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FINANCIAL SECTOR, TRADE AND GROWTH

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Financing for SMEs in the ECCU: An Empirical Investigation into the Constraints of SME Financing

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Abstract

SMEs are the main drivers of economic growth and employment in developing countries and emerging economies. However, they are often constrained when it comes to accessing financing for investments and expansion. In recognising the vital role that SMEs play in the ECCU and CARICOM region, it is important to garner a clear understanding of the underlying factors. That is, what leads to this access to credit constraint as it relates to SMEs?

The paper uses surveys to investigate the determinants of access to credit and demand for credit using firm specific and credit assessment characteristics to determine which of these characteristics are more likely to lead firms to become constrained or discouraged. Findings suggested that size among other firm characteristics as well as credit assessment characteristics do have a significant impact on both the supply and demand for credit. Country variables were found to impact on supply and demand for credit negatively suggesting the need for government intervention. Policy analysis is conducted on some possible solutions to increase access to financing in the region.

Keywords: SMEs, Determinants, Constraints, Demand for Credit, Access to Credit, and SME Financing.

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1 Introduction

In perfect frictionless credit markets, there is an unlimited supply of funds available to firms with feasible investment strategies and interest rates are determined by the interaction of market forces. However, in reality, this does not exist as imperfections in credit markets arise due to asymmetric information and agency problems. These imperfections violate the assumption of perfect markets and affect the free flow of capital from lender to investors with profitable ventures.

In the literature, it has often been argued that larger firms are less likely to be constrained when it comes to obtaining financing because of their ability to supply collateral, build relationships with lenders and establish credit ratings and records of accomplishment. Such factors seemingly mitigate the risks associated with information asymmetry. More so, empirical studies have found that smaller and younger firms which are more informationally opaque as a result of unavailable or poor financial information, are usually more constrained in accessing external finance (Berger & Udell, 2004), (Fazzari, et al., 1988), (Petersen & Rajan, 1994). This inability to access credit markets severely inhibits them from making profitable investments, which may impede their growth and development. These firms typically have to use internal revenues to fund their investment strategies, causing them to become cash constrained especially in times of economic uncertainty.

In the ECCU, access to credit is consistently cited by the private sector (which consist mainly of small and medium enterprises), as one of the major hindrances to growth and expansion of their businesses. According to the Foreign Investment Advisory Service (2004), high cost and low access to finance were among the top four cited binding constraints to doing business in Grenada. This is also consistent with the findings of (Brewster) 2006) who surveyed 125 firms within the CARICOM region. While some financial institutions, such as development banks and credit unions have facilitated SMEs by channelling resources to them, the prospects of the aforementioned institutions in their present state, making any significant contribution to growth is minimized given their current financial position (Jack & Samuel, 2013), (Eastern Caribbean Central Bank, 2014).

SMEs can contribute to reducing unemployment levels, bolstering taxation revenues, creating opportunities to earn foreign exchange, reducing dependency on high level of imports and contributing to sustainable economic growth within the region. However, this would require strong political will and a unified regional collaboration on the part of policy and decision makers. Since SMEs are considered the engine of growth in most countries, it is necessary to focus on minimising the gaps and impediments to SME financing within the region.

There have been a number of studies done examining factors affecting firms' access to credit in Latin America and the Caribbean using World Bank Enterprise Surveys (WBES) data. Some studies (Schiffer & Weder, 2001) (Beck, et al., 2005) (Beck & Cull, 2014), investigated firm level, environmental and other factor determinants of financial constraints and obstacles to growth respectively for selected Caribbean countries. Specific to the ECCU, limited empirical studies have been conducted to date that thoroughly considers constraints to financing for SMEs.

This paper offers a more comprehensive investigation of the constraints that SMEs face in the ECCU and CARICOM[1]. In particular, it seeks to add to the body of knowledge in this area by empirically assessing the factors affecting access to and demand for credit by SMEs using firm level data. The paper examines whether or not firm size plays a role in determining access to credit and the extent to which it is a major constraint relative to key factors affecting access as highlighted in the literature. These other factors include the type of industry, the region (CARICOM vs ECCU), legal status of the firm, manager's education, ownership of the firm, relation with the bank and ownership of the banks. In addition, a comparative analysis of financing patterns based on firm size is done. Findings are consistent with other studies in the literature with small and medium firms more likely to be constrained relative to larger firms.

The remainder of this paper is as follows. The next section reviews the literature. Section 3 looks at the data set and characteristics of the sample, as well as a brief description of the variables employed. Section 4 provides the empirical methodology and model specifications followed by

[1] The selected CARICOM countries included are Barbados, Belize, Guyana, Jamaica, Suriname, Trinidad & Tobago, The Bahamas and The Dominican Republic.

Section 5, which discusses the financing patterns of firms in both regions and the empirical results. Section 6 concludes the study and Section 7 puts forward some policy recommendations.

2 Literature Review

It is easier to finance large firms at the expense of small enterprises due to the cost involved in processing small scale loans and the required rates which are usually far above the prevailing maximum (McKinnon, 1973). Perhaps one of the earliest attempts to understand constraints to firm financing is a seminal paper by (Stiglitz & Weiss, 1981) who sought to explain that banks ration credit in the form of limiting the number of loans made available as opposed to increasing interest rates or collateral requirements in the presence of imperfect information in capital markets.

Imperfections in the capital market can have far-reaching and debilitating effects on firms' performance and investment decisions. Several studies have highlighted these issues: (Fazzari, et al., 1988) finds that capital market imperfections were found to have binding constraints on firms' investments decisions. Schinatarelli (1995), found evidence of agency problems and adverse selection arising out of imperfections in the financial market that creates a wedge between firms and external financers (loan suppliers and equity investors) see also studies by Hubbard (1997).

In an effort to mitigate issues with capital market imperfection and informational opaqueness of small firms, which usually cast a dark cloud over their credibility, lenders have turned to diverse lending technologies. Relationship lending theory argues that lenders can overcome this information asymmetry problem by employing relationship-lending technologies in their assessments. Petersen & Rajan (1994) finds strong evidence between relationships and the availability of credit. Findings suggested that the longer the relationships and the closer ties small firms establish with banks, the greater the amount of financial products purchased. Similar findings by Berger & Udell (1995) showed that smaller firms with longer banking relationships required less collateral and enjoyed lower interest rates.

Berger & Udell (2002) argues that small banks turn to "soft information" in assessing firms' creditworthiness and the character of owners. This is in an effort to reduce the problems associated with information asymmetries in lending. However, this type of technology may suffer from (1) shocks to economic environment (2) transferability of relationship[2] and (3) agency problem between loans officers and firms, leading banks to contract lending to the small business sector. Berger & Udell (2004) further argues that lending infrastructure may directly affect SMEs ability to access credit, confining the degree to which diverse technologies may be engaged in lending.

Presbitero & Rabellotti (2014) using probit analysis finds that larger, older and less export-oriented firms had a higher propensity to demand bank credit and was less likely to be discouraged from applying or financially constrained. In terms of access to credit, aside from firm characteristics, credit market structure was found to be a significant factor in explaining its heterogeneity. On the contrary, Okura (2009) using probit analysis, found that the probability of a SME accessing bank credit for working capital was significantly lower compared to larger firms with export rights.

An ordered probit model was estimated by Schiffer & Weder (2001) their findings suggested that small firms and medium firms have greater problems in accessing finance in Europe than in the USA. In general, it was found that SMEs ability to obtain bank credit stemmed mainly from internal factors such as financial results, ownership, size etc. For the Caribbean in particular, negative coefficients was observed for dummies of small firms, which is indicative that small firms face more problems than larger ones. In Latin America and the Caribbean, medium sized firms suffered more from taxes and regulations compared to larger firms.

Using cluster analysis techniques on a sample of Mauritian manufacturing SMEs Padachi & Howorth (2012) found that younger firms particularly those in their development and nascent stages had the most difficulty in sourcing financing. Furthermore, significant information costs were another decisive factor that prevented SMEs from obtaining financing from traditional sources. On the other hand, findings found limited evidence to support the literature that older firms tend to hold larger fixed asset bases, which can be used to secure advances.

[2] This relates to the verification, observation and transmitting of information.

Beck & Cull (2014) conducted a study on SME finance in Africa using a probit model. Findings indicated that small and medium firms were 30.0 per cent and 13.0-14.0 per cent less likely to obtain a formal loan respectively as compared to larger firms. Evidence also suggests that older firms' sole proprietorships and partnerships were less likely to have a formal loan. This is indicative that age and legal status do have an impact on the probability of a firm accessing financing. There is also evidence of relationship lending between banks and enterprises in Africa where banks relied mostly on soft information in the absence of credit markets. In addition, ownership structure had a negative impact on firms' ability to secure financing. In formal credit markets, firms registered as sole proprietorship and partnerships progressed far less compared to those in developing countries. Using multiple regression analysis Wu & Wang (2014) found that age and entrepreneurs' tenure were positively associated with the probability of accessing financing. In addition, evidence of cooperation and the length of relationship between enterprise and bank positively increased SMEs access to bank financing.

Using an ordered probit model findings by Kira (2013) suggest that small and medium firms as well as infant and young firms were more likely to be financially constrained compared to larger and mature firms. Additionally, it was found that domestic private firms and sole proprietorships had greater obstacles when it came to accessing financing as compared to foreign owned and listed firms. Estimating a probit regression model Sannajust (2014) observed that for SMEs in Europe and the USA, small and young firms have a higher probability of being refused a bank loan. Another significant determinant of loan rejection was industry structure, as firms in industrial sectors were more likely to be affected than those in the services sector.

Sun et al. (2013) conducted a recent study on the factors that influence SMEs access to bank loans using multiple regressions. The findings revealed that scale of operations and bank loans were significant and positively related. This implies that the larger the size of a business the higher their probability of accessing credit. In addition, tangible assets were found to be another determinant of bank loan availability. As businesses increases in size they acquire more assets and machinery, which makes them more stable. Liquidity was found to be a significant determinant in the ability of the firms to access bank loans. Finally, the authors observed that there was a negative correlation

between bank loans and commercial credit. This is indicative of the serious asymmetric information phenomena between banks and SMEs.

Using a probit model Holton et al. (2012) estimates credit and demand supply conditions for SMEs in Europe. The authors found that larger and older firms have a lower probability of being rejected credit. This is mainly attributed to the fact that these firms have a wider array of options when it comes to accessing financing. Zhao et al. (2006) found that firm size was determined to be the most significant factor affecting SMEs ability to secure credit. While Wang(2016) observed that firm size and age were negatively correlated with financing constraints implying that larger and older firms perceive access to credit as less of a problem.

Holden & Howell (2009) argues that high collateral requirements, high interest rates, exorbitant transaction costs, and underdeveloped financial sector reduces access to credit and often makes it difficult for entrepreneurs in the Caribbean to access financing for their businesses. Beck (2007) contends that higher transaction costs and default risks as a result of information asymmetries associated with SMEs, leads lenders to ration credit, thus implementing non interest screening devices such as collateral requirements and requesting audited financial statements. This makes it more difficult when it comes to lending to SMEs, particularly in developing countries, as most of them are unable to provide collateral or produce audited financial statements.

Zhao et al. (2006) estimated a multiple regression analysis to determine factors affecting SMEs ability to borrow from banks in the Chengdu City. Findings revealed that relationship with banks especially close relationships, size of firm, ability to provide collateral and willingness to comply with banks clauses were among the key factors in determining whether SMEs were able to secure credit from a bank. Furthermore, the authors argued that the overall findings were indicative of the presence of information asymmetry between borrower (SMEs) and banks. This is attributed to the small and medium size of most SMEs and their inability to provide collateral, lack of credit histories, inadequate compiled financial registers and poor record keeping which makes lending to them undesirable.

Using a survey of SMEs in Cote D'Ivore Abo et al. (2013) employed bi-variate analysis and found that for most SMEs, inadequate collateral and lack of financial information were the principal constraints to obtaining bank credit. Further, information asymmetry between lender and SMEs were cited as another hindrance to obtaining bank loans. Principally because of lack of collateral on the part of the borrower, banks look for formal financial information, which is lacking amongst most SMEs given their size and length of years in operation.

Using cross-country data from the World Bank Enterprise Surveys (WBES) for a group of developing countries Wang (2016), estimated a probit model and found that high interest rates, complicated application procedures and high collateral requirements were found to be some of the most serious constraining factors in accessing finance. Sharma & Gounder (2011) also used a probit model and found that bank collateral, paperwork, interest and fees was among the main concerns expressed by enterprises with and without financing in Fiji. In the case of those without financing (bank loan), 90.0 per cent of those attributed the foregoing list as the reason why they could not access a facility.

Cole & Dietrich (2014) estimated a bivariate probit model using WBES data for 41,000 SME in 80 countries. Findings revealed that even though firms needed credits they were discouraged from applying for credit, as they were much more likely to be denied when they applied. In developing countries, of the firms that needed credit, it was estimated that 44 per cent of them did not apply because they were discouraged from doing so. High interest rates and large collateral requirements were some of the main impediments that discouraged firms from applying for credit. Additionally, it was found that length of years in operation, size of firm and growth were important characteristics in facilitating firms to secure financing.

Using the World Bank Enterprises Survey 2009 Nu Minh Le (2012) carried out a study on what determines access to credit by SMEs in Vietnam using a logit model. Based on findings; machinery, bank fund and national sales was positively related with the probability of procuring credit whereas the probability of possessing an overdraft facility did not improve the likelihood of accessing credit. Additionally, possession of financial statements did not have an impact on the ability to access credit as it was found that many enterprises possessed two different bookkeepings;

one for taxes and the other for the bank. Further, type of industry was also found to be an important determinant to accessing credit with services and other manufacturing having higher probability.

Afsana et al. (2015) analyses data from a private and public bank in Bangladesh. Findings revealed that when it comes to SME financing, both bankers and SMEs encountered problems. High interest rates, high collateral requisite, and issues with the valuation of collateral were among the problems SMEs faced. Whereas, poor credit history, non-profitable ventures, inadequate guarantee and inability to generate cash flows, inexperienced management and improper record keeping by the SMEs were among some of the problems that bankers faced.

Holton et al. (2012) discovered that the real economy proxied by GDP growth was found to affect demand for credit through a supply spillover effect. Decreases in GDP were found to be strongly associated with the likelihood of credit being rejected. Using a multiple regression model Jenkins & Hussain (2014) analyses the macroeconomic conditions required for SME lending on the Turkish economy. Results from the multiple regression analysis were in favor of the hypothesis that macroeconomic environment do have an impact on SME bank credit. More specifically, economic growth, economic stability and government borrowing were all found to have a significant impact on the expansion of bank credit. A positive relationship between SME bank credit and economic growth and stability was observed which is consistent in the literature.

3 Data & Sample Characteristics

For this study firm level data based on the Productivity, Technology and Innovation (PROTEqIN) survey is used.[3] The survey spans a number of Caribbean countries namely Barbados, Belize, Jamaica, Guyana, Suriname, Antigua and Barbuda, Dominica, Grenada, St. Kitts and Nevis, Saint Lucia, St. Vincent and the Grenadines, The Bahamas and Trinidad and Tobago. The main objectives of the survey are to provide new and updated data from enterprises that were included in the previous World Bank Enterprise Survey (WBES) for the Latin America and Caribbean (LAC) region. The survey also provides indicators that are statistically significant across countries so that reliable inferences can be made. Lastly, is provides policy makers with new insights that are relevant to projects they may undertake.

[3] The data was sourced from the Compete Caribbean website (http://competecaribbean.org/proteqin/).

The PROTEqIN survey targets those establishments that were covered in the WBES for the LAC countries. Firms are added in some instances and re-weighted where deemed necessary. This survey was conducted using a conventional methodology with control for quality. Similar to the WBES for LAC, firms in the PROTEqIN survey were surveyed in strata's according to size (small, medium and large) and sector. A broad range of topics were covered from business & legal environment, general information, legal and formality, foreign trade & competition, innovation, labor & skills and firm financing. For the purposes of our study, emphasis was placed only on those variables as it relates to firm characteristics as identified in the literature and credit assessment characteristics.

The *country variables* real interest rate and GDP per-capita, which were used as control variables, were sourced from the World Bank. Data on these variables are in time-series format for the period 2014, corresponding with the year of the PROTEqIN survey.

Some key characteristics of firms in the sample were summarized in Table.1 (appendix 1A); identifying firms by country, industry, ownership, legal structure and exporters. From table 1 it is observed that the ECCU comprises 39.6 per cent of the total firms in the sample followed by Trinidad & Tobago at 17.3 per cent, Jamaica 12.3 per cent and the remaining countries individually averaging between the ranges of 6 to6.5 per cent. In the industry, 66.4 per cent of the firms are in the services sector, whereas the remaining 33.6 per cent are in manufacturing. Of the total number of firms, 82.6 per cent are owned by private individuals, foreign individuals and firms own 15.8 per cent and 2.2 per cent are owned by governments. Of all the legally incorporated firms 36.3 per cent are owned by shareholding companies, sole proprietors own 36.6 per cent and 27.0 per cent are partnership industries. Finally, firms that engage in some level of export account for 21.0 per cent of the total no of firms in the sample.

3.1 Description of Variables

One of the key *dependent variable* is "access to bank credit" which is defined as those firms which indicated that they utilise bank credit. It follows from the question "do you currently have a line of credit or loan". So the variable takes a binary format where 1 = yes and 0 if otherwise.

The *second dependent* variable "demand for credit" is based on the question "In the last fiscal year, did this establishment apply for a loan or line of credit". This variable also is expressed in binary form where 1= yes and 0 if otherwise.

For the *industry variable* covers two principle sector; manufacturing and services. This was constructed from the survey, it is noted that there were (18) eighteen[4] industries in each sector. As such as all industries were collapsed into two broad categories manufacturing and services. This variable is expressed in categorical format.

The PROTEqIN survey describes size of a firm as follows: Small (< 20employees), Medium (20-100) employees and (Large > 100 employees). In light of this, the number of full time employees at the end of last fiscal year located in section I of the survey was used as the basis to determine the size of the firms. This variable is also expressed in categorical format.

For legal status of the firm the variable *legal* is another categorical variable. It comes from section B of the survey and comprises if six legal types of registration. Shareholding with traded and shareholding with non-traded shares were grouped together and limited partnership and partnership were grouped together. The other category was omitted, thus reducing Legal to three categories: shareholding, sole-proprietorship and partnership.

For ownership of the firm the variable *foreign* is based on the percentage of ownership by foreign firms where those firms that are 1.0 per cent or more foreign owned are represented by a dummy variable.

For the variable *technical*, it has to do with whether the firm is receiving any benefit from technical assistance programs. It comes from section M of the survey and is a simple yes and no question. The variable is in binary form where 1 = yes, 0 if otherwise.

[4] Manufacturing covered the sectors Food, textiles, Garments, Chemicals, Plastics & Rubber, Non-Metallic Mineral Products, Basic Metals, Fabricated Metal Products, Machinery and Equipment, Electronics and Other Manufacturing. The sectors services were Retail, Wholesale, Information technology, Hotels and Restaurants, Services of Motor vehicles, Construction and Transport.

The variable *education* is based on the managers' average level of education and comes from section I of the survey. There were nine categories in level of education, as such for convenience they were re-categorized into four broader categories: primary & secondary, college & vocational, academic and other.

The variable *larger* has to do with whether the firm is part of a larger establishment. It is coded in binary format 1 = yes, 0 if otherwise.

Exporter is a dummy variable coded in binary format. It was constructed based on the percentage of the establishment sales that came from direct exports in the last fiscal year. For those firms that had exports sales > 0 a 1 one identified and those firm that had export sales ≤ 0 a zero was identified.

International is a binary variable and comes from part B of the survey. It is based on whether the firm has an internationally recognised certification with a 1 = yes and 0 if otherwise.
The variables Innovation and Product are all binary variables with a 1 = yes and 0 if otherwise. They have to do with whether the firm has a dedicated innovation department and those that launched or improved products.

The variables *audit* and *overdraft* come from section J of the survey. These variables are also coded in binary form with 1 = yes and 0 if otherwise. They are based on whether the firm possesses certified annual financial statements or possess an overdraft facility respectively.

Growth is a continuous variable; it measures the firms growth by looking at the growth in sales expressed in logarithmic form. It comes from section K in the survey that has to do with performance of firms. It is the difference between 2011 and 2012 sales divided by base year 2011 and scaled by exchange rate of 2.7 ECD to 1USD.

Collateral is another binary variable and comes from section J of the survey. It is based on whether the firm purchased machinery, vehicles, equipment, land or buildings within the last financial year. It seems rational that if the firm is using bank credit to fund these purchases, more than likely, the

bank will hold these items on their books as collateral via bill of sale. If these items were originally purchased from retained earnings, it means that if the firm decides to borrow in the future it would have collateral that could be used to secure loans and advances.

4 Econometric Methodology:

4.1 Model Specification

In specifying a model, one seeks to develop a construct that is able to capture the dynamics of a given process. Ideally, the model should not be one that is exhaustively over-specified nor under-specified but adequately specified in the sense that it includes all the relevant variables in line with prevailing literature, economic theory and logical reasoning in relation to the area of inquiry. Exactly specifying a model is usually difficult to achieve in practice due to noise, errors in the data and missing data points. In the spirit of general to specific modelling, if one must mis-specify the model, it is usually preferable to over-specify the model and refine it by pruning variables, as opposed to under-specifying the model.

The preferred model of choice for answering the research questions is the logistic regression model. As Nu Minh Le (2012) posits, most conventional studies and traditional research on SME access to bank credit either uses the probit or logit models. It should be noted that it is possible but not a necessary condition to derive binary choice models from an underlying latent model framework (Verbeek, 2004). The logit model follows what is known as the cumulative density function (cdf). The generic setup of the logistic model is specified in equation 1.

$$\Pr(y = 1|x) = \frac{\exp(x'\beta)}{1 + \exp(x'\beta)} = \Lambda\,(x'\beta) \ldots\ldots\ldots (1)$$

For the analysis using the full sample of 1966 firms and a sub-sample of the ECCU of 772 firms, two models were estimated. These are specified as follows:

1. $\Pr(Bank\ Credit)_{kj} = G\big(Firm\ Specific_{kj},\ Credit\ Assessment_{kj},\ Country_j\big) + e_{kj}$

The outcome variable bank credit is dichotomous in nature identifying whether the k^{th} firm located in country j has a loan or not. Firm Specific is vector representing a set of variables that include key policy variables as well as other that include the characteristics specific to the firm (technical, foreign, larger, size, legal, education). Bank Assessment is a vector representing a set of credit assessment characteristics (innovation, overdraft, collateral, development, marketing,

growth, audit, exporter, duration) that lenders look for when assessing firms' creditworthiness. Country is a set of variables representing the country characteristics. They are GDP per-capita and real interest rate[5]. GDP per-capita measures the wealth and depth of financial development of a country (Beck & Cull, 2014), while real interest rate measures the level of stability in the economy. From henceforth this shall be called model 1.

2. $\Pr\ (Demand)_{kj} = G\big(Firm\ Specific_{kj},\ Credit\ Assessment_{kj},\ Country\ _j\big) + e_{kj}$

In this model demand is the outcome variable and is dichotomous in nature identifying whether the k^{th} firm in country j demands credit or not. Similar to model 1 firm specific represents those key policy variables as well as those that speak to the characteristics of the firms (technical, foreign, larger, size, legal, education). Credit assessment in this model is the set of those characteristics (innovation, overdraft, collateral, development, growth, audit, exporter, duration) that determine the firm's creditworthiness. Country variables in this model are the same as those identified in model 1. Hereafter, this model shall be referred to as model 2. It should be noted that higher the real rate of interest the lower the demand for credit would be (Nistor & Popescu, 2013).

Collinearity test is also employed to determine the extent of correlation among the explanatory covariates. If there is high correlation among the explanatory variables then most likely the model would produce unstable results and not be a good fit. As such, the variables were subjected to collinearity test. Those found to be correlated were removed from the models. A benchmark of r > 0.5 was used to determine which variables should be booted from the model (see table 21-24)[6]. For the sub-sample of ECCU countries in model 1, the variables collateral and real were dropped. For model 2 the variable real was dropped as it showed a high level of correlation with the other covariates.

[5] The real interest rate can be computed by subtracting the inflation rate from the nominal rate of interest. In the literature it is often postulated that inflation and interest rate move together thus making the real interest rate stable in the long-run.
[6] Pairwise correlation test is employed due to its ability to take into account observations with missing data points.

The control variables "*country*" were included in all regressions to account for any heterogeneity that may arise at the country level. Additionally, to account for variation among firms clustering of the errors at the industry level was allowed[7]. This allows for correlation of the firms within similar industries but not across the different industries. This was done because: 1) firms in manufacturing and services both differ in their financing patterns, mode of operations and the way in which they carry out transactions; and (2) the estimators could be grossly overstated under default standard errors (Cameron & Miller, 2013).

5 Financing Pattern and Regression Results

5.1 Financing in CARICOM

This Section looks at the different financing patterns of firms working and fixed capital and the different types of facilities firms use in the CARICOM region. From table 2 (appendix 1B) it can be observed that across the board all firms basically fund more than 50.0 per cent of their working capital needs using internal sources of revenue. Small firms are observed to use less financing from private commercial banks as compared to medium and large firms. However, only 15.0 per cent of the firms made use of private commercial banks for financing working capital. Small and medium firms use more credit from private commercial banks than state-owned banks. Overall contribution by state banks to working capital financing is the lowest at only 3.0 per cent of the total. Supplier credit is the second largest contributor to working capital financing with an overall 17.0 per cent contribution. Other sources of financing account for just over 4.0 per cent of the total working capital financing.

Table 3 (appendix1B) illustrates firms' fixed capital financing by size and institution. Small and medium firms finance a greater proportion of their fixed capital using internal funds as compared to larger firms. Internal funds account for an overall 63.0 per cent of firms total fixed capital financing. Private commercial banks are the second largest accounting for just over 22.0 per cent of funding for fixed capital purchases. Larger firms are observed to use more bank credit than small and medium firms in financing fixed capital purchases. Other sources which is inclusive of

[7] See studies by (Beck, et al., 2008) (Seker & Correa, 2010); for a more detailed description of clustering robust standard errors by industry see (Petersen, 2007) and (Cameron & Miller, 2013).

state-owned banks account for an average of 14.0 per cent of total overall financing with both small and medium utilizing less financing from other sources as compared to larger firms.

Tables 4 and 5 (appendix 1B) show the percentage of firms that have overdraft and loan facilities respectively. Of small firms, 53 per cent and medium firms 66 per cent did possess an overdraft facility, as compared to 81 per cent of the large firms, which possessed an overdraft facility. Of the firms that had a loan facility, 35.9 per cent of small firms and 41 per cent of medium firms had a loan compared to 47 per cent of large firms. Overall 62 per cent of the total firms were found to use overdraft facilities and 39.4 per cent of firms were found to be in possession of a loan. Compared to Mexico only 24 per cent of firms possessed an overdraft while 30 per cent had a line of credit or loan (Presbitero & Rabellotti, 2014) whereas, in Vietnam only 13per cent of SMEs were found to have an overdraft (Nu Minh Le, 2012).

Overdraft facilities also known as revolving credit can allow firms flexibility especially in the cases where they might need working capital to clear salaries etc. In the CARICOM region, it is observed that there is greater penetration in the overdraft market than in the market for loans this is consistent with findings by FSD Kenya (2015) which suggest there is a heavy reliance by mid-sized banks in Kenya on overdraft facilities as their core financial product.

5.2 Financing in the ECCU

The absence of credit bureaus in the ECCU member countries increases the level of information asymmetries between borrowers and lenders. Hence, whenever owners of small and medium enterprises approach the Commercial banks for loans they are often turned away for lack of collateral. This section looks at the different financing patterns of firms working and fixed capital, the different debt financing instruments and the perceived access to finance obstacle in the ECCU.

Table 6 (appendix 1C) shows the mean proportion of working capital financing by firm size. From this table it is observed that internal funds account for 60 per cent of firms working capital financing, while supplier credit accounts for the second largest source of finance for working capital at 19.87 per cent. Booth et al. (2001) finds that in the presence of imperfect information much like the case in the ECCU, firms tend to avoid borrowing due to the high cost of external

finance. Private commercial and state banks account for 12.97 per cent and 3.37 per cent of working capital financing while other sources account for 3.1 per cent of financing respectively. State owned banks continue to be one of the least utilized sources of financing among firms. Table 7 (appendix 1C) summarizes the mean proportion of fixed capital financing by firms. From table 7 it is observed that internal funds make up the bulk of firms total fixed capital financing at 69.9 per cent. This is consistent with the findings by Chen & Jung (2011) who found that firms preferred internal financing to fund new projects and would only turn to debt when internal capital is insufficient. Commercial banks make up the second largest share of financing for fixed capital at 23.0 per cent, while other sources account for 7.0 per cent. Small and medium firms are observed to use more other informal sources of financing such as moneylenders, angel investors and family and friends. This is partly due to the relaxed collateral requirements and relationship these parties might share with the firms' owner, which allows them to access financing with less restrictions.

Tables 8 & 9 (appendix 1C) illustrate the percentage of firms with an overdraft facility and a loan facility. In table 8, it is observed that 54.7 per cent of small firms and 63.1 per cent of medium firms have an overdraft facility compared to 54.3 per cent for large firms. Overall, 57.9 per cent of the total observed firms have an overdraft facility. From table 9, on average 35.0 per cent of small and medium firms have a loan facility, whereas 43.0 per cent of large firms have a loan or credit facility. Overall, 35.8 per cent of firms are observed to have a loan or credit facility.

Table 10 (appendix 1C) summarizes the access to financing obstacles of firms. It is observed that 5.7 per cent of large firms reported access to finance as an obstacle compared to 0.26 per cent who reported that it was not an obstacle. For small and medium firms 52.3 per cent and 34.2 per cent reported that access to finance was an obstacle to operations as opposed to only 3.76 per cent of firms in both categories who reported that it was not an obstacle. Overall 92.2 per cent of the sampled firms in the ECCU found that access to finance was an obstacle to operations.

5.3 Regression Results

Table 11 (appendix 2A) summarizes the findings of the analysis for the full sample of firms in the CARICOM region. For the supply side, it is observed that the coefficients on small and medium firms are negative and in line with existing studies in the literature. It is also in harmony with our

a priori expectations. For the CARICOM region, small firms are 38 per cent and medium firms are 23.0 per cent are less likely to obtain credit relative to larger firms, implying that larger firms do have an advantage when it comes to accessing credit. This is because banks perceive larger firms as more stable in the long run and less of a risk, especially where these economies in the CARICOM region are subject to higher volatilities in income.

For those firms formally registered as partnership the odds of accessing credit are significantly higher and they are 15.5 per cent more likely to have access to financing, relative to shareholding companies. This is an indication that firms that follow proper channels in legally incorporating their enterprises, would have a better chance at accessing credit. There is a part here for SMEs in the region to play; as such, efforts should be made by those firms operating in the informal sector to secure formal registration, as it could improve their chances of future access to finance.

The variables collateral, overdraft facility and audited financial statements significantly increases firms' chances of accessing financing. Firms with collateral are 9 times more likely to access credit facilities as compared to those firms without. Firms with audited financial statements and overdraft facilities are 32.5 per cent and 36.3 per cent more likely to have access to credit respectively. Collateral reduces the risks of moral hazard, whereas audited financial statements tells about the financial performance, ability to service credit and overall health of the organization. Having an overdraft also reduces some of the risks of asymmetric information, as lenders are able to gauge firms' creditworthiness by observing the servicing patterns of the overdraft facility. Moreover, lenders will always have updated information on the firms standing when they conduct their annual credit reviews on these overdraft facilities. If firms are servicing their overdraft facilities adequately, then they would be able to build a better relationship with the lenders thus, increasing their odds of obtaining future credit.

The coefficient on the category university & postgraduate which measures managers' education is negative relative to the category primary and secondary education, it's a bit ambiguous as to why having academically qualified managers would reduce one's chances of accessing financing. A possible explanation for this is that perhaps the majority of graduates are also owners of small, medium and young enterprises. The categories college and vocational and sole proprietorship were

found to be not significantly associated with the odds of accessing credit. In addition, the variables larger technical, innovation, development and growth were found to have no significant impact on a firms' likelihood of accessing credit. On the country level, it was observed that the log of GDP per-capita significantly reduces the odds of obtaining a loan, while the real interest rate has no significant impact on firms' chances of obtaining credit.

On the demand side, small and medium firms are significantly associated with the demand for credit and are both 42 per cent more likely to be discouraged relative to larger firms. The odds of foreign owned firms applying for credit is less than one 1per cent even though its significant, this was also observed for the variable duration of loan. This suggests that foreign owned firms have less need for credit in domestic markets. Also for the duration of a loan, if maturity dates cause the installments on loans to rise in the short-run, firms will be unwilling to refinance or seek additionally facilities and will pursue alternative sources of financing or reduce demand for credit altogether.

The categories of managers' education; university & postgraduate, technical & vocational, and variables; collateral, audited financial statements, innovation and development are found to significantly impact on the demand for credit. University & postgraduate are 19 per cent, technical & vocational are 44 per cent, innovative firms are 49 per cent, product development firms are 14 per cent, firms with collateral are 15.7 per cent and firms with audited financial statements are 6.8 per cent are all less likely to demand credit.

The variables technical, exporter, growth as well as sole proprietors and partnership firms were not significantly associated with the likelihood of demand for credit. What this suggests is that exporters make more use of trade credit and other export guarantee schemes available thus reducing the need for credit. For those firms experiencing growth in sales, they are more likely to use retained earnings to finance investment decisions.

Both country variables as measured by the log of GDP per-capita and real interest rate were found to significantly reduce the probability of firms applying for credit. This is consistent with studies by Cole & Dietrich (2014) who found that the need for credit was found to be negatively associated

with per-capita GDP and findings by Turkali & Martinis (2007) who suggested that real interest rate was found to negatively affect the demand for credit.

Table 12 (appendix 2A) summarizes the results of the logistic regression for the ECCU sub-sample for both models. For the outcome variable bank credit, it is observed that small and medium firms are less likely to access credit relative to larger firms. This is consistent with the findings of the full sample only this time it is significant for medium firms only. Firms' performance as measured by growth in sales was found to significantly increase the odds of firms obtaining credit by 52 per cent. This is quite different from the CARICOM sample as firms' performance was found to have no significant impact on firms' ability to secure financing. This suggest that regional differences do have an important role to play in SME financing. Thus, further probing at the individual country level is recommended.

Innovative firms were 13 per cent and firms that invested in product development were 18 per cent significantly more likely to have access to credit. Audited financial statements were found to significantly increase the likelihood of firms accessing credit by 77 per cent. University & postgrad, college & vocational, sole proprietorship, partnerships, exporters, foreign ownership, part of a larger firm and technical were found to have no significant impact on the likelihood of firms accessing credit.

The country variable log of GDP per-capita significantly reduces the likelihood of firms accessing credit, which is similar to the findings of the CARICOM sample. This is an indication that financial institutions do look at the overall macroeconomic environment when deciding to lend. If they perceive that the economic outlook is negative they would tighten their lending policies, thus restricting the amount of credit available.

For the outcome variable demand findings suggest that small and medium firms are less likely to apply for credit. This is consisted with the results of the full sample except that only small firms are significant. Firms registered as sole proprietors are significant and 34per cent more likely to demand credit relative to shareholding companies. Those firms that are part of a larger organization are also significant and 85per cent more likely to demand credit. Audited financial statements were

found to have a significant impact on the likelihood of firms demanding credit. As such, firms with audited financial statements are 49per cent less likely to be discouraged from applying for credit. Additionally the variable foreign was found to have a significant impact on demand for credit however; the odds of foreign owned firms demanding credit were less than 1per cent. This is because foreign owned firms often secure their financing abroad before making investments domestically. In addition, given their reputation and the diverse financing options available to them, they are less likely to demand credit from domestic markets.

Firms that have invested in product development were significant and 30per cent less likely to demand credit. This is in contradiction with the a priori for this variable, as it was expected that firms that have invested towards developing their products would have a higher need for credit. However, it appears that firms are more likely to use internal funds for investment financing as evidenced in section 5.2 and table 7 (appendix 1C). This is also consistent with the findings of Chen & Jung (2011) who found that firms prefer to use internal financing, resorting to debt only when capital is insufficient.

Lastly, university & postgraduate, partnership, duration, growth, overdraft exporter, collateral, innovation, technical were found to be not significantly associated with the demand for credit. The country variable real interest were found to significantly reduce firms demand for credit, whereas income as measured by the log of GDP per-capita had no significant effect on the likelihood of firms need for credit.

6 Conclusion

Using firm level data this paper investigated whether firm characteristics as well as bank relationship and creditworthiness characteristics were more likely to place firms in a position to access credit or whether it increases the likelihood of them being financially constrained in CARICOM and the ECCU member countries. Findings suggest that small and medium firms are more likely to be financially constrained and discouraged due to their small size for both models in the two samples.

Compared to CARICOM, in the ECCU there is a high degree of heterogeneity among firms and countries. Highly innovative firms, those dedicated towards product development and firms with audited financial statements were significantly more likely to have access to credit. In addition, firms' performance as measured by growth in sales was found to significantly increase their likelihood of accessing credit. Whereas, firms belonging to a larger enterprise, those with audited financial statements and legally incorporated sole proprietors were significantly more likely to demand credit.

In the ECCU, the log of GDP was found to significantly reduce firms' ability to access credit; however, it had no significant impact on the demand for credit whereas real interest rate was found to significantly reduce the likelihood of firms applying for credit. This suggest that there is a role for policy makers to ensure that sound fiscal rules are applied and sound macroeconomic policies are implemented so as to ensure stability in these economies and confidence in the private sector. Individual differences among firms were found to significantly affect the way in which firms access and demand credit particularly in the ECCU.

7 Policy Recommendations

Given the information asymmetries that exist in the ECCU and wider CARICOM region, there is currently a gap in credit markets between borrowers and lenders. The empirical analysis confirms some of the key findings that are consistent with the literature. In particular, firm size and audited financial statements were found to have a significant impact on firms' likelihood of accessing credit. This shows that information as evidence by the significance of the variable audit, does increase access to credit and reduce information asymmetries. It is also noted that the relationship between borrowers and lenders also significantly increases firms' likelihood of accessing credit. It is also an indication that banks have resorted to the use of "soft information" in the absence of reliable information. The following recommendations are proposed for mitigating the risks in lending to SMEs: (1) the establishment of a regional credit bureau (2) the establishment of a loan guarantee scheme and (3) the creation of a secured transactions framework.

Establishment of a Regional Credit Bureau

In credit markets, information is a key factor lenders consider when making a decision about whether to grant credit or not. In the absence of reliable credit information, lenders are unable to differentiate the good borrowers from the delinquent ones. Applying the work of Akerlof (1970) to commercial lending, financial institutions could end up with a significant amount of undesirable credit facilities. Thampy (2010) argues that inefficient allocation of funds is due to the absence of a mechanism to bridge the information gap between borrowers and lenders.

Triki & Gajigo (2012) finds that public credit registries, which provide positive and negative information work in favor of firms when it came to accessing finance. Findings by Djankov et al. (2007) suggest that the association between private credit and public and private credit registries was strong in poorer countries but not for the richer countries. Evidence by Galindo & Miller (2001) suggests that countries where credit registries were better developed enjoyed lower financial restrictions as opposed to those where credit bureaus were underdeveloped. Jentzsch & Rientra (2003) finds that information sharing led to increased access to credit and furthermore increased indebtedness among firms.

From the findings in the preceding section, evidence shows that small and medium firms are less likely to have access to credit in both the CARICOM and ECCU sub-region. Credit information sharing can enforce discipline among borrowers and reduce risks associated with moral hazard, furthermore it would allow the firms to build a credit history and establish a reputation that can be useful later on particularly as it relates to SMEs (Malhotra, et al., 2006). The ECCB is partnering with the World Bank on the establishment of a regional credit bureau for the ECCU[8]. This initiative would allow banks to access more information on SMEs, which should reduce the risk in lending to this sector. This would result in more credit allocation to the private sector, spilling over into the real economy and leading to overall economic growth.

[8] At the time of this paper there is current draft legislations awaiting approval by the different regional governments.

Partial Loan Guarantee Scheme (PLGS)

PLGS are usually thought of as a means to overcome the imperfections in credit markets by allowing the associated risks with loan recovery, to shift partly towards a third-party guarantor (Camino & Cardone, 1998). The purpose of this would be twofold: Firstly it would allow for lenders to establish and gather information on new borrowers who would be backed by the guarantee, this would enable the borrowers to establish a credit record and later progress to borrowing without collateral as lenders would have sufficient information on the borrowers (Vogel & Adams, 1997). This would serve as a mechanism that would allow small businesses with viable opportunities to expand by being able to access credit.

Secondly, it would allow for greater penetration in the credit markets as banks would be able to extend credit to borrowers who would not have qualified without the PLG. This would allow banks to not only reduce the risks in lending but also allow for new learning to take place, as banks would be able to gain valuable insights and gather intelligence in SME lending. Hence, becoming more efficient at credit allocation. It should be noted that such schemes would need to be carefully designed to ensure that there is proper governance structure and the risk of moral hazard is minimized.

