high degree of collinearity of the variables; maybe there should be some multicollinearity correction, and each of the variables significance should be checked individually. Another challenge I had encountered was getting the verifiable data, as some of my variables had many missing values.

Recommendations

The research that this project focused on was narrowly defined. I examined only the developing countries of the English-speaking Caribbean and the effects of those countries that created an independent telecommunications regulatory institution had on various aspects of the telecommunications sector. Possible research questions involving differing and various parameters were left unanswered. SIDs are rarely studied, as there are few resources. However, this allows for numerous research possibilities, of which there are several recommendations for consideration here.

I determined that there must be a difference between small and large and developed and developing countries because the literature supported that difference. In addition, I also found that a difference existed as to the impact of the telecoms regulatory institutions on the telecoms sector. However, there could also still be a difference between countries that are considered overseas territories (OTs) such as Anguilla, Turks, and Caicos Islands and those that are independent countries such as Jamaica and Trinidad

and Tobago. OTs, while generally self-governing, do have a representative of the Queen, usually a governor whose responsibility is international affairs and economic issues. Telecommunications is considered both an economic issue with some degree of international affairs associated with it. Additionally, these OTs are also much smaller in population than their independent brethren with Bermuda being the largest at 69,000 and Montserrat with just over 5,000. These numbers stand in contrast when compared with Jamaica with a population just shy of 3 million persons.

A possible area of research is an examination of the degree of independence that may exist between the regulatory bodies. Those regulatory institutions with more independence could be having more of an effect on the telecommunications sector than what is being observed in this study. There was a difference between formal independence of a regulator that is pursuant to the legislation and a de facto independence, the latter being so much more difficult to measure.

Another potential area of study is in the size and type of regulator to determine if there is a difference between those regulatory institutions that are multisector or single sector focused. Multisector focused regulators for small developing countries would be able to make use of economies of scale and scope. Instead of having an economist focused on a single sector, that same person could be used to focus on the electricity and water sector.

Implications for Positive Social Change

There is the potential of additional economic growth that would result in a positive social change with the regulation of the telecommunications sector. As I have

shown, the relationship has varying strengths between the independent telecoms regulator and the telecoms sector. However, in some areas where in larger countries regulators take the lead, the regulators in the small developing countries of the English-speaking Caribbean play a minimal role.

Regulation is generally considered one of the primary development tools for a government to employ to extract value from any particular sector. This works in conjunction with both policy and sector development. Policy tends to be broad-brush national initiatives, while sector development is more practical interventions for that sector. Regulation as the tool should be bringing market efficiency and customer safeguards. This can be seen in the telecoms regulators (i.e., independent or not) before competition was prevalent and their primary duty was to ensure that a monopoly operator did not charge monopoly rents. In addition, price regulation telecoms regulators that includes management of the spectrum ensures that assignment and allocation is done efficiently and fairly.

In developed countries where telecoms regulators are most independent, they have had their decisions legislatively reversed. Positive social change could be a discussion to make a demarcation and clarification of where the portfolio responsible minister or government powers begin and end, and those of the regulators so that there is no blurring of the lines of responsibility. A key is to ensure regulators have autonomy in certain areas exclusively; smaller developing countries have different structures and should not imposed on to adopt ideas/structures of larger countries, cost of setting up, design the regulatory institution to get maximum autonomy in areas designated.

Legislation must be clear to minimize any overlap between policy makers and the regulators, hence avoiding confusion as to their respective roles. The OUR lawsuit brought against the portfolio minister indicated that the minister did overstep his bounds, as per the legislation.

Another area for positive social change is to improve the transparency of information that flows between operators, regulators, government (i.e., policy makers) and the consumers and or consumer advocates. This includes the regulator being mindful of competitive information. Rules governing the flow of information between participants in the marketplace would help to limit or minimize even the perception of capture that could occur with regulators.

Conclusion

Telecoms sector regulation in the English-speaking Caribbean is politically driven and is impacted by the policy makers' perception and external influences of where their respective markets should be at any given time. This causes the role of policy and regulation to be intertwined. However, although it may be that some degree of capture will always exist in the English-speaking countries of the Caribbean because of small populations and the socioeconomic make up, it can be constrained. It is important for IRs to have credibility; this is especially true in the eyes of external institutions such as the World Bank. Evidence-based policies that are tailored to the country will come to supersede the general "one-size fits all" policy that currently obtains in the English-speaking Caribbean.

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