An example of a PLGS in the CARICOM region is the Credit Enhancement Facility (CEF) launched by the Development Bank of Jamaica (DBJ). The CEF functions like a partial loan guarantee and enables MSMEs without the requisite collateral requirements to access financing from a network of approved financial institution. To date the CEF has allowed for loans in excess of $1 billion to be allocated to owners of MSMEs through the issuing of more or less 200 guarantees (Smith-Edwards, 2016). There is currently an initiative being facilitated by the World Bank in collaboration with the member governments to establish a partial credit scheme in the ECCU.

Secured Transactions Framework

From Section 5, it is observed that the second largest source of working capital and fixed capital financing was credit from suppliers. This paper makes a strong assumption that firms in the region do some level of trading with each other, and therefore one firm's account receivable would be another trading partner's accounts payable. Based on this assumption, recommendation is made for the establishment of a secured transaction framework. This would enable SMEs the ability to pledge movable collateral to obtain capital for investment and growth. This would also allow for non-traditional sources of financing such as factoring and leasing to be used in SME financing.

Factoring opens up an opportunity for small and medium firms to access capital financing by selling their short-term assets (accounts receivables and inventories) to a factor who buys it usually for a fee. Additionally, they also provide complementary services such as assessing creditworthiness of sellers whose accounts factors will purchase and provide collection services. The credit services done on the part of the factor also provides opportunities for information sharing, as factors would have to collect information on sellers through a combination of their own databases as well as public and private data (Klapper, 2005). Findings by Klapper (2005) also suggested that in countries with better information sharing there was greater factoring which lends further support for the importance of establishing a regional credit bureau.

It should be noted that in 2013, the government of Jamaica passed the Security Interests in Personal Property Act and established a collateral registry. The underlying framework for this act was based on the principles of the OAS Model Inter-American Law on Secured Transactions and Regulatory Regulations. This legislation would allow for a wide range of collateral items to be used such as inventory and accounts receivable thus improving the overall access to credit by MSMEs (Organisation of American States, 2015).

It is recommended that consideration be given to creating a secured transaction framework for the ECCU. This would allow borrowers to pledge moveable property for collateral purposes and create the legal environment to support factoring, leasing and non-traditional forms of financing or lending arrangements.

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Appendix 1A

Table 1. Characteristics of Firms

Country	No. Firms (%)	Industry	No. Firms (%)	Ownership	No. Firms (%)	Legal Structure	No. Firms (%)	Exporter	No. Firms (%)
Jamaica	242	Manufacturing	660	Private	1,624	Shareholding	714	Exporter	413
	(12.31)		(33.57)		(82.60)		(36.32)		(21.02)
ECCU	772	Services	1,306	Government	44	Sole Proprietor	720	Not Exporter	1,552
	(39.27)		(66.43)		(2.24)		(36.62)		(78.98)
Barbados	123			Foreign	311	Partnership	532		
	(6.26)				(15.82)		(27.06)		
Guyana	120								
	(6.10)								
Suriname	120								
	(6.10)								
Belize	122								
	(6.21)								
The Bahamas	127								
	(6.46)								
Trinidad & Tobago	340								
	(17.29)								

Appendix 1B

Table 2 Mean Proportion of Working Capital Financing by Firm Size.

	Larger	Medium	Small	Total
Internal Funds	56.64	58.67	60.36	59.20
	(27.03)	(26.97)	(28.36)	(27.67)
Private Commercial	16.34	16.32	14.52	15.47
	(17.92)	(20.37)	(19.51)	(19.65)
State Banks	2.664	3.091	3.180	3.075
	(5.956)	(5.869)	(5.792)	(5.844)
Supplier Credit	19.25	18.14	17.10	17.79
	(16.34)	(14.27)	(15.26)	(15.05)
*Other	5.097	3.766	4.825	4.455
	(12.10)	(10.21)	(12.32)	(11.53)

mean coefficients; sd in parentheses

*Other includes sources of finance from non-bank financial institutions, family and friends, angel investors equity, credit cards etc.

Table 3. Mean Proportion of Fixed Capital Financing by Firm Size

	Larger	Medium	Small	Total
Internal Funds	54.03	64.52	65.45	63.30
	(34.27)	(34.53)	(33.12)	(34.04)
Private Commercial	30.19	22	20.15	22.44
	(30.71)	(28.81)	(26.10)	(28.09)
Other	15.78	13.77	14.40	14.38
	(25.00)	(23.57)	(23.82)	(23.89)

mean coefficients; sd in parentheses

*Other includes sources of finance from non-bank financial institutions, family and friends, angel investors' equity, credit cards etc.

Table 4. Percent of Firms with Overdraft Facility by Size

	Don't have Overdraft	Have Overdraft	Total
Large	18.59	81.41	100.00
Medium	33.82	66.18	100.00
Small	46.10	53.90	100.00
Total	37.59	62.41	100.00

Table 5. Percentage of Firms with Loan by Size

	Do Not Have Loan	Have Loan	Total
Large	52.79	47.21	100.00
Medium	58.95	41.05	100.00
Small	64.03	35.97	100.00
Total	60.53	39.47	100.00

Appendix 1C

Table 6. Mean Proportion of Working Capital Financing by Firm Size

	Larger	Medium	Small	Total
Internal Funds	63.78	61.71	59.58	60.64
	(23.83)	(24.20)	(27.72)	(26.21)
Private Commercial	8.922	12.90	13.45	12.97
	(13.09)	(16.69)	(18.50)	(17.56)
State Banks	2.448	3.343	3.493	3.374
	(4.042)	(4.325)	(4.869)	(4.624)
Supplier Credit	20.83	19.21	20.21	19.87
	(12.22)	(11.88)	(13.95)	(13.09)
Other	4.022	2.799	3.273	3.137
	(10.88)	(8.953)	(10.51)	(9.961)

mean coefficients; sd in parentheses

*Other includes sources of finance from non-bank financial institutions, family and friends, angel investors' equity, credit cards etc.

Table 7. Mean Proportion of Fixed Capital Financing by Firm Size

	Larger	Medium	Small	Total
Internal Funds	61.36	73.91	68.50	69.92
	(28.58)	(31.65)	(30.41)	(30.83)
Private Commercial	34.09	17.80	24.90	23.03
	(28.40)	(23.89)	(26.61)	(26.12)
Other	4.545	8.288	6.594	7.054
	(9.869)	(14.02)	(12.38)	(12.84)

mean coefficients; sd in parentheses

*Other includes sources of finance from non-bank financial institutions, family and friends, angel investors' equity, credit cards etc.

Table 8. Percent of Firms with Overdraft Facility by Size

	Don't have Overdraft	Have Overdraft	Total
Large	45.65	54.35	100.00
Medium	36.86	63.14	100.00
Small	45.27	54.73	100.00
Total	42.10	57.90	100.00

Table 9. Percentage of Firms with Loan by Size

	Do Not Have Loan	Have Loan	Total
Large	56.52	43.48	100.00
Medium	64.51	35.49	100.00
Small	64.90	35.10	100.00
Total	64.25	35.75	100.00

Table 10. Percentage of Firms Reporting Access to Finance as an Obstacle

	No Obstacle	Obstacle
Large	0.26	5.70
Medium	3.76	34.20
Small	3.76	52.33
Total	7.77	92.23

Appendix 2A

Table 11. Regression Results Full Sample

	Model1 Bank Credit	Model2 Demand
Medium	0.774***	0.576***
	(0.000)	(0.000)
Small	0.623***	0.581***
	(0.000)	(0.000)
College & Vocational	1.130	0.564***
	(0.101)	(0.000)
University & Postgrad	0.809***	0.812***
	(0.000)	(0.003)
Larger	0.770	1.722**
	(0.494)	(0.026)
Sole Proprietorship	1.173	0.915
	(0.277)	(0.431)
Partnership/Other	1.155***	1.026
	(0.000)	(0.456)
Exporter	0.881	0.993
	(0.664)	(0.882)
Foreign	1.001	0.993*
	(0.460)	(0.066)
Technical	1.261	0.895
	(0.116)	(0.548)
Innovation	0.629	0.514***
	(0.228)	(0.000)
Development	1.109	0.858***
	(0.540)	(0.000)
Collateral	9.455***	0.834***
	(0.000)	(0.002)
Audit	1.325***	0.932***
	(0.000)	(0.000)
Overdraft	1.363***	0.857
	(0.003)	(0.627)
Growth	1.399	0.922
	(0.368)	(0.344)
Real	0.982	0.954***
	(0.313)	(0.000)
LNGDPC	0.868**	0.957***
	(0.049)	(0.000)
Duration		0.991***
		(0.000)
Observations	1883	726

Exponentiated coefficients; *p*-values in parentheses

Notes: For each regression standard errors are clustered at the industry level.

* p<0.1, ** p<0.05, *** p<0.

Table 12. Regression Results ECCU Sub-Sample

	Model1 Bank Credit	Model2 Demand
Medium	0.715***	0.512
	(0.006)	(0.120)
Small	0.709	0.608***
	(0.226)	(0.000)
College & Vocational	0.726	1.075
	(0.201)	(0.859)
University & Postgrad	0.817	0.837
	(0.266)	(0.827)
Larger	0.915	1.857***
	(0.829)	(0.000)
Sole Proprietorship	1.008	1.343*
	(0.234)	(0.086)
Partnership/Other	1.091	1.037
	(0.634)	(0.334)
Exporter	0.973	1.267
	(0.892)	(0.541)
Foreign	1.000	0.994***
	(0.954)	(0.000)
Technical	0.990	1.127
	(0.973)	(0.633)
Innovation	1.139***	1.250
	(0.000)	(0.513)
Development	1.189***	0.700***
	(0.010)	(0.000)
Audit	1.177***	1.493***
	(0.000)	(0.006)
Overdraft	1.079	1.013
	(0.580)	(0.936)
Growth	1.521***	0.669
	(0.000)	(0.300)
LNGDPC	0.755**	1.009
	(0.032)	(0.988)
Collateral		0.956
		(0.463)
Duration		0.994
		(0.330)
Real		0.933**
		(0.039)
Observations	772	276

Exponentiated coefficients; *p*-values in parentheses
Notes: For each regression standard errors are clustered at the industry level
* p<0.1, ** p<0.05, *** p<0.01

Appendix 3A

Diagnostics Model 1 Full Sample

Table 13. F-Test Test Baseline Logit

Null Hypothesis:β1- β16=0 Alternative Hypothesis: Not H_o		
	P-Value	Decision
F-Statistic	0.000***	The coefficients are not simultaneously equal to zero and improves the model's fit by their inclusion.

* p<0.1, ** p<0.05, *** p<0.01

Table 14. Goodness of Fit Test

Null Hypothesis: The Model is Correctly Specified Alternative Hypothesis: The Model is incorrectly Specified		
	P-Value	Decision
Pearson χ^2	0.3120	There is insufficient evidence to reject the null, as such we conclude that the model is correctly specified.
Hosmer-Lemeshow	0.1374	Like the Pearson goodness of fit test we conclude that there is insufficient evidence to reject the null at all conventional levels, hence the model is a good fit.

* p<0.1, ** p<0.05, *** p<0.01, Hosmer-Lemeshow 8 groups.

Diagnostics Model 2 Full Sample

Table. 15 F-Test Baseline Logit

Null Hypothesis:β1- β17=0 Alternative Hypothesis: Not H_o		
	P-Value	Decision
F-Statistic	0.001***	The some of the coefficients are close to or equal to zero as such removing them from the model would not affect the models predictability power.

* p<0.1, ** p<0.05, *** p<0.01

Table. 16 Goodness of Fit Test

Null Hypothesis: The Model is Correctly Specified Alternative Hypothesis: The Model is incorrectly Specified		
	P-Value	Decision
Pearson χ^2	0.2951	There is insufficient evidence to reject the null, as such it can be concluded that the model is correctly specified.
Hosmer-Lemeshow	0.5199	Like the Pearson goodness of fit test there is insufficient evidence to reject the null at all conventional levels, hence the model is a good fit.

* p<0.1, ** p<0.05, *** p<0.01, Hosmer-Lemeshow 8 groups.

Diagnostics Model 1 ECCU Sub-Sample

Table. 17 F-Test Baseline Logit

Null Hypothesis:β1- β15=0 Alternative Hypothesis: Not H_o		
	P-Value	Decision
F-Statistic	0.0001***	The coefficients are not simultaneously equal to zero as such including them in the model improves it fit.

* p<0.1, ** p<0.05, *** p<0.01

Table. 18 Goodness of Fit Test

Null Hypothesis: The Model is Correctly Specified Alternative Hypothesis: The Model is incorrectly Specified		
	P-Value	Decision
Pearson χ^2	0.4013	There is insufficient evidence to reject the null, as such it can be concluded that the model is correctly specified.
Hosmer-Lemeshow	0.4608	Like the Pearson goodness of fit test there is insufficient evidence to reject the null at all conventional levels, hence the model is a good fit.

* p<0.1, ** p<0.05, *** p<0.01, Hosmer-Lemeshow 8 groups.

Diagnostics Model 2 ECCU Sub-Sample

Table. 19 F-Test Baseline Logit

Null Hypothesis:β1- β18=0 Alternative Hypothesis: Not H_o		
	P-Value	Decision
F-Statistic	0.0000***	Do not reject the null at all levels of significance and conclude that the coefficients are not jointly equal to zero.

* p<0.1, ** p<0.05, *** p<0.01

Table. 20 Goodness of Fit Test

Null Hypothesis: The Model is Correctly Specified Alternative Hypothesis: The Model is incorrectly Specified		
	P-Value	Decision
Pearson χ^2	0.3162	There is insufficient evidence to reject the null, as such it can be concluded that the model is correctly specified.
Hosmer-Lemeshow	0.6535	Like the Pearson goodness of fit test there is insufficient evidence to reject the null at all conventional levels, hence the model is a good fit.

* p<0.1, ** p<0.05, *** p<0.01, Hosmer-Lemeshow 8 groups.

Table 21. Correlation Matrix for Model 1 Full Sample

	Loan	Size	Education	Larger	Legal	Exporter	Foreign	Technical	Innovation	Development	Audit	Overdraft	Growth	Collateral	Real	LNGDPC
Loan	1															
Size	-0.0776	1														
Education	-0.00857	-0.0755	1													
Larger	-0.00474	-0.190	0.0456	1												
Legal	-0.00273	0.176	-0.0218	-0.0995	1											
Exporter	0.0213	-0.147	0.0498	0.0859	-0.0971	1										
Foreign	0.00843	-0.152	0.0337	0.161	-0.108	0.107	1									
Technical	0.0388	-0.00584	0.0306	-0.0140	-0.00013	0.0475	-0.0251	1								
Innovation	0.0408	-0.187	-0.00042	0.108	-0.0647	0.165	0.0126	0.0357	1							
Develop	0.0396	-0.127	0.0440	0.0977	-0.0609	0.172	0.0251	0.0174	0.526	1						
Audit	0.0670	-0.212	0.0632	0.133	-0.102	0.0851	0.0648	0.0126	0.122	0.0637	1					
Overdraft	0.0742	-0.192	0.0785	0.0353	-0.0701	0.0484	0.00317	0.0500	0.0417	0.0709	0.178	1				
Growth	0.0313	0.0240	-0.0482	-0.00621	0.0103	-0.0152	-0.00325	-0.0102	0.00909	0.00082	-0.0453	-0.0392	1			

Collateral	0.467	-0.0436	-0.00706	0.0454	-0.0336	0.0614	-0.0178	0.00664	0.176	0.102	0.0351	-0.00395	-0.0149	1	
Real	0.0246	0.101	-0.182	-0.00742	0.0490	-0.0127	-0.00163	0.0289	0.202	0.0272	-0.102	-0.145	0.0495	0.126	1
LNGDPC	-0.0619	-0.0630	-0.0662	-0.0180	0.0518	-0.0992	-0.0725	-0.0765	0.130	0.0408	0.0360	-0.104	0.0568	0.0110	-0.00166

Table 22. Correlation Matrix for Model 2 Full Sample

	Demand	Size	Education	Larger	Legal	Exporter	Foreign	Technical	Innovation	Develop	Audit	Overdraft	Growth	Collateral	Duration	Real	LNGDP
Demand	1																
Size	-0.0505	1															
Education	-0.0139	-0.021	1														
Larger	0.0909	-0.254	0.0372	1													
Legal	-0.0124	0.127	-0.0555	-0.148	1												
Exporter	-0.0173	-0.169	0.0136	0.0861	-0.126	1											
Foreign	-0.0461	-0.164	0.0281	0.201	-0.102	0.124	1										
Technical	-0.00782	-0.014	0.0191	0.0370	-0.006	-0.0250	-0.0595	1									
Innovation	-0.110	-0.235	-0.0184	0.0700	-0.036	0.183	-0.0002	0.0014	1								
Developm	-0.0802	-0.131	0.0520	0.0544	-0.044	0.203	0.0347	-0.012	0.525	1							
Audit	0.00162	-0.229	0.0663	0.117	-0.070	0.122	0.0400	0.0101	0.144	0.0970	1						
Overdraft	-0.00523	-0.167	-0.00217	0.00139	-0.087	0.0706	-0.036	0.0561	0.115	0.112	0.190	1					

	Demand	Size	Education	Larger	Legal	Exporter	Foreign	Technical	Innovation	Develop	Audit	Overdraft	Growth	Collateral	Duration	Real	LNGDP
Growth	-0.0397	0.041	-0.0863	-0.0180	0.0202	-0.025	-0.017	-0.017	-0.00718	-0.00842	-0.069	-0.0582	1				
Collateral	-0.0439	-0.015	0.0713	0.0531	-0.064	0.0736	-0.051	0.036	0.120	0.101	-0.042	-0.0072	-0.0490	1			
Duration	-0.105	0.087	0.00059	0.0277	-0.035	-0.003	0.0120	0.0019	-0.0134	0.0404	-0.079	-0.0906	0.0228	0.165	1		
Real	-0.120	-0.026	-0.179	0.00069	0.0791	-0.014	-0.006	0.0266	0.173	0.0204	-0.104	-0.0468	0.0716	-0.0843	-0.014	1	
LNGDPC	-0.0264	-0.077	-0.0590	-0.0310	0.0390	-0.042	-0.034	-0.062	0.120	0.0554	0.0745	-0.101	0.0845	-0.0003	0.0422	-0.06	1

Table 23. Correlation Matrix for Model1 ECCU Sub-Sample

	Loan	Size	Education	Larger	Legal	Exporter	Foreign	Technical	Innovat	Develop	Audit	Overdraft	Growth	Collate	Real	LNGGDP
Loan	1															
Size	-0.0283	1														
Education	-0.0263	0.0282	1													
Larger	-0.0034	-0.178	0.0192	1												
Legal	0.0029	0.235	0.0268	-0.104	1											
Exporter	0.0005	-0.103	0.0250	0.0277	-0.117	1										
Foreign	0.0062	-0.153	-0.023	0.161	-0.054	0.0548	1									
Technical	0.0005	0.0251	-0.051	-0.010	-0.004	0.0233	-0.046	1								
Innovation	0.0288	-0.103	0.0388	0.0608	-0.050	0.126	0.0665	-0.0149	1							
Developm	0.0383	-0.0448	0.0567	0.0156	-0.042	0.104	0.0259	-0.0263	0.405	1						
Audit	0.0383	-0.149	0.0320	0.152	-0.107	0.0201	0.0716	0.0048	0.0831	0.0394	1					
Overdraft	0.0175	-0.0522	0.0380	-0.015	-0.079	-0.018	-0.023	0.0206	0.0111	0.0109	0.119	1				
Growth	0.0251	0.0165	0.0374	0.0057	0.0653	-0.048	-0.042	-0.0321	0.0064	-0.033	-0.0512	-0.0472	1			
Collateral	0.646	-0.0727	-0.050	0.0106	-0.016	0.0470	0.0161	-0.0177	0.0038	0.0290	0.0134	-0.0087	0.0034	1		
Real	-0.0431	-0.007	-0.010	-0.032	-0.080	-0.013	-0.092	0.0784	0.005	0.011	-0.0052	0.0550	0.0822	-0.028	1	
LNGDPC	-0.0382	-0.071	-0.02	0.002	-0.10	-0.03	-0.00	-0.0267	0.045	-0.02	0.0337	0.0390	0.051	-0.01	0.601	1

Table 24. Correlation Matrix for Model 2 ECCU Sub-Sample

	Demand	Size	Education	Larger	Legal	Exporter	Foreign	Technical	Innovation	Developm	Audit	Overdraft	Growth	Collateral	Duration	Real	LNGDP
Demand	1																
Size	-0.0433	1															
Education	-0.0320	0.084	1														
Larger	0.117	-0.263	-0.0135	1													
Legal	0.00390	0.223	0.0734	-0.153	1												
Exporter	0.0305	-0.098	-0.0698	0.0116	-0.138	1											
Foreign	-0.0550	-0.142	-0.0377	0.209	-0.0651	0.104	1										
Technical	0.0442	-0.024	0.00300	0.0795	-0.0482	-0.0898	-0.102	1									
Innovation	0.0171	-0.134	0.0393	0.0477	-0.134	0.265	0.0851	-0.0228	1								

Developm	-0.0355	-0.003	0.0865	-0.0120	-0.0219	0.128	-0.0182	-0.0215	0.418	1							
Audit	0.0961	-0.158	0.0332	0.216	-0.116	0.0687	0.0800	0.0188	0.124	0.105	1						
Overdraft	0.0209	-0.034	-0.00540	-0.0428	-0.193	-0.00363	-0.0899	0.0135	0.0330	0.0425	0.124	1					
Growth	-0.0289	0.015	0.102	-0.00901	0.112	-0.0731	-0.0933	0.0215	0.0531	0.0421	0.0295	-0.0560	1				
Collateral	-0.0171	-0.066	-0.0151	0.0681	-0.0639	0.0770	0.00801	-0.00784	0.0171	0.0458	-0.0271	-0.0219	-0.0375	1			
Duration	-0.0822	0.027	0.0904	-0.0284	-0.0359	0.00432	-0.0128	0.0236	-0.103	-0.0783	-0.0473	-0.141	0.0293	0.206	1		
Real	-0.0371	0.005	-0.00013	-0.00231	-0.0703	-0.0132	-0.169	0.0417	0.0422	0.00870	-0.0788	0.0641	0.127	-0.0235	-0.0273	1	
LNGDPC	-0.0349	-0.098	-0.00518	0.0533	-0.0960	-0.0334	0.0116	0.00023	0.0934	-0.0108	-0.0151	-0.00947	0.131	0.0291	-0.0004	0.601	1

Can Financial Innovation Foster Economic Growth in the Eastern Caribbean Currency Union?

Ms Reyna Samuels

University of the West Indies

Mona Campus

EASTERN CARIBBEAN CENTRAL BANK

ST KITTS

CAN FINANCIAL INNOVATION FOSTER ECONOMIC GROWTH IN THE EASTERN CARIBBEAN CURRENCY UNION (ECCU)?

Reyna Samuels [9]

Abstract

This paper investigates the relationship between financial innovation and economic growth in the ECCU over the period 2004-2016. Financial Innovation is an important research topic in modern economics. It speaks to the ongoing process where new financial products, services, procedures and institutions are created as a response to the continuously changing environment. The relationship is assessed from estimates of a Pooled OLS model and further, through the use of Granger Causality. The study limited financial innovation to payment systems based on the availability of data. The results revealed a positive causal relationship running from financial innovation to economic growth.

JEL classifications: F65, E20

Key words: Financial Development, Financial innovation and Economic Growth

[9] The above mentioned author is a student at the University of the West Indies, Mona Campus who did an internship with the Research Department.

Table of Contents

1.0 Introduction

Financial stability is one of the key objectives of central banks. A well-functioning financial system is important for economic growth, especially for the allocation of capital. The significance of finance in an economy and for economic growth naturally increases the importance of financial innovation (Levine, 1997). Since finance is an input for practically all production activities and a relatively large proportion of consumption activity, improvements in the financial sector are likely to have positive effects throughout the economy.

Financial innovation plays an important role in making progress toward improved access to financial services and increased competition with the banking industry. According to Tufano (2003), "*Financial Innovation*[10] *is the act of creating and popularizing new financial instruments as well as new financial technologies, institutions and markets*." Others define it as the unanticipated improvement in the array of financial products and instruments as a response to continuous changes in the economic environment. Today, enterprise, intellectual assets and innovation are the driving force for economic growth and improvement in standard of living (Mwinzi 2014). The improvements in the financial sector have led to an increase in the number of financial institutions as well as the level of sophistication, with new payment systems and a variety of products and services offered. This is as a result of technological advancement and increase in competition due to an increase in the number of institutions.

The theory of financial innovation is centered on the provision of opportunities for risk sharing. For economists, it is natural not only to ask how innovation comes about, but also whether the market is doing a good job at providing the institutions and instruments needed. The purpose of the introduction of a financial innovation to market participants is to minimize costs and reduce the risk of exposure through the moving of funds across time and space (e.g., savings accounts), the pooling of funds (e.g., mutual funds), managing risk (e.g., insurance and many derivatives products) and facilitating the sale or purchase of goods and services through a payment system (e.g., cash, debit cards, credit cards) (Merton, 1992), among others.

[10] According to Laeven et al (2012) financial innovation is not limited to the invention of new financial instruments nor is it limited to financial institutions; it consists of more mundane financial improvements such as improvement in data processing and credit scoring, new financial reporting procedures and so on.

Following the financial crisis of 2008/2009, financial innovation has been regarded as doing more harm than good (Bara, et al., 2016). The crisis was associated with a proliferation in innovative financial products which did not necessarily serve the best interest of consumers. Despite the negative reviews, financial innovation has been a ubiquitous character for the expansion of economies for centuries (Laeven et al, 2012), therefore, it is inevitable. Also, according to Loayza and Ranciere (2006) "*the path to financial development is far from smooth and along the way, economic growth can suffer from financial fragility that characterizes maturing systems*."

In correlation, like most countries, the Eastern Caribbean Currency Union (ECCU) member states were greatly impacted by the crisis which revealed some weaknesses and precipitated the failure of several institutions within the region. Some of these weaknesses include poor credit underwriting, weak corporate governance structures and weak credit quality. Consequently, a key challenge that the ECCU faces is banking sector fragility which may have negatively impacted growth within the region.

The purpose of this paper is to investigate the role of financial innovation on economic growth in the Eastern Caribbean Currency Union (ECCU), given the dearth of economic research of this nature in the region. The rest of the paper is organized as follows: Section 2 will provide some stylized facts on financial innovation and GDP per capita growth; Section 3 will provide an overview of the literature; Section 4 will review the data, the models and the tests used to assess the models; Section 5 will uncover the outcomes of the assessment of the models; and Section 6 will conclude and provide some policy recommendations.

2.0 Stylised Facts

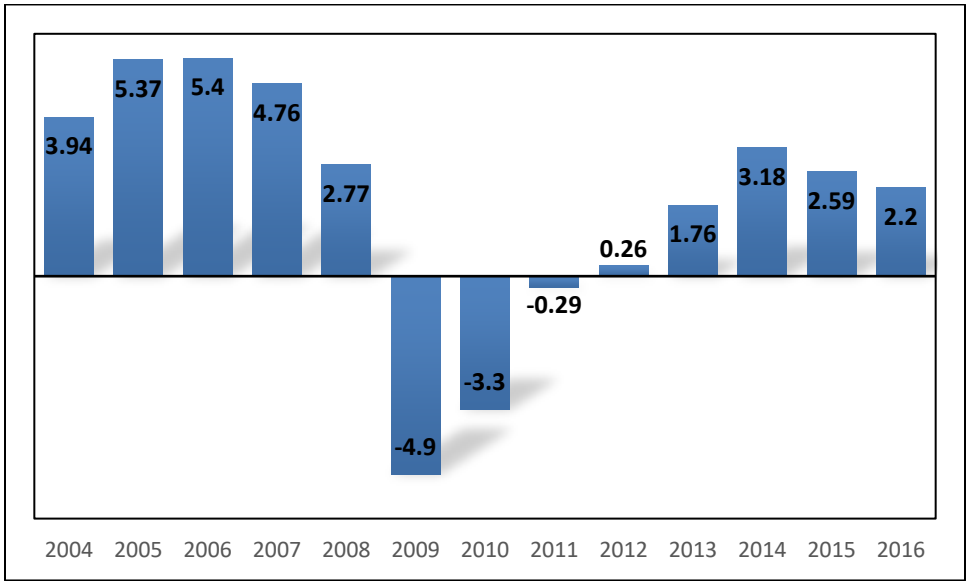
The ECCU comprises of eight (8) member countries, namely: Anguilla, Antigua and Barbuda, Dominica, Grenada, Montserrat, Saint Kitts and Nevis, Saint Lucia and Saint Vincent and the Grenadines. The ECCU along with the British Virgin Islands and Martinique are jointly known as the Organisation of Eastern Caribbean States (OECS). The ECCU countries share a common central bank and a common currency, the Eastern Caribbean Central Bank and Eastern Caribbean Dollar respectively.

2.1 Overview of Economic Growth within the ECCU

The ECCU has experienced both a secular decline and increased volatility in real GDP growth over the past two decades. The agricultural sector traditionally was the main ingredient for sustained growth, but the focus has shifted over time towards tourism which has been a critical source of foreign exchange for the member countries.

Figure 1 illustrates the growth rate of the ECCU over the period 2004-2016. Prior to the crisis, the region experienced elevated levels of growth, specifically in 2005 and 2006, with growth rates in excess of 5.0 per cent. The region has since experienced its lowest Real GDP growth (2009) with a decline of 4.90 per cent. Subsequently, positive growth has been recorded, averaging 2.0 per cent over the 2012-2016 period. This outcome was primarily driven by improvements in the international macroeconomic environment which facilitated a rebound in the tourism sector.

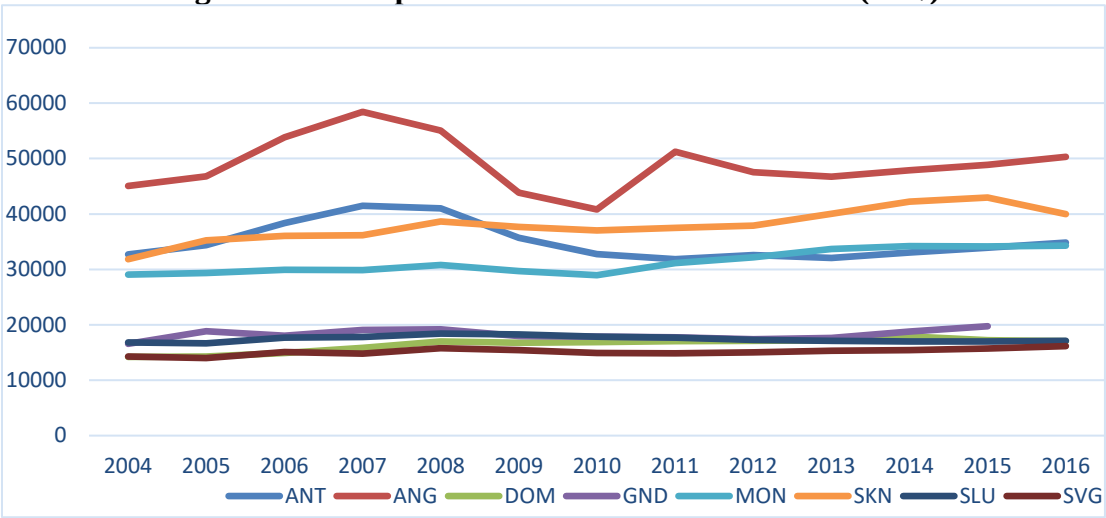
Figure 1: GDP Growth in the ECCU (2004 – 2016)



Source: Eastern Caribbean Central Bank

Figure 2 shows per capita GDP among the ECCU member countries ranged from approximately $16,000 (St. Vincent and the Grenadines) to $50,000 (Anguilla) as at 2016. In addition, St. Kitts and Nevis recorded the fastest percentage growth in its per capita GDP over the period compared with the other countries.

Figure 2: Per Capita GDP of the ECCU Countries (EC$)



Source: Eastern Caribbean Central Bank

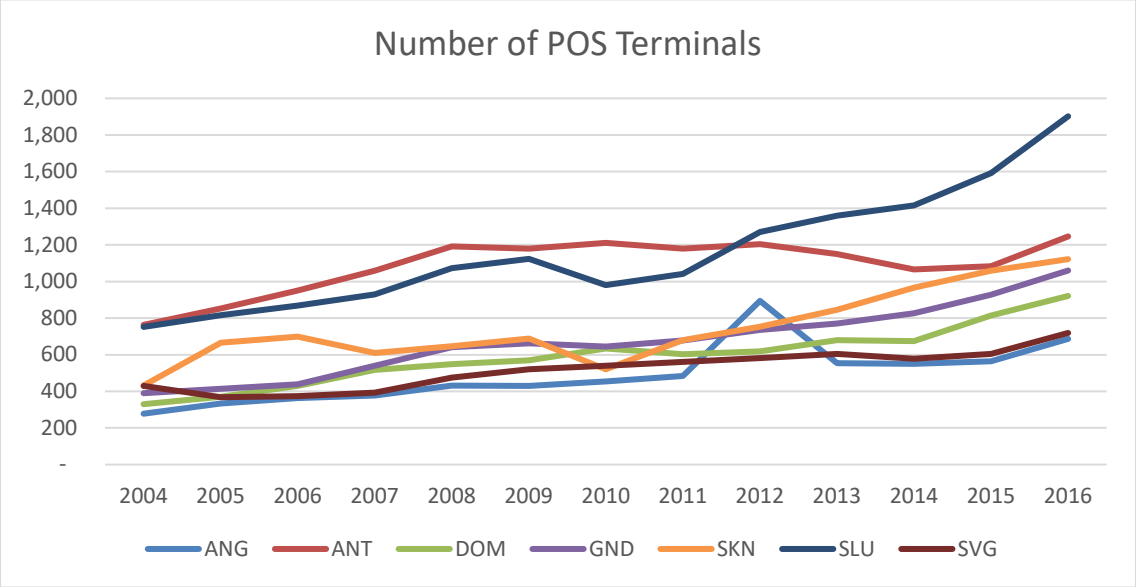
2.2 Financial Sector

The ECCU's financial sector comprises of commercial banks, insurance companies, national development foundations, development finance institutions, credit unions, building and loan associations, and other finance companies. The financial sector is dominated by banking institutions. Financial intermediation in the region has continued to record favourable growth rates due to increased lending as reflected by the rise in domestic credit backed by significant financial innovation. Some of these products include mobile banking, online banking, real time gross settlement systems (RTGS), and an increased number of ATM and POS terminals. These financial products are maintained by financial institutions and enhances their competitiveness in the sector. Financial innovations will not only generate returns for the innovators, but they have the potential to impact the entire economy and can lead to widespread changes.

2.2.1 Financial Innovation within the ECCU

The most common type of Point of Sale (POS) are electronic cash register used by merchants. The emphasis of POS terminals are the ease of use of software and hardware and the speed of operation. POS terminals were first introduced within the region in the early 2000's and has been gradually increasing in numbers over the years. For SaintLucia, there is a greater number of point of sales compare to the other countries (Figure 3). The POS terminals represent the number of organizations accepting card payments and can be used as a gauge of whether citizens are more responsive to technological changes and accepting the new innovative ways of making transactions in the economy.

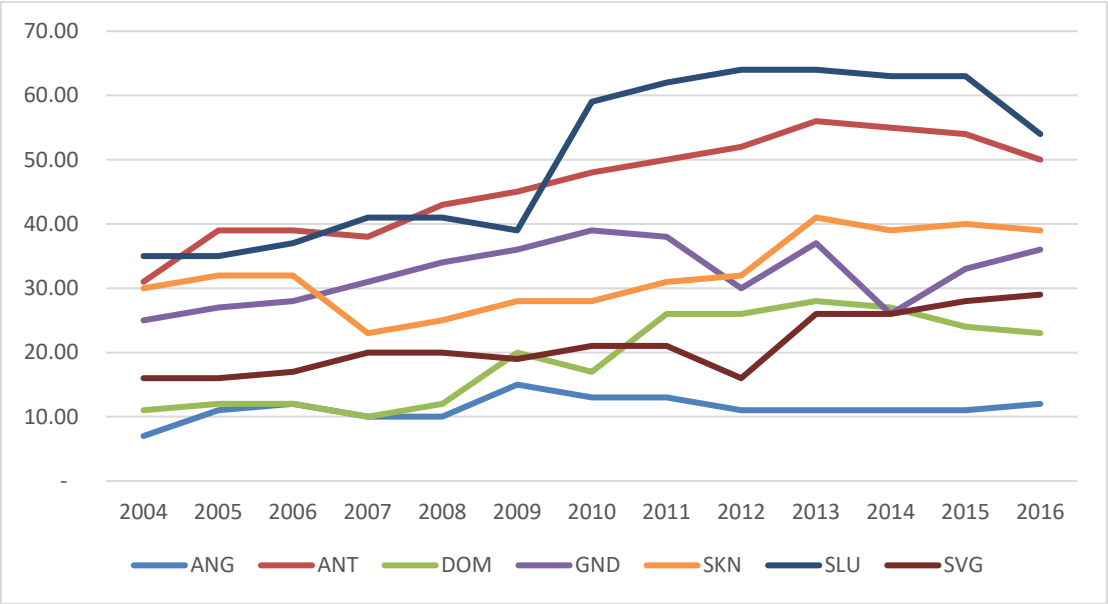
Figure 3: Number of Point of Sales Terminals in the ECCU Countries



Source: Eastern Caribbean Central Bank.

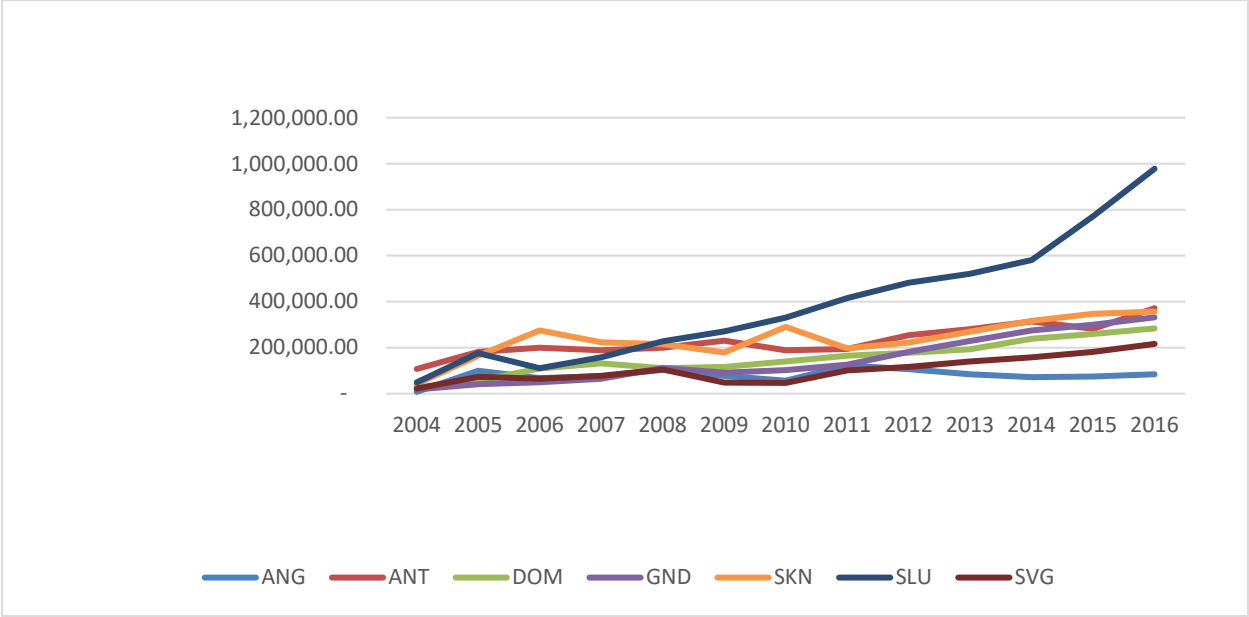
Likewise, ATM machines were introduced in the region in 2004. Figure 4 shows the use of ATM machines since its introduction up to 2015. A general increase was noted across all countries within the ECCU, of note, countries such as Saint. Lucia, which has experienced large growth relative to the other countries, utilizes the ATM services to increase its reach to customers. This is evident when we look at Figure 5 where Saint Lucia records the highest card usage in the region. Of note, the number of card transactions that took place over the period has increased generally, except for Montserrat. Countries that contribute to a higher per cent of economic growth (figure 2) utilizes more of the new financial instrument.

Figure 4: ATM Machines in the ECCU Countries



Source: Eastern Caribbean Central Bank

Figure 5: Total Card Transaction in the ECCU



Source: Eastern Caribbean Central Bank

3.0 Literature Review

The finance-growth nexus has been a topic of interest over the past decades, as there is a continuous debate on the relationship between finance and economic growth. The link between economic growth and financial innovation has been well studied but remain unclear. The two variables are clearly related, and this relationship has occupied the minds of economists for decades and the direction of causality have remained unsettled in both theory and empirics. This section will conduct a critical review of the literature on financial innovation and economic growth. This will be done in two parts,

3.1 Theoretical Review

The underpinning theory of the finance growth nexus can be trace back to Schumpeter (1911). "*Schumpeter was the first drew a strong connection between the innovative performance of an economy and the functioning of its credit and capital markets*" (Muzzucato, 2013). He introduced the term creative destruction[11] which ideally speaks to the fact that innovation can lead to economic growth. He argued that entrepreneurial activity, innovation and large corporations are key determinants of economic growth (Schumpeter (1942) as cited in Muzzucato (2013)).

One of the predominant factor of financial innovation is the reduction of transaction cost. This concept was put forward by Hicks & Niehans (1983)[12], which suggest that financial innovation is a response to technological advancement which leads to reduction in transaction cost. The authors examined the financial innovation for the microscopic economic structure change perspective. They concluded that the driving force for financial innovation was the reduction of transaction cost. Additionally, the reduction in transaction cost can encourage improvement in financial system.

Finally, there was theory put forward by Merton (1990), known as the Merton's market efficiency theory. This theory is based on the idea that financial innovations was designed to improve social welfare and increase market efficiency. Merton (1990) argued that markets are imperfect,

[11] Creative destruction refers to the constant product and innovation mechanism by which new production units replace outdated ones (Muzzucato, 2013).
[12] As cited in (Mwinzi, 2014)

therefore, inefficient, and as a result financial institutions should put interest in innovation to improve market efficiency. He noted that "*financial innovation is viewed as the engine driving the financial system towards its goal of improving the performance of what economists call the real economy*."

3.2 Empirical Review

The right kind of financial innovation encourages banks to invest in new technologies that can assist financial systems in achieving its role and consequently, deliver growth. According to Bara et Al (2016), financial innovation channels surplus from savers to more productive investments avenues, thereby, raising the rate of capital accumulation and thus economic growth. Levine (2010)[13] argued that technology and financial innovation are closely related and has developed together and that financial innovation is crucial for improving the wealth of nations. Overall financial innovation results in the venture of new financial technologies that enhances efficiency of capital, decreases transaction costs and hence stimulate higher levels of economic growth.

Levine (1997) in his study of the relationship between financial development and economic growth, stated that financial development was a good indicator of economic growth, capital accumulation and technological change. He purported that financial development depends heavily on financial innovation. Levine stated that economic growth relies on financial systems and that there should be a functional approach to understand the role that the financial system plays in economic growth. Levine developed five functions of the financial system namely: mobilize Savings, allocate resources, exert corporate control, facilitate risk management and ease trading of goods, services and contracts. Theses function if performed efficiently, they will foster growth through capital accumulation and technological innovation (Levine 1997).

Tufano (2003) did an excellent study into the review of Financial Innovation. He highlighted some purposes of financial innovation. He noted that financial innovations help reduce agency costs, facilitate risk sharing, complete the market, and ultimately improve allocative efficiency. For instance, in incomplete market, financial innovation can lead to improvement by providing

[13] Cited in (Bara, et al., 2016).

opportunities for risk sharing. Additionally, innovations address inherent concerns and information asymmetries. Information asymmetries have led to numerous innovations.

In Southern Africa, financial innovation is seen as the driving mechanism for growth in the developing countries. Oruo (2013) examined the relationship between financial inclusion and GDP growth in Kenya. The study established that GDP growth over the study period was increasing as well as number of automated teller machines, number of mobile money users/accounts and branch networks. Similarly, Mwinzi (2014) studied the impact of financial innovation on Economic growth in Kenya using the Ordinary Least Squared (OLS) method. He concluded that financial innovation in payment system resulted in improvement in economic growth. The study showed that the demand for traditional payment systems has decrease as customers are leading towards more effective payment systems. Additionally, Bara et al (2016) examined the role of financial innovation on economic growth in SADC. The results showed that there was a positive relationship between financial innovation and economic growth in the long run for SADC. The findings support the idea of increasing financial innovation in the SADC counties to enhance growth.

Laeven et al (2012) noted that economies without financial innovation will stagnate, irrespective of the initial level of financial development. They highlighted that for centuries, financial innovation has always been a driving force for economic development. The paper used the joint model of endogenous evolution of financial and technological innovation. The model utilized the Schumpeterian endogenous growth model. They recommend that analysis should stress adaptability and innovation as key elements for sustain growth. Additionally, they noted that, "laws, regulation, institutions and policies that impedes financial innovation slows technological change and economic growth."

Unquestionably, not all financial innovation contributes to economic growth. Number of researchers argue that the financial crisis was associated with financial innovation. Researchers have found that financial innovation is associated with higher growth volatility among industries that are rely heavily on external financing and on innovation (Beck et al 2014). Paul Volcker, former chairman of the Federal Reserve and an advisor to President Obama, claim that financial innovation in recent years has done anything to enhance the economy. And, Henderson and

Pearson (2010)[14] show that financial institutions engineered financial products that exploited uninformed investors.

4.0 Data and Methodology

The data collected for this paper was obtained through the Eastern Caribbean Central Bank's database and the World Bank. This paper used panel data for seven (7) ECCU countries for the period 2004-2016. The sample does not include prior years due to lack of data for variables used to measure financial innovation. The data was analysed using Stata-14.

4.1 Methodology

This study employed the extended Aghion, Howitt, and Mayer-Foulkes (AHM) Model developed by Laeven, Levine & Michalopoulos (2012). A key feature of their model was that, despite the level of financial development, without financial innovation economies will not grow. Let's first consider the AHM cross-country regression framework:

$$g - g1 = b_0 + b_1F + b_2(y - y_1) + b_3F(y - y_1) + b_4X + u \quad (1)$$

where $g - g_1$ is average growth rate of per capita income relative to U.S. growth over the period 1960-95, F is financial development in 1960, which is measured as credit to the private sector as a share of GDP, $y - y_1$ is log of per capita income relative to US per capita income, X is set of control variables, and u is an error term. AHM estimate this regression model using cross-sectional data on 63 countries over the period 1960-1995. In contrast to AHM, the extended AHM model stresses the importance of financial innovation, not financial development. Indeed, in their model the level of financial development in any period is an outcome of previous financial innovations. Building on the model above, Laeven et al (2012) amend the AHM regression framework as follows:

$$g_{i,t} - g_{1i,t} = b_0 + b_1F_{i,t} + b_2(y_{i,t} - y_{1i,t}) + b_3F_{i,t}(y_{i,t} - y_{1i,t}) + b_4X_{i,t} + b_5f_{i,t} + b_6f_{i,t}(y_{i,t} - y_{1i,t}) + \delta_i + \mu_{i,t} \quad (2)$$

Where t indicates the particular period, so that t = 1,2,...7, for each country i, data permitting, δt is the coefficient on a country-specific effect, and where they also control for a time-specific effect in each period in the panel. This study estimates a reduced form of equation (2) by dropping

[14] Cited in (Laeven, et al., 2015)

comparative variables such that interpretation of coefficients becomes that of responsiveness rather than speed of convergence. The dynamic panel regression model to be estimated in this study becomes:

$$lGDP\_PC_{it} = \beta_0 + \beta_1 CTR_{it} + \beta_3 lPOST_{it} + \beta_4 PSC_{it} + \beta_5 GCF_{it} + \beta_6 TO_{it} + \beta_7 GEXP_{it} + \mu_{it} \quad (3)$$

Where lGDP_PC is the log of per capita GDP, CTR is card transaction, lPOST represents the log of point-of-sales- terminals, PSC is private sector credit to GDP, GCF is gross fixed capital formation, TO is trade openness and GEXP is government expenditure.

4.2 Data

There is no approved measure of financial innovation, henceforth, studies often proxy financial innovation with different variables (Laeven et al 2012). For this research, the number of point of sale terminals (POST) and the value of card transactions (CTR) both credit and debit card will be used as proxies for financial innovation. These variables represent more modern innovations within the financial sector that managed to increase the access to financial credit and ease of payments.

Financial development is proxied by private sector credit to GDP (PSC). PSC is more likely to gauge development within the financial sector as it explains the financial depth within the sector. It is expected that financial innovation will have a positive effect on economic growth. This is based on their ability to reduce cost of financial transactions, raise the ability to access credit and boost the level of efficiency in the financial sector, thereby driving economic activity and growth.

Other variables include, gross fixed capital formation (GCF), trade openness (TO), and government expenditure (GEXP)[15]. These variables were included in the model as there was an interest in considering the effects of the additional variables in the model. GCF and TO are expected to have a positive effect on growth while GEXP is expect to have a negative effect. Economic growth is measured by per capita GDP. Lastly, all financial variables were deflated by the consumer price index.

[15] See table 1 for definition of variables.

5.0 Results and Analysis

The correlation results indicate a positive relationship for all the independent variables except for government expenditure, consistent with the initial prediction in the model (see table 4 in Appendix). The results also provide strong evidence of a strong correlation between private sector credit to GDP and per capita GDP (0.5941), gross fixed capital formation and per capita GDP (0.5660). However, there was a weaker correlation between point-of-sales terminals and per capita GDP (0.0601); and card transaction and per capita GDP (0.2448). Importantly, given that correlation does not necessarily provide evidence of causation, a regression was done.

5.1 Estimation Results

In the study, the models were estimated using the Pooled Ordinary Least Squares (OLS) Method. The summarized regression results are presented in the Table 1. Four models were estimated:

- Model 1 : $lGDP\_PC_{it} = \beta_0 + \beta_1 CTR_{it} + \beta_2 GCF_{it} + \beta_3 TO_{it} + \beta_4 GEXP_{it} + \mu_{it}$ *(4)*
- Model 2 : $lGDP\_PC_{it} = \beta_0 + \beta_1 lPOST_{it} + \beta_2 GCF_{it} + \beta_3 TO_{it} + \beta_4 GEXP_{it} + \mu_{it}$ *(5)*
- Model 3: $lGDP\_PC_{it} = \beta_0 + \beta_1 CTR_{it} + \beta_2 GCF_{it} + \beta_3 TO_{it} + \beta_4 GEXP_{it} + \beta_5 PSC_{it} + \mu_{it}$ *(6)*
- Model 4: $lGDP\_PC_{it} = \beta_0 + \beta_1 lPOST_{it} + \beta_2 GCF_{it} + \beta_3 TO_{it} + \beta_4 GEXP_{it} + \beta_5 PSC_{it} + \mu_{it}$ *(7)*

The results on card transaction in the first regression (Model 1) are consistent with the prior expectations of the model. The coefficient was positive and significant at the 5.0 per cent level, with a point estimate of 0.027. The significance of the coefficient suggests that a 1.0 per cent increase in card transaction would lead to a 0.0271 per cent increase in per capita GDP on average, holding everything else constant. As more cards are supplied and more merchants accept cards, transaction volume increases. That is because consumers feel more comfortable using their cards for a larger proportion of their overall transactions. At the same time, merchants would desire access to the increasing pool of cardholders with guaranteed payment. In other words, an electronic payment system produces a multiplier effect that can result in significant increases in consumption. However, in model 3 when private sector credit was added to the model, card transactions became insignificant. A possible explanation is that private sector credit and innovation are joint measures of financial deepening however, private sector credit has a larger contribution, therefore, a greater growth effect.

Table 1: The impact of Financial Innovation on Economic Growth

(Dependent variable is logged per capita GDP)

VARIABLES	Model 1 CTR	Model 2 lPOST	Model 3	Model 4
CTR	0.0271**		0.0160	
	(0.0113)		(0.00986)	
GCF	0.0265***	0.0300***	0.0217***	0.0238***
	(0.00439)	(0.00436)	(0.00384)	(0.00373)
TO	0.0110**	0.0104**	0.00165	0.00162
	(0.00436)	(0.00440)	(0.00405)	(0.00388)
GEXP	-0.0136*	-0.00437	0.00112	0.00815
	(0.00748)	(0.00686)	(0.00687)	(0.00599)
lPOST		0.178*		0.196**
		(0.0942)		(0.0779)
PSC			0.00971***	0.0104***
			(0.00168)	(0.00162)
Constant	9.136***	7.894***	8.781***	7.365***
	(0.225)	(0.721)	(0.202)	(0.601)
Observations	91	91	91	91
R-squared	0.391	0.376	0.562	0.580

Note: The dependent variable is the logged per capita GDP. The Pooled OLS estimation model. Sample period 2004-2016. Standard Errors are in parentheses. *, **, *** indicate statistical significant 10%, 5% and 1% respectively.

The number of point of sales terminals was statistically significant in models 2 and 4 at the 10.0 per cent and 5.0 per cent levels, respectively. The interpretation of the results is that consumption is likely to be stimulated as more merchants and consumers make use of the technology. Additionally, the efficiency gains brought about by the technology, such as ease of use, prompt processing and worldwide acceptance, among others, are likely to further impact the volume of business transacted.

Overall, point-of-sales terminals and card transaction have a positive effect on growth and are consistent with a priori expectations. The findings support the arguments that financial innovation encourages economic activity within the ECCU. The ease of conducting financial transactions is perhaps the key incentive for the use of electronic payment systems. These payment systems have several advantages over traditional modes of payment. According to Slozko and Pelo (2014), the

use of these payment systems will increase consumer spending which will increase the demand for goods and services and lead to a decrease in inventory, an increase in production, and a decrease in unemployment, thereby, facilitating growth.

In terms of the control variables, Private sector credit to GDP (PSC) maintained a positive and significant coefficient in models 3 and 4 at the 1.0 per cent level. This supports the initial prediction of the model, given that private sector credit drives domestic consumption to a large extent, thereby strongly influencing domestic activity. Gross capital formation (GCF) was significant in all models at the 1.0 percent level, given the long-term impact of investments on GDP. Trade openness (TO) maintain a positive effect on per capita GDP but was only significant in the first two models, reflective of the nature of the economies. Government expenditure (GEXP) had a negative effect on growth in the first two models, consistent with expectations. However, the variable was statistically significant only in the first model. A possibly explanation for the significant result is that government expenditure drives domestic consumption and investments on one hand, while negatively impacting the trade balance due to the open nature of the domestic economies. In addition, public expenditure that is financed by taxation, negatively impacts domestic consumption.

In addition to the Pooled OLS estimation, the Generalized Least Squares (GLS)[16] estimation was applied. The results are displayed in Table 6 in the Appendix. The results from the regression presented similar findings with that of the Pooled OLS, therefore, supporting the results that was put forward above.

[16] The GLS is designed to produce an ideal unbiased estimator for situations with heterogeneous variance. The model assumes that there is cross sectional dependence given the single financial space and currency; among other things.

5.1 Granger Causality Tests

The Dumitrescu & Hurlin Granger non-causality test was utilized in this study. Table 8 shows the results for the test estimated between selected variables. The results indicate that there is no causality from financial innovation to per capita GDP or vice versa. However, there is the possibility of a long run causal relationship. Therefore, it is not conclusive to say that there is no causal relationship between financial innovation and growth.

6.0 Conclusion and Policy Recommendations

This paper investigated the role of financial innovation on economic growth in the ECCU over the period 2004-2016. The study limited financial innovation to payment systems. The findings showed that there was a positive relationship between financial innovation and economic growth, which supports the prediction in the model as well as the existing literature. The advancement in payment systems is fuelled by the development in technology and innovation, evidenced by the increased use point of sales terminals and card transactions. It is envisaged that ongoing development with electronic payment systems will expand the society's ease of access to cashless payments, thereby fuelling increased demand in the economy. This is in keeping with the ECCB's goal of significantly reducing the quantum of cash transactions over the medium to long term. Further, financial innovation is seen as a critical component to achieving the ECCU's growth target of 5.0 per cent based on the efficiency gains that are likely to be derived from the new technologies.

This paper like other empirical papers, encountered some limitations which may have impacted the robustness of the findings. First, the data sample was small, therefore limiting the ability to do adequate panel data-related estimation techniques that requires a larger sample set. Also, the researcher wanted to include other variables in the model based on empirical literature, but the data for ECCU was unavailable, thereby, limiting the proxies of financial innovation to payment systems. Consequently, it is the researcher's intention to expand the dataset and/or utilize other techniques to further investigate the relationships among the variables in the future. Despite the limitations, however, the overall results corroborate the existing literature and can serve as the basis for further research for the region.

Given the significance of financial innovation to broader economic growth, an examination of the key hurdles to the wider adoption of the new technologies may be warranted by governments. One such hurdle pertains to the fees imposed on merchants for very small transactions, which serves as a disincentive for the adoption of the technologies. Consequently, member governments may consider granting certain concessions to merchants to compensate them for any losses incurred through small charges by customers. Additionally, the authorities are encouraged to ensure that the necessary institutions are in place to safeguard the interests of consumers. A key concern here is the quality of the internet connection which is critical for the effective use of emerging products and services within the financial system. Lastly, governments may want to advocate greater card usage via education campaigns that highlight the benefits and potential risks to consumers, thereby empowering them in their decisions to adopt the new technologies. A key potential advantage offered by the new financial products is the efficiency gains they provide to both businesses and consumers, given the ease with which transactions can be carried out. Further, such products may provide a boost to the foreign exchange earning potential of the regional economies through increased tourist expenditures. The study also highlighted some of the regional deficiencies in respect of coverage of the dataset. As a result, the central bank, in collaboration with member governments, is advised to allocate resources towards studying and monitoring measures of financial innovation. Moreover, there also exists very little empirical literature on financial innovation in the region on the macro level, hence more research and focus should be targeted toward this area.

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Appendix

Table 2: Definition of Variables

Variable Category		Description	Definition	Expected Sign
Dependent Variable	GGDP_PC	Growth in GDP per capita	GDP divided by the number of person in the country.	-
Financial Innovation	POST	Point of sale Terminal	The number of Point of sales Terminals	Positive
	CTR	Card transactions (value)	Total value of Debit and Credit card transaction as % of GDP	Positive
Financial Development	PSC	Private Sector to GDP	Private sector credit divide by GDP	Positive
Control variables	TO	Trade Openness	Exports plus imports divided by GDP	Positive
	GEXP	Government Expenditure	Total Government Expenditure divided by GDP	Negative
	GCF	Gross Fixed Capital Formation	gross fixed capital formation divided by GDP	Positive

Source: World Bank data and International Monetary Fund.

Table 3: Summary Statistics

Variable	Obs	Mean	Std. Dev	Min	Max
lgdp_pc	91	10.10013	0.4520624	9.5467	10.9757
psc	91	6.369605	0.329554	5.8984	7.2291
lpost	91	6.52493	0.4282712	5.4806	7.5507
latpc	91	5.636359	0.6356231	4.5017	7.6769
ctr	91	11.66282	0.8105327	8.8736	13.4979
gcf	91	23.47063	8.91972	8.624759	57.44871
to	91	42.1258	9.609704	0	65.47549
gexp	91	23.17437	6.074538	13.45268	43.31087

Source: Calculated by Author

Table 4: Correlation Matrix

	lgdp_pc	psc	lpost	ctr	gfc	to	gexp
lgdp_pc |	1.0000						
psc	0.5941	1.0000					
lpost	0.0601	-0.0883	1.0000				
Ctr	0.2448	0.0559	0.3341	1.0000			
gcf	0.5660	0.2432	-0.1082	0.1866	1.0000		
to	0.1294	0.2444	-0.2525	-0.0536	-0.0482	1.0000	
gexp	-0.0464	-0.2046	-0.1887	0.3701	-0.0618	0.3639	1.0000

Source: Calculated by Author

Table 5: Granger Causality Test

Dependent Variables	lGDP_PC	lPOST	CTR
lGDP_PC	-	0.4596	0.1634
lPOST	0.7329	-	0.5717
CTR	0.6768	0.6382	-

Note: The null of no granger causality is rejected if the p-value is less than 0.05

Table 7: The effect of financial innovation on Economic Growth: GLS regression

(Dependent variable is logged per capita GDP)

VARIABLES	CTR		lPOST	
CTR	0.0143***	0.0148***		
	(0.00300)	(0.00265)		
GCF	0.0180***	0.0187***	0.0208***	0.0218***
	(0.00189)	(0.00112)	(0.00132)	(0.00186)
TO	0.00670***	-0.00140	2.96e-05	0.00592***
	(0.00203)	(0.00179)	(0.00188)	(0.00140)
GEXP	-0.00878***	0.00298*	0.00932***	-0.00355***
	(0.00154)	(0.00164)	(0.00180)	(0.00137)
PSC		0.00880***	0.00879***	
		(0.000800)	(0.00102)	
lPOST			0.240***	0.172***
			(0.0283)	(0.0201)
Constant	9.507***	9.007***	7.276***	8.313***
	(0.114)	(0.0758)	(0.184)	(0.171)
Observations	91	91	91	91
Number of id	7	7	7	7
Wald chi2(4)	103.20	491.80	901.32	274.29

Note: The dependent variable is the logged per capita GDP. The Generalized Least Squares (GLS) estimation model. Sample period 2004-2016. Standard Errors are in parentheses. *, **, *** indicate statistical significant 10%, 5% and 1% respectively.

Economic Openness and Economic Growth, What Has Been the Experience of the ECCU?

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Abstract

The ECCU is a group of small open and dependent economies such that they are subject to exogenous shocks that continue to affect economic growth performance. Economic growth performance in the Eastern Caribbean Currency Union (ECCU) has been on a decline since the 2008/2009 financial crisis. While there has been some recovery in recent years, the growth performance measured by growth rates and growth levels, has yet to realign with pre-crisis performance Although the ECCU has been an open region from pre-independence and throughout post- independence, the impact of economic openness has yet to be empirically investigated.

This paper employs a panel Vector Error Correction Model (VECM) and Granger Causality test to investigate the relationship between economic openness and economic growth in the six independent countries of the Eastern Caribbean Currency Union (ECCU) over the period 1995 to 2013. This method allowed the study to achieve its three main objectives. First, this study utilized two openness indicators, FDI and trade openness, on the ECCU's economic growth. Second, the study investigated openness in the case of ECCU countries solely such that policies rendered may aid in achieving the ECCU's goal of increased economic growth. Third, in a contemporary and comparative approach, the study captures trade openness with tourism arrivals against the traditional metric, which is the main export of the ECCU economies.

The results indicate that there is a unidirectional long-run relationship running from the economic openness indicators to economic growth, which is validated by the cointegration analysis. Granger Causality analysis also confirms a causal unidirectional relationship from FDI to economic growth, tourism arrivals and economic growth but no causal relationship with respect to the traditional trade openness indicator.

Key terms: Economic growth, FDI, trade openness, ECCU, VECM, Granger Causality

JEL Classification:

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1.0 Introduction

It is widely believed that small open economies benefit positively from foreign direct investment (FDI) inflows and trade openness. In fact, many post-independent Caribbean islands have adapted an export-led, open economy strategy, based on attracting FDI in key sectors to spur economic growth. . Initially, attaining relatively high growth rates was seen as critical for achieving targeted economic and social objectives such as reducing unemployment and poverty. However, the focus has shifted over time away from simply attaining growth to ensuring that there is resilience and sustainability in the level of growth. This is in recognition of the reality that these small open economies are subject to great output volatility induced by their level of exposure to external shocks from global economic as well as natural disasters.

Economic openness has traditionally been comprised of two dimensions: Firstly, there is the free trading of goods and services between home and foreign countries and secondly, there is the liberated flow of international capital into a host country, as noted by Marwah and Tavakoli (2004). These two dimensions are critical and there is a vast body of literature that has provided insights into their relationship with economic growth. For instance, Kakar and Khilji (2011) argued that the expansion of trade activities is likely to stimulate local demand, which may result in the establishment of large-scale industries that can result in an increased level of export. In relation to FDI, McLean and Shrestha (2002) found that in developing countries FDI plays a very important role in spurring economic growth and development.

The ECCU's growth performance in the 1980s were perhaps the best over the last 40 years, achieving an average growth rate of 12.6 per cent compared to 6.4 per cent in the 1990s and 4.6 per cent in the 2000s. These statistics have moved in synchronization with the exogenous shocks that have plagued the territories over the years. For instance, in the 1970s and 1980s the countries enjoyed preferential trading and liberated investment inflows that allowed the economies to experience robust growth performances. However, in the 1990s, such trade arrangements were disbanded and the investment flows were curtailed; this restrained growth performance. In the 21st century, natural disasters and international crises resulted in a further downward trend in economic performance in the ECCU. Initially in the early 2000s the region's economic performance started an upward trend, it peaked at 10.5 per cent by 2006, influenced by a favourable external environment and the positive developments associated with the hosting of

2007 International Cricket Council (ICC) World Cup. Growth spiral downwards thereafter as the 2008/2009 global financial crisis negatively impacted economies of the member countries in the currency union. .

Given the current growth performance, the constant threat of exogenous shocks and the need to be relevant and competitive players in the world economy, the ECCU has placed tremendous focus on spurring growth in a sustainable manner. This research therefore adds to the discussion through an empirical investigation of the causal link between FDI and trade openness on economic growth in the ECCU.

Theoretically, there are a number of channels through which each of these variables are likely to affect the ECCU economies. For instance, FDI can be a promoter of economic growth in less developed countries (LDCs) as it allows for technological spillovers, strengthening of the supply capabilities of the host country, and potential enhancement of international competitiveness. As it relates to trade openness, this enables an economy to achieve a faster rate of growth contingent on the rate at which new technologies and skills are absorbed. In addition, trade openness can induce lower transaction costs of investment and promote In the ECCU, there limited studies have been undertaken focusing specifically on the impact of openness (both FDI and trade openness) on economic growth. Moreover, previous studies would have used static empirical methodologies such as Ordinary Least Squares (OLS), which may have been victim to statistical issues. As a result, this research finds four opportunities to contribute to the existing literature. Firstly, this study uses two openness indicators, FDI and trade openness, on the ECCU's economic growth. Secondly, the study investigates openness in the case of ECCU countries solely, therefore, the findings would produce specifics recommendations taking into consideration the specifics of the ECCU region. Thirdly, the study uses the panel Vector Error Correction Model (VECM) to investigate the impact of economic openness on economic growth. Within the VECM framework, short-run, long-run and causal relationships are investigated utilizing the Wald coefficient test, cointegration analysis and the Granger Causality test, respectively. Fourthly, in a contemporary and comparative approach, the study captures trade openness with tourism arrivals instead of the traditional metric.

The study follows with section two exploring the relevant literature on the present topic. Section three considers an important and informative assessment of the stylized facts surrounding the ECCU. While section four speaks to the methodology employed. First, it gives an overview of the empirical model used and the justification of its utilization. Second, it considers the empirical steps undertaken in the VECM framework. In section five, the empirical results are analyzed. The last section concludes the paper with policy recommendations.

2.0 Literature Review and Theoretical Underpinnings

2.1 FDI

There are two fundamental theories that this research sought to utilize in understanding the ways in which FDI, trade openness and capital formation impact economic growth. The neoclassical growth theory postulates that FDI contributes to economic growth by increasing physical investment and the marginal productivity of capital. In fact, similar findings of Mahran & Al Meshall (2014) concluded that FDI aids in augmenting domestic investment resources thus promoting capital formation. Their work thus shows one theoretical way in which FDI and capital formation are linked. To elaborate, given the law of diminishing rate of returns, countries with lower capital stock are able to increase growth by channeling financing to sectors of the economy that are productive.

The endogenous (new growth) theory on the other hand has determined that other factors are at play in determining growth. For instance, FDI allows for transfer of knowledge, human skills, innovative processes and the accumulation of knowledge. Asiedu (2002) noted that FDI can be a source of long-term capital investment into new technologies, managerial skills and marketing capabilities that can augment economic growth as technologies are diffused, employment is created, managerial skills are increased and innovations take place. In addition, Govil (2013) posited that FDI can increase competition as monopoly holds and profits are reduced, which thus results in improved quality and quantity of goods and services offered in the economy. The ultimate end is that economic growth can be invigorated. In casing the experience of Portugal, Andraz & Rodrigues (2010) uncovered a bi-directional causal link between inward flowing FDI and economic growth. Their analysis of such findings went on to suggest that expansion in FDI

is able to affect total capital formation, subsequently increasing the total production capacity and increasing external competitiveness.

While there are many studies that postulate a positive relationship between FDI and economic growth, this does not always hold as proven empirically by some research. For instance, Olatunji and Shahid (2015) employed the Engle Granger cointegration test in the case of Nigeria. The results did not show any long-run relationship between FDI and economic growth. In addition, the authors suggested the need to enhance the business environment with the provision of necessary infrastructure to build the FDI intake capacity of the country. Research examining the impact of FDI on economic growth conducted by Carkovic and Levine (2002) found that FDI does not exert an independent, reliable and positive impact on economic growth. The authors noted many studies may have been subject to statistical issues, for example failure to control for country specific-effects, endogeneity and simultaneity bias, and as such produced inadequate results.

Studies that considered FDI in the Caribbean include that of Taylor et at. (2012) who examined FDI in oil producing economies with a particular interest in Trinidad and Tobago. Their work concluded that countries with high degrees of trade openness tends to attract more FDI. In addition, they noted that the degree of trade openness along with other explanatory variables were positively related to FDI inflows. Campbell (2012) employed the Engle-Granger two-step procedure to look at the impact of FDI inflows on economic growth in Barbados and concluded a positive relation between the variables. Barnard & Bullen (2016) examined the FDI policy framework of the ECCU where they concluded a positive relation between FDI and economic growth.

2.2 Trade Openness

The endogenous growth theory's view on trade openness is that more open economies allow for the opportunity to bolster their factors of production in the productive sectors which allows for greater potential for growth. Moreover, the more efficient use of factors of production results in greater productivity that is pertinent for economic growth to take place (Thacker et al. 2012). Furthermore, it is postulated that trade openness enables a country to be better absorb technological developments of the relatively more advanced trading partners. Mahran & Al Meshall (2014) argued that in the case of developing countries, trade is able to enhance domestic

skills via the adaptation of superior technology and innovative processes. In fact, the authors went on to note trade openness could lead to increased competitiveness when more advance ways of production through open trade are embraced. Meanwhile, Awokuse (2008) postulated trade openness may serve as a conduit for technology trasnfer and imports can impact on productivity growth through its effect on domestic innovation via import competition. Adhikary (2011) argued that trade openness is likely to influence the flows of international capital as it relates to the risk-return relationship. The author further argued that international investors would not want to commit to long-term investment if a country imposes tariffs and non-tariff barriers to trade; therefore, a more liberated regime will invite more international investments and thus spur growth. In addition, Tahir and Azid (2015) suggested that open economies are better positioned to import investment and intermediate goods than would a closed economy; thus, open economies are better position to benefit from trade openness. Moreover, Dollar (1992) and Das (2002) also came to similar conclusions, citing that foreign capital and importation of intermediate goods can embody superior technology that can enhance productivity growth and by extension economic growth in an economy.

Mahadevan and Suardi (2010) explored the trade-growth nexus in the empirical framework of the Vector Autoregressive Model in the case of Singapore. The result showed that trade (exports and imports) has had a positive impact on GDP in the focus country. The research further identified the role of imports as providing intermediate inputs and foreign technology. Interestingly enough, the import experience of Singapore is also something that the ECCU nations have been privy to and can use to increase their global competitiveness as well. Studies conducted by Agbestsiafa (2010) on the UEMOA[17] countries have produced some mixed results in regards to the direction of causality. Employing the Johansen conintegration test, it was found that indeed there is a long-run relationship between trade openness and economic growth. However, in a few of the counties a bidirectional causal relationship was found while in other countries only a unidirectional causal relationship was found going from trade openness to GDP. In light of such findings, it is quite natural that the author suggested expansions in trade activity might result in increased economic growth in these countries. While many studies mentioned above may have found a positive link between trade openness and growth, there are authors that oppose this claim based on their

[17] The UEMOA countries refer to the Union Economique et Monetaire Ouest-Aafricaine

research. Rodriguez and Rodrik (2001) have cast some doubt on previous research conducted on the role of trade openness in economic growth. To elaborate, the authors cited problems with respect to how previous studies measured openness and the particular methodologies employed; for instance, inadequately dealing with the endogeneity issue. In addition, Awokuse (2008) noted that many early studies may have opted for methods such as ordinary least squares and simple correlation coefficient testing which would produce spurious results. This is due to the method's inability to capture the dynamics of the data over time; for example, unit roots and cointegration. Expounding on the author's point, Biswal and Dhawan (1998) and Richards (2001) argued that causality is a dynamic economic situation that needs to be modelled in a dynamic economic framework employing recently developed concepts such as unit root, cointegration testing and the VAR methodology.

Few studies that investigated trade and the ECCU were captured by the work of the following. Labadie and Barnard (2016) examined strengthening trade relations with the emerging economy of Brazil. . George (2014) noted free trade policies are conduits for increased competition and innovation in the ECCU economies.

2.3 Openness and Growth

The above literature considered the individual effects of FDI or trade openness on economic growth; however, in the proceeding sub-section a consideration of the impact of openness on overall economic activity is examine.

Marelli and Signorelli (2011) cased the experience of China and India, and concluded that openness (FDI and trade openness) both have a positive impact on growth but, most importantly, have made these economies more competitive globally. More evidence from Asia has also concluded the positive link between an open economy and economic growth as found by the research of Marwah & Tavakoli (2004). In their study, they found that in the case of Indonesia, Malaysia, Philippines and Thailand that after these countries strategically focused on the opening of their economies they were able to achieve positive economic performance.

This current research also seeks to understand the linkage between these variables. The literature has shown that there exists an interplay between FDI, trade openness and capital formation in spurring economic activity in a country. For instance, employing a panel methodology for

developing countries, Shahmoradi and Baghbanyan (2011) concluded that the extent to which an economy is opened would result in a positive effect on FDI inflows into that country. Singh and Kwang (1995) also adapted a panel approach in investigating the determinants of FDI in developing counties and cited a linkage mechanism of multinational firms that may engage in heavy trading activities as they commence operations in a particular country. The author further noted open economies smooth trade paths in and out of the countries such that FDI can flow uninterrupted because of less barriers. Research conducted by Hussin and Saidin (2012) analyzing the three variables' impact on growth has concluded a positive linkage between FDI and capital formation. In fact, the authors noted that FDI inflows can potentially add to gross fixed capital formation which eventuate into growth in the economy of the host country.

The review of the literature has found inconclusive results on the impact of FDI and trade openness on economic growth, thus keeping the doors open for continued dialogue on the subject matter. Although the findings vary in the literature this might be a function of the differing methodologies applied in the research that inadequately controlled for statistical issues. However, the takeaway is that open economies tend to benefit from transfer of knowledge, technology, skills, and increased competition. Moreover, by being open there can be increases in capital whether through FDI or multinational corporations (trade). The reviewed literature shows that carefully and strategically harnessing these three variables is able to result in a more competitive economy in the global arena, which was the case of many Asian and Latin American countries, see Awokuse (2008), Kakar & Khilji (2011) and Adhikary (2015).

3.0 Background and Stylized Facts

The ECCU is a group of islands located in the tropical area more generally known as the Caribbean.[18] These islands are in fact relatively young and the oldest independent country is Grenada at 42 years. The ECCU was formed in 1981 through the legal bindings of the Treaty of Basseterre[19] and consists of six Caribbean islands including Antigua and Barbuda, the Common Wealth of Dominica, Grenada, St. Kitts and Nevis, Saint Lucia and St Vincent and the Grenadines. For deeper integration, the Treaty was revised in 2010, establishing the Eastern Caribbean

[18] Note that Montserrat joined the ECCU in 1981 while Anguilla joined in 1995.
[19] For deeper reading of the claims made in this paragraph, refer to the following articles in the Revised Treaty of Basseterre. Articles 1, 2, 12, 14, 15 and 27.

Economic Union.[20] Some of the core objectives of the Treaty included the creation of a single and economic space, harmonious development of economic activities, and sustained economic and social progress and cohesion.[21]

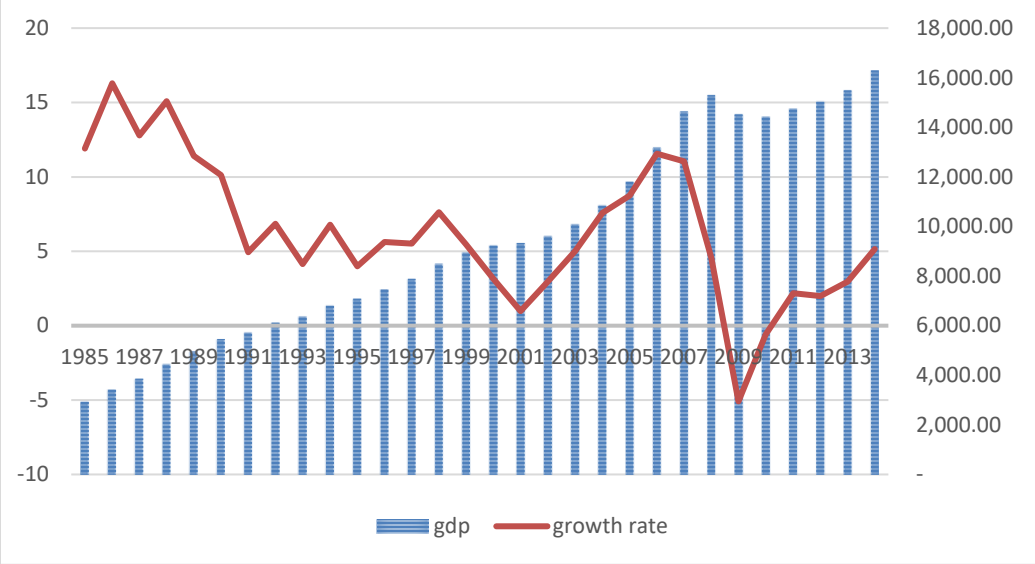
3.1 Economic Performance

The ECCU has endured volatile growth performance over the last 40 years. Exogenous shocks such as natural disasters, international crises and disbandment of trade agreements have all affected the performance of the economies.. In fact, ECCU's growth performance in the early 1970s and 1980s were perhaps the best over the last 40 years achieving growth rates as high as 18.6 per cent in 1980 (see Chart 1). This was the case as the region enjoyed preferential trade arrangements for their booming agriculture products and inflows of foreign aid. However, the region has been victim of adverse exogenous shocks such as the dismantling of preferential trading, terms of trade shocks, reduction in foreign aid and global economic crises; see Schipke, Cebotari and Thacker (2013). During the 1990s, the region embraced structural changes forced by the exogenous shocks it faced; as such, the economic performance started to decline, Thacker et al. (2012). Around the early 2000 the region's economic performance started picking up again but was short lived due to the drop in economic activity after the ICC World Cup and the 2008/09 global financial crises.

[20] The Treaty set out the legal parameters for which the single market is to be bolstered. It required each participating member state to co-ordinate and harmonize in areas of trade policies, monetary policies, immigration and foreign policy. The Treaty goes further to outline the structure for which free movement of persons should take place while explicitly noting the abolition of any discriminatory actions conducted by any member state against differing nationalities.

[21] The ECCU uses the Eastern Currency Dollar which is pegged to the United States of America Dollar $2.70 EC = $1 USD since 1976. The Eastern Caribbean Central Bank is the monetary authority for this Union.

Chart 1: ECCU growth performance

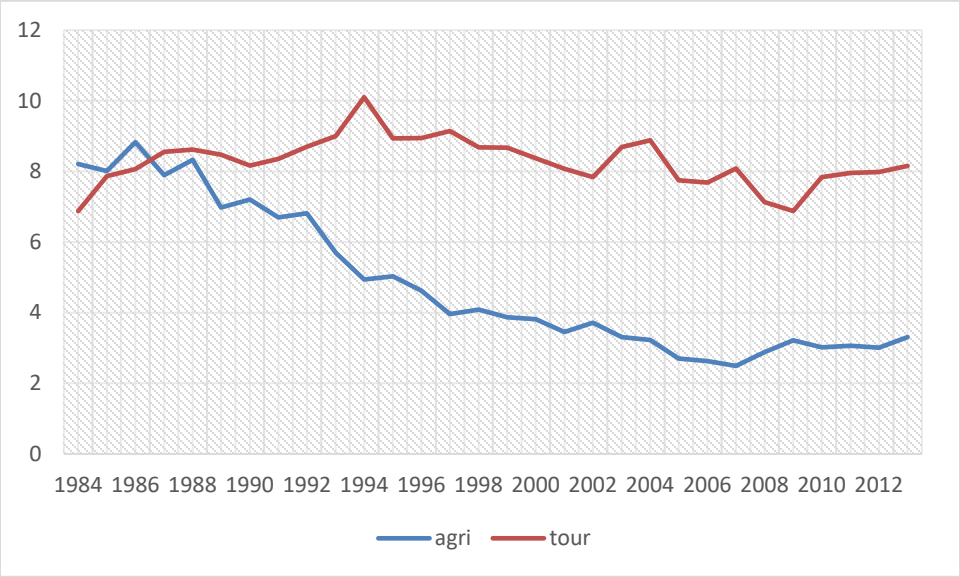


Source: Eastern Caribbean Central Bank

In light of the general declining contribution of the agriculture sector, on an ECCU level, the economies have shifted focus mainly to tourism and related services.[22] Chart 2 shows that since 1987 the tourism sector has surpassed the agriculture sector while the agriculture sector continues a downward trend. Moreover, comparing 1990-1999 to 2000-2009 shows that the agriculture sector's contribution to GDP was 5.3 per cent compared to the tourism sector's contribution of 8.9 per cent. For the 2000-2009 period, both ratios fell but the tourism sector still weights heavier (7.9 per cent) compared to the agriculture sector's 3.1 per cent contribution to GDP.

[22] Note while on an ECCU level tourism activity outgrows agriculture trading, economies such as Dominica and St. Vincent and the Grenadines' main export remains based in agriculture, see Chart 5 in appendix.

Chart 2: Agriculture Sector vis-à-vis Tourism sector



Source: World Bank Database

Adriens (2008) noted that the services industry has had a driving effect in the small economies of the Caribbean since the decline in the agriculture sector has taken place over the years. As such, the ECCU economies have sought to achieve higher levels of economic growth by bolstering their financial services and tourism industries, through liberated market operations.

3.2 Openness in the ECCU: FDI and Trade Openness

3.2.1 FDI

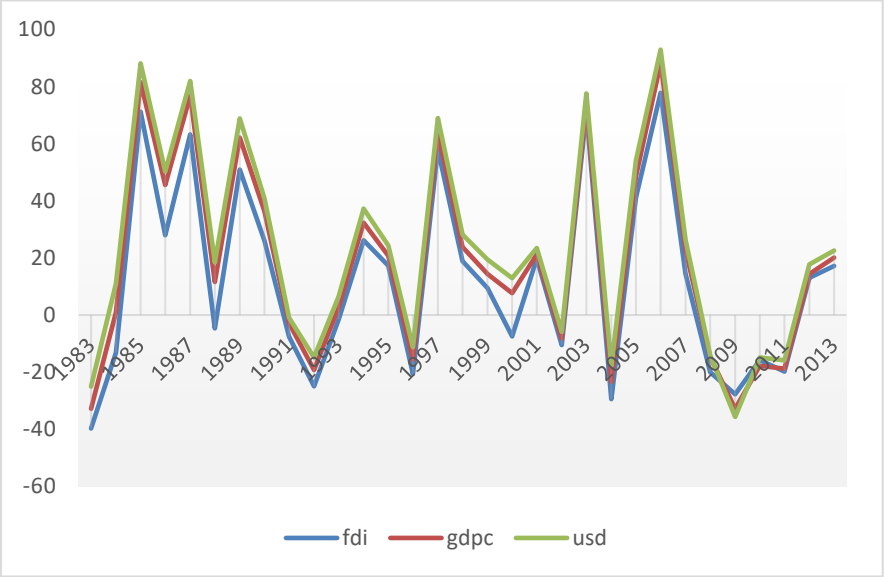
With respect to FDI, each territory has over the years, developed its own strategy to attract foreign investments into their islands, more focused with the advent of their respective investment promotional agencies. . Notwithstanding the individual country approach to investment promotion, the strategies of these investment agencies are however relatively homogenous across the islands. For instance, all countries allow 100.0 per cent repatriation of profits and capital, waiver on import tax duties, tax exemptions and holidays. In addition to the traditional investments, these countries with the exception of St Vincent and the Grenadines, all have Citizenship by Investment (CBI) programmes that allow foreign investors to acquire economic citizenship. Under these programmes investors normally are required to pay a lump sum or invest in a real estate project approved by the government.

Available statistics from 1984 ($78m)[23] show that the level of net FDI has been increasing reaching an all-time high in 2007 of $2.64b after which time a declining trend ensued in light of the 2008/09 global financial and economic crisis. Despite the fact of increasing net FDI levels, inflows to the region have been very volatile as indicated by its growth rate.

The statistics showed that the United States of America (USA) has been the largest source of FDI into the ECCU over the study period. Chart 4 shows a co-movement relationship between the growth rates of the ECCU's GDP per capita in relation to FDI inflows from the USA and the USA's GDP per capita.

[23] Figures quoted are in Eastern Caribbean Dollars (EC) unless otherwise noted.

Chart 4: Growth Rates: ECCU FDI, -ECCU and USA GDP per Capita



Source: World Bank Database

Over the past 30 years, the region has been able to attract roughly $1b in annual net FDI inflows averaging an annual growth rate of 14.7 per cent and representing 10.2 per cent of regional GDP. On a per country basis, net FDI has played a role in all the economies of the ECCU. For instance, annual average net FDI taken as a percentage of GDP shows its contribution ranges from as low as 7.5 per cent (Dominica) to 13.4 per cent in the case of St. Kitts and Nevis. Although, FDI inflows are increasing, it is important to note the fact that for the most part they have been directed into the tourism industry while other industries receive substantially less FDI. This implies the need for these countries to be creative in attracting foreign investment such that other areas of the economy can be advanced and hence diversify the economy.

3.2.2 Trade openness

ECCU nations, since post-independence have relied heavily on preferential trade arrangements to export the produce from these once heavily agriculture based economies. However, although there were preferential arrangements and other trade arrangements, there have always been exogenous shocks that have affected long-term benefits from such agreements. For instance, around the 1970s and 1980s these territories needed to supplement the declining main industry of sugar with the banana industry in many of the Windward Islands while Grenada went the way of cocoa, mace

and nutmegs. While they were afforded preferential trade with Britain, who once colonized these islands, in the advent of the World Trade Organization these arrangements came to a gradual end. In 1984, the conception of the Caribbean Basin Initiative (CBI), a unilateral trade programme between the United States of America and the Caribbean Islands was created. Under such an arrangement a number of tariff and trade benefits would have been offered to Caribbean islands including the ECCU territories. However, with the inception of the North American Free Trade Agreement (NAFTA – 1994), Mexico proved to be a more beneficial trade partner such that the ECCU lost their advantage relative to Mexico.

The most recent form of trade aid comes in the form of the Economic Partnership Agreements (2008) which are extensions of the Cotonou Agreement first signed in June 2000.[24] Unlike the Cotonou Arrangement that provided non-reciprocal trade from ACP[25] countries to the European Union, the Economic Partnership Agreement (EPA) has now made the trade relations between these countries reciprocal. In other words, while the EU allows ACP countries to export their goods to the EU markets by receiving duty-free access, ACP counties are now required to allow EU exports into their borders with duty-free access as well. Although the arrangement has been in place for some eight years to date, OECS territories have not yet harnessed the full potential of the initiative. Moreover, some analysts are arguing that there is no benefit to be had in the current construct of the agreement. Most significantly, is the recent Brexit vote that might have some adverse implications for this arrangement. This induces uncertainty for ECCU territories and yet another shock that continues to affect trade performance.

[24] Cotonou Agreement is a treaty between the European Union and the ACP countries mainly to facilitate trading from the ACP counties to the European Union.
[25] ACP countries includes African, Caribbean and pacific Group of States.

4.0 Empirical Methodology

4.1 Model

Panel vector error correction model (VECM) and panel Granger causality analysis were utilized to investigate the causal link between FDI and trade openness on economic growth in the six independent economies of the ECCU, which is also the model used by Adhikary (2015)**.** To assess this empirical causal relationship, the general specification of the VECM follows:

$$\Delta y_{jt} = \alpha_1 u_{t-1} + \sum_{j=1}^{n} \delta_{jt} \Delta y_{t-j} + \sum_{j=1}^{n} \beta_{jt} \Delta X_{t-j} + \sum_{j=1}^{n} \gamma_{jt} \Delta G_{t-j} + e_{jt} \qquad eq.\ 1$$

$j = 1, 2, 3 \ldots . N \; and \; t = 1, 2, 3 \ldots . T$

Where Δ is the lag operator, u_{t-1} is the error correcting term (ECT) used to handle variables that may have deviated from their long-run equilibrium path due to some disturbance over time and e_{it} is the error term. *X* is a vector of exogenous variables not defined or explained in the system while *G* is a vector of endogenous variables. j denotes the j^{th} country in the t^{th} period.

The actual VECM estimated follows:

$$\Delta lneg_{jt} = \alpha_1 u_{t-1} + \sum_{j=1}^{n} \alpha_{jt} \Delta lneg_{t-j} + \sum_{j=1}^{n} \beta_{jt} \Delta lnfdi_{t-j} + \sum_{j=1}^{n} \gamma_{jt} \Delta lnto_{t-j} + \sum_{j=1}^{n} \delta_{jt} \Delta lngov_{t-j} + \sum_{j=1}^{n} \varphi_{jt} \Delta lnhhc_{t-j} + e_{it} \qquad eq.2$$

Where $e_{it} \sim i.i.d\ (0, \sigma^2)$

ln is the natural logarithm**.** ***eg*** is Gross Domestic Product per capita which used to capture economic growth. ***fdi*** is the net inflow of foreign direct investment, it is widely the notion that open economies are more likely to attract relatively more ***fdi*** inflows than closed economies. ***to*** represents trade openness which is traditionally measured by the sum of exports and imports divided by GDP [(x+m)/gdp]. Trade openness as posited by the literature allows for increase efficiencies (productivity) and technological spill overs. Therefore, net ***fdi*** inflows and ***to*** are the openness indicators employed in this study. Control variables include government spending noted

as ***gov***. Government activity is very large in these economies and contributes substantially to economic activity. The ***hhc*** captures household consumption.

Trade openness redefined in the context of the ECCU. This research suggests ***tourism arrivals (ta)*** to capture economic openness in the context of the ECCU, three rationales are provided. (i) Theory. (ii) Problems with traditional trade openness. (iii) Statistical trends.

Faber and Gaubert (2016) highlighted tourism as a medium for market integration (or globalization) where instead of the traditionally shipped goods; tourism involves exporting non-traded local services to consumers moving across the market. Moreover, the authors noted that tourism exports have become crucial to advance the global integration of a country, in particular developing countries. To this end, tourism has attracted extensive policy attention globally as countries have been focusing on bolstering their tourism product such as the introduction of promotion agencies. Similar study carried out by Wong and Tang (2010) on economic openness and economic growth in Singapore utilized tourism arrivals as their measure for openness with respect to the economy. Yet more evidence from Carsamer (2015) who supports the notion that tourism exports contribute a large portion to Less Developed Countries' (LDCs) exports citing an estimated 45 per cent contribution due to tourism service exports globally. Ajvaz (2015) noted that worldwide increases in tourism trends resulted in countries opening up their borders to tourism and tourism based investments and have become competitive with food products and vehicles exports. In fact, The United Nations World Tourism Organization (UNTWO) posited that international tourism represents 7 per cent of the world's exports in goods and services, outpacing world trade for the past four years.[26] In addition, from a worldwide export category, tourism ranks third after fuels and chemicals but ahead of food and automotive products; but in developing countries tourism ranks as the number one export sector.

The traditional metric is a measure of country size and its level of integration into internationalmarkets than trade policy oriented. This is evident in light of the fact that the United States of America (USA) is considered one of the most restrictive countries while developing countries (e.g. Jamaica) rank at the top of the list. Moreover, the measure appears imprecise when making comparisons, statistics show that developing countries are rank higher than developed

[26] Refer to the UNWTO Tourism Highlights 2016 Edition for more insight into to global trends of tourism activity.

countries see David (2007). Moreover, the metric depends on a fusion of non-policy and policy dimensions. Non-policy aspects include resource endowment, country size, and taste while policy aspects are concerned with trade restrictions (trade laws). Therefore, a country may have a high trade ratio based on its non-policy construct rather than the policies implemented by the country, Lloyd and Maclaren (2002).

In the stylized facts section, the data show that on an ECCU level the tourism sector has surpassed the agriculture sector since 1987 and shows that the latter is on a downward trend since then. Further, comparing two decades (1990-1999 and 2000-2009), shows that the tourism sector contributes more to the region's GDP in both decades compared to the contribution from the agriculture sector. Moreover, four of the six independent ECCU territories show that tourism is the main export, see Table 5 in appendix.[27] On a per country assessment, the Dominican agricultural sector contributes more to GDP than does tourism but in St Vincent and the Grenadines, the agriculture sector shows decline relative to the tourism sector. In summary, tourism is an export that has been challenging traditionally traded goods. In fact worldwide and is many LDC's, tourism exports are the main integrating link into global markets. Moreover, unlike the traditional metric's failure to decipher between policy and non-policy measure, the proxy used captures the deliberate policy efforts of ECCU member governments to increase tourism exports. Secondly, data reveal that tourism activity has outweighed and contributed more to the region's GDP versus the agriculture sector under the study period. Upon these points, it may be more adequate to use tourism arrivals to capture openness in the ECCU.

4.2 Empirical methodology

Panel Unit Root test

The test for unit root is done analyzing if the series reverts to its mean (stationary) or if the series contain either a deterministic or stochastic trend (non-stationary) Mamingi (2005). In fact, estimating a non-stationary series would result in spurious regression, upon which accurate interpretation cannot be conducted, Maddala and Kim (1998). Moreover, this concept aids in understanding the nature of the variable and its potential impact on economic performance as it relates to structural breaks. For instance, if FDI is found to have unit root, it may suggest shocks

[27] Dominica and St. Vincent and the Grenadines are the economies with agriculture as the main export.

to this variable may be permanent versus temporary on economic performance. Other benefits of the panel unit root test are noted in the power of such test compared to individual unit root tests of times series data.

Panel unit root tests Im, Pesaran & Shin (IPS) and Hadri panel unit root tests were used. The IPS tests individual unit root processes assuming that ρ_i varies across the cross-sections. Furthermore, the test combines individual unit root tests to derive a panel specific result. On the other hand, the Hadri builds on the premise that there is a common unit root process. The test is based on residuals obtained from individual OLS regressions; one may specify a constant or a constant and trend. While the IPS tests the null as unit root, Hadri tests the null as no unit root.

Panel Cointegration tests

Cointegration has long been a statistical consideration in empirical studies. The concept concerns itself with the long-run relationship between non-stationary variables. The algebra of cointegration states that if two variables are integrated of the same order (say, I(1)**)** with their linear combination of a lower order (say, I(0)**)** of integration, then the variables are said to be cointegrated. However, the need to difference a non-stationary series to obtain stationarity potentially throws away this important long-rung relationship Maddala and Lahiri (2009). Therefore, running this test was important to determine if the long-run relationship has been eradicated via differencing or not. Further, if there is no cointegration amongst the variables it suggests the pure Vector Autoregressive model (VAR) is sufficient but if there is cointegration then a Vector Error Correction Model (VECM) is appropriate because it corrects the presence of cointegration with an error correcting term according Karanfil and LI (2015). One of the key drawbacks of panel cointegration which panel unit root is also subjected to is short time series such that more robust methods may have to be employed.

The Fisher combined Johansen panel cointegration test was employed, examining the nature of cointegration between the variables. The non-residual based test provides a number of benefits over its residual based counterparts. These include (i) it is not affected by the randomness of the residuals (ii) it provides valid test statistic and (iii) it has the ability to speak to the precise number of cointegrating relationships (iv) not affected by sample size and (v) can handle imbalance order of integration relationships.

Estimating the long-run relationship

Using static approaches such as ordinary least squares (OLS) methodology to estimate cointegrated relationships have great consequences such as biased estimator of the parameters. Alternative approaches for panel cointegration estimation are the fully modified ordinary least square (FMOLS) proposed by Pedroni (2000) and the dynamic ordinary least squares (DOLS) offered by Stock and Watson (1993). Both the FMOLS and the DOLS are found to provide consistent estimates more appropriate for inference purposes and have normal limiting properties. In light of the short times series dimension, the study opted to use the DOLS since it is superior to the FMOLS in short samples. Most importantly, the DOLS corrects for the statistical issue of endogeneity and serial correlation, issues that need to be adequately addressed.

VECM model

If the variables of the model, at least two, are cointegrated then the Granger representation theorem holds. It posits that a valid error correction model holds which utilizes an error correction term to correct for any short-run deviation in the variables. The VECM advances on the cointegration analysis to explore the existence of causality between the variables as well. In addition, Maddala & Kim (1998) explains that the pure VAR produces erratic estimates due to high multicollinearity among the explanatory variables. Alternatively, ECMs were established to remedy the issues of the pure VAR, determine whether or not there are any long run relationships and capture the dynamic behaviour of current variables as well. The VECM was estimated using generalized method of moments (GMM) using lagged values of the regressors as instruments.

Panel Granger Causality

The last step is the Granger Causality. In statistical terms, the concept posits that given a time series containing y_t and x, y_t Granger causes x_t if the inclusion of y_t leads to a better prediction of x_t than if y_t was excluded. Further, causality can be unidirectional, running from y_t to x_t or vice versa; or bidirectional, running both directions. In addition, if cointegration is found between the variables then the Granger Representation Theorem holds, which indicates that Granger causality exists in at least one direction.

The panel Granger Causality advanced by Dumitrescu-Hurlin was employed. The method allows all coefficients to be different across cross-sections such that

$$\alpha_{0,i} \neq \alpha_{0,j}, \alpha_{1,i} \neq \alpha_{1,j}, \ldots, \alpha_{1,i} \neq \alpha_{1,j}, \forall\, i,j \qquad eq.3$$

$$\beta_{1,i} \neq \beta_{1,j}, \ldots, \beta_{1,i} \neq \beta_{1,j} \forall i,j \qquad eq.4$$

Diagnostics

Along with the expected diagnostics, cross-sectional dependence is checked. In the context of panel studies, it may be likely that substantial cross-sectional dependence in errors may arise due to common shocks, unobserved components and spatial dependence. The general hypothesis of no cross-section dependence is considered in terms of correlations between the disturbances in different cross-section units given by:

$$H_0: \rho_{ij} = Corr(u_{it}, u_{jt}) = 0 \; for \; i \neq j \qquad eq.5$$

In this study the Breusch-Pagan Chi-square test for cross-section independence was employed. In the context of dynamic panel estimators, the presence of cross-sectional dependence has severe consequences. Refer to De Hoyos & Sarafidis (2006) for a deeper discussion on the subject. Note, the Bayesian (Schwarz) information criterion (BIC)/(SIC) was used throughout the research. All discussion on diagnostics are found in the appendix.

The time series data span the years 1995 to 2013 gathered on an annual basis where all variables are expressed in Eastern Caribbean dollars with 2010 as base year. Data utilized in this study were mainly gathered from the World Bank and the Eastern Caribbean Central Bank (ECCB).

5.0 Empirical Results and Analysis

5.1 Unit Root test

The results concluded that each variable is integrated of order one or I (1) while their linear combination (that is, the error term) is I (0) at 5% level of significance; see Table 2. Note, I (n) speaks to the number of times a variable is differenced to achieve stationarity and the fact that all variables are I (1) suggests there is a balanced order of integration. The implications of these results are that the model can avoid estimating inaccurate results in the presence of unit root variables. In addition, the balance order of integration allows the research to employ a robust cointegration test to enhance the results of the study.

Table 2: Panel unit root test

Variable	Im, Pesaran & Shin (IPS)	Hadri	Im, Pesaran & Shin (IPS)	Hadri
	Level		1D	
Ln eg	0.2521	0.0000	0.0000	0.1727
Ln fdi	0.3363	0.0143	0.0000	0.7098
Ln to	0.2122	0.0000	0.0000	0.5379
Ln gov	0.8158	0.0000	0.0000	0.4852
Ln hhc	0.7148	0.0000	0.0000	0.3971
Ln ta	0.3853	0.0041	0.0000	0.1511
Resid	0.0000	0.4899		

Variables are I (1) at 5 % level of significance

5.2 Cointegration test

After detecting cointegration relationships, equation 2 fitted with ***to*** and then with ***ta*** was estimated. The results are opposing; they indicated that trade openness has no long-run relationship with economic growth in the ECCU while tourism arrivals have such a relationship.

Table 3: DOLS coefficient results

Equation	$\widehat{\boldsymbol{\beta}}$	p-value
FDI1	0.049915	0.0821*
TO	0.048181	0.6880
FDI2	0.052102	0.0507
TA	0.363235	0.0532

* Significant at 10 % level of significance

According to Table 3, the long-run coefficient on ***ta*** is 0.4 and is significant at 5 per cent level of significance. Further, since the model is estimated in logarithms then this indicates the elasticity of ***ta*** would cause a 0.4 percentage point increase in economic growth given a 1 per cent increase

in ***ta***. The results prompt further investigation, the study would need to assess the short-run causal relationship between the variables with the use of the VECM in the following section. In both versions of equation 2, ***fdi*** has been found to have a long-run relationship with economic growth.

5.3 Long-run Estimation with DOLS

Test results reported in Table 4 (see appendix) show that there are at most four cointegrating relationships. The finding is consistent with theory which suggests that there can be up to n-1 (n = number of variables) cointegrating relationships. To the extent that cointegration has been found, it indicates that the Granger representation theorem holds. The theory posits that in the presence of cointegrated variables, "Granger causality exists in at least one direction", Mamingi (2005, p. 201). Most importantly, there will be a valid error correction model, that is, a VAR that is restricted with the presence of a lagged error correction term as the restriction term. The bottom line of the cointegration result is that the long-run relationship between the variables can be exploited by member governments of the ECCU to spur economic activity.

5.4 VECM results

Results from the panel vector error correction model validated both the cointegration and DOLS analysis conceding that there is a unidirectional long-run equilibrium relationship running from ***fdi***, ***to, ta*** and the control variables to economic growth in the ECCU. The significant and negative cointegration coefficient (0.0032, -0.059223) indicates that ***fdi*** and ***to*** converge to their long-run equilibrium at a rate of 6.0 per cent annually. In the case of ***ta***, it converges at rate of 5.6 per cent (0.0013, -0.055779) annually. For economies that are substantially open and depend mainly on open market strategies for economic activity, these convergence rates appear to be low. The results further imply that it would take roughly 17 years for equilibrium to take place between ***fdi***, ***to*** and economic growth to reach their long-run equilibrium while ***fdi*** and ***ta*** would take approximately 18 years.

The Wald coefficient test for short-run dynamics shows that ***fdi*** has a short-run relationship with economic activity in both versions of equation 2. Moreover, a 1 per cent increase in ***fdi*** leads 9.5 (ran with ***to)*** and a 10 (ran with ***ta)*** percentage point increase in economic growth in the short-run.

This suggests that member Governments of the ECCU can continue creative initiatives to invite ***fdi*** inflows that can contribute to short and long-run economic activity.

Once more results are opposing for short-run dynamics with ***to*** and ***ta***. The Wald coefficient test reveals that there is no short-run relationship between ***to*** and economic growth while ***ta*** has been found to have a short-run relationship with economic growth. This lends further support to the argument for assessing the ECCU economies using tourism arrivals to capture their economic openness. Member governments of the ECCU have placed more emphasis with respect to policy and infrastructure to open their economies to international tourism versus building beneficial trade relationships. In fact, trade activities in the ECCU are heavily weighted in importing activity hence the large trade deficits. Previously mentioned, ECCU integration into global trade is because of their construct (non-policy e.g. taste, size) more so than as a result of efforts to trade an abundant endowment (policy oriented).

5.4 Granger Causality

Panel Granger causality tests run on the openness indicators provided mix results. ***fdi*** has been found to Granger cause economic growth but the reverse relationship does not hold. In other words, the unidirectional short and long-run relationship between ***fdi*** and economic growth is a causal one. Therefore, ECCU member governments can construct strategies to increase ***fdi*** inflows into the region that would cause economic growth to increase in both the short and long run. With respect to ***to***, testing shows there is no causal relationship running from this variable to economic growth. On the other hand, ***ta*** has a unidirectional causal relationship with economic growth in the ECCU.

The Granger Causality results give further insight into the nature (direct or indirect) of the impact of both variables. For instance, the results suggest that both ***fdi*** and ***ta*** have more of a direct causal relationship with economic growth relative to ***to*** which gets its impact within the system. In the proceeding discussion, the research provides some assumptions for this outcome.

5.5 Structural Breaks

The relatively low cointegrating relationship raised suspicion that warranted further investigation. It is suspected that exogenous shocks over the study period may be attributable to reality observed from the VECM results. As such, the Chow structural test was run to determine if a number of structural changes are responsible for the low cointegrating relationships. The test involves estimating two equations, a restricted versus an unrestricted equation. A dummy variable captures structural changes that took place over the period. After running both versions of the model, the paper applied the Likelihood Ratio test to determine the significance of the results. The Likelihood Ratio follows

$$LR = (T - m)(ln|\gamma_r| - ln|\gamma_{ur}|) \sim X^2(q) \quad eq.6$$

Where **T** is the number of observations, **m** the number of parameters times the number of lags plus the intercept and the number of dummies. $\boldsymbol{\gamma}$ is the determinant of the residual covariance matrix, ***r*** and ***ur*** are restricted and unrestricted equation respectively. The LR ratio is distributed Chi-square with q is the degrees of freedom, calculated by the number of dummies times the number of equations.

Results from the tests show that the 2008/09 global financial crisis had an impact on the economic openness relationship with economic growth. The implication of this finding is in alignment '*apriori*' that structural changes have reduced the relationship between these variables over the years. Therefore, member governments of the ECCU would have to ensure they bolster other economic sectors to ensure economic performance less affected by external events.

6.0 Conclusion

The research employed a panel VECM and panel Granger Causality analysis to investigate the causal link between economic openness as measured by FDI, trade openness and used tourism arrivals as a fitting measure of economic openness for the ECCU territories. The objectives of this study were important to the ECCU because of the recent growth performance by member states and the need for greater competitiveness in the region. Further, although the ECCU economies are open there have been no studies assessing the impact of economic openness on economic performance. Thus, this paper investigated what role economic openness has played in economic growth in the ECCU economies over the years 1995 to 2013.

Results obtained from the empirical model indicate that there is a unidirectional long-run relationship running from the focused variables and the control variables to economic growth. They converged at a rate of 6.0 per cent (trade openness***)*** and 5.6 per cent (tourist arrivals) annually. There is both a short and long run causal relationship running from FDI to economic growth as expected. On the other hand, ***trade openness*** has no short-run relationship with economic growth while ***tourism arrivals*** was found to have a short-run relationship with economic growth.

The study encountered a number of problems that would have affected the full potential of this study. Persistent data challenges in the ECCU did not allow for a longer time series that would have been able to capture this situation over the years. In addition, the study would have fallen short of comparable periods to determine if the value of the cointegrating relation was dynamic over the years. In light of the use of a new metric it would have been beneficial to compare one of the agriculture based economies versus a tourism based economy. Another limitation was that impulse response function (IFS) analysis failed to make its way into the study; this was due to time constraints.

Given the limitations above, there are ways to advance future research. For instance, the low convergence rate may be a result of the absorption capacity of the ECCU territories. Thus investigating the territory's capacity to benefit from economic openness may be worthwhile.

7.0 Recommendations

The findings show that there is a low convergence rate implying economic openness has contributed little to economic growth in the six independent ECCU countries. It further suggests that continued efforts are needed to diversify the economic activities of these economies. The study also shows that there is a detachment between the economies and this has resulted in economic loss due to leakages in the system. Lastly, in alignment with the a priori, ***tourism arrivals*** was found to have a more causal impact than ***trade openness***, thus it may be prudent to push strategies in the area of tourism activities. Based on these findings, a number of recommendations are put for consideration by the member Governments of the ECCU.

- Member governments should continue their efforts to making their economies more robust by identifying other leading and potential sectors to push economic performance.

- Extract the benefit of the currency union by capping the leakages amongst member states. In other words, avoid the present individual approach by harmonizing efforts towards attracting and harnessing the benefits of tourism activity as a union versus a per country approach.
- In light of the findings of ***tourism arrivals*** having a stronger causal impact on the six independent ECCU countries' economic growth than ***trade openness***, then continued efforts need to be done in the tourism industry to bolster and diversify it.

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Appendix

Table 4: Johansen Fisher Panel Co-integration Test

No. of CE(s)	Fisher stat Trace test	Prob.	Max Eigen test	Prob.
Eq. 2 w/***TO***				
None	291.6	0.0000	161.4	0.0000
At most 1	131.3	0.0000	80.12	0.0000
At most 2	67.74	0.0000	37.99	0.0002
At most 3	38.26	0.0001	34.30	0.0006
At most 4	15.07	0.2377	15.07	0.2377
Eq. 2 w/***TA***				
None	293.9	0.0000	188.5	0.0000
At most 1	109.3	0.0000	65.37	0.0000
At most 2	53.59	0.0000	35.04	0.0005
At most 3	27.61	0.0063	26.40	0.0094
At most 4	11.18	0.5137	11.18	0.5137

Table 5: Small States Degree of Openness and Main Exports

Country	Degree of Openness	Main Exports	Share of Top 3 Exports
Caribbean			
Antigua and Barbuda*	1.05	Tourism	38.2
The Bahamas	1.01	Tourism	58.56
Barbados	1	Tourism	47.49
Belize	1.31	Agriculture and Fisheries	64.92
Dominica**	0.9	Bananas	59.73
Grenada**	0.74	Nutmeg and Tourism	41.64
Guyana	2.04	Agriculture	59.05
Jamaica	0.85	Tourism	55.34
St. Kitts and Nevis*	0.73	Tourism	73.27
St. Lucia*	1.14	Tourism	40.49
St. Vincent and the Grenadines*	0.83	Agriculture	48.84
Trinidad and Tobago	0.92	Oil and Gas	60.84

Source: The Commonwealth Secretariat (2013)

* Represents ECCU territory with tourism being the main export sector; ** represents ECCU territory with the main export being agriculture based.

Chart 5: Individual ECCU Member States' Agricultural Sector versus the Tourism Sector

Source: Eastern Caribbean Central Bank

Autocorrelation or serial correlation, which is the correlation of errors between different space and time; in a statistical notation it is where $E(u_i u_j \neq 0$ for $i \neq j$. The test states its null hypothesis as no autocorrelation and has not found any traces of this statistical phenomenon.

Homoscedasticity or the absence of **heteroscedasticity** concerns itself with a variance that fails to be constant over time or $E(UU') = \sigma^2 I$. Employing the White heteroscedasticity (no cross terms) test has indicated that the equation do not suffer from a varying variance over time.

It was also necessary to determine if the data set was **well-modelled** in accordance to a normal distribution which would aid in speaking to the **goodness of fit with accuracy**. Testing with the null hypothesis as normality, it has been concluded by the joint Jarque-Bera statistic that the model has been structured properly. **Inverse roots of the AR characteristic polynomial** show covariance stationarity of the variables.

Table 6: Diagnostic Tests

	Portmanteau Autocorrelation	Residual Heteroscedasticity	Residual Normality test (Jarque-Bera)
Eq. 2 w/***TO***	3.798196 (0.7040)	71.24070 (0.0163)	7.803110 (0.0991)
Eq. 2 w/***TA***	4.527728 (0.6056)	68.48190 (0.0277)	8.680758 (0.0696)

Note: figures in parentheses are p-values and all tests taken at 5% level of significance.

The Breusch-Pagan Chi-square cross-section dependence test which is suitable in small samples was utilized. In both versions of versions of equation 2, it was found that disturbances have cross-sectional independence, see Table 7.

Table 7: Breusch-Pagan Chi-square test

Breusch-Pagan Chi-square	Statistic	p-value
Eq. 2 w/***TO***	15.28421	0.4311
Eq. 2 w/***TA***	13.45623	0.5671

H_0: Cross-sectional independence

Remittances and Economic Growth in Floating and Fixed Exchange Rate Economies: The Case of Latin America and the Caribbean

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Abstract

This paper examines the causal relationship between remittances and exchange rate regime, assessing their impact on per capita GDP growth using a strongly balanced panel for thirty-two of the independent countries in Latin America and the Caribbean, over a 4-year period from 2000-2015. Using the system Generalized Method of Moments (SGMM) estimation technique developed by Arellano and Bover (1995) and Blundell and Bond (1998) in the panel data analysis, the major conclusions drawn from the results indicate that remittances inflow to Latin America and the Caribbean exhibit counter-cyclical properties. Results from study also indicate that remittances estimates being negative exudes a greater negative impact in floating exchange rate economies.

JEL Code: C23, F3,

Keywords: Remittances, Latin America, Caribbean, GMM

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1 Introduction

Historically, remittances were an important part of European development, especially in the eastern European states. England, France, Spain and Portugal colonized the lands in the region and extracted essential resources that were remitted back to the respective motherland to augment their treasury, boost their economy and eulogize their power in Europe. This meant that 'remittances' and resources were flowing from the region to other economies. In recent times, the directional flow of remittances' have turned significantly with developing countries being the main recipient. Remittances in the form of foreign monetary transfers to developing countries, especially countries in Latin America and the Caribbean, have contributed to fostering economic growth, alleviating poverty, and enhancing consumption and investment. Remittances are private monetary transfers across borders that often involve transactions between different currencies, and have become a global phenomenon. The past few decades have experienced an upsurge in the value of remittances transfers globally. For many developing nations, remittances represent a significant part of international capital inflows rivalling export revenues, foreign direct investments (FDI) and international aid[28]. Cumulatively remittances are currently the second largest source of foreign exchange earner, both in absolute terms and as a percentage of GDP. For some countries, remittances represent more than 10 percent of GDP. This is the case for small Caribbean and Pacific Islands, some Latin American countries and for some labour-exporting countries, such as Albania, Tonga, Moldova, and the Philippines[29].

With this upward monotonic concavity in remittances movement, GDP growth does not seem to mirror remittances movement in some economies whilst in others, the growth increases simultaneously. This sparked interest among academics and policy makers alike, especially as it relates to the type of exchange rate regime and its role in determining how remittance flow influences growth.

This paper will investigate the importance of remittances to developing economies and how they influence growth, given the exchange rate regime. It is argued that there is a greater uncertainty effect that recipients of remittances may encounter in economies with floating exchange rate

[28] Giuliano P., and Ruiz-Arranz M (2005), "Remittances, Financial Development, and Growth", IMF Working Paper
[29] IMF Data Bank

arrangements relative to those with a fixed regime. . This uncertainty allows for volatility in consumption and investment expectations and this will lead to less developed institutions, aimed at propelling growth and fostering development. The paper therefore explores the hypothesis that remittances will have a greater impact on economic growth in economies with a fixed exchange rate regime.

The paper is organized in the following manner. Section 2 will give a brief overview of the exchange rate regimes that exist in Latin America and the Caribbean. Section 3 will review existing literatures, both theoretically and empirically. Section 4 will focus on research variables, data description and the econometric models employed in the paper. Section 5 gives an analysis of the results and section 6 provides the concluding remarks.

2. Exchange Rate Regimes in Latin America and the Caribbean

Three frameworks prevail in Latin America and the Caribbean. They are listed below while the country specific regimes are stated and defined in *(See Appendix Table 1*):

1. **USD anchor specified framework;** where the US dollar is the 'focus currency' when making monetary and inflationary decisions.
2. **Fixed/Managed Exchange Rate policy framework;** this occurs when the monetary authority buys or sell foreign exchange to maintain the exchange rate at its predetermined level or within a range.
3. **Inflation-targeting framework**; involves the public announcement of numerical targets for inflation, with an institutional commitment by the monetary authority to achieve these targets, typically over a medium-term horizon.

In addition to these frameworks, there are myriad of de facto exchange rate regimes being employed by countries in Latin America and the Caribbean which in turns have implications for how monetary shocks impact the economies and also how they are transmitted through the economy. Table 1 (See Appendix) outlines the main regimes for the countries included in the study.

3. Review of Literature

I. Theoretical Framework

Literature on remittances identified two main theories explaining the motives to remit. The two theories are the Pure Altruism Theory and the Pure Self-interest Theory. The *Pure Altruism* theory states that the welfare statuses of family members in the domestic country are what drives remittances inflow. Chami et al. (2008) reported that the migrant's utility is a function of his family consumption function, implying that the migrant is satisfied when the welfare of his family is better off. They also stated that the migrant is motivated to remit more funds to his family when there are unfavourable economic conditions prevailing in the home country. Therefore, under the Pure Altruism model, remittances are countercyclical and tend to increase in times of deteriorating economic conditions domestically. They concluded that remittances are received by households with a higher marginal propensity to consume.

The predominance of consumption in the end uses of remittance funds all indicate that remittances attempt to compensate the receiving economy for poor economic performance, and therefore, may not direct significant quantities toward investment. This is an important role in the altruism theoretical framework.

Russell et al (1986) suggested that capital flows such as FDI are profit driven, and have a positive correlation with GDP growth. Their empirical estimations also revealed considerable evidence that remittances are negatively correlated with per capita GDP growth, suggesting that they are used to offset poor current economic situation of households. This led them to believe that remittances differ greatly from private capital flows in terms of their motivation, and they do not serve as capital for economic development.

Feeny, Iansiraroj and McGillirray (2013) said that remittances, if are perceived to be permanent, may tend to stimulate additional consumption rather than investment, even in the presence of credit constraints. This would imply positive effects on household welfare, but not necessarily on aggregate economic growth. Ukeje and Obiechina (2013) complimented Feeny et al (2013) by highlighting that remittances undermine productivity and growth in low-income countries because they are readily spent on consumption likely to be dominated by foreign goods rather than on productive investments which will subsequently enhance growth.

The *Pure Self Interest* theory posits that migrants send money, not out of altruistic concerns, but mainly for their own personal benefit such as exploiting investments opportunities. Borensztein et al. (2006) posited that there is no inverse relationship between volumes of remittances and the economic performance of the domestic country. They showed that a positive correlation lies between volumes of remittances, FDI and economic performance in countries where bad economic conditions prevail.

The self-interest theory has identified other drivers behind remittances. To accumulate wealth in the home country as stated by Dustmann and Kirchkamp (2002), to defray migration costs or repay education and other expenses, and according to Stark (1995), to pay for social status in the home country compensate services provided by the household members such as taking care of the migrant's assets or relatives while the migrant is abroad.

Lucas and Stark (1985) claimed that migrants' self-interest is the principal motive for remittances. Migrants have an intent to return home, promoting remittance for investment in fixed capital such as land, livestock, house, and in public assets to enhance prestige or political influence. This phenomenon is not countercyclical. This means that remittances are used for capital investment, to form small businesses and garner fixed assets such as homes. Therefore, when there is deterioration in economic performance of the domestic country, migrants are most likely to remit less since the situation will have a negative impact on both investible and inheritable assets. Hence, there is likely to be an increase in the volumes of remittances if the home economy is undergoing a favourable spell.

Guilano and Arranz (2009) study found that remittances improve credit constraints on the poor, can be used as a substitute for the lack of financial development and improve the allocation of capital, thus accelerating economic growth. They assessed the cyclical properties of remittance flows and concluded that huge cyclical behaviours are apparent and tend to be more pro-cyclical in countries where less developed financial system exist.

Grigorian and Melkonyan (2008) stated that remittances are also being driven by a combination of these two theories that vary in strength depending on societal and economic factors underlying the country/culture, as well as individual remitters/families in question. They also argued that while

altruism is likely to result in more remittances being directed to poorer households, the self-interest motive is consistent with co-movement of the relative's income.

In terms of the specific relation with key macroeconomic variables, Ball, Lopez and Reyes (2012) identified the relationship that remittances have on GDP growth for fixed and floating exchange rate regimes. Remittances can influence growth they concurred. They postulated that remittances temporarily increase inflation, GDP and domestic money supply while appreciating the real exchange rate under *fixed regime***,** but decrease inflation, increase GDP, appreciate real exchange rate and generate no change in the domestic money supply under a *flexible regime***.**

Barajas et al (2009) highlighted the fact that workers' remittances represent one of the largest sources of financial flows to developing countries. In 2007, over $300 billion of workers' remittances were transferred worldwide through official channels, and billions more were transferred through unofficial ones[30]. A supporting view came from Chami et al (2008), reporting that the average workers' remittances to GDP for all developing countries over the period 1995-2004 was 3.6%. On a country-by-country basis, workers' remittances exceeded 1% of GDP (on average) for over 60 countries during this period, and seven of these countries had average workers' remittances-GDP ratios amounting to 15% or higher.

II. Empirical Strategy and Framework

To explore the relationship between remittances and growth, Giuliano and Arranz (2009) used a sample consisting of 73 developing countries with annual data for the period 1975-2002. Following most empirical cross-country studies, they worked with a panel of five-year averages of all the variables and made their assessment using a panel-based data analysis technique using the econometric model presented below:

$$GDP_{it} = \beta_0 + \beta_1 GDP_{i,t-1} + \beta_2 REM_{it} + \beta_3 X_{it} + \mu_t + \eta_i + \varepsilon_{it} \quad (1)$$

Here, X_{it} is a matrix of the usual growth accounting regressors. In the same paper, they made it clear that the panel OLS will not address the issues regarding endogeneity, so they corrected for this by taking advantage of the panel nature of the data using systems GMM regressors, following that of Arellano and Bover (1995). Their model was complimented and used by Mundaca (2005)

[30] World Bank (2009)

and Ratha (2013). Zghidi et al (2016) on a study assessing the impact of FDI on economic freedom employed the same econometric method, so too did Narayan et al (2011) whose study assessed the impact that remittances have on inflation. Acosta et al (2008) employed similar techniques and they concluded that remittances in emerging economies have an important spending effect that peaks in the presence of real exchange rate appreciation. Their results indicated that the rising levels of remittances have spending effects that lead to resource movements that favour the non-tradable sector at the expense of tradable goods production. Their results also show that increases in remittances inflow causes the labour force to decline and lowers productivity in other economic sectors, a phenomenon known as the Dutch-Disease[31], which operates stronger in fixed exchange rate regimes.

Overall, the -conclusions of the literatures have not been unanimous as most concluded that remittances would not affect growth positively. They all lamented that perhaps the most persuasive evidence in support of their finding is the lack of a single example of a remittance success story - a country in which remittances led growth contributed significantly to its development.

Adam Smith, the founding father of free-market economics may have identified one such success story but that was centuries ago. Smith argued that there were two important economical game-changing moments in history. They were Columbus' discovery of a route to the Americas in 1492 and Vasco da Gama's feat of sailing around southern Africa to find the sea route to Asia in 1498. These discoveries gave Europe a bewildered access to other regions. Historians like Vern C. (2015) stated that post Americas discoveries, 'the resources exploited from the region and remitted back to Europe explained the gradual ascent of wealth and power that Europe today is benefiting from. These events led to the emergence of the first-ever completely global market, one that fierce international rivals sought to dominate. Europe eventually found itself at the center of the global economic network commanding large empires.' Fast forward five centuries to today we are not seeing this reverse in gargantuan wealth being experienced in Latin America and the Caribbean region with remitted monetary resource from said Europe, and the reason for this goes without saying.

[31] According the 'Handbook of Development Economics,' the Dutch Disease is defined as the deindustrialization of a country's economy when the discovery of a natural resource raises the value of the nation's currency, making manufactured goods less competitive, decreasing net exports significantly.

Due to the differences in results on papers assessed, it was interesting to know which theoretical framework would be more applicable to countries in Latin America and the Caribbean considering each country's exchange rate regime.

4. Data and Methodology

I. Data

This research focussed on 32 of the 33 countries in the Latin America and the Caribbean, which is 97 per cent of the independent nations in that region (*See Appendix, Table 9*). The panel covers data for these 32 countries spanning the years 2000-2015, implying a large cross section with a small time series. The year 2000 was used as the starting point because since that year, there has been no change in an exchange regime for the countries assessed. Of the 32 countries, 18 use a fixed exchange rate regime and the remaining 14 countries use a floating regime that is a 14:11 fix to float ratio. This allows for a more comprehensive understanding of how exchange rate regimes coupled with remittances may affect per capita GDP and its subsequent impact on growth. The appropriate control variables were chosen based on lessons learnt from similar empirical model used to explain this phenomenon. Fixed and floating exchange rates regimes were accounted for in the models by using dummy variables to capture their effects[32].

Table 2 give a list and description of the variable used in the models.

[32] Regional impacts were also assessed using dummy variables for Latin America and the Caribbean. Results for these were documented but discussed in the paper where relevant.

Table 2. Definition, Short Name and Source of Variables Used[33]

Variable Name	Short Name	Description	Source
Real GDP per Capita	**gdp_pc**	GDP per capita is gross domestic product divided by midyear population.	World Development Index: World Bank Data Bank
Personal Remittances % of GDP	**rem**	Personal remittances comprise personal transfers and compensation of employees. Personal transfers consist of all current transfers in cash or in kind received by resident households from non-resident households.	World Development Index: World Bank Data Bank
Population Growth (%)	**pop_g**	Annual population growth rate for year t is the exponential rate of growth of midyear population from year t-1 to t, expressed as a percentage.	World Development Index: World Bank Data Bank
Inflation (CPI %)	**infla**	Inflation as measured by the consumer price index reflects the annual percentage change in the cost to the average consumer of acquiring a basket of goods and services that may be fixed or changed at specified intervals, such as yearly.	World Development Index: World Bank Data Bank The Laspeyres formula is the one used.
Final Private Consumption (% of GDP)	**f_cons**	Final private consumption expenditure is the sum of household final consumption expenditure (private consumption).	World Development Index: World Bank Data Bank
Foreign Direct Investments (% of GDP)	**fdi**	Foreign direct investment are the net inflows of investment. It is the sum of equity capital, reinvestment of earnings, other long-term capital, and short-term capital.	World Development Index: World Bank Data Bank
Openness to Trade	**opns**	The sum of Exports of goods and services (% of GDP) and Imports of goods and services (% of GDP).	World Development Index: World Bank Data Bank
Fiscal Balance	**fb**	General government revenue minus general government total expenditure	IMF Data Bank

[33] The variables gdp_pc, opns and f_cons will be specified in natural logs in the paper's econometric models.

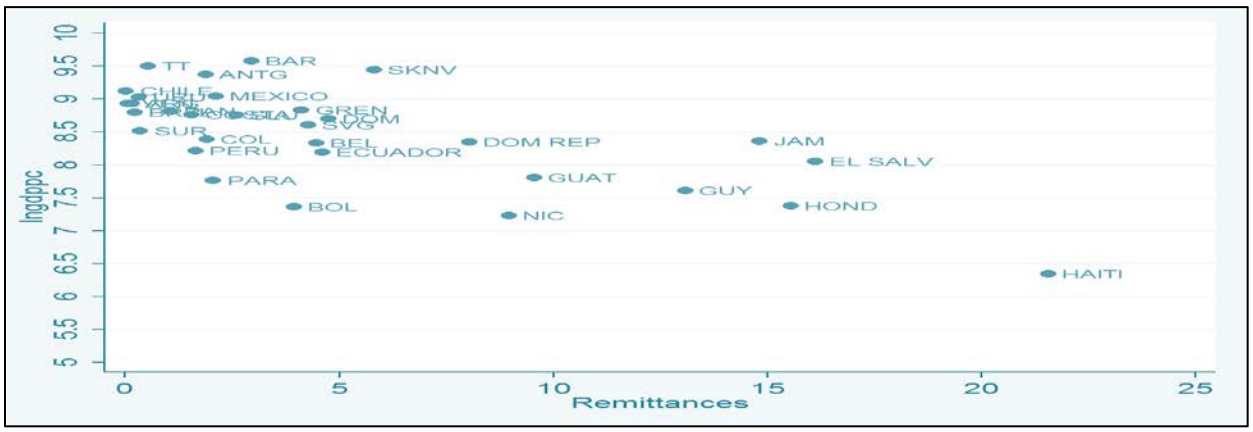
II. Time Intervals Specification

The Im-Pesaran-Shin panel unit root test (*Im et al., 2003*) was applied to check the annual series for stationarity between 2000 and 2015. . Results revealed that the null hypothesis for non-stationarity is rejected for all variables except log per capita GDP (*See Appendix, Table 3*). This non-stationarity of variables supported the choice to use non-overlapping time intervals rather than the annual data set. The panel data was therefore transformed using four 4-year average periods (2000-2003, 2004-2007, 2008-2011 and 2012-2015)[34].a. The use of four-year averages was helpful because yearly averages reduce the influence of short term economic shocks, and it avoids the problem of non-stationarity in variables which may produce biased regression results. Furthermore, compared to the sixteen-year annual data, the use of four-year intervals allowed GMM estimations to be more robust given the time dimension necessary to acquire more precise results..

III. Summary Statistics

Figure 1 shows that the higher the per capita GDP the lower the remittance inflow. It also shows a significant clustering of countries in the top left hand corner which are mainly using a fixed exchange regime, except for El Salvador and Guyana.

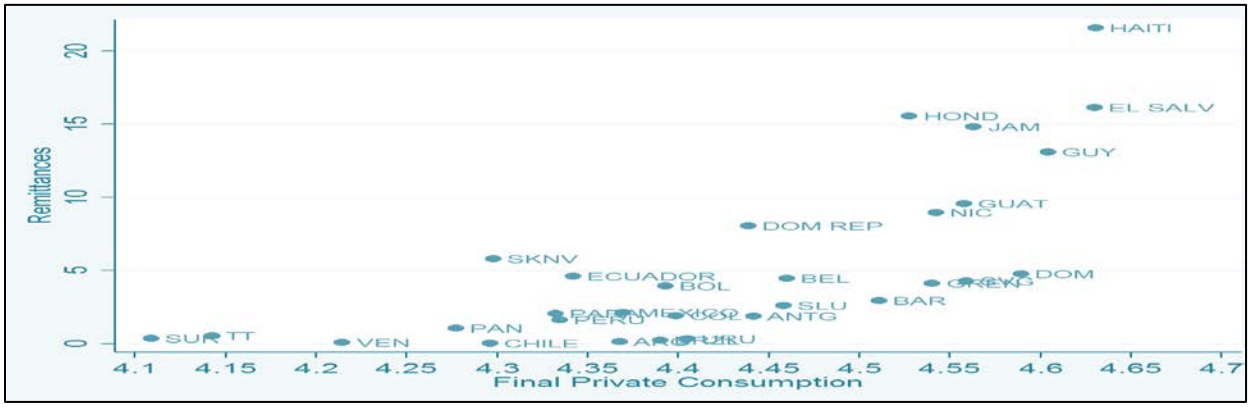
Figure 1. Per Capita GDP (natural log) scattered against Remittances.



[34] Non-overlapping time intervals were also used in empirical studies by Bonnefond (2014), Narayan et al (2011), Zghidi et al (2016), Brun et al (2002) and Giuliano and Ruiz-Arranz (2005).

Moreover, there seems to be a clear relationship between remittances and private consumption. Figure 2 shows that the higher the remittances the higher the final domestic private consumption (as a percentage of GDP), which is an indication that remittances inflow to the Latin America and the Caribbean maybe based on altruistic motives.

Figure 2. Remittances scattered against Final Private Consumption.



Additionally, there is a suggested negative relationship between remittances and foreign direct investments. Figure 3 shows that the higher the inflow of remittances, the lower the foreign direct investments (as a percentage of GDP).

Figure 3. FDI (as a percentage of GDP) scattered against Remittances.

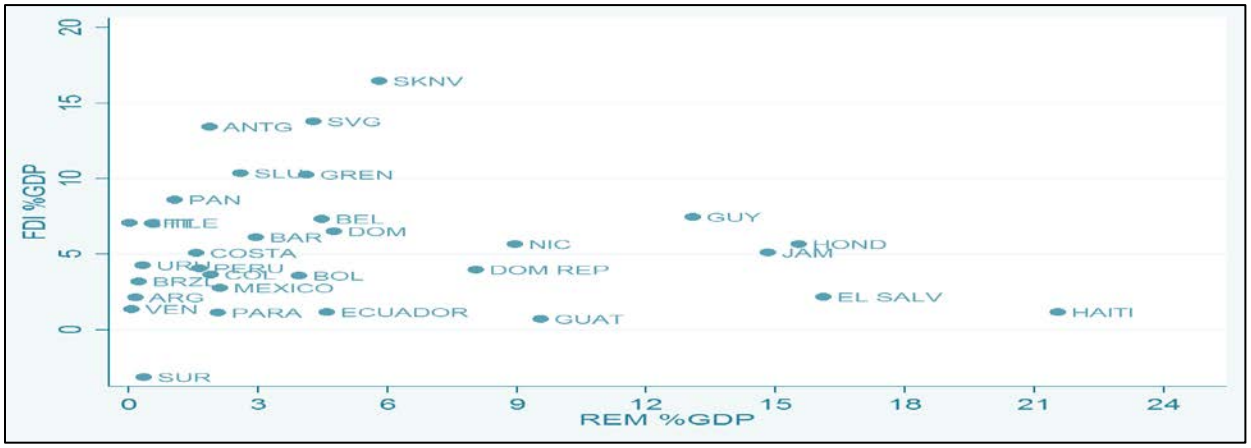


Table 4 shows the bivariate correlations among variables. Per capita GDP, as expected, is positively correlated with foreign direct investments. Remittances, trade openness, fiscal balance, final private consumption, inflation and population growth are all negatively correlated with per capita GDP. Final private consumption is highly positively correlated with remittances at the 5% level of significance which indicates that remittance inflows to the region are altruistically motivated.

Furthermore, inflation is positively correlated with remittances complementing the results of Narayan et al (2011). Intuitively, this is the case when increases in inflation is recognized to be that of the domestic country. However, it can be argued that remittances inflow may decrease if inflation in the foreign country increases.. On the other hand, one might argue that the positive relationship can have bi-directional causality. Is it that higher inflow of remittance signals more purchasing power, thus increasing the demand for the same basket of goods, which leads to inflation, or does inflation in the domestic country make remitters send more money so family back home can maintain their consumption spending based on the pure altruism theory?

Table 4. Bivariate Correlations of Variables in Study[35]

	lngdp_pc	rem	lnopns	fb	fdi	lnf_cons	infla	pop_g
lngdp_pc	1.0000							
rem	-0.6092*	1.0000						
lnopns	-0.0135	0.2538*	1.0000					
fb	-0.1130	-0.0501	0.0099	1.0000				
fdi	0.3439*	-0.0544	0.4207*	-0.1076	1.0000			
lnf_cons	-0.3934*	0.6002*	0.0681	-0.2169*	0.0832	1.0000		
infla	-0.1557	0.0039	-0.2549*	-0.2194*	-0.4001*	-0.0709	1.0000	
pop_g	-0.2410*	-0.0138	-0.0354	0.0650	-0.2003*	-0.2057*	0.1075	1.0000

[35] The table displays the correlation matrix of the main regression variables. Stars (*) denote significance at the 5 percent level of significance.

IV. Methodology

(i) Framework

Based on the conceptual framework highlighted above, the dynamic panel specification is the most appropriate estimation technique applicable, since the data set consisted of 32 cross sectional data points with four 4-year averages non-overlapping periods. This approach accounts for any chronologic autocorrelation and reduce any potential spurious regression that can cause regression estimates to be inconsistent, paving the way for more accurate inferences.

(ii) Baseline Model

In light of the existing literature, the baseline specification model will take the form:

$$lngdp\_pc_{it} = \rho_0 + \rho_1 lngdp\_pc_{i,t-1} + \rho_2 rem_{it} + \rho_3 \mathrm{X'}_{it} + \mu_t + \omega_{it} \quad (3)$$

$$\omega_{it} = \eta_i + \varepsilon_{it} \quad (4)$$

To assess GDP growth, we rewrite equation **(3)** as:

$$gdp\_pc\ growth_{it} = gdp\_pc_{it} - gdp\_pc_{i,t-1} \quad (5)$$[36]

$$\therefore gdp\_pc\ growth_{it} = \rho_0 + (\rho_1 - 1) gdp\_pc_{i,t-1} + \rho_2 rem_{it} + \rho_3 \mathrm{X}_{it} + \mu_t + \eta_i + \varepsilon_{it} \quad (6)$$

Where $(\rho_1 - 1)$ is the convergence coefficient, gdp_pc_{it} denotes the initial level of real per capita GDP, rem_{it} is equal to remittances in current levels and X_{it} is a vector of core regressors used to model per capita GDP excluding remittances as described in table 2. The variable μ_t is a set of time dummies incorporated to capture business cycle effects, η_i is the unobserved country-specific effect, and ε_{it} is the error term. The subscript '*i*' represents the different countries while '*t*' represents the 4-year average periods.

Using a pooled OLS and a panel regression (fixed effects) in its core form is dubious because $lngdp\_pc_{i,t-1}$ will correlate with ε_{it}. Therefore, the preferred estimation technique applicable here is the Generalized Method of Moments developed by Arellano and Bover (1995) and Blundell and

[36] David Romer in his book "Advanced Macroeconomics" reminded us that a key fact about growth rates is that the growth rate of a variable equals the rate of change of its natural log. The natural log was used in all models of this paper thus accounting for per capita GDP growth.

Bond (1998). This technique is more effective given that the data was used to construct panels having a small *"t"* and large *"i"*.

Applying the panel GMM controls for country-specific effects and controls for any simultaneity issues that may arise from regressors being endogenous with the response variable. AB-BB (95, 98)[37] estimators iron out these problems by using **"*n*"** [38] lags of the first difference of regressand as instruments. The first difference transformation removes cross sectional effects and this allows equation (3) to be transformed as follows:

$$\left(\boldsymbol{lngdp_{pc_{it}}} - \boldsymbol{lngdp_{pc_{i,t-1}}}\right) = \boldsymbol{\rho_0} + \boldsymbol{\rho_1}\left(\boldsymbol{lngdp_{pc_{i,t-1}}} - \boldsymbol{lngdp_{pc_{i,t-2}}}\right) + \boldsymbol{\rho_2}\left(\boldsymbol{rem_{it}} - \boldsymbol{rem_{i,t-1}}\right) + \boldsymbol{\rho_3}\left(\mathbf{X_{it}} - \mathbf{X_{i,t-1}}\right) + \left(\boldsymbol{\varepsilon_{it}} - \boldsymbol{\varepsilon_{i,t-1}}\right) \quad (7)$$

The assumption here is that the error term is not serially correlated and the regressors in their lagged form are weakly endogenous. This strategy is called Difference GMM and consist of the following moment functions:

$$\boldsymbol{E}[lngdp\_pc_{i,t-u} * (\varepsilon_{it} - \varepsilon_{i,t-1})] = 0 \quad for\ u \geq 2,\ t \in [1,4], t > s \quad (8)$$

$$\boldsymbol{E}[rem_{i,t-u} * (\varepsilon_{it} - \varepsilon_{i,t-1})] = 0 \quad for\ u \geq 2,\ t \in [1,4], t > s \quad (9)$$

$$\boldsymbol{E}[X_{i,t-u} * (\varepsilon_{it} - \varepsilon_{i,t-1})] = 0 \quad for\ u \geq 2,\ t \in [1,4], t > s \quad (10)$$

One drawback of DGMM is that when differencing equation (1), the process removes long-run cross-country information at current levels, and if the column vector $X_{i,t}^{transpose}$ consists of annual persistence, the lagged levels of the variables within X_{it} will be weak instruments in the GMM estimation. To rectify this, AB-BB (95, 98) proposed the System GMM estimator. Blundell and Bond (1998) demonstrated that the SGMM panel estimator is able to enhance efficiency by reducing biases and erroneousness characterized by the difference GMM, especially as it relates to problems of weak instruments. Whilst maintaining the estimator's consistency, the system GMM method modifies equations 8-10 to yield the following moment conditions:

[37] **Shortening for Arellano and Bover (1995) and Blundell and Bond (1998)**

[38] $n \geq 1$. This paper will use one (1) lag

$$\boldsymbol{E}[(lngdp\_pc_{i,t-u} - lngdp_{pc_{i,t-u-1}}) * (\eta_i + \varepsilon_{it})] = 0 \quad for\ u = 1,\ t \in [1,4] \tag{11}$$

$$\boldsymbol{E}[(rem_{i,t-u} - rem_{i,t-u-1}) * (\eta_i + \varepsilon_{it})] = 0 \quad for\ u = 1,\ t \in [1,4] \tag{12}$$

$$\boldsymbol{E}[X_{i,t-u} - X_{i,t-u-1}) * (\eta_i + \varepsilon_{it})] = 0 \quad for\ u = 1,\ t \in [1,4] \tag{13}$$

According to Bonnefond (2014), the consistency of the system GMM estimator relies on two hypotheses. First, the set of instrumental variables must not correlate with the error terms. This hypothesis is tested using Sargan/Hansen[39] test of over-identifying restrictions. Second, the absence of second-order autocorrelation (AR2) in residuals must be verified, given that a negative first-order autocorrelation (AR1) may is spotted. This second hypothesis is tested using Arellano-Bond tests for AR(1) and AR(2).

5. Empirical Results and Analysis

5.1 Preliminary Tests

Two preliminary estimations were conducted without considering the exchange rate regimes, using a pooled OLS and a panel regression with fixed effects. Results can be seen *in table 5*. The OLS estimator cannot account for potential correlation between the countries' errors over time and does not address the problem of unobserved heterogeneity. The FE panel regression estimator fixes this issue by taking autogenous transformation of the data, however, it suffers from Nickell bias[40] due to data's time series being too short. Cognizant of the fact that these estimates will be inconsistent, they were done to compare coefficients with that of the subsequent system GMM estimator.

[39] The Hansen test was used in this paper over the Sargan test because the Sargan test works best in the face of homoscedasticity while the Hansen's test is preferred in the face of cross-country heteroskedasticity, which this paper's data set consist of.

[40] Baun C.F (2013), "Dynamic Panel Data Estimators", Boston College

Table 5. OLS and Fixed Effects Estimation Results[41]

Variables	OLS	FE
Log per capita GDP	0.806***	0.615***
	(0.0465)	(0.0938)
Remittances	-0.0137***	-0.0845**
	(0.00492)	(0.0370)
Log openness	-0.0509	-0.0847
	(0.0556)	(0.260)
Fiscal Balance	0.00382	0.00760
	(0.00763)	(0.00704)
Foreign direct investments	0.00473	0.0179***
	(0.00445)	(0.00514)
Log final private consumption	-0.405**	-0.197
	(0.190)	(0.211)
Inflation	0.00315	0.00400
	(0.00272)	(0.00288)
Population growth	-0.0863**	-0.278
	(0.0327)	(0.213)
Intercept	4.029***	5.372**
	(1.103)	(2.142)
Observations	90	90
R-squared	0.959	0.778
Number of id		30[42]

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

[41] All estimations done using the Stata-SE 14 statistical package

[42] Missing data for Costa Rice's final private consumption and Bahamas' remittances is the reason why the cross section panel was reduced from 32 to 30

Preliminary results revealed that GDP per capita has a very high persistence is positive and significant, while remittance estimates are negative and are statistically significant in both models. Population growth and final private consumption are negative and significant to current per capita GDP growth in the OLS model, while foreign direct investment is positively significant in the fixed effects model.

5.2 System GMM and Model's Specifications

Estimation results for the system GMM estimates can be seen in *tables 6 and* 7 (See Appendix), with only two variants of per capita GDP models assessed. Each model will show the impact that remittances have on log per capita GDP:

i. In the whole region
ii. For countries using a fixed exchange regime
iii. For countries using a floating exchange regime
iv. For the Latin American countries
v. For the Caribbean countries.

Given the objectives of the paper, emphasis will be placed on ***i – iii*** for analytical discussion**.** *Table 6* gives results for the baseline model specification as highlighted in equation (3). A number of insignificant variables were obtained from model 1, hence a general to specification test[43] was carried out to incorporate only significant variables in model 2 (See Appendix Table 8). Results showed that the significant regressors were remittances, foreign direct investments, final private consumption and population growth. Therefore, model 2 was developed and took the form[44]:

$$lngdp\_pc_{it} = \rho_0 + \rho_1 lngdp\_pc_{i,t-1} + \rho_2 rem_{it} + \rho_3 fdi_{it} + \rho_4 lnf\_cons_{it} + \rho_5 pop\_g_{it} + \rho_6 infla_{it} + \varepsilon_{it} \quad (14)$$

The forward orthogonal deviation technique in the system GMM estimator instead of the variable transformed first differencing technique. Hayakawa (2009) stated that the GMM estimator of models transformed by the forward orthogonal deviation tends to work better than those transformed using the differencing technique. Differencing the variables would imply losing

[43] General specification test searches regression variables in a model and select the best model based upon a criterion of relevance or explanatory power.
[44] Inflation was still incorporated in model 2, and time dummies were not incorporated due to their insignificance.

additional data and information that are necessary for better inferences. The forward orthogonal method subtracts the estimates from their actual mean values while keeping data points consistent, rather than losing data through differencing and finding lag differences.

5.3 Empirical Results

The system GMM estimated regressions passed all the specification tests, except for the one highlighted in the column for Model 2-Latin America in *table 7*. The null hypothesis for no first order serial autocorrelation was not rejected at the five percent level of significance. Likewise, regressions are not impinged by simultaneity bias, as orthogonality conditions rendered results failed in rejecting the null hypothesis; that the error term is uncorrelated with the instruments used. In light of these result of both the Hansen and Arellano-Bond tests, the parameter's estimates resulting from models are consistent and empirically non-biased to be analysed and discussed.

5.4 Discussion and Analyses of Results

Much can be discerned from the results presented in *tables 6 and 7*. Column 1 of tables highlight the short name of variables used, column 2 report results for the whole Latin America and the Caribbean region (without considering the exchange rate regime), columns 3 and 4 report results for the fixed and floating exchange rate economies respectively, while columns 5 and 6 show estimation results for Latin American and Caribbean countries receptively.

One important thing to note from results garnered from the SGMM is that estimates are mostly significant in both per capita GDP models for the region as a whole, and the same is true for economies operating under a fixed exchange regime.

***Hindrances to Regional Growth**:*

Estimates in all models show that both remittances and population growth have a significant negative impact on the economies in the region. This means that remittances inflow to the region fit the pure altruism theoretical framework that coincides with its counter-cyclical property highlighted by Ukeje et al., Feeny et al., Chami et al. and others. Likewise, results show that countries with higher population growth rates record slower growth patterns than the smaller populated countries. These results coincide with the Solow (1956) convergence theory,

complemented by his results, which states that “slower population growth results in a higher equilibrium level of both output and capital stock per unit labour”.

Results in both models also showed that under a fixed exchange regime, final private consumption has a colossal negative impact on the dependent variable at the five percent level of significance, while it is positive and insignificant to log per capita GDP in floating exchange rate regimes. Also, the negative impact is more prevalent in the Caribbean countries. Worrell et al (2017) highlighted that in these small open economies, consumption affects per capita GDP negatively through the sustained deficits in the fiscal balances. The authors also alerted that the Caribbean imports majority of the goods and services they consume which overshoots net exports relative to consumption, thus mitigating domestic per capita GDP growth.

***Engines for Regional Growth**:*

In all models displayed above, the coefficient associated with the initial level of log per capita GDP is positively significant (at the 1% level of significance), implying persistence and conditional divergence. Bonnefond (2014) using a different study demography stated that this positive relationship indicates that among the countries in the region, none have reached a steady state level of growth. He lamented that results could also mean that among the countries in the region, the ones who share similar structural peculiarities, and were initially richer are still recording improved growth rates synonymously to the those of the poorer nations.

The other positively significant variables to per capita GDP in models assessed were foreign direct investments and inflation. In the models, the coefficient associated with the share of foreign direct investments is significantly positive throughout the regions especially under fixed exchange regimes at the 10% level of significance or better. According to models, a 1% increase in foreign investments are associated with a 2% increase in the growth rate of per capita GDP. This result is close to the 1.5% estimated by Ding and Knight (2011).

Albeit its positive coefficient, inflation estimates are all negligible in the models specified. Author theorizes that these results imply that inflation is a consequence of economic activities and decisions, not a cause nor an impact factor whenever assessing per capita GDP growth.

6. Concluding Remarks

Do remittances affect per capita GDP growth in Latin American and Caribbean countries? Do the growth effects differ depending on the exchange rate regime that prevails? Are the differences significant in explaining remittances led growth effects? To bring light to these questions, this paper analysed the relationship between remittances and per capita GDP growth and how the impacts differ under a fix and floating exchange rate regime. The paper used a cross-section data series covering 32 of the 33 independent countries in Latin America and the Caribbean over the period 2000-2015 using four 4-year average periods. Applying the system GMM estimation technique which corrects for all forms of data auto-correlation, endogeneity issues and cross-panel heteroscedasticity, results show that remittances affects growth negatively in both fixed and floating exchange rate regimes.

Results imply that the *pure altruism* theoretical framework is what motivate remittances inflow to the region, and because of the consumption nature of the recipients, this will lead to counter-cyclical growth effects. Further analysis of results tells us that in fixed exchange economies, a 1% increase in remittances will lead to a 3.7% decline in per capita GDP growth, while in floating exchange rate economies, a 1% increase in remittances will have a 5.2% decline in per capita GDP growth.

After estimating GDP per capita growth models, it was found that growth regressors are most significant in fixed exchange regimes than in floating exchange regimes. The reason for this phenomenon, as was hypothesized, is that a greater uncertainty effect exists for the recipients of remittances in floating economies, versus those who dwell in fixed exchange rate economies. This uncertainty augments volatility in consumption and investment expectations, thus resulting in less developed institutions aimed at propelling growth and fostering development.

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APPENDIX

Table 1. Exchange Rate Regime that prevails in the Countries of Latin America and the Caribbean[45]

Exchange Rate Arrangement	Country[46]	Definition Of The Arrangement	Exchange Rate Regime
No Separate Legal Tender	Ecuador El Salvador Panama	The currency of another country (USA in this case) circulates as the sole legal tender (formal dollarization). Adopting such an arrangement implies complete surrender of the monetary authorities' control over domestic monetary policy.	**Fixed**
Quasi-Currency Boar	Antigua and Barbuda Dominica Grenada St Kitts St Lucia St Vincent and the Grenadines	A monetary arrangement based on an explicit legislative commitment to exchange domestic currency for a specified foreign currency at a fixed exchange rate. The domestic currency is usually fully backed by foreign assets, eliminating traditional central bank functions such as monetary control and lender of last resort, and leaving little room for discretionary monetary policy.	**Fixed**
Conventional Peg	Bahamas Barbados Belize Bolivia (Cuba)[47] Venezuela	The country formally pegs its currency at a fixed rate to a basket of currencies, where the basket is formed from the currencies of major trading or financial partners and weights reflect the geographic distribution of trade, services, or capital flows.	**Fixed**
Stabilized Arrangement	Guyana Suriname Trinidad and Tobago	Entails a spot market exchange rate that remains within a margin of 2% for six months or	**Fixed**

[45] All definitions stated and classifications identified were taken from the IMF Annual Report on Exchange Rate Arrangements (2014).
[46] No asterisk signifies that those country's regime are USD anchor specific, one asterisk (*) means they are using a monetary policy framework and two asterisks (**) mean that those countries are operating under an inflationary policy framework.
[47] Cuba was excluded from research paper due to the lack of requisite data for that country.

Exchange Rate Arrangement	Country[46]	Definition Of The Arrangement	Exchange Rate Regime
		more and is not floating. The required margin of stability can be met with respect to either a single currency or a basket of currencies, where the anchor currency or the basket is ascertained using statistical inferences.	
Crawling Peg	Nicaragua	The currency is adjusted in small amounts in response to changes in selected quantitative indicators such as past inflation differentials vis-à-vis major trading partners and differentials between the inflation target and expected inflation in major trading partners.	**Float**
Crawl-like Peg	Honduras Jamaica Argentina* Haiti* Dominican Republic** Guatemala**	The exchange rate must remain within a narrow margin of 2% relative to a statistically identified trend for six months or more. An arrangement is considered crawl-like with an annualized rate of change of at least 1%, provided the exchange rate appreciates or depreciates in a sufficiently monotonic and continuous manner.	**Float**
Floating	Uruguay* Brazil** Columbia** Paraguay** Peru**	A floating exchange rate is largely market determined without a predictable path for the rate. Floating arrangements may exhibit more or less exchange rate volatility, depending on the size of the shocks affecting the economy.	**Float**
Free Floating	Mexico** Chile**	Free floating exchange rate regimes occurs only if intervention happens atypically and aims to address disorderly market conditions within a	**Float**

Exchange Rate Arrangement	Country[46]	Definition Of The Arrangement	Exchange Rate Regime
		float regime, given that the authorities have provided information or data confirming that intervention is necessary.	
Other Arrangement	Costa Rica*	This category is a residual and is used when the exchange rate arrangement does not meet the criteria for any of the other categories and is classified as a fixed rate regime.	**Fixed**

Table 2. Panel Unit Root Test for Stationarity

PANEL A: Im-Pesaran-Shin Unit Root Test (IPS) For Full Annualized Data		
Variables	**Stationarity of Variables in Levels for full annual data**	
	t-statistics	***Inference***
Log per capita GDP	-0.8840	Non-stationary
Inflation	-3.6300	Stationary
Remittances	-2.0938	Stationary
Log openness	-1.8755	Stationary
fb	-2.0249	Stationary
Foreign direct investment	-2.5882	Stationary
Log final private consumption	-1.8403	Stationary
Population growth	-3.0130	Stationary
First difference of log per capita GDP	-2.9325	Stationary

Critical values: (-1.820: 1%, -1.730: 5%, -1.690: 10%)

Table 6. System GMM Estimation Results using Baseline Model. Determinants of per capita GDP growth in Latin America and the Caribbean.

Variables	Model 1	Model 1 Fixed	Model 1 Float	Model 1 Latin America	Model 1 Caribbean
l.lngdp_pc	**0.456*** **	**0.463*** **	**0.487*** **	**0.479*** **	**0.427** **
	(0.0866)	(0.121)	(0.0989)	(0.125)	(0.144)
rem	**-0.0402*** **	**-0.0367** **	**-0.0470** **	**-0.0209***	**-0.0487*** **
	(0.0122)	(0.0171)	(0.0195)	(0.0112)	(0.0161)
lnopns	-0.0996	-0.00919	-0.135	**-0.238** **	0.0369
	(0.0774)	(0.160)	(0.108)	(0.0960)	(0.210)
fb	-0.0140	-0.0000972	-0.0331	-0.0434	0.00910
	(0.0147)	(0.0138)	(0.0241)	(0.0315)	(0.00943)
fdi	**0.0213** **	**0.0203***	0.0406	**0.0341***	0.0169
	(0.00860)	(0.0112)	(0.0270)	(0.0180)	(0.0120)
lnf_cons	**-0.553** **	**-0.502** **	0.0729	-1.172	**-0.423***
	(0.258)	(0.225)	(1.297)	(0.772)	(0.236)
infla	0.00194	**0.00744** **	-0.00761	-0.00418	-0.000930
	(0.00389)	(0.00349)	(0.00958)	(0.00719)	(0.00952)
pop_g	**-0.202*** **	**-0.198** **	-0.142	-0.172	**-0.185** **
	(0.0590)	(0.0824)	(0.128)	(0.113)	(0.0726)
Intercept	**7.946*** **	**7.260*** **	4.973	**10.84** **	**7.171** **
	(1.366)	(1.673)	(6.117)	(4.178)	(2.681)
Observations	90	48	42	48	42
No. of id	30	16	14	16	14
No. of Instruments	11	11	11	11	11
Hansen test of over-identifying restrictions	5.28	2.63	4.41	4.85	1.94
	((0.071))	((0.269))	((0.110))	((0.089))	((0.380))
Arellano-Bond test for AR(1)	-1.31	-1.51	-1.08	-1.43	-1.94
	((0.190))	((0.131))	((0.278))	((0.152))	((0.052))

Robust standard errors in single parentheses for system GMM estimates, p-value in double parentheses for Hansen and Arellano-Bond tests. Level of statistical significance: 1% ***, 5% ** and 10% *. Time dummies are not reported.

Table 7. System GMM Estimation Results for Model 2. Determinants of per capita GDP growth in Latin America and the Caribbean.

Variables	Model 2	Model 2 Fixed	Model 2 Float	Model 2 Latin America	Model 2 Caribbean
l.lngdp_pc	**0.485*** **	**0.462*** **	**0.523*** **	**0.624*** **	**0.411*** **
	(0.0646)	(0.106)	(0.0812)	**(0.0733)**	(0.124)
rem	**-0.0415*** **	**-0.0370** **	**-0.0523** **	**-0.0285** **	**-0.0503*** **
	(0.00929)	(0.0161)	(0.0198)	**(0.0129)**	(0.0162)
fdi	**0.0173** **	**0.0202** *	0.0229	**0.00962**	**0.0171** *
	(0.00783)	(0.00975)	(0.0349)	**(0.0152)**	(0.00944)
lnf_cons	**-0.417** **	**-0.499** **	0.598	**-0.446**	**-0.459** *
	(0.182)	(0.210)	(1.240)	**(0.603)**	(0.244)
infla	**0.00536** *	**0.00738*** **	-0.00620	**0.00424** *	-0.00181
	(0.00263)	(0.00210)	(0.00871)	**(0.00216)**	(0.00804)
pop_g	**-0.199*** **	**-0.198** **	-0.184	**-0.171** *	**-0.186** **
	(0.0544)	(0.0797)	(0.127)	**(0.0877)**	(0.0716)
Intercept	**6.713*** **	**7.222*** **	2.003	**5.638** **	**7.624*** **
	(0.836)	(1.079)	(5.447)	**(2.489)**	(1.737)
Observations	90	48	42	**48**	42
Number of id	30	16	14	**16**	14
No. of Instruments	9	9	9	**9**	9
Hansen test of over-identifying restrictions	5.54	2.63	2.73	5.37	2.02
	((0.063))	((0.269))	((0.256))	((0.068))	((0.364))
Arellano-Bond test for AR(1)	-1.87	-1.41	-1.44	-2.65	-1.95
	((0.061))	((0.158))	((0.151))	((0.008))	((0.051))

Robust standard errors in single parentheses for system GMM estimates, p-value in double parentheses for Hansen and Arellano-Bond tests. Level of statistical significance: 1% ***, 5% ** and 10% *. Time dummies are not reported.

Table 8. General Specification Results for Log per Capita GDP Significant Regressors

Variables	Significant in explaining per capita GDP across panels
Remittances	-0.0665***
	(0.0110)
Foreign direct investment	0.0498***
	(0.0108)
Final private consumption	-1.054**
	(0.405)
Population growth	-0.390***
	(0.0817)
Intercept	13.63***
	(1.776)
Observations	120
R-squared	0.572

Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Table 9. List of Country's Short Name and ID Specification

Antigua and Barbuda	ANTG	1
Argentina	ARG	2
Bahamas	BAH	3
Barbados	BAR	4
Belize	BEL	5
Bolivia	BOL	6
Brazil	BRZL	7
Chile	CHILE	8
Columbia	COL	9
Costa Rica	COSTA	10
Dominica	DOM	11
Dominican Republic	DOM REP	12
Ecuador	ECUADOR	13
El Salvador	EL SALV	14
Grenada	GREN	15
Guatemala	GUAT	16
Guyana	GUY	17
Haiti	HAITI	18
Honduras	HOND	19
Jamaica	JAM	20
Mexico	MEX	21
Nicaragua	NIC	22
Panama	PAN	23
Paraguay	PARA	24
Peru	PERU	25
St Kitts and Nevis	SKNV	26
St Lucia	SLU	27
St Vincent and the Grenadines	SVG	28
Suriname	SUR	29
Trinidad and Tobago	TT	30
Uruguay	URU	31
Venezuela	VEN	32

CLIMATE CHANGE AND GROWTH

- Natural Disasters, Growth and Debt Sustainability: A Critical Analysis of the ECCU
  Ms Tonya Da Silva

- Can the Government Influence the Cost of Property Insurance in the ECCU?
  Ms Oneka Taylor

Natural Disasters, Growth and Debt Sustainability:
A Critical Analysis of the ECCU

BY

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Abstract

The aim of this empirical study is to examine the impact of natural disasters on economic growth in the ECCU countries. Two random effects panel data models are used to ascertain the relationship over the period 1980-2016. In addition, the paper utilises the Debt Sustainability Analysis Framework to investigate the potential impact of natural disasters on the debt sustainability of the countries over the medium term. Overall, the findings show that economic growth is significantly affected by intense natural disasters with growth being impacted in the order of 2.8 percentage points. Furthermore, the results of the DSA indicate that the countries would face difficulties to reach their debt target by 2030 if they were hit by an intense natural disaster as early as 2018.

Key Words: Natural Disasters, Growth, Debt Sustainability

JEL Classification: Q54, O44, H63

Table of Contents

1.0 Introduction

Over the years, there has been an increase in the frequency and intensity of natural disasters throughout the Caribbean. In addition, the prevalence of disasters is expected to increase in the future. Small island developing states (SIDS) are particularly vulnerable to natural disasters, with the countries of the Eastern Caribbean being among the most disaster-prone in the world (Rasmussen, 2004). Furthermore, natural disasters are found to have a discernible macroeconomic impact including large effects on both fiscal and external balances thus revealing the important role of precautionary measures. Since 2000, there has been an increase in both the frequency and intensity of hurricanes, with a record number of eight category 5 hurricanes occurring in the Atlantic over the period 2000 to 2009. Three of these hurricanes namely, Ivan, Emily and Dean caused extensive damage resulting in significant costs to the ECCU countries. In 2004, hurricane Ivan had a devastating effect on Grenada causing damages in excess of 200 per cent of the country's GDP (Caribbean Development Bank, 2013).

Currently, the countries of the ECCU are highly indebted and as such, the effects of natural disasters can have severe adverse effects on their fiscal and debt positions. Therefore, the objectives of this study are: 1) to investigate the impact of natural disasters on economic growth in the ECCU and 2) to examine the likely implications for debt sustainability for the ECCU member countries over the medium term. Generally, this study aims to augment the body of research geared at formulating appropriate policy responses to natural disasters in the region.

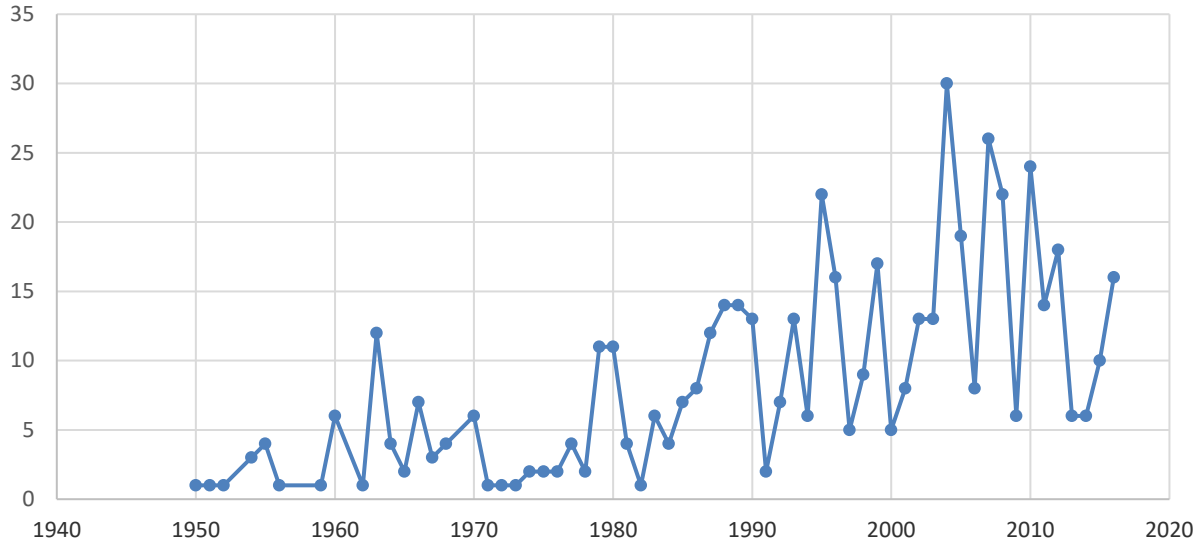
The remainder of this paper is organised as follows: section 2 gives some stylised facts on the ECCU; section 3 provides a review of the literature; section 4 describes the data and methodology; section 5 presents the results and analysis; section 6 concludes and section 7 highlights some policy recommendations.

2.0 Stylised Facts

2.1 Natural Disaster Occurrences in the Caribbean

The Caribbean region is susceptible to varying types of natural disasters such as hurricanes, floods, landslides, earthquakes, volcanic eruptions and droughts. Over the years, there has been an overall upward trend in the number of disaster occurrences affecting the region (Figure 1). During the period 1986 to 2016, the region experienced more than twice the amount of natural disasters compared with the occurrences of disasters over the period 1950 to 1986. Thus, showing the significant increase in the level of weather-related hazards over time.

Figure 1: Natural Disaster Occurrences in the Caribbean 1950-2016



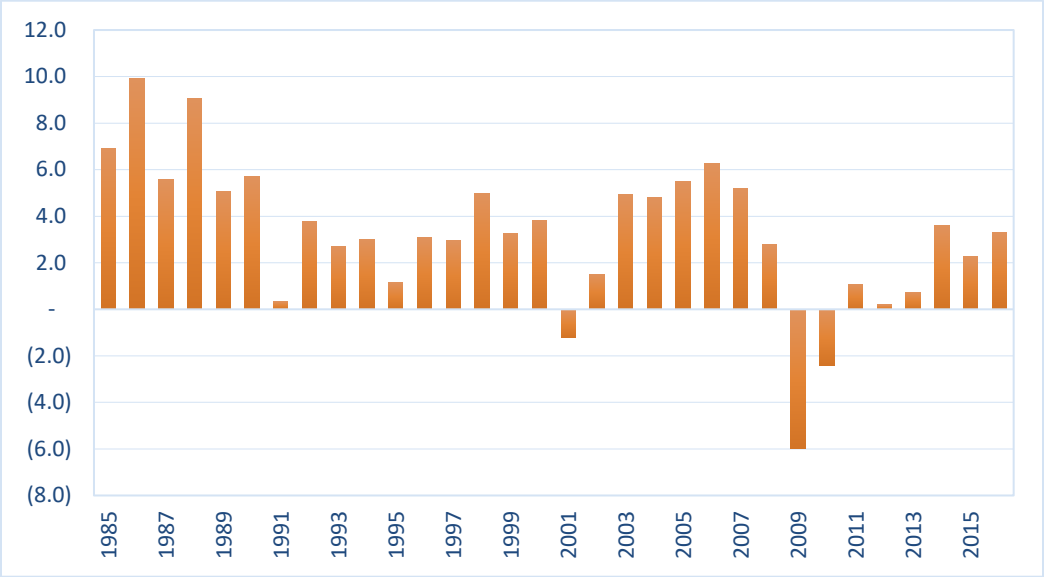
Source: EM-DAT

2.2 Growth in the ECCU

The ECCU countries have experienced high levels of growth in the immediate post-independence period; however, there has been a decline in growth since the 1990s due to the removal of preferential trade agreements and other external shocks (Figure 2). The elimination of trade preferences made the agricultural sector of the economies uncompetitive as a result of the decrease in the prices of agricultural products, thus leading to a decline in revenue from exports. Additionally, the global financial crisis of 2007-2009 and the consequent global recession exacerbated the situation. Notably, Antigua and Barbuda experienced high levels of economic

growth prior to the crisis, with growth reaching a high of 12.7 per cent in 2006. By contrast, the country recorded negative growth rates for three consecutive years subsequent to the crisis. Similarly, the remaining member countries experienced a high degree of volatility in their growth outcomes prior to and following the crisis; however, there were differences in the magnitude of the impact. Currently, the economies of the Eastern Caribbean are still recovering from the crisis and have yet to return to their pre-crisis growth levels.

Figure 2: Real GDP Growth in the ECCU 1980 to 2016 (%)

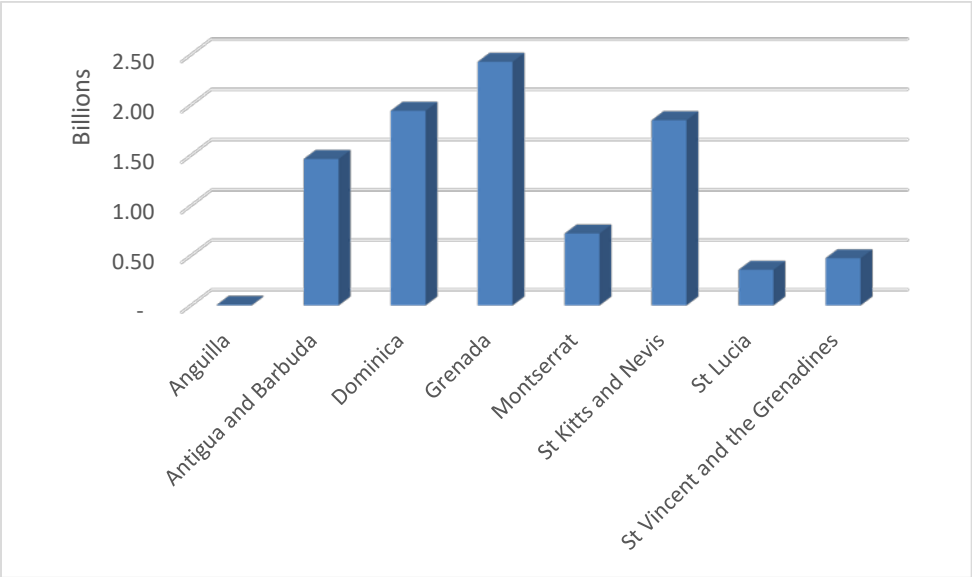


Source ECCB

2.3 Vulnerabilities of the ECCU Countries

During the period 1950 to 1980, the ECCU countries experienced 24 natural disasters compared with 68 weather-related events over the period 1981 to 2016 (Appendix Table 1), highlighting the higher level of vulnerability to these events. In addition, the costs incurred by natural disasters have grown significantly in real terms over the years. During the period 1980 to 2016, the countries of the ECCU sustained a cumulative cost of damages ranging from a low of EC$6.3m in Anguilla to a high of EC$2.4b in Grenada (Figure 3).

Figure 3: Cumulative Cost of Damages (EC$) over the period 1980-2016



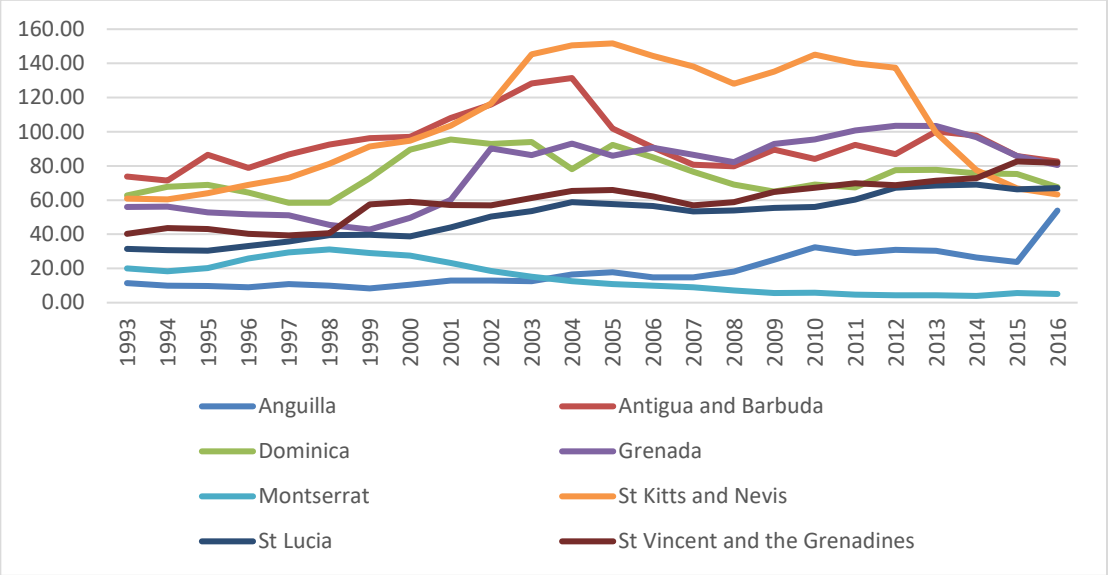
Source: EM-DAT and Country Reports

Small Island Developing States (SIDS) such as the ECCU are considered the most vulnerable and least equipped to deal with the effects of natural disasters. The economies of the Eastern Caribbean are highly undiversified and are heavily reliant on one or two sectors of the economy such as the tourism industry and the agricultural sector. This undiversified nature of the economies means that a single adverse shock to a key sector can negatively impact growth. In addition to natural disasters, the countries are susceptible to oil price shocks and world interest rate fluctuations, particularly due to the high degree of openness and the dependence on external markets for key imports and foreign direct investment. Moreover, the ECCU countries are heavily reliant on foreign sources to finance costs incurred in the aftermath of natural disasters.

2.4 Debt in the ECCU

Over the years, all of the independent countries of the ECCU have accumulated high levels of debt. With the exception of the dependent territories: Anguilla and Montserrat, each country has surpassed the 60 per cent debt to GDP prudential. However, the member countries have agreed to achieve the stated target by the year 2030. In 2005, St Kitts and Nevis recorded an exceedingly high public debt to GDP ratio of 152 per cent but has since been on a downward trajectory.

Figure 4: Public Debt to GDP over the Period 1993 to 2016



Source: Eastern Caribbean Central Bank

3.0 Literature Review

Issues associated with the impact of natural disasters on the economy are still relatively under researched. However, in recent years there have been an increase in the literature on natural disasters in relation to economic growth and debt.

Skidmore and Toya (2002) investigates whether natural disasters promotes growth in the long run and they conclude that disasters may stimulate growth in the long run. This conclusion is based on Schumpeter's process of creative destruction and therefore they postulate that these occurrences may provide an opportunity to update the capital stock and thereby encourage the adoption of new technologies.

In an empirical paper, Loayza et al (2009) examines the impact of natural disasters on growth in the long run over the period 1961-2005 by disaggregating the type of disaster and the different economic sectors in developed and developing countries. Using a dynamic Generalised Method of Moment (GMM) panel estimator for 94 developed and developing countries, the results reveal that disasters affect growth but not always negatively and the impact varies across the different types of natural disasters and economic sectors.

Fomby et al (2011) analyses the yearly economic growth response of countries in the aftermath of natural disasters in 60 developing countries and 24 developed countries from 1960 to 2007. The study utilises a panel VAR methodology with endogenous variables and exogenous shocks. The results show that natural disasters have a greater impact on developing countries than on developed countries. Similar to Loayza et al (2009), different natural disasters have varying effects on economic growth and some natural disasters were found to be beneficial if of moderate intensity. For example, the results suggest that moderate floods have a positive impact on agricultural growth through the collection of irrigation water. However, the findings show that severe natural disasters have a strong negative effect on growth.

Melecky and Raddatz (2011) uses a panel VAR model to estimate the impact of natural disasters on government expenditures and revenues for middle and high-income countries for the period 1975-2008. The results reveal that disasters have a negative impact on the fiscal stance of the countries by decreasing output and increasing the deficit particularly in low and middle-income countries. Furthermore, it was found that countries with a high level of insurance or a more developed financial market experienced smaller output declines in relation to natural disasters.

Similarly, Acevedo (2014) explores the effects of natural disaster occurrences on growth and debt in the Caribbean by using a panel VAR model with exogenous variables over 40 years, from 1970 to 2009. The findings show that moderate floods and storms have a negative effect on growth and debt while severe disasters generate larger declines in output. Additionally, the results suggest that floods increase debt.

Scott-Joseph (2010) addresses the issue of natural disaster expenditure and fiscal sustainability in the ECCU. Specifically, the paper examines the effect of natural disasters expenditure on fiscal policy cyclicality. The results show that when unexpected events such as natural disasters occur the government will automatically increase public expenditure, thereby undertaking pro-cyclical fiscal policies that generally lead to wider fiscal deficits.

In an empirical study, Lugay and James (2014) investigates the impact of natural disasters on public debt accumulation in the ECCU countries for the period 1993-2011 using a fixed effects panel data model. The study contends that the occurrence of natural disasters leads to the accumulation of public debt in order to finance reconstruction as fiscal resources in the region tend to be limited and expenditure structures are too rigid to absorb the effects of external shocks. Moreover, the results reveal that when a natural disaster causes 2 per cent or more of GDP in damages in a year the debt to GDP ratio increases by 6.7 per cent in comparison to a year where no disaster or a less intense disaster occurred.

Overall, the review of the literature shows that there is mixed results on the impact of disasters on growth, with the main findings being that natural disasters negatively impact growth in the short run while being positively correlated with growth in the long run.

4.0 Data and Methodology

4.1 Data

For the purpose of this study, the dataset consists of an unbalanced panel of 267 observations for the eight ECCU countries (Anguilla, Antigua and Barbuda, Dominica, Grenada, Montserrat, St Kitts and Nevis, Saint Lucia and St. Vincent and the Grenadines) over the years 1980 to 2016. The Eastern Caribbean Central Bank was the main source of data for most variables such as real GDP, government final consumption, population growth and foreign direct investment inflows. The data on US GDP were obtained from the World Bank.

The Emergency Events Database (EM-DAT), which is a database that collects data on natural disasters affecting countries around the world was used to gather data on natural disasters in the ECCU. The EM-DAT database contains all weather events from the year 1900 to present that meet the qualification of a natural disaster. In order for a natural disaster to be included in the database, the event must fulfil one of the following criteria: 10 or more people killed; 100 or more people affected; the declaration of a state emergency; and/or a call for international assistance.

Data on the cost of damages incurred by the natural disasters were supplemented by the reports done by the governments of the respective countries in conjunction with other organisations such as the World Bank and the Economic Commission for Latin American and the Caribbean (ECLAC).

4.2 Model

In order to assess the impact of natural disasters on economic growth, two panel data models were utilised. The models are specified as follows:

$$RGDP_{it} = \alpha_{it} + \beta_1 GC_{it} + \beta_2 POP_{it} + \beta_3 FDI_{it} + \beta_4 USGDP_{it} + \beta_5 ND1_{it} + u_{it} + \varepsilon_{it} \quad (1)$$

$$RGDP_{it} = \alpha_{it} + \beta_1 GC_{it} + \beta_2 POP_{it} + \beta_3 FDI_{it} + \beta_4 USGDP_{it} + \beta_5 ND2_{it} + u_{it} + \varepsilon_{it} \quad (2)$$

Where:

- Subscripts *i* and *t* represent the country and time effects respectively;
- α_{it} captures the unobserved country effect;
- $RGDP$ is the growth rate of real GDP;
- GC is government consumption (% of GDP);
- POP is the growth rate of the population;
- FDI is Foreign Direct Investment Inflows (% of GDP);
- $USGDP$ is the growth rate of GDP of the United States of America;
- $ND1$ is the natural disaster occurrences dummy variable (1 if a natural disaster occurred, 0 otherwise);
- $ND2$ is the intense natural disaster dummy variable (1 if a natural disaster incurs damages greater than 1 per cent of GDP, 0 otherwise);
- u_{it} is the between-entity error term;
- ε_{it} is the within-entity error term;

4.3 Methodology

4.3.1 Panel Least Squares

The results of the Durbin-Watson test for autocorrelation indicates that there is an absence of serial correlation among the variables. Four different tests were used to check the presence of unit root: i. Levin, Lin and Chu; ii. Im, Pesaran and Shin W-Sta;, iii. ADF-Fisher Chi-square; and iv. PP-Fisher Chi-square. The Levin, Lin and Chu test assumes a common unit root process while the other tests assume individual unit root process. Table 3 in the appendix shows a summary of the unit root tests results. The findings indicate that all variables except consumption activity were statistically significant in levels, indicating the absence of a unit root in these variables and rendering them stationary. Government consumption returned a p-value of more than 5 per cent for all of the unit root tests, presenting evidence of a common unit root and an individual root. In order to make the variable stationary, the variable was first differenced. Additionally, the White cross-section method was applied to control for heteroscedasticity.

The Hausman test is used to determine whether the Fixed Effects model or the Random Effects Model was the more suitable. The null and alternative hypotheses for the Hausman Test are as follows:

H_0: *The Random Effects Model is appropiate* H_1: *The Fixed Effects Model is appropiate*

In models 1 and 2, the Hausman test returned a p-value of 0.3702 and 0.2657. Given the insignificance of these results, the null hypothesis was not rejected and the random effects model was deemed to be appropriate. These results can be seen in table 4 of the appendix.

4.3.2 Debt Sustainability Analysis

The Debt Sustainability Analysis Framework is a forward-looking analysis of debt that is used to assess the primary balance necessary to maintain debt at a certain level. Also, it calculates the primary balance needed to reduce debt to a target level within a specified number of years. The Debt Sustainability Analysis was used for all eight ECCU countries in order to forecast the likely debt path of member countries after the occurrence of an intense natural disaster. The natural disaster coefficient from model 2 was used as a shock within the DSA to evaluate whether the

countries would realistically be able to meet their target by 2030 if an intense natural disaster was to occur in 2018.

4.4 A Priori Expectations

Prior to any econometric evaluation of the correlation between economic growth and the dependent variables, the following are a prior expectations based on economic theory and conclusion of some empirical studies as discussed in the literature review section above.

Table 2: A Priori Expectations

Variable	*Expected Sign*
GC	-
POP	+/-
FDI	+
USGDP	+
ND1	-
ND2	-

Despite differing views in the economic literature, Government consumption (GC) is generally expected to have a negative relationship with economic growth as a high level of government consumption increases the fiscal deficit, which negatively affects economic growth. Furthermore, a high level of government consumption may crowd out private investments thus slowing economic activity and thereby economic growth.

The a priori expectation of the population growth (POP) variable is unclear as the variable may result in a positive sign given that population growth may lead to an increase in the productive capacity of the country, as there is now a larger quantity of human capital, thus spurring growth. On the other hand, there may be a negative relationship if the increase in the population does not positively contribute to growth. In addition, population growth may worsen resource scarcity and hinder growth.

Foreign Direct Investment inflows (FDI) are anticipated to be positively correlated with growth as the flows tend to be heavily concentrated in the tourism industry, thus creating jobs and generating foreign exchange. US GDP is also expected to have a positive sign since the ECCU economy is closely tied to that of US through trade and financial linkages. Therefore, growth in the US economy has positive spill-over effects in the ECCU countries while a downturn in the US economy has the opposite effect. The natural disaster dummy variables (ND1 and ND2)are expected to yield a negative sign as natural disasters result in extensive damage to countries, thus generating negative economic growth in the short run.

5.0 Results and Analysis

5.1 Panel Least Squares Results

The signs of the coefficients for all of the variables conform to the a priori expectations in both models (Table 3). Therefore, the results revealed positive signs for the population growth, FDI and USGDP variables, while government consumption and the natural disaster dummy variables in both models yielded negative signs.

Table 3: Random Effects Estimation Results

Variable	Model 1	Model 2
C	-0.224 (0.806)	-0.248 (0.788)
D(GC)	-0.998 (0.000)	-0.971 (0.000)
POP	0.241 (0.039)	0.228 (0.061)
FDI	0.094 (0.039)	0.099 (0.033)
USGDP	0.81 (0.000)	0.844 (0.000)
ND1	-0.792 (0.248)	
ND2		-2.762 (0.003)
R^2	0.381	0.411
Adjusted R^2	0.369	0.399

The government consumption variable is statistically significant at the 1 per cent level in both models with negative coefficients of -0.99 and -0.97 respectively. This is partially explained by the negative spill over effect an increase in government consumption can have on an economy through higher levels of taxes and borrowing. Moreover, high levels of government consumption may crowd out private investments thus leading to a contraction in growth.

With respect to population growth, the results suggest the variable has a positive and statistically significant impact on economic growth. This may be due to the rise in the population positively impacting human capital thus resulting in a rise in economic growth.

FDI inflows were shown to have a positive and statistically significant impact on growth in both models with a coefficient of 0.09. This indicates that foreign direct investment inflows positively contribute to growth in the ECCU, primarily through the tourism channel.

Furthermore, the findings indicate that the growth rate of US GDP positively influences growth in the ECCU with coefficients of 0.81 and 0.84 in models 1 and 2 respectively. This provides evidence of how tightly linked the ECCU economies are to that of the US as a 1 per cent change in US GDP leads to an almost proportional change in GDP in the Eastern Caribbean. The ECCU has been pegged to the US dollar since at 1976 at US$1.00=EC$2.70. Also, tourism is the main driver of the ECCU economies, with the US market being the most dominant source of tourists.

The findings show that the occurrence of natural disasters is negatively associated with an average decline in economic growth of 0.79 percentage point. However, this figure was not statistically significant in model 1. Based on the results, natural disasters that incur damages of more than 1 per cent of GDP significantly and negatively impact economic growth and are associated with a 2.8 percentage point decline in growth in the short run. On average in the ECCU, intense natural disasters costs as a per cent of GDP ranged from a low of 3.6 per cent in Anguilla to a high of 89.5per cent in Montserrat. The negative impact of disasters is likely due to the destruction of critical infrastructure, including the tourism plant, the housing stock, roads and bridges, necessary for the smooth functioning of the economy. As a result, such events tend to negatively impact the export earning capacity of the countries, while concurrently leading to an increase in the demand for imports related to reconstruction activities, thereby further dampening growth.

5.2 Debt Sustainability Analysis Results

For the purpose of the debt sustainability analysis, three scenarios were conducted, namely: 1) A baseline scenario assuming no weather-related shocks; 2) A natural disaster scenario incorporating the baseline primary surplus; and 3) A natural disaster scenario with a primary surplus adjusted to meet the 60 per cent target by 2030. Under all three scenarios, both the long-term average real growth rates, as well as, the average real interest rates were used. In addition, the debt to GDP ratios as at December 2016 were used as the starting debt levels in the analysis.

Table 4: Baseline Scenario

	AXA	***ATG***	***DOM***	***GDA***	***MON***	***SKN***	***SLU***	***SVG***
Growth	2.75%	2.9%	2.2%	2%	2%	2.2%	2.2%	2.3%
Primary Surplus	N/A	2.4%	0.6%	1.4%	N/A	0.81%	1.01%	1.35%
Debt by 2030	N/A	60%	60%	60%	N/A	60%	60%	60%

Under the baseline scenario, all countries are expected to meet the benchmark of 60 per cent by 2030 with average forecasted growth rates ranging from 2.0 per cent in Grenada and Montserrat to 2.9 per cent in Antigua and Barbuda (Table 4). In addition, member countries would be required to generate primary surpluses ranging from 0.6 per cent of GDP (Dominica) to 2.4 per cent of GDP (Antigua and Barbuda). This baseline scenario shows the projected debt outlook for the economies before the natural disaster shock is simulated in 2018. Anguilla and Montserrat were not included in the analysis given that both countries are already below the established debt target at 53.8 and 5.1 per cent respectively as at December 2016.

In table 5, the coefficient from Model 2 above (-2.76) representing the average growth impact of an intense natural disaster, is inputted into the DSA in the year of the shock, in this case, 2018. It is assumed, that growth rates would return to their long run path, as shown in Table 4, following the passage of the natural disaster. In addition, the scenario maintains the primary surplus positions established under the baseline. The results of the alternative scenario of the DSA of the ECCU countries indicate that if each country were to experience an intense natural disaster as early as 2018, most of the countries are not likely to meet their debt targets by the year 2030.

Table 5: Natural Disaster Scenario with Baseline Primary Surplus

	AXA	*ATG*	*DOM*	*GDA*	*MON*	*SKN*	*SLU*	*SVG*
Primary Surplus	N/A	2.0%	0.6%	1.4%	N/A	0.81%	1.01%	1.35%
Debt by 2030	N/A	68.2%	63.9%	64.2%	N/A	67.7%	63.8%	65.5%
Year debt will be 60%	N/A	2033	2033	2032	N/A	-	2033	2032

Additionally, Grenada and St. Vincent and the Grenadines would likely be the first countries to meet the debt target, but not until 2032, with Antigua and Barbuda, Dominica and Saint Lucia achieving the target by 2033. Accordingly, member countries would be required to generate even larger primary surpluses in order to achieve the debt target by the agreed date.

In the third scenario, the growth shock remains the same as per scenario two, but the important difference is that primary balances are allowed to adjust in order to arrive at the debt target by 2030. A shown in ***Table 6***, each country would be required to further increase their fiscal effort in order to achieve the 60.0 per cent debt target by 2030, with the revised primary surpluses ranging from 0.9 per cent (Dominica) to 2.6 per cent (Antigua and Barbuda) of GDP. Given the current fiscal constraints of ECCU member countries and their historical performances, some governments may find it extremely difficult to generate the required fiscal surpluses on a sustained basis. However, St Kitts and Nevis may be able to generate the required surplus regularly given their history of running primary surpluses.

Table 6: Natural Disaster Scenario with Primary Surplus Adjusted to meet 60 Per Cent Target

	AXA	*ATG*	*DOM*	*GDA*	*MON*	*SKN*	*SLU*	*SVG*
Primary Surplus required	N/A	2.6%	0.9%	1.8%	N/A	1.35%	1.23%	1.76%
Debt by 2030	N/A	60%	60%	60%	N/A	60%	60%	60%

The DSA was also done using an average of the historical growth rates in the years of an intense natural disaster for each country. The findings of this corroborates the aforementioned due to the similarity between both results, which indicates that the countries would face difficulties to attain the necessary fiscal surplus. These results can be seen in table 5 of the appendix.

5.2.1 Limitations

The DSA is a static tool, therefore, it does not capture the full dynamics of the economies. Therefore, interactions among some key macroeconomic variables that drive debt are not accounted for. Additionally, the DSA uses forward-looking projections over the medium term and therefore there is a margin of error present.

5.2.2 Financing Needs

The ability of the countries to finance their needs in the aftermath of disasters is heavily constrained. For example, in the aftermath of the December 2013 floods in St. Vincent and the Grenadines, there was an extreme financing gap where the country only had 2.0 per cent of the finance needed. Additionally, Saint Lucia faced a financing gap of 83.0 per cent after the December 2013 floods. This means that the country had 17 per cent of the finances they needed in the aftermath of the disaster. The Caribbean Catastrophe Risk Insurance Facility (CCRIF) was created in order to ease some of the immediate financing needs of countries post-disaster. CCRIF assists the countries with their short-term cash flow problems when a natural disaster occurs by providing immediate payout to member countries to help finance initial disaster response. All eight ECCU countries are members of CCRIF. The countries also receive funds from other sources to assist them after a weather-related hazard occurs. However, the countries continue to face a wide financing gap.

6.0 Conclusion

The purpose of this empirical study was to analyse the relationship between natural disasters and economic growth in the ECCU over the period 1980-2016. The method of panel least squares was applied to estimate the variables in both models with the main findings being that natural disaster occurrences are negatively associated with a 0.79 percentage point decline in economic growth. However, this was not statistically significant. Additionally, intense natural disasters that inflict more than 1 per cent of GDP in damages were found to be associated with a 2.8 percentage point decrease in growth. These results are in line with the literature and the a priori expectations. Moreover, the Debt Sustainability Analysis revealed that the countries are not likely to have enough fiscal space to achieve their debt target if an intense natural disaster were to occur as early as the year 2018.

The results indicated that natural disasters hinder growth in the ECCU and adversely impact the debt positions of the countries. High debt levels negatively impact public finances and impede the government's ability to achieve sustainable debt levels. For the ECCU countries, the impact is immediately seen on the government's fiscal accounts via increased fiscal deficits as a result of a significant expansion in capital expenditure. The increase in expenditure during the rehabilitation and reconstruction period generally outpace the rate of growth on the income side of the fiscal account. Natural disasters also affects the wider ECCU economy, particularly when they occur with high degree of frequency as they impede the financial capacity and welfare of the ECCU citizens. High debt levels can propagate through the economies through a number of ways, such as weak labour markets, resulting in an increase in unemployment and the crowding out of private investments. In conclusion, this paper emphasises the need for proactive policy measures to build the resilience of the ECCU countries against natural disasters and also to foster prudent debt sustainability practices.

7.0 Policy Recommendations

Based on the findings, the following policy recommendations are made in order to help the ECCU countries mitigate the impact of natural disasters while improving their prospects for debt sustainability:

- A natural disaster sinking fund can be created using a portion of the Citizenship by Investment flows in the ECCU countries that have this programme. Five ECCU countries (Antigua and Barbuda, Dominica, Grenada, St Kitts and Nevis and Saint Lucia) have programmes where investors can acquire citizenship by paying a fee. Therefore, it may be beneficial if these countries allocate between 5.0 to 10.0 per cent of these inflows to a sinking fund. The countries can make regular payments into the fund thereby ensuring that their debt obligations can be paid when they fall due. Furthermore, these payments can also be used to repurchase bonds.
- Given the vulnerability of the countries to natural disasters and the significant costs they incur, ECCU member territories are encouraged to pool 1.0 per cent of their GDP to create a contingency fund that can be disbursed immediately after the occurrence of a disaster. Also, it is important for the countries to generate primary surpluses on a regular basis so that there is adequate fiscal space to deal with disasters without undertaking high levels of debt. Strengthened expenditure management by the governments would be useful in this regard.
- It is imperative that disaster risk management be integrated into the medium and long term planning and goals of each country. Weather-related hazards must be addressed in order to achieve sustainable development.
- Greater emphasis must be placed on improving the quality of key infrastructure such as roads, hospitals and airports. The destruction of critical infrastructure during a disaster has the potential to halt economic activity in a country. Furthermore, regular maintenance of vital infrastructure must be done and vulnerability audits undertaken to enhance the quality of the housing stock and critical public sector structures.
- It is important that building codes be improved and enforced in order to enhance resilience to future disasters.
- Enhancing and maintaining drainage infrastructure is critical. This would help to reduce flooding and landslides during episodes of heavy rainfall.

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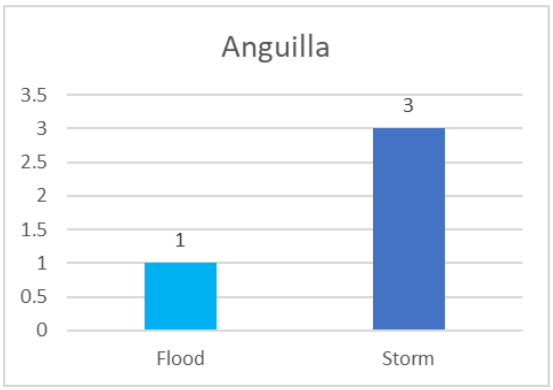
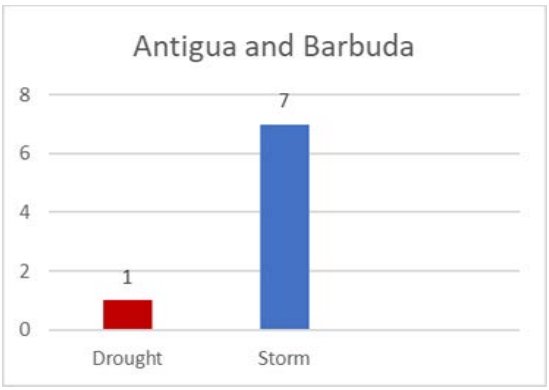
Appendix

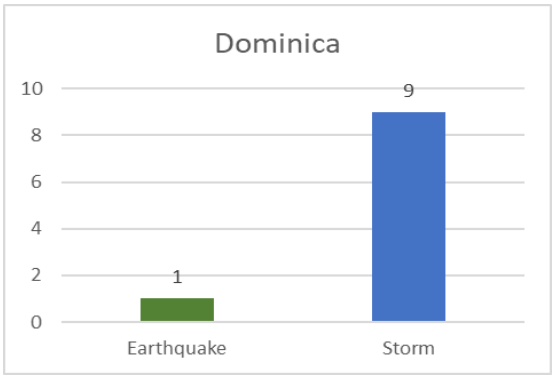
Table 1: Major Disasters in the ECCU over the period 1980-2016

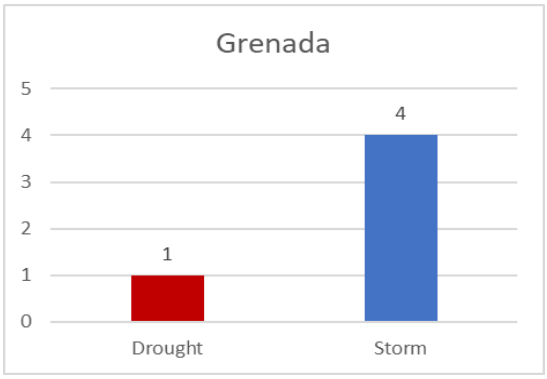
Country	*Natural Disaster*	*Impact*
Antigua and Barbuda	Hurricane Luis 1995	• Decrease in GDP of 5.0 per cent • Electricity outages up to six months • Closure of tourism facilities for several months
Dominica	Tropical Storm Erika 2015	• Cost of Damages totalling EC$1.3b • Major damages to transportation, housing and agricultural sectors
Grenada	Hurricane Ivan 2004	• Damages in excess of 200 per cent of GDP • 89.0 per cent of the housing stock severely damaged, with 30.0 beyond repair • Significant losses to both the agriculture and tourism sectors
Montserrat	Volcanic Eruptions 1995-1997	• Two-thirds of the islands uninhabitable; • Tourism industry decimated; lack of air access; • Large scale destruction to the capital stock; • Has yet to return to the pre-crisis GDP levels
St Kitts and Nevis	Hurricane Georges 1998	• EC$1.2b in damages incurred • 80.0 per cent of the housing stock affected • Widespread destruction to electricity and tourism infrastructure
St Lucia	Hurricane Tomas 2010	• Cost of damages approximately EC$907.2m (36.0 per cent of GDP); • Major losses to tourism industry and infrastructure generally; • Cancellation of seven cruise ship visits;
St Vincent and the Grenadines	Trough System 2013	• Cost of damages approximately EC$291.4m or 15 per cent of GDP • Major destruction to roads and bridges • Functioning of the economy negatively impacted via infrastructural damages

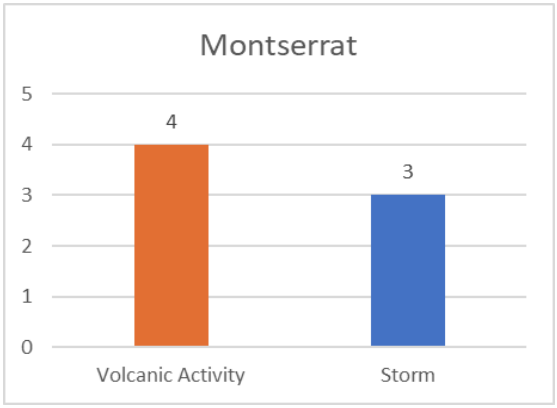
Source: Country Reports

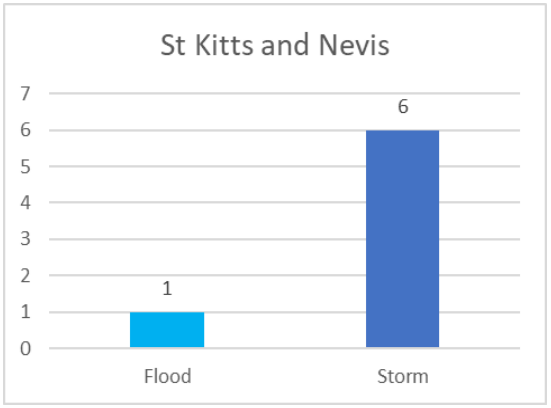


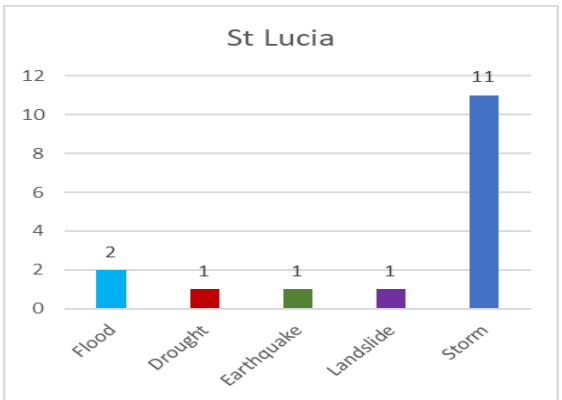


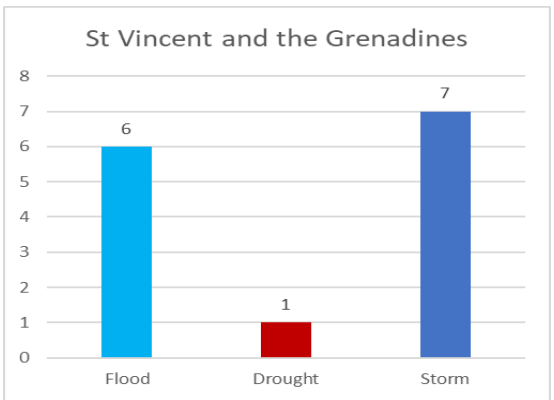






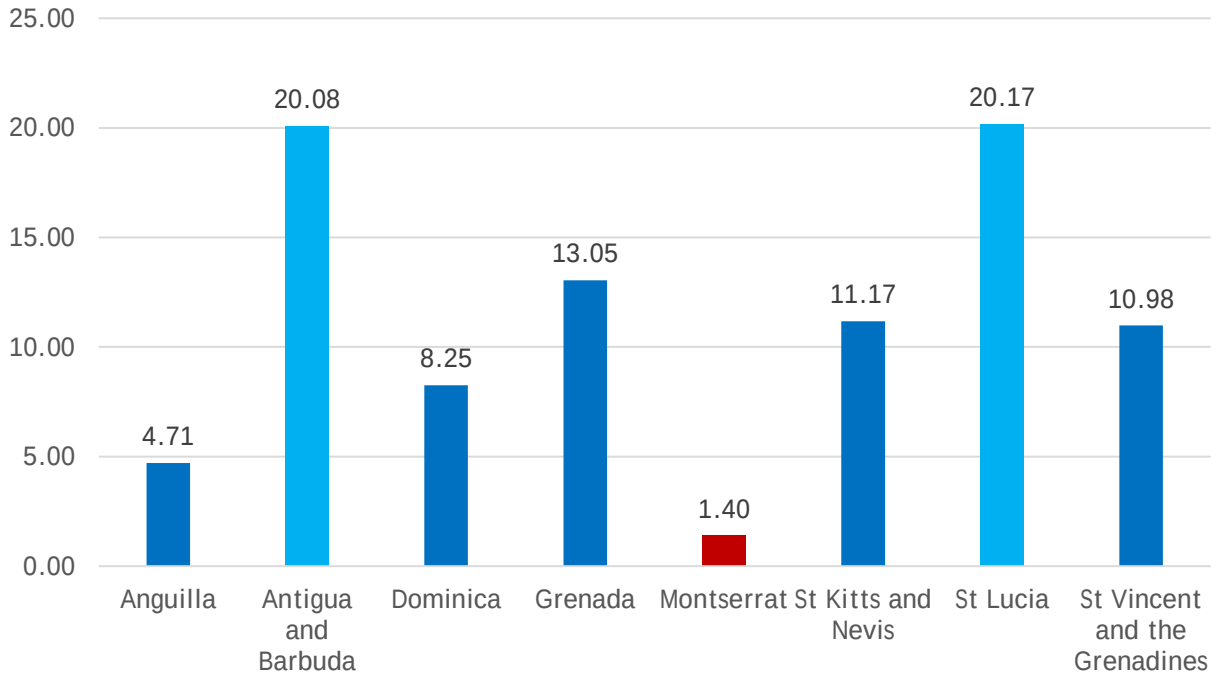






Source: EM-DAT

Figure 2: One (1) per cent of GDP on average in the ECCU during the period 1980-2016



Source: Eastern Caribbean Central Bank

Table 1: Summary Statistics of Variables

Sample: 1980 2016

	RGDP	GC	FDI	USGDP	POP	ND1
Mean	2.740865	17.76103	10.87137	2.595422	0.531763	0.210332
Median	2.902586	15.64903	8.468433	2.718976	0.668896	0.000000
Maximum	17.25066	54.56017	51.75760	7.259087	25.34850	1.000000
Minimum	-26.75992	8.881186	0.080922	-2.775530	-55.26748	0.000000
Std. Dev.	5.113491	9.830727	7.841176	1.857703	4.934314	0.408299
Skewness	-1.439377	2.733067	1.826450	-0.751098	-5.753964	1.421528
Kurtosis	9.718441	9.588685	8.365146	4.353102	69.36968	3.020741
Jarque-Bera	603.2536	827.5592	475.7007	46.15449	51234.43	91.27500
Probability	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
Sum	742.7744	4813.239	2946.141	703.3594	144.1077	57.00000
Sum Sq. Dev.	7059.904	26093.66	16600.69	931.7864	6573.812	45.01107
Observations	271	271	271	271	271	271

Table 2: Correlation Matrix

	RGDP	**GC**	**FDI**	**USGDP**	**POP**	**ND1**
RGDP	1.000000					
GC	-0.302417	1.000000				
FDI	-0.166815	-0.172529	1.000000			
USGDP	0.259377	-0.056285	-0.119273	1.000000		
POP	0.356036	-0.109140	0.159058	-0.053626	1.000000	
ND1	-0.115076	-0.033195	-0.084898	-0.169432	-0.094108	1.000000

	RGDP	**GC**	**FDI**	**USGDP**	**POP**	**ND2**
RGDP	1.000000					
GC	-0.308312	1.000000				
FDI	-0.169803	-0.174712	1.000000			
USGDP	0.260864	-0.056791	-0.117966	1.000000		
POP	0.355814	-0.103054	0.160120	-0.055239	1.000000	
ND2	-0.239692	-0.003671	-0.038305	-0.093909	-0.124180	1.000000

Table 3: Panel Unit Root Results

Variable	Levin, Lin and Chu T	Im, Pesaran and Shin W-Stat	ADF-Fisher Chi-square	PP- Fisher Chi-square
RGDP	-5.22468 (0.000)	-5.33627 (0.000)	60.5200 (0.000)	115.398 (0.000)
D(GC)	-7.10867 (0.000)	-8.36251 (0.000)	97.7632 (0.000)	191.914 (0.000)
POP	-1.76593 (0.0387)	-4.24194 (0.000)	49.6725 (0.000)	100.755 (0.000)
FDI	-4.50087 (0.000)	-4.35778 (0.000)	48.7592 (0.000)	50.9485 (0.000)
USGDP	-5.40924 (0.000)	-5.43137 (0.000)	59.0105 (0.000)	99.7135 (0.000)
ND1	-6.15073 (0.000)	-9.86535 (0.000)	97.2267 (0.000)	148.648 (0.000)
ND2	-0.66709 (0.2524)	-6.50228 (0.000)	54.8399 (0.000)	108.128 (0.000)

Table 4: Hausman Test Results

Correlated Random Effects - Hausman Test
Equation: Untitled
Test cross-section random effects

Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section random	5.389427	5	0.3702

Correlated Random Effects - Hausman Test
Equation: Untitled
Test cross-section random effects

Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section random	6.440347	5	0.2657

Table 5

: Debt Sustainability Analysis Results using historical data

Baseline Scenario

	AXA	***ATG***	***DOM***	***GDA***	***MON***	***SKN***	***SLU***	***SVG***
Growth	N/A	-0.59	1.39	-1.13	-19.07	2.51	0.74	2.41
Primary Surplus	N/A	2.4%	0.6%	1.5%	N/A	0.81%	1.01%	1.35%
Debt by 2030	N/A	60%	60%	60%	N/A	60%	60%	60%

Natural Disaster Scenario with Baseline Primary Surplus

	AXA	***ATG***	***DOM***	***GDA***	***MON***	***SKN***	***SLU***	***SVG***
Growth	N/A	-0.59	1.39	-1.13	-19.07	2.51	0.74	2.41
Primary Surplus	N/A	2.4%	0.6%	1.5%	N/A	0.81%	1.01%	1.35%
Debt by 2030	N/A	66%	61.6%	62.9%	N/A	63.9%	61.1%	60.3%
Year debt will be 60%	N/A	2034	2031	2032	N/A	2043	2031	2030

Natural Disaster Scenario with Primary Surplus adjusted to meet 60 per cent target

	AXA	***ATG***	***DOM***	***GDA***	***MON***	***SKN***	***SLU***	***SVG***
Growth	N/A	-0.59	1.39	-1.13	-19.07	2.51	0.74	2.41
Primary Surplus	N/A	3%	0.8%	1.6%	N/A	1.17%	1.15	1.52%
Debt by 2030	N/A	60%	60%	60%	N/A	60%	60%	60%

Can the governments Influence the Cost of Property Insurance in the ECCU?

BY

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University of the West Indies

Mona Campus

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Executive Summary

The Property Insurance industry in the Eastern Caribbean Currency Union (ECCU) has been, on several occasions, marked by a number of large-loss events such as the volcanic eruption in Montserrat as well as hurricanes and floods in many other countries. For example, after Hurricane Ivan in Grenada, devastation was widespread with damages totaling 200 per cent of the country's GDP. As a result, claim payments increased by 126.0 per cent, causing premiums to increase by as much as 42.0 per cent. More recently, Hurricane Maria, one of the strongest hurricanes ever recorded in the Caribbean, caused more than 60 casualties in Dominica and over EC$1.78b in total damages to building. The damage to the social sector accounted for more than 35.0 per cent of this cost.

In recent years, there has been an unprecedented rise in the frequency and severity of natural disasters plaguing the region. As the impact of climate change continues to be felt across the globe, the financial and societal costs associated with this phenomenon continue to increase. Consequently, the role of insurance has become increasingly necessary. Without a concerted effort by heads of government and policy makers to improve hazard and climate risk management, these events can have adverse impacts on the affordability of insurance and the ability of households and businesses to recover from the devastation caused. In the absence of appropriate risk mitigation techniques, including enforcement of building codes, land use controls and contingency and resilience funding, the resultant large catastrophe losses will likely lead to escalating insurance costs, which creates a risk for governments, businesses and households. In an effort to provide a better mechanism for dealing with risks, CARICOM Heads of Government requested the World Bank's assistance in considering the special needs and concerns of developing countries resulting from the adverse effects of climate change in the area of insurance. The Caribbean Catastrophe Risk Insurance Facility (CCRIF) is the result of this collaboration which provides CARICOM governments with an insurance instrument to partially address their soaring vulnerability. It is noteworthy that while the CCRIF provides critical assistance to governments in the aftermath of a natural disaster, it only represents a short-term solution to their liquidity needs. In addition, to the extent that both the intensity and frequency of natural disasters increase over the medium to long term, ECCU member governments are likely to see a concomitant increase in their premium payments for the insurance facility.

Acknowledging that natural disasters can reduce the affordability of insurance, this brief seeks to examine whether governments can more effectively influence premium rates, given the important and significant link between the public sector and the insurance sector. An examination of the issues revealed that the government could better influence premium rates through land-use planning, granting concessions on building materials and a collaboration with insurance companies to provide risk mitigation strategies and financial education to the public.

Context and Importance of the Problem

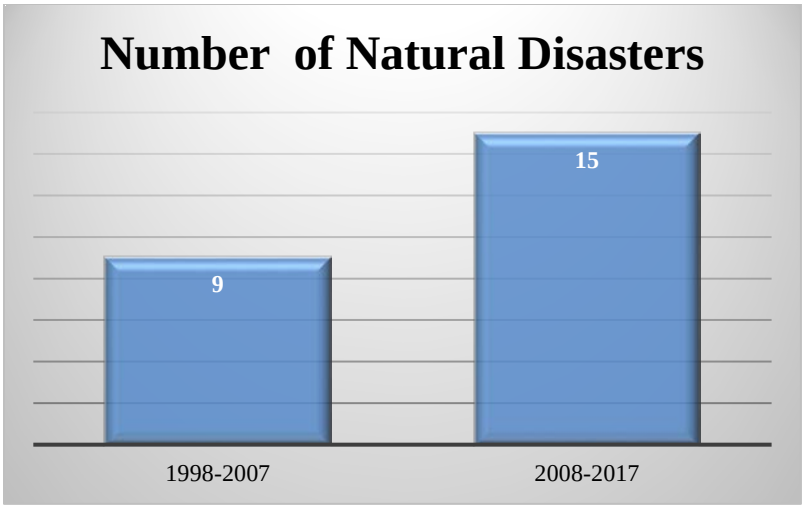
Hurricanes, droughts, floods, earthquakes and other natural events are common across the world and may lead to catastrophic damage. An event developing into a natural disaster is primarily driven by its force, the extent of the damage and the loss of life.[48]The vulnerability of infrastructures, increased concentration of population in hazard-prone areas (urbanization), economic and fiscal exposure and climate change can increase the damage caused by an event.

In recent years, there has been an unprecedented rise in the frequency and severity of natural disasters plaguing the region. This is fueled by a rise in sea temperature, which is expected to become more noticeable for decades to come, largely due to greenhouse gases emitted by human-induced activities (Intergovernmental Panel on Climate Change, 2014). These activities increase losses and damages, resulting in a negative impact on a country's GDP. Due to their geographical location, size, and substandard construction practices, Small Island Developing States (SIDS) are more vulnerable to a disaster (Briguglio, 1995). The Eastern Caribbean Currency Union (ECCU)[49] member countries have experienced an increase in the occurrences of natural disasters over the past two decades. During the period 1998 to 2007, the countries experienced 9 natural disasters compared with 15 natural disasters over the period 2008 to 2017, highlighting the frequency and severity of the disasters attributed to climate change (Figure 1). For example, Hurricane George (1998), Hurricane Ivan (2004), Tropical Storm Erika (2015) and Hurricane Maria (2017).

[48] According to Centre for Research on the Epidemiology of Disasters (CRED) (2004), Natural disasters are here defined as events that satisfies one of the following criteria: ten (10) or more fatalities, hundred (100) or more people reported as being affected, the declaration of a state of emergency or a call for international assistance.

[49] The ECCU countries are Anguilla, Antigua and Barbuda, Dominica, Grenada, Montserrat, St. Kitts and Nevis, St. Lucia, and St. Vincent and the Grenadines.

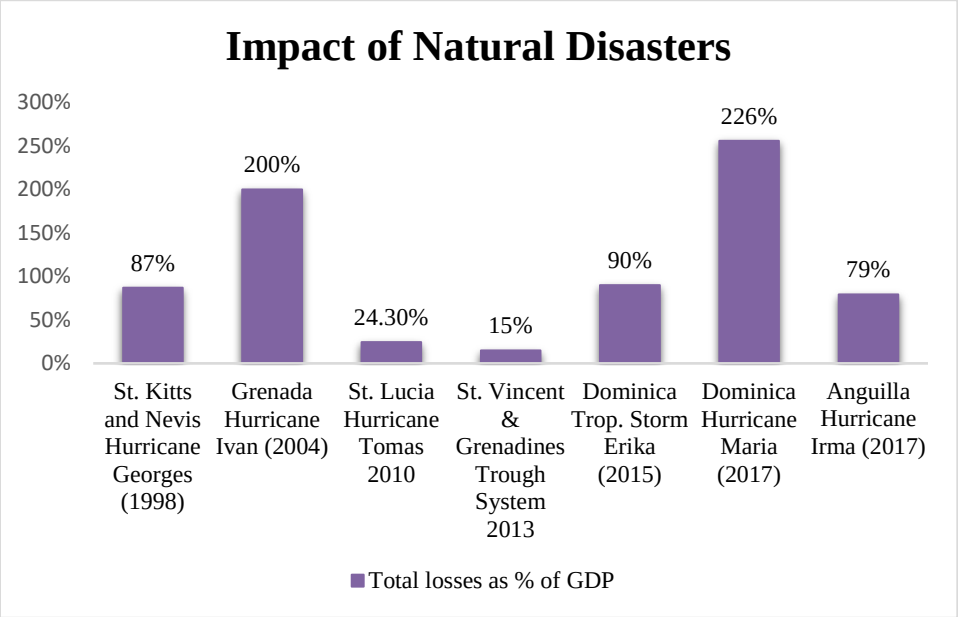
Figure 1: Number of Natural Disasters Impacting the ECCU during 1998-2017



Source: EM-DAT: The Emergency Events Database – Université catholique de Louvain (UCL) – CRED, – www.emdat.be, Brussels, Belgium"

In addition, during the period 1998 to 2017, the countries of the ECCU sustained losses ranging from 15.0 per cent of GDP in St Vincent and the Grenadines in 2013 to 226.0 per cent in Dominica in 2017 (Figure 2). This poses an important policy challenge for the governments of the ECCU member countries in respect of post disaster recovery. Although these events cannot be eradicated, there are measures and strategies that can be adopted to prevent or reduce the impact of a natural disaster.

Figure 2: Impact of Natural Disasters in the ECCU, 1998-2017 (per cent of GDP)

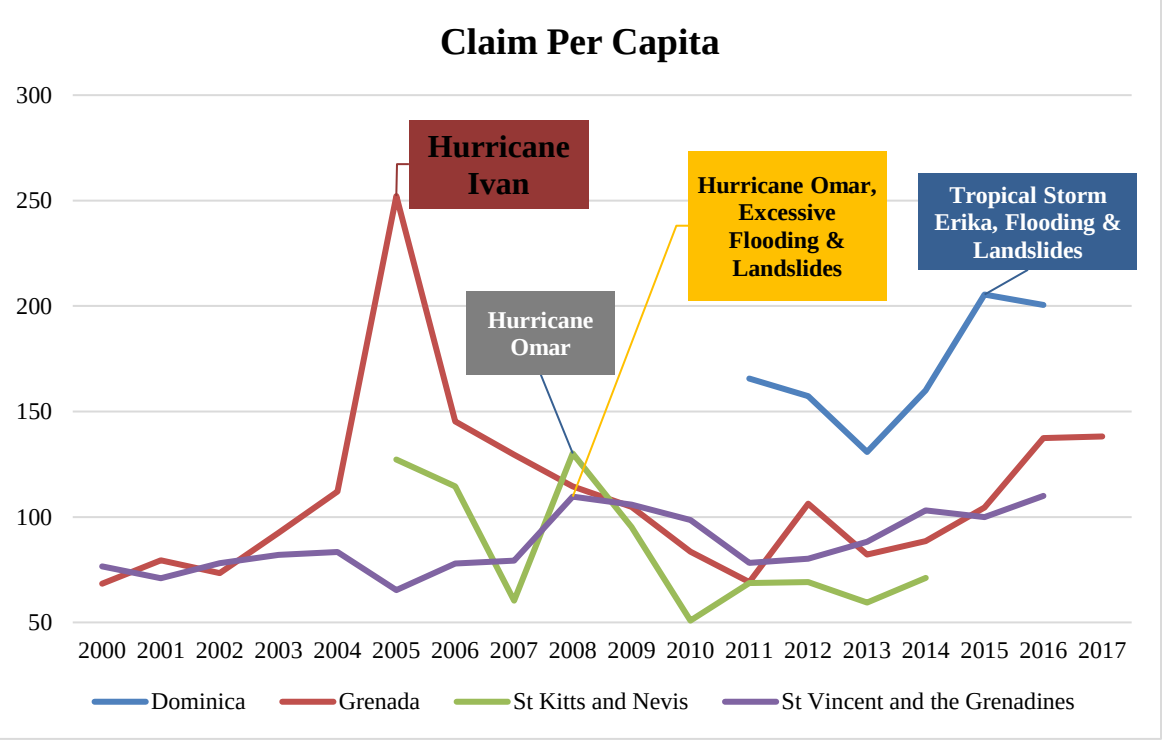


Source: Central Statistics Office, ECCB & Country Reports

As the effects of climate change intensify, the associated financial costs feature more prominently on the societal radar, and consequently, the role of insurance has become increasingly necessary. Insurance has evolved as a process of protecting individuals and companies from financial losses and uncertainties by diversifying risks among policyholders. It also encourages investments in cost-effective mitigation measures through premium reductions and facilitates rebuilding of property and long-term recovery following a disaster by way of claim payments. Therefore, the affordability of insurance is fundamental for economic development and the financial cohesion of society. However, research has confirmed that the availability and affordability of insurance is likely to decrease under worsening climate change conditions. This finding was substantiated with statistical models predicting a significant increase in costs (Cutter et al 2012; Kunreuther, Michel-Kerjan and Ranger, 2013).

One of the ramifications of a disaster is that it influences the rate structure of a firm. An insurer may encounter high loss ratios[50] in the year of a catastrophe and low loss ratios in non-catastrophe years. For example, post hurricane Ivan in Grenada, claim payments were as high as EC$250 per person (a 126.0 per cent increase over prior years) (Figure 3). In addition to the money paid to claimants for compensation, the insurer generally incurs loss adjustment expenses (LAE)[51] ,and, as a result, premium rates are likely to increase to maintain profitability in the long run.

Figure 3: Claims Paid Per Capita in the ECCU, 2000-2017 (EC$)



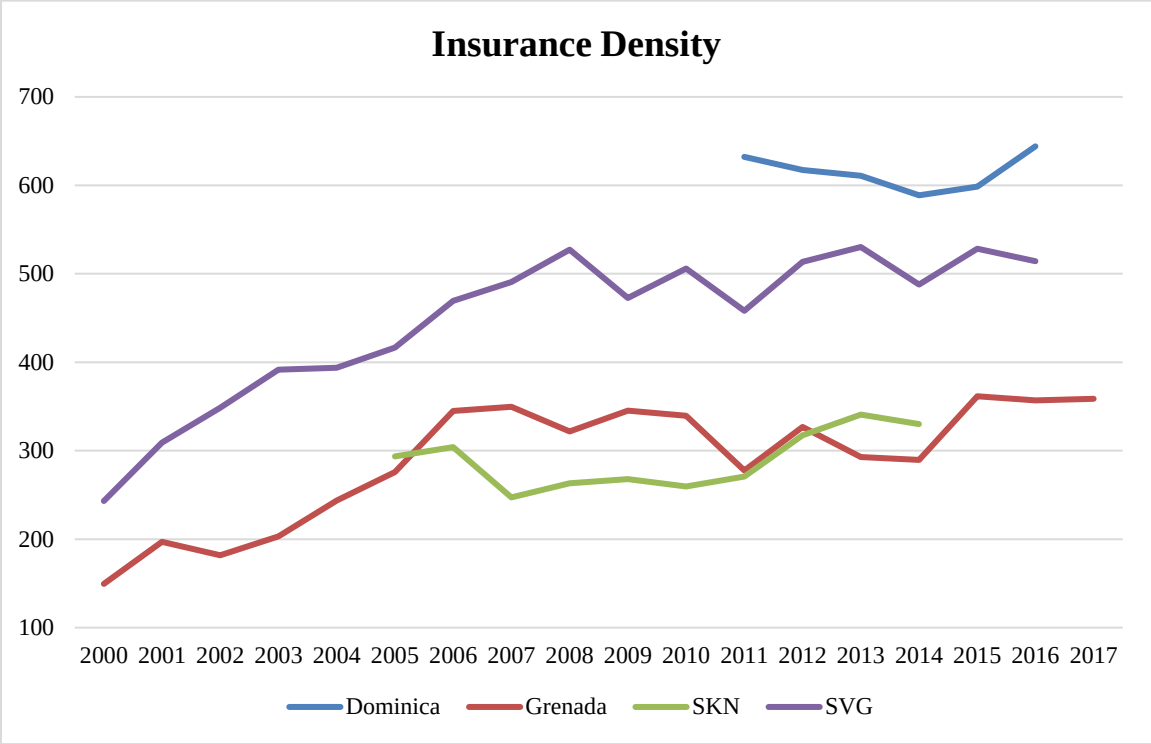
Source: Central Statistical Office, the World Bank and Eastern Caribbean Central Bank

One of the primary deterrents to insurance is cost. Over the last two decades, the cost of property insurance has increased in the region (see Figure 4). Due to the high claim payments in Grenada following hurricane Ivan, premium rates increased by at least 42 per cent. It must also be noted that the cost of insurance and reinsurance, as a result of the 2017 hurricane season, is expected to

[50] Loss ratio is a measure of the portion of each premium dollar used to pay losses.
[51] Loss adjustment expenses are expenses incurred in the process of settling claims. For example, legal and administrative fees.

increase in the following years due to the exhaustion of capital from the Property & Casualty sector (Swiss Re, 2018). Many factors contribute to the relatively high and volatile cost of insurance in the region, partly reflecting the limited financial reserves, high exposure to hazards, high administrative costs and great reliance on reinsurance.

Figure 4: Premium Paid Per Capita in the ECCU, 2000-2017 (EC$M)



Source: Central Statistical Office, the World Bank and Eastern Caribbean Central Bank

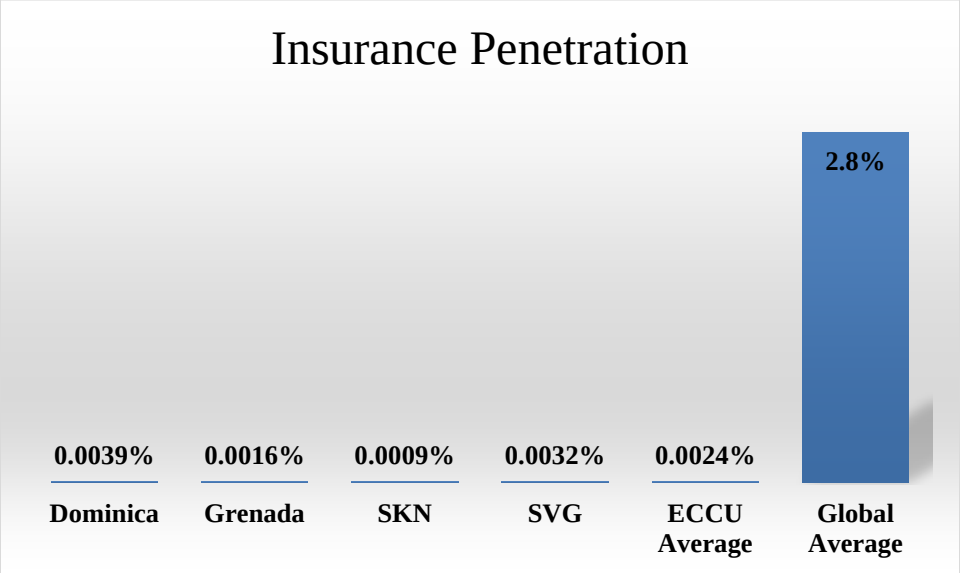
One of the main indicators of insurance development within a country is total premiums per capita, otherwise known as the insurance density[52]. The diagram shows that the total premiums paid per capita exhibits an upward trend, this may be due to both increases in the premium and the number of persons who are insured as well as a reduction in the total population. Data from the World Bank revealed that the total population in the four ECCU member states[53] increased during the period of the study. Unfortunately, data on the customer base and individual premium rates for the entire ECCU is not accessible. However, based on information garnered from the Financial Services Commission in four of the ECCU member states, it was assumed that on average more

[52] Insurance Density is the ratio of gross written premiums to total populations. It refers to the per capita premium or premium paid in EC dollar per person.
[53] Antigua & Barbuda, Dominica, Grenada and St. Vincent and the Grenadines

than 50 per cent of homes are not insured and there was an overall decline in the customer base over time. Therefore, this upward trend is mostly attributed to an increase in the premium rates.

Further increase in premiums may price the poor and vulnerable out of the market, resulting in a greater number of uninsured and/or underinsured persons and by extension, a low insurance penetration. Insurance spending, also known as insurance penetration measures the growth of insurance premiums vis-a-vis the growth of the gross domestic product in the economy, which reflects the level of development of the insurance sector in the region. It also represents the portion of a country's GDP that is protected by premiums paid to the private sector. Although premium per capita exhibits an upward trend, penetration has remained at approximately zero percent. On average, the insurance penetration rate for four countries[54] in the ECCU for the period 2014-2017 is 0.0024 per cent, which is extremely low compared with the global average of 2.8 per cent (see Figure 5). Accordingly, this low penetration rate may be due to a lack of affordability of insurance among individuals, lack of awareness, negative perception of insurance companies and the uninsurable nature of some properties due to their location in hazard prone areas or its inability to meet building code criteria.

Figure 5: Insurance Penetration for Grenada, SVG, Dominica, SKN, ECCU and Global Average



Source: Central Statistics Office, Eastern Caribbean Central Bank & Swiss Reinsurance

[54] Dominica, Grenada, St. Vincent & the Grenadines and St. Kitts and Nevis

Based on the post disaster assessment conducted by the Economic Commission for Latin America and the Caribbean (ECLAC) in collaboration with the ECCB after the passage of hurricane Irma in September 2017, it was discovered that, of the 4,935 dwellings in Anguilla, more than 60.0 per cent were not insured and only 8.0 per cent of these dwellings had their contents insured. Damage to these uninsured and underinsured households may place a heavy burden on public finances and gives rise to unlimited contingent liabilities, as most governments may feel obligated to provide post-disaster emergency relief and assistance to affected households and businesses.

To supplement the government's central role, the Caribbean Catastrophe Risk Insurance Facility (CCRIF) was launched in 2007 to aid in the financing of early renovation and public-sector costs in the wake of natural catastrophic events [55]. However, CCRIF is only a solution to the short-term liquidity needs, as the sums disbursed oftentimes represent a small fraction of the required sums for effective reconstruction to take place. Nevertheless, the facility does provide an important buffer for member governments in the immediate aftermath of a natural disaster. What may be of some concern, though, is that the increasing intensity of disasters is likely to result in larger premium payments for governments as claim payments from CCRIF rise in tandem with the level of destruction caused.

Current Challenges or Shortcomings

One of the most important objectives of the ECCB is the maintenance of a strong, diversified and resilient financial sector through the implementation of strategies to mitigate the impact of threats and challenges. One of those threats is the viability of the insurance sector after a major disaster. The ability of the insurance company to adjust contractual underwriting terms, pricing or limit exposure to offset these rising costs is constrained by the following shortcomings:

[55] CCRIF was created by CARICOM Heads of government in collaboration with the World Bank because of the damaged encountered during the 2004 hurricane season. The sixteen member countries are Anguilla, Antigua & Barbuda, Bahamas, Barbados, Belize, Bermuda, Cayman Islands, Dominica, Grenada, Haiti, Jamaica, St. Kitts & Nevis, St. Lucia, St. Vincent & the Grenadines, Trinidad & Tobago and Turks & Caicos Islands

i. **Lack of enforcement of building codes and materials specifications.**

Anecdotal evidence points to the fact that while enactment and enforcement of building codes in the ECCU are critical, the implementation of these codes can be prohibitively expensive. The Organisation of Eastern Caribbean States (OECS) has stressed the importance of building codes and enforcement of regulations to reduce losses from natural disasters. However, the devastation caused by the 2017 hurricane season to buildings is an unpleasant reminder as to the costs associated with these disasters (see Table 1). Many countries in the Eastern Caribbean have adopted codes, however, the necessary inspection procedures, administrative systems, and enforcement mechanisms have not been established. For instance, in Dominica, a code has been developed and adopted, but to date, there is no legislation to enforce it. As a result, the damage to the social sector[56] accounted for more than 35 per cent of the total damages to buildings (World Bank PDNA, 2017).

Further, building codes in the Eastern Caribbean member countries, with the exception of Dominica and Grenada[57], state that buildings should be able to withstand up to a category 3 hurricane. With the expected increase in the frequency and severity of disasters, these buildings may not be able to withstand a higher category storm. Also, national codes developed in the region over the past decade utilize the framework of the Caribbean Uniform Building Code (CUBiC)[58], which needs to be updated (it was last updated in 1989) to stipulate that buildings should be built to withstand a category 5 hurricane.

In addition, the enforcement of building standards is a national issue and the political will to fully implement building codes and standards needs to be considerably strengthened in every country. It is noteworthy, however, that the benefits associated with better infrastructures are costly. With a high number of uninsured (possibly low

[56] Social Sector includes housing, education, health and culture

[57] Building codes in Dominica and Grenada states that buildings should be able to withstand a category 5 hurricane

[58] The OECS Secretariat, with the assistance of the United Nations Development Programme developed standard building codes and guidelines which speak directly to the specific requirement of each OECS country. The codes and guidelines are based on the Caribbean Uniform Building Code (CUBiC) and other regional codes such as the Bahamas Building Code, the draft Jamaica National Building Code and the Turks and Caicos Islands Building Code

income) individuals in the ECCU, it may be difficult for that segment of the population to build weather-resilient houses due to the high costs of construction materials. Consequently, the burden could potentially fall on member governments to provide these types of homes to the poor and vulnerable. Alternatively, governments may face the prospect of granting concession on building materials as a way of mitigating the cost of building such homes.

Table 1: Total Damage to Buildings in ECCU Member States during the 2017 Hurricane Season

Country	Total Damages to Buildings (EC$ millions)
Anguilla (Hurricane Irma)	458.38
Antigua and Barbuda (Hurricane Irma)	512.29
Dominica (Hurricane Maria)	1,781.19

Source: World Bank PDNA 2017, United Nations ECLAC 2017

ii. Identification of hazard-prone areas, land-use allocation and control

People may choose to live in places vulnerable to natural events because of the benefits they foresee relative to the perceived risk, for example, agricultural activities in coastal areas due to highly productive soils and water accessibility. In other cases, people live in exposed locations because they have limited alternatives. A common example would be squatter settlements that are exposed to risks associated with a natural event. Due to Dominica's geographic characteristics, approximately 70.0 per cent of the population live in low lying coastal areas. Torrential rainfall across these hazard-prone areas may cause flash flooding and mudslides, creating devastation and forcing the government to embark on a resettlement project which are extremely costly.

iii. Contingency & Resilience Fund

Governments are responsible for much of the major services and infrastructure upon which the population, and by extension, the economy of the country depend. To ensure that damage incurred during events can be quickly repaired, disaster financing should be arranged before a natural event strikes, through a combination of contingency[59] and resilience funds. In the ECCU, three countries have announced contingent financing plans, namely: Grenada, Saint Lucia, and St Vincent and the Grenadines. Grenada's contingency fund has been established and is being financed by receipts from the Citizenship by Investment Programme. The IMF recommended that Saint Lucia establish a contingency fund, which would require immediate capitalization of US$5.0-7.0m and in the medium term create a savings fund with capitalization of 5.0 per cent of GDP. In the case of St Vincent and the Grenadines, a 1.0 per cent levy on consumption, hotel accommodation and other tourist related activities[60] is likely to be used to capitalise the contingency fund. In addition, a proposition has been made by the Eastern Caribbean Central Bank (ECCB) for the establishment of a regional growth and resilience fund. With the expected increase in natural disasters, there is an urgent need for these contingency funds to be operationalized.

iv. Low Insurance Penetration

As mentioned above, the average insurance penetration rate for the four ECCU countries is very low at 0.0024 per cent, which implies that approximately zero percent of the region's GDP includes premiums paid to the insurance sector. This low level of insurance penetration is partly due to the lack of economies of scale in the region which contributes to the high and volatile cost of insurance. These issues are particularly burdensome in these countries, as they are exceedingly prone to natural disasters. The low level in the ECCU is a reflection that majority of Eastern Caribbean nationals and their properties are not protected against risks. This implies that in the event of a disaster, they are exposed to major losses with no form of compensation. Apart from the high numbers of casualties, property losses after a

[59] A contingency fund is a reserve of money set aside to cover possible unexpected future expenses.
[60] The standard rate of Value-Added-Tax increased from 15 per cent to 16 per cent and the rate for accommodation and other tourism related activities from 10 per cent to 11 per cent

disaster usually cause serious economic setbacks. Studies have proven that high insurance penetration significantly reduces or balances out these negative effects.

Policy Recommendations

Acknowledging the relationship between natural disasters, the cost of insurance and claim payments, and the role of government, the following policy recommendations are made in order to increase the affordability of insurance:

i. Emphasis must be placed on the strengthening of building codes, along with the institutionalization of training facilities across the region to ensure that adequate construction standards are being met. To encourage implementation of building codes, the government could grant concessions on building materials, for example, roof sheeting, nails, beams etc. It is also imperative that governments insure their facilities, for example providing insurance coverage for low income housing. Large Government portfolios may command better pricing given the volume of public property and infrastructure and its associated value.

ii. Furthermore, regular maintenance of essential infrastructure must be done, and vulnerability audits undertaken to enhance resilience. Property revaluation once every two years is necessary to ensure adequate coverage after a loss event. Alternatively, once a property has been updated or improved, the home owner should inform the insurer as it is likely that the policy may need to be adjusted or the property may be under-insured.

iii. The enforcement of land use controls in hazard-prone areas and the development of a thorough risk assessment study to use as the foundation for land suitability and risk mapping are critical. These maps, along with the gradual relocation of assets and residents from hazard-prone areas, may reduce an island's predisposition to natural disasters and reduce its vulnerability to climate change. The enhancement and maintenance of drainage is also critical to reducing landslide and flooding incidents.

iv. It is imperative that the member states of the ECCU implement a resilience fund reserve prior to the occurrence of a hazard. Member governments can adopt a regional approach to the fund by contributing an agreed proportion of GDP or current revenues to the arrangement. Such an arrangement may have to be passed in parliament and form part of the annual budgeting exercise of governments. Member governments faced with a fiscal deficit should position themselves to access investments, whether in the form of grants or loan, from the Green Climate Fund (GCF)[61]. The GCF assists Small Island Developing States (SIDS) to address climate change mitigation and adaptation needs.

v. A collaboration between public entities and insurance companies is needed to engage the civil society in sensitization campaigns to better inform the uninsured and underinsured about their risk exposures. This partnership could utilize the mechanisms of the disaster management agencies to provide risk mitigation strategies and financial education to the public.

Conclusion

Natural disasters leave in their wake, evidence on the importance of planning, adaptation, enforcement and investment decisions to reduce a country's vulnerability. While natural events are indiscriminate, their impact is usually more devastating for poor households because they have fewer options for coping with them. Financial losses that are attributable to disasters can be reduced through risk transfer mechanisms such as insurance which is a key player in the operations of modern society and a prerequisite for economic development. However, one of the primary deterrents to insurance is the cost. While it is expected that rates would rise after a natural disaster, due to high claim payments and reinsurance costs, a concerted effort by governments, working in tandem with financial institutions and civil society, could be instrumental in curbing rate increases and possibly reducing them altogether. Prudently employing a combination of infrastructure strengthening, land use regulations, public private partnership between governments and insurance companies, as well as disaster contingency and resilience funding, may greatly reduce the cost of

[61] Currently only six ECCU member states have access to the GCF namely; Antigua and Barbuda, Dominica, Grenada, Saint Kitts and Nevis, Saint Lucia, & Saint Vincent and the Grenadines

insurance and thereby capture the market of those most vulnerable. It is noteworthy, that due to the fiscal deficit challenge faced by most of the ECCU member governments, these mechanisms may be costly initially. However, they are likely to provide an efficient and effective method of counteracting shocks and providing meaningful economic and social returns in the long run.

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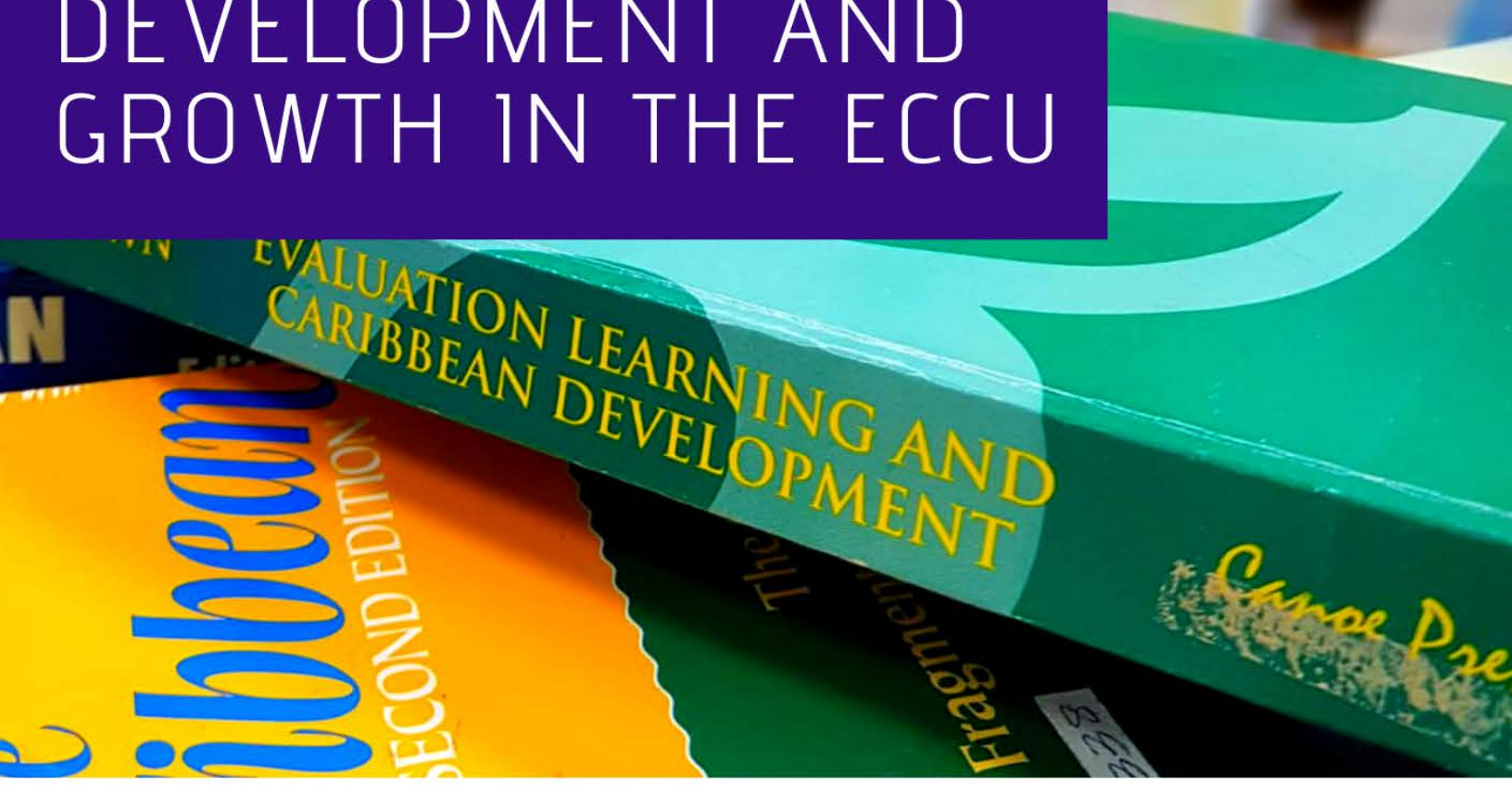
HUMAN CAPITAL DEVELOPMENT AND GROWTH IN THE ECCU



- Human Capital as a Tool for Growth: The Case of St Vincent and the Grenadines 1970-2014

  Dr Dalano R DaSouza

- Employment for the Future: An Analysis of Saint Lucia's Labour Market Trends and Prospects

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Human Capital as a Tool for Growth: The Case of St Vincent and the Grenadines 1970-2014

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Abstract

Human capital development has long been mooted as a vehicle for achieving socio-economic progress through the improvement of key indicators such as literacy, unemployment, poverty reduction, and Gross Domestic Product.. This paper utilises an Error-Correction Model (ECM) to determine whether the increase in resource allocation to education over the period has brought about tangible returns to the economy of St. Vincent and the Grenadines (ST VINCENT AND THE GRENADINES) over the period 1970-2014. Results show that education has been an important variable to spur growth and the country's development. Changes in the primary school labour force participation rate recorded the greatest magnitude but had an inverse relationship with GDP growth, while secondary and tertiary education contributed positively to economic growth. Both labour accumulation and improvements to the quality of labour employed contributed more to growth than physical capital accumulation.

Keywords: St Vincent & the Grenadines, human capital, education, economic growth

JEL Classification Code: H52, I26, J24, O41

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1.0 Introduction

Studies seeking to decompose economic growth are nothing new. Indeed, for as long as there has been growth accounting there have been inquests into the sources of growth. “In the 1960s, growth theory consisted mainly of the neoclassical model as developed by Ramsey (1928), Solow (1956), Swan (1956), Cass (1965) and Koopmans (1965)” (Barrow, 1997: 3-4). Perhaps one of the most discussed growth phenomena has been the experience of the East-Asian newly industrialised nations. Often termed the ‘East-Asian Miracle’, this group of nations recorded unprecedented growth during the 1960s to 1980s. This quickly became the subject of much inquiry by academics and politicians alike. Bayhaqi (2006: 172) captures the prevailing debate with the question of “whether it was simply an input-driven growth, where economic growth was simply a process of accumulation of factors of production (capital and labour), or whether it was productivity-driven growth, [spurred] by total factor productivity, from augmented-labour or augmented-capital”.

The education system of St. Vincent and the Grenadines (ST VINCENT AND THE GRENADINES) has witnessed extensive transformation both in the period before and after independence. Its structure was established in the 1937 Education Act, and is broadly consistent with the UNESCO revised International Standard Classification of Education of 1996 (Ministry of Education Youth and Sports 2002, 7). Bayhaqi (2006) correctly points out that education is not being considered as a sub-system of economic growth in respect of investigations such as this, but rather the interest stems from the possibility of variables within the education system intersecting with those in the economic growth and development processes. Such an understanding can only help to bring added clarity to the questions surrounding human capital development and its link with socio-economic advancement.

The following research questions underpin this study:

1. How have education enrolment and labour force education attainment levels changed over the study period?
2. To what extent have the quality of physical capital and labour changed over the study period?
3. To what extent have physical capital and labour accumulation contributed to economic growth?
4. What is the marginal effect of additional years of schooling?
5. To what extent have the different levels of education contributed independently to economic growth?

The rest of the paper is organised as follows: the literature review is presented in section 2; the data and methodology used in the study are discussed in section 3;the results and analysis are presented in section 4, while the conclusion and policy considerations constitute section5.

2.0 Literature Review

Economists have studied economic growth and development since Adam Smith set out to explain the nature and causes of the wealth of nations. In the 1950s and 1960s, Gary Becker, Jacob Mincer, T. W. Schultz, and others turned economists' attention to education and the role it plays in a variety of economic phenomena' (Glewwe, 2002: 436). While there are innumerable definitions of education, this study focuses on formal education. Dean Borgman defines the term as follows: education is considered a process whereby knowledge or systematic information is received (acquired) or given (imparted) especially in schools or universities.[1] In the Caribbean, emphasis on the development of education within different countries has largely been a manifestation of perspectives on the function and role of education held by successive governments. In his work, Miller (1999) put Commonwealth Caribbean education in historical context.[2] He asserts that education has evolved over four major eras: Early Education: Laity, Piety, Family and Philanthropy; The Denominational System with State Support (beginning around 1833); The State System with Church Involvement (around the 1870s); and The National System of education (1950s and 1960s). Two significant developments influenced the path of education in the Caribbean. The Imperial Government's policy that education should cater to the interest of the sugar industry and that education expenditure should not exceed 10.0 per cent of public expenditure served to prejudice the black population while halting the expansion of a school system that was being engineered to support all school-aged children who were fifteen years and under.

[1] Definition taken from the Education Overview webpage - http://www.urbanministry.org/education-4

[2] The term Caribbean in this context refers to the Commonwealth Caribbean, which consists of: Anguilla, Antigua and Barbuda, Bahamas, Barbados, Belize, British Virgin Islands, Cayman Islands, Dominica, Grenada, Guyana, Jamaica, Montserrat, St. Kitts and Nevis, Saint Lucia, St. Vincent and the Grenadines, Trinidad and Tobago, and Turks and Caicos Islands.

"*It used to be that development was seen as simply increasing GDP. Today we have a broader set of objectives, including democratic development, egalitarian development, sustainable development, and higher living standards*" (Stiglitz 1998: pg343). Whitehead (2011) explicitly distinguishes between economic growth and development, with the former constituting a quantitative widening of the economy, while the latter is qualitative in nature, primarily referring to the improved performance of the factors of production and greater institutional development. Traditionally, economic growth is measured by increases in real gross domestic product (GDP) or in GDP per capita. It usually means that a higher output is being produced in a certain region, with the expansion of production of marketable goods and services (Denison 1962: 3).

Arraes and Teles (2003) have concluded that there are two major conceptual approaches to explaining the process of growth. These are the exogenous and endogenous growth approaches; the former popularised by authors such as Ramsey (1928), Solow (1956), Koopmans (1965) and Cass (1965), and the latter by Romer (1986) and Lucas (1988). Solow (1956) hypothesised that the single composite commodity is produced by combining labour and capital under the standard neoclassical assumptions used by the Harrod-Domar model. Bayhaqi (2006) views the neoclassical model as implying several proclivities including what he describes as the 'catching-up' and 'convergence' hypotheses of economic growth due to the assumption of diminishing returns to aggregate capital. Arraes and Teles (2003) criticises what they see as the model's conclusion that (long-run) growth is exogenously determined (predominantly by the level of technological progress). They also highlight the limited role of government policy in influencing long-run growth as another weakness.

'Generally, the empirical approaches to economic growth have examined three issues: (i) convergence and divergence; (ii) the sources of economic growth; and (iii) testing the export-led growth hypothesis' (Francis 2003: 16). Rodrik (2003) points to the need for distinguishing between what he termed as the 'proximate' and 'deep determinants' of growth. He contends that physical capital deepening, human capital accumulation and productivity growth may be considered the 'proximate' determinants, while variables such as geography, integration (trade) and institutions the 'deeper' determinants of growth. The body of literature relating to education has largely surrounded the benefits that can accrue to individuals, families and nations if they have access to

education. These benefits occur at the micro and macroeconomic levels and interact in a multiplicity of ways.

The prospect of education achieving the desired economic outcomes rests crucially on a number of factors such as quality (linked to the efficiency of expenditure in the sector), the percentage of educated that joins the labour force (linked to the demand for labour and the brain-drain phenomenon), and wage levels, among others. The first two hold particular relevance for this study given the dynamics of the education sector and economy of St Vincent and the Grenadines, which has evolved from a largely agrarian composition. A 2009 European Commission Study on the efficiency of public spending on education using a two-stage semi-parametric methodology and stochastic frontier analysis found that public spending on tertiary education is more effective in achieving improved productivity when that spending is efficient. In Bangladesh, Azad (2010) found that the higher the efficiency in education both in secondary and tertiary sectors, the higher is economic growth. In the Caribbean, Jules (2009), di Gropello (2003), and Miller, Jules and Thomas (2000) have all spoken (at least in part) to the importance of efficiency in education with respect to realising development objectives. Mankiw, Romer and Weil (1992) argue that in the absence of technological progress, to maintain positive growth in the long run, the educational attainment of the population must increase continuously.

Studies have investigated this relationship both from a theoretical and empirical basis with mixed results. Lim (1996) notes that education contributes to economic growth in six ways: (i) improving the quality of the labour force by imparting skills and work knowledge; (ii) increasing labour mobility and therefore promotes the division of labour; (iii) enabling new information to be absorbed faster and unfamiliar inputs and new processes applied more effectively; (iv) improving management skills which leads to a more efficient allocation of resources; (v) removing many of the social and institutional barriers to economic growth; and (vi) encouraging entrepreneurship by promoting individual responsibility, organisational ability, risk-taking in moderation, and planning over the long-term.

An empirical study by Benhabib and Spiegel (1994) which ran the growth accounting regressions implied by a Cobb-Douglas aggregate production function using long-term growth series from cross-country estimates of physical and human capital stocks showed that improving education levels has contributed significantly to the growth in Chinese Taipei. Countries with more schooling would be expected on average to have a higher steady-state income, implying that countries that are more educated should be expected to grow faster than those with lower education attainment (Krueger and Lindahl, 2000).

In the Caribbean, Francis and Iyare (2006) in a study of Barbados, Jamaica and Trinidad and Tobago found that countries with higher per capita gross national income (GNI) are spending more per capita on education. However, they conclude that improving the level of education appears to have not stimulated the magnitude of development envisaged in these three countries, possibly reflecting the belief that the educational systems in the Caribbean have not been adequately developed. Psacharopoulos and Patrinos (2002) posited that secondary education is more highly rewarding than primary, and tertiary is more highly rewarded than the previous two levels. The private rate of return to education in Barbados ranges from 4.8 to 8.0 per cent, implying that for every dollar spent (of income foregone) on secondary education, there is a return of 4.8 to 8.0 per cent to the individual. Using annual data for the period 1970-2004, Moore (2006) attempts to forecast the effect of expanded university education on national output. Confirming that education attainment influences economic output, he argued that an increase in the number of household university graduates would realise a fall in poverty levels and an increase in the standard of living of Barbados. Though not explicitly studied, the general belief is that these findings would hold for smaller Caribbean nations such as St Vincent and the Grenadines.

3.0 Data and Methodology

The methodology from Barro and Lee (1993), Loening (2005) and Moore (2006) was used to create the three-factor model, which incorporates capital (K) and labour (L) human capital (H) in the Solow Growth Model. This will examine more closely the relationship between education and economic growth in the case of St Vincent and the Grenadines using national aggregate data for the period 1970-2014. Loening (2005) and Moore (2006) utilise an augmented production function operationalised through an error-correction model on single country case studies of Guatemala and Barbados. Use of this type of model is motivated by the need to account for unit roots, which are present in most macroeconomic time series (Moore, 2006).

3.1 Construction of Dataset

The following describes the compilation of data needed for the analysis:

i. Gross Domestic Product (GDP) - taken from World Bank Data recorded in constant 2005 US dollars;

ii. Labour Force - The Penn World Table (PWT) describes the employed as 'all persons aged 15 years and over, who during the reference week performed work, even just for one hour a week, or were not at work but had a job or business from which they were temporarily absent.[3] For the purposes of this study, the labour force refers only to employed workers. Census data was combined with estimates from the World Bank to construct this time-series;

iii. Physical Capital Stock - the stock of physical capital estimates were constructed using the Perpetual Inventory Method as follows:

(1) $K_{t} = K_{t-1} \cdot (1 - \delta) + I_{t}$

where K is the capital stock, I gross fixed capital formation, δ annual depreciation rate of the capital stock, and t an index for time. To determine the initial capital stock, the methodology used by Lorde, Waithe and Francis (2010) was adopted. GDP in 1970 (the starting year of the study period) is multiplied by an incremental capital–output ratio (ICOR) of 6.6 to determine capital stock in that year.[4] Equation (1) is then used to estimate the capital stock time-series for the remainder of the period. Depreciation (δ) is represented by 4% - the rate at which the income tax law of St Vincent and the Grenadines allows for allocating depreciation expenses.

iv. Human Capital Stock

Like Loening (2005) and Moore (2006), average years of schooling in the labour force is used as a proxy for human capital stock. Before the average years of schooling variable can be determined, the stock of maximum education attainment by levels must be constructed. This is done by deriving

[3] See Penn World Data examples - http://data-planet.libguides.com/PennWorldTables

[4] In World Bank's (1987) World Development Report, it was estimated that the ICOR for highly outward-oriented developing countries is 4.5, while for highly inward-oriented countries the value is 8.7. Like Barbados, ST VINCENT AND THE GRENADINES also 'lies on the spectrum between these two extremes' and so I also use the arithmetic average of ICOR for highly inward- oriented and highly outward-oriented countries, that is, the value of 6.6 used by Lorde, Waithe and Francis (2010, 1414).

current levels of education attainment of the labour force, which is added to the initial/benchmark levels of 1970 taken from the population and housing census of that year. Following Loening (2005), the ensuing equations are used to construct the four levels of education attainment (hr):

(2) $$hr_{1,"} = \frac{34_{5,6}}{7_6} = hr_{1,"\$\%} \cdot 81 - \frac{7\%9_6}{7_6}\mathbf{:} + \frac{7\%9_6}{7_6} \cdot (1 - PRI_{"\$\%})$$

(3) $$hr_{\%,"} = \frac{34_{=,6}}{7_6} = hr_{\%,"\$\%} \cdot 81 - \frac{7\%9_6}{7_6}\mathbf{:} + \frac{7\%9_6}{7_6} \cdot (PRI_{"\$\%} - SEC_{"})$$

(4) $$hr_{\mathrm{A},"} = \frac{34_{\mathrm{B},6}}{7_6} = hr_{\mathrm{A},"\$\%} \cdot 81 - \frac{7\%9_6}{7_6}\mathbf{:} + \frac{7\%9_6}{7_6} \cdot SEC_{"} - \frac{7\mathrm{A}1_6}{7_6} \cdot TER_{"}$$

(5) $$hr_{\mathrm{D},"} = \frac{34_{\mathrm{E},6}}{7_6} = hr_{\mathrm{D},"\$\%} \cdot 81 - \frac{7\%9_6}{7_6}\mathbf{:} + \frac{7\mathrm{A}1_6}{7_6} \cdot TER_{"}$$

where HNj = number of the economically active population for whom j is the highest level of schooling attained (j=0 for no school, j=1 for primary, j=2 for secondary and j=3 for higher education). PRI = enrollment ratio for primary education, SEC = enrollment ratio for secondary education, TER = enrollment ratio for tertiary education, L = number of the economically active population, L15 = number of persons aged 15, and L20 = number of persons aged 20.

Table 1: Education Level of Labour Force, St Vincent and the Grenadines 1991-2012

YEAR	1991	2001	2012
No School			
Model	0.81%	0.46%	0.29%
Census	0.15%	0.48%	0.02%
Difference (# of Workers)	0.66% (275)	0.02% (88)	0.27% (140)
Some Primary			
Model	71.20%	57.57%	45.60%
Census	70.24%	57.96%	42.52%
Difference (# of Workers)	0.96% (400)	3.2% (1401)	3.08% (1602)
Some Secondary			
Model	22.12%	32.04%	35.66%
Census	23.81%	27.37%	35.29%
Difference (# of Workers)	1.69% (704)	4.67% (2429)	0.37% (192)
Some Tertiary			
Model	5.87%	9.93%	18.45%
Census	5.04%	12.55%	18.42%
Difference (# of Workers)	0.83% (346)	2.62% (1147)	0.03% (16)

Source: Author's calculations and Censuses (1991, 2001, 2012). Discrepancies are due to rounding and/or exclusion of the 'not-stated' category.

Ideally, net enrolment ratios are preferred but are seldom available for developing countries like St Vincent and the Grenadines. Accordingly, gross enrolment ratios taken from the United Nations Educational, Scientific and Cultural Organisation (UNESCO), census reports and statistics from the MoE were used, but were adjusted for accuracy using methodology from Barro and Lee (1993). Table 1 compares the education level of the labour force as estimated by the results of the human capital model to the actual levels as recorded in the respective censuses. In all cases, differences between model output and census data were within 5.0 per cent.

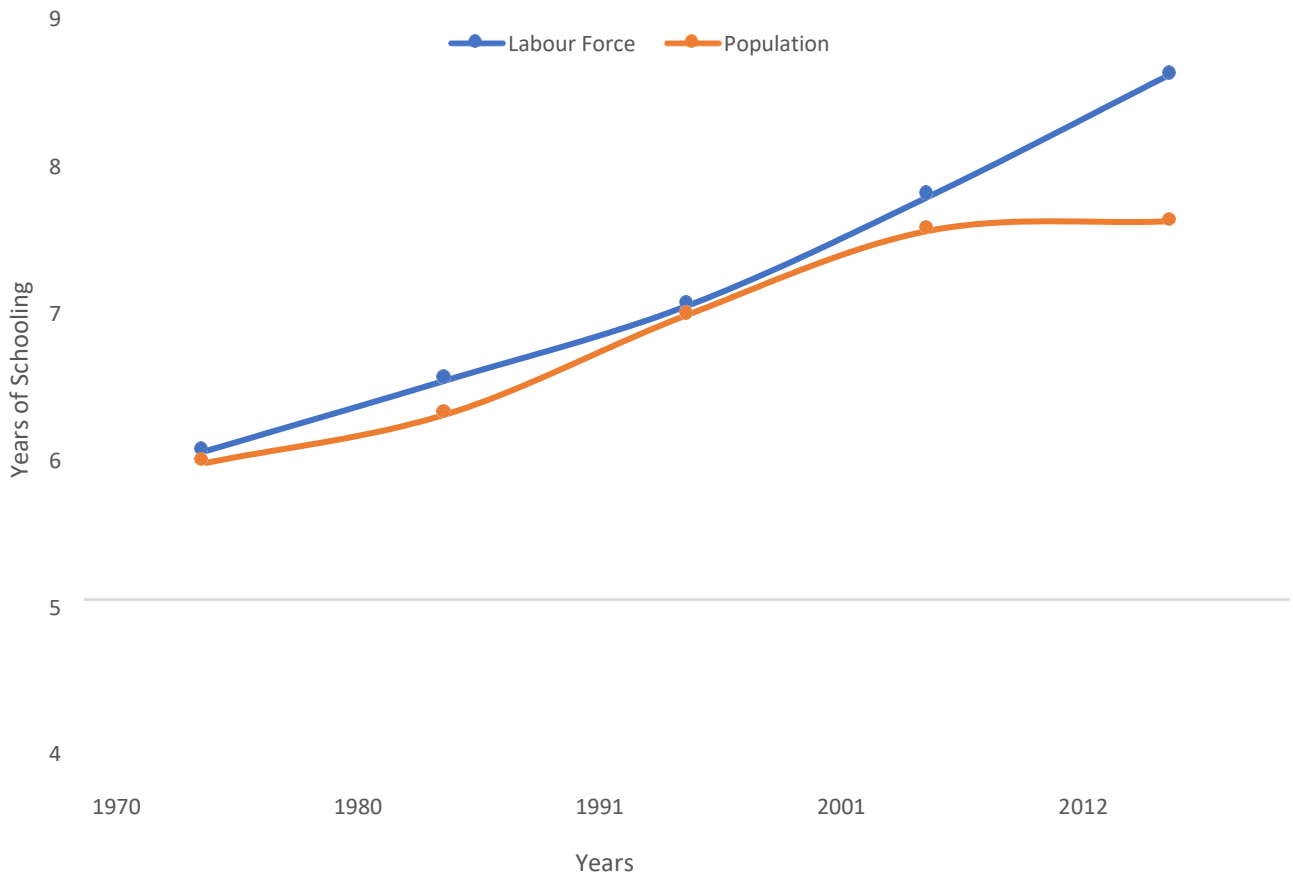
After the calculation of human capital stock for the various levels of education, the average years of schooling of the labour force variable was then constructed using the following formula:

(6) $$h_{"} = \sum^{D}{}_{\%} hr_{H,"} \cdot d_{H,"}$$

H I

where $h_{"}$ is the average years of schooling, hr_{H} the estimated attainment ratio of the labour force and d_{H} the average years of education received in the respective schooling level j. Those without formal education are assumed to have zero (0) years of schooling. Fully completing primary school takes 7 years, while those who do not complete the cycle are assumed to have an average attended for half that time (3.5 years). Secondary school lasts for 5 years with partial attendance assumed to be 2.5 years. In the case of tertiary education, post-secondary programs are 2 years long, while a first degree at university is typically 3-4 years long. Since post-secondary and university education is amalgamated under the term *'tertiary'*, following UNESCO (2013) and Psacharopoulos and Arriagada (1986), completion of full tertiary education is taken as 4 years, while partial completion is assumed to be 2 years. These durations are assumed to have remained constant over time when applied to Equation (6). The result is a time series of values for the average years of schooling for St Vincent and the Grendines for the period 1970-2014 (see Figure 1).

Figure 1: Average Years of Schooling, Labour Force and Population, SVG 1970-2012



Source: Author's Calculations, Censuses (1970, 1980, 1991, 2012)

Studies or statistics that present a time-series of average years of schooling of the labour force (entire economically active employed and unemployed population) as a proxy for education attainment are not available for Caribbean nations. Psacharopoulos and Arriagada (1986b) estimated the average years of labour force schooling for twenty-five (25) Latin American and Caribbean Countries including Barbados, Belize, Cuba, Trinidad and Tobago, Jamaica, and Guyana for different years. These are presented in Table 2, along with the corresponding estimate for St Vincent and the Grenadines.

Table 2: Average Years of Schooling in Labour Force, Select Countries and Years

Country	Year of Estimate	Average Years of Schooling	Average Years of Schooling – SVG
Barbados	1970	8.9	5.3
Belize	1970	6.9	5.3
Jamaica	1978	6.9	5.7
Trinidad & Tobago	1980	6.6	5.9
Cuba	1981	8.2	6.0
Guyana	1982	6.8	6.0

Source: Psacharopoulos and Arriagada (1986b) and Author's Calculations

v. Quality Adjusted Capital and Labour

Time-series described above do not account for changes in what is referred to as the "quality" of labour and capital. These are described and calculated in turn below:

Quality of Labour – The measure of the "quality" of labour is intended to adjust for the change in education attainment of the labour force. 'As firms and other employers substitute among of hours worked by hiring relatively high skilled and highly compensated workers, labour quality increases. Consistent with Loening (2005) and Moore (2006), the measure of labour quality takes the following weighted average of labour with the respective education levels:

(7) $$hq_{"} = \sum_{H\mathbf{I}\%}^{M} w_H \cdot \left(\frac{7_{N,6}}{7_6}\right)$$

where w_H is the relative wages in 2014 taken from the 2015 National Labour Force Survey conducted by the Statistical Department of St Vincent and the Grenadines.[5] L_H is the portion of the labour force with education level j (primary, secondary, tertiary) and the subscript t represents time.

Quality of Capital – In studies of this nature, it is normal to make adjustments to account for variations in the quality of capital over the period of study. However, to be able to adjust for quality there is a requirement that capital is disaggregated by categories such as buildings, machinery, etc. Disaggregated Gross fixed capital formation data is to the level of construction and investment in machinery and other investment, for the period 1977-2014, was obtained from the

Eastern Caribbean Central Bank (ECCB) and the World Bank. Following Craigwell, Maxwell and Moore (2005) and Moore (2006) depreciation for buildings and other structures and machinery were set at 0.02 and 0.08 respectively.

As with the initial value of capital stock, disaggregated values for structures and machinery and equipment in 1970 was not available for use in the weighted average equation. The assumption that the capital stock ratio of buildings and structures to machinery and equipment in 1970 across many nations stood at .75 to 0.25 respectively was adopted.[6] As was the case with Barbados, United Nations trade data revealed that most machinery in St Vincent and the Grenadines was imported from the United States. Consequently, like Moore (2006), the export price index for machinery from the US was used to deflate the machinery and equipment investment series. The construction investment series was converted using the implicit price deflator of St Vincent and the Grenadines. Both deflators were taken from United Nations Statistics and adjusted the asset types to constant 2005 values. Using the approach developed by Christensen, Cummings and Jorgerson (1980) and applied by Moore (2006), the investment series were inserted into Equation (8) to obtain an estimate of the change in quality of capital as follows:

$$(8) \quad \ln Z_{t} - \ln Z_{t-1} = \sum_{i=1}^{n} v_i \left[ln\, k_{i,t} - lnk_{i,t-1}\right] - [lnk_{t-1} - lnk_{t-2}]$$

where the weights, v_i are the relative capital rental rates and k_i are the different capital stocks. Quality of capital refers to changes in the composition of capital. If all components of the capital stock are growing at the same rate, quality remains unchanged., while if those with higher rental rates are growing more rapidly, quality increases (Loening 2005). Rental rates for St Vincent and the Grenadines were estimated using Equation (9) following Moore (2006):

$$(9) \quad R_{i,t} = (1 + \rho_t)P_{i,t} - (1 - \delta)P_{i,t-1}$$

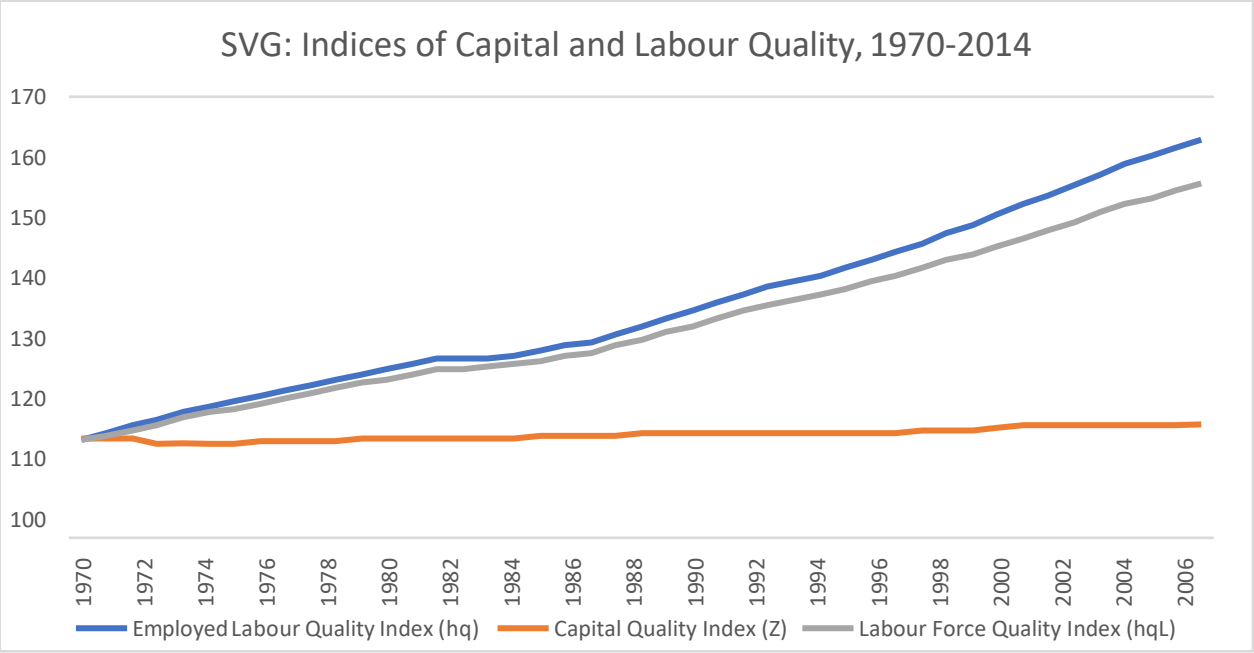
[5] Wages were reported on a monthly basis, but for use in the study, they were converted to average weekly wages by dividing each wage by 4. Weights were calculated based on each education level's share of total monthly wages.

[6] Hofman (1992) – Latin America, Prinsloo and Smith (1997) – South Africa, Schmalwasser and Schidowski (2006) – Germany, and Erumban and Das (2014) – India all concluded that the ratio capital stock for the 2 asset types in these countries was .75 to 0.25.

where ρ is the economy-wide real interest rate, proxied by the total loan rate minus the inflation rate, both of which are taken from World Bank Country Data for St Vincent and the Grenadines. The price index P is for capital item i as discussed above.

Over the period, the quality of capital index reflected only minor variations. The estimate decreased by less than one full percentage point over 1972-1977 and climbed to a maximum in 2014. On the other hand, the quality of labour indices trend upward for the entire period. This is indicative of improvements to education attainment and the increased prevalence of jobs that require skilled workers (see Figure 2).

Figure 2: Quality Indices – Labour and Capital



Source: Author's Calculations

3.2 The Error Correction Model (ECM)

An augmented growth model represented in a Cobb-Douglas production function with constant returns to scale as in Equation (10) underpins the ECM:

(10) $$Y_{"} = A_{"} \cdot K^{c} \cdot H^{e} \cdot L^{(\%\$c\$e)}$$

" " "

where Y is output, A the level of technology or Total Factor Productivity, K physical capital, H human capital (proxied by average years of schooling) and L is labour. Loening (2005) sought to address the possibility of multicollinearity between capital and labour by standardising output and capital stock by labour units. This also imposes the restriction that the scale elasticity of the production factors is equal to unity. The same is done in this study with the following logarithmic expression:

(11) $$log\ y_{"} = \log A_{"} + \alpha \cdot \log k_{"} + \beta \cdot \log h_{"} + U_{"}$$

where $\boldsymbol{y} = \boldsymbol{Y}_{\mathrm{q}\boldsymbol{L}}$ and $\boldsymbol{k} = \boldsymbol{K}_{\mathrm{q}\boldsymbol{L}}$ are output and capital in intensive terms, and $\boldsymbol{h} = \boldsymbol{H}_{\mathrm{q}\boldsymbol{L}}$ stands for average human capital.

An ECM is used to mitigate against the issues that arise after the time-series is transformed to stationarity by first differencing. It combines long-run information with short-run adjustment mechanisms to account for unit roots common in macroeconomic time-series taking the form:

(12) $$\Delta\ log\ y_{"} = C + \gamma_{\%} \cdot \Delta \log k_{"} + \gamma_{\mathrm{A}} \cdot \Delta \log k_{"\$\%} + \gamma_{\mathrm{D}} \cdot \log y_{"\$\%} + \gamma_{\mathrm{M}} \cdot \log k_{"\$\%} + \gamma_{9} \cdot \log h_{"\$\%} + \sum_{\mathrm{H}} \delta_{\mathrm{H}} \cdot dummy_{\mathrm{H},"} + u_{"}$$

Estimates of the parameter γ_{D} are used to calculate the elasticities of α and β in equation 11. As with Loening (2005), it is considered a measure of the speed of adjustment in which the system moves towards its equilibrium on the average. The constant term represents a freely moving technology parameter. Dummy variables representing shocks to GDP were included to chronicle the growth experience of St Vincent and the Grenadines. The 1972 dummy captures the effects of a tightly contested election cycle, while the 1975 dummy accounts for the shift in the timing of the government's financial year and spill-off effects from the 1973-74 energy crisis.

3.3 Mincerian Human Capital Specification

One area of uncertainty has always been how to account for differences between macro and micro level results in economics. In this case, how do we reconcile the effect of schooling at the macro level with what is manifesting at the micro level. Loening (2005) points out that macro returns could be higher due to externalities that accrue from education. Occurrences such as technological progress, reduction in crime, improved health care that come about as a result of investments in education do not appear in private returns to education. Schultz (1988) defines the private rate of return as the internal rate that equalises the present discounted private opportunity and the direct cost of schooling with the discounted value of the private after-tax gains. Griffith (2001: 157) simplifies it as "the net benefits accrued to an individual for having foregone income to attain education and any direct costs of education". Following Cohen and Soto (2001), an attempt is made to reconcile macro and micro level returns in St Vincent and the Grenadines using Equation (13):

(13) $$Y_{"} = A_{"} \cdot K^{\mathbf{c}} \cdot HM^{(\%\$\mathbf{c})}$$

where Y is output, A total factor productivity, K physical capital, and HM human capital. In applying Mincer's 1974, Bils and Klenow (2000) made the conclusion that micro evidence derived from a log-linear version could be used to specify the aggregate human capital stock:

(14) $$HM_{"} = e^{\sim\cdot h_6} \cdot L_{"} \Leftrightarrow hm_{"} = e^{\sim\cdot h_6}$$

where $hm_{"}$ is the human capital per worker, $h_{"}$ is average years of schooling and ψ measures the returns to education.[7] The original Mincer (1974) equation shows the relationship of wage income with their educational attainment level at the individual or worker level, i.e. the rate of return to education or schooling. Bils and Klenow's (2000) adaptation of this approach allows for the incorporation of human capital. As with the construction of the earlier error-correction model, a logarithmic expression is derived from the production function:

(15) $$\log y_{"} = \log A_{"} + \alpha \cdot \log k_{"} + (1-\alpha) \cdot \psi \cdot h_{"}$$

Equation (26) is then converted into the required error-correction model allowing for isolation of the long-run schooling parameter:

(16) $$\Delta\, log\, y_{"} = \gamma_{\%} \cdot \Delta \log k_{"} + \gamma_{A} \cdot \Delta \log k_{"\$\%} - \gamma_{D} \cdot (\log y_{"\$\%} - \cdot \log k_{"\$\%} - (1-\alpha) \cdot \cdot h_{"\$\%} - \log A_{"\$\%}) + u_{"}$$

3.4 Solow Framework

A useful supplement to the regression analysis above is the application of the traditional Solow (1957) framework. By decomposing growth rates for specific periods by the different factors of production, it remains a useful tool in the formulation of medium-term policy recommendations. Following a brief description of the modified framework, the traditional comparative measure of growth in St Vincent and the Grenadines is presented, followed by an extended model incorporating the quality of capital and labour indices calculated earlier. Given the remit of investigating the role of the different levels of education, the model is further disaggregated by primary, secondary and tertiary education.

(17) $$Y_{"} = A_{"} \cdot K^{\mathbf{c}} \cdot L^{(\%\$\mathbf{c})}$$

" "

where Y is output, K physical capital and L the labour output. 'A' is the Total Factor Productivity (TFP) – the element of GDP Growth not accounted for by accumulation of capital or labour – sometimes interpreted as a measure of efficiency. The model exhibits constant returns to scale and markets are competitive. Given these tenants, Equation (18) is modified accordingly:

[7] These operators were taken from Loening (2005).

$$(18) \quad \frac{\Delta Y_t}{Y_{t-1}} = \frac{\Delta A_t}{A_{t-1}} + \alpha \cdot \left(\frac{\Delta K_t}{K_{t-1}} + \frac{\Delta zq_t}{zq_{t-1}} \right) + (1-\alpha) \cdot \left(\frac{\Delta L_t}{L_{t-1}} + \frac{\Delta hq_t}{hq_{t-1}} \right)$$

where zq_t and hq_t are the quality indices of capital and labour. The analysis by a second level of decomposition, which disaggregates, by the three different education levels. Equation (19) incorporates primary, secondary and tertiary education:

$$(19) \quad \frac{\Delta Y_t}{Y_{t-1}} = \frac{\Delta A_t}{A_{t-1}} + \alpha \cdot \left(\frac{\Delta K_t}{K_{t-1}} \right) + \sum_{i=1}^{3} \beta_i \cdot \left(\frac{\Delta H_{i,t}}{H_{i,t-1}} \right) + \left(1 - \alpha - \sum_{i=1}^{3} \beta_i \right) \cdot \left(\frac{\Delta L_t}{L_{t-1}} \right)$$

where $H_{i,t}$ disaggregates for the 3 levels of education and β_i the shares of human capital. These values are sourced from the regression analysis. Since the framework assumes that human capital share contributes $\frac{1}{3}$, these coefficients are scaled to ensure that they sum to 0.333: primary – 0.194, secondary 0.094 and tertiary – 0.045.

4.0 Results and Analysis

4.1 Error Correction Model

Results are reported for total average years of schooling and by education level in (See Appendix Table 3). The Augmented Dickey-Fuller test confirmed that variables are non-stationary (I1). With respect to total average years of schooling specification, like Loening (2005) and Moore (2006), the loading coefficient is highly significant and suggests a speed of adjustment towards the long-run growth path equal to about 44.0 per cent of the deviations per year. This result is higher than the 24.0 per cent and 25.0 per cent obtained for Guatemala and Barbados respectively. This may be due to the use of employed workforce rather than the economically active population, as well as the relatively greater contribution of human capital to GDP given that the economy is driven more by labour than the use of capital when compared to Barbados and Guatemala.

Table 3: Production Function, Average Years of Schooling General Specification with Select Dummy Variables and Quality-Adjusted Capital, 1970-2014

	Dependent Variable: GDP/worker			
Explanatory Variables	j = Primary	j =Secondary	j = Tertiary	Total Avg Yrs
Constant	5.555***	2.867***	3.295***	2.992***
	(3.320)	(4.264)	(2.740)	(3.645)
% Change of ADJCapital/Worker	1.627*	1.595**	1.976***	1.704**
	(1.829)	(2.084)	(3.345)	(2.039)
% Change of ADJCapital/Worker [-1]	-0.466	-1.021	-0.391	-0.511
	(-0.513)	(-1.300)	(-0.705)	(-0.595)
Log GDP/Worker [-1]	-0.381**	-0.520**	-0.390**	-0.443**
Log ADJCapital/Worker [-1]	-0.133	0.165**	0.031	-0.015
	(-1.328)	(2.299)	(0.390)	(-0.198)
Log J Avg Years of Schooling [-1]	-0.489**	0.246***	0.117**	0.681***
		(4.846)	(2.521)	(3.819)
DUMMY1972[A]	0.138***	0.148***	0.163*	0.150***
	(3.209)	(3.978)	(1.927)	(3.646)
DUMMY1975	-0.122**	-0.125**	-0.117**	-0.121**
R-Squared	0.567	0.674	0.589	0.611
Durbin Watson[B]	1.462	1.644	1.607	1.517
S.E. of Regression	0.045	0.039	0.044	0.042
F-Stat	3.684	5.834	4.035	4.421
Prob	0.002	0.000	0.001	0.001
N	43	43	43	43

*** - Significant at 1%, ** - Significant at 5%, * - Significant at 10%, T-statistics in parenthesis, Source: Author's Calculations. A – Only significant dummies are reported. B - Breusch-Godfrey test finds no evidence for the presence of first and second order correlation in the residuals.

Since the lagged capital variable, which interacts with the loading coefficient (GDP/worker) to generate the long-run capital elasticity, is statistically insignificant, this measure is not reported. However, the impact of the physical capital accumulation variable on short-run growth was both significant and positive. The inference being that measures geared towards increasing investment are likely to impact short-run growth in the country. Unlike in Loening's (2005) investigation of Guatemala, the constant, which is the proxy for technology, was positive in the case of St Vincent and the Grenadines. This suggests that technological progress has played a role in

the growth path of St Vincent and the Grenadines. Further interventions that augment capital through improving technology are likely to have a positive impact on growth.

4.1.1 Growth By Education Level

Table 3 also details results for average years of schooling by primary, secondary and tertiary education entered separately. Based on results of similar studies including Psacharopoulos and Arriagada (1986a, 1986b), Loening (2005) and Barro and Lee (1993, 2004), it was expected that the coefficient for primary level education would be positive and significant. However, in the case of St Vincent and the Grenadines this turned out to be highly significant but negative. It was also anticipated that primary education would be the most influential in terms of its contribution to growth. While this level did have the greatest magnitude coefficient, the negative relationship actually meant that an increase in the share of the population with just primary education would actually stymie growth. This is due to the decline in population of persons 15 and 20 years old as well the expectation that as education access increases and time passes, the labour force would become less constituted by workers with primary education as their highest education attainment level and more by those with post-primary education. In light of this finding, secondary education was the most important level of education for growth, followed by tertiary education. These results confirm Petrakis and Stamatakis (2002) and Papageoriou (2003) assertion that post- primary education increases with the level of development. St Vincent and the Grenadines's output suggests that having achieved high attainment of primary school education, the country is at the stage of development where more skills transferred to the labour force at the secondary specialised and tertiary school levels are required to move the economy forward.

The technology parameter and physical capital coefficients also respond differently to different levels of education. Long-run elasticity of physical capital can only be reliably calculated for secondary education since both primary and tertiary education offer statistically insignificant results. Short-run change of capital/worker is positive and significant across all three levels of education, but the tertiary education coefficient recorded the greatest magnitude. Following Loening (2005), this could be interpreted as secondary education having the strongest influence on the productivity of physical capital in the long run, while tertiary schooling would do so in the short-run.

4.2 Mincerian Human Capital Specification

Results of the Mincer specification are presented in Table 4. The important take-away from these results is that the effect of one additional year of average years of schooling causes income per worker to increase by approximately 14.9 per cent.[8] A survey of relevant literature revealed no studies of this type. There are no empirical studies that used St Vincent and the Grenadines as a case study, nor included it in a cross-country analysis aimed at investigating returns to education.

Table 4: Production Function, Mincerian Human Capital Specification

	Dependent Variable: GDP/worker	
	Total Average Years	
Explanatory Variables		
Constant	3.701***	(3.522)
% Change of Capital/Worker	1.883**	(2.210)
% Change of Capital/Worker [-1]	-0.286	(-0.324)
Log GDP/Worker [-1]	-0.424***	(-3.947)
Log Capital/Worker [-1]	-0.034	(-0.409)
Average Years of Schooling [-1]	0.090***	(3.277)
DUMMY1972	0.146***	(3.530)
DUMMY1975	-0.124**	(-2.671)
Effect of 1 Additional Year of Avg. Schooling	0.149	
R-Squared	0.614	
S.E. of Regression	0.042	
F-Stat	4.475	
Prob	0.000	
N	43	

*** - Significant at 1%, ** - Significant at 5%, * - Significant at 10%, T-statistics in parenthesis,
Source: Author's Calculations.

Loening (2005) estimated the additional year to increase income per worker by 18.4 per cent in Guatemala, while Psacharopoulos (1994) estimated the average mincerian rate of return to total average years of schooling for Latin America and the Caribbean to be 12.4 per cent.[9] Griffith (2001) estimated the rates of return to the different levels of education for neighbouring Barbados,

[8] Following Loening (2005), this is calculated by dividing the long-run school variable by the loading coefficient, the result is then divided by 1 minus the loading coefficient.

[9] The Bahamas and Jamaica were the only CARICOM nations included in this study.

but did not examine the marginal effect of an additional year of average schooling.

1.1 – Solow Framework

GDP growth rates are decomposed by capital, labour and TFP over 5-year periods (Table 5). Results are consistent with the regression analysis. While the economy recorded efficiency gains recorded in TFP (18 per cent), the quality-adjusted labour played the most dominant role in the growth process (56 per cent). Given that the capital quality index demonstrated only marginal change over the entire study period, a relatively low contribution is expected.

Table 5: Decomposition of GDP Growth Adjusted for Quality of Inputs (in per cent)

Time Period		GDP Growth Rates	Capital	Contribution of Labour	TFP
1971-75		0.3	0.1	2.4	-2.2
1976-80		7.8	0.5	2.2	5.2
1981-85		4.8	0.6	2.7	1.5
1986-90		5.1	1.0	2.5	1.6
1991-95		3.7	1.0	1.5	1.1
1996-00		2.6	1.3	0.9	0.4
2001-05		4.5	1.2	1.7	1.5
2006-10		1.5	1.5	1.9	-2.0
2011-14		0.8	0.8	1.7	-1.7
	Average	3.51	0.9	2.0	0.7
Overall Contribution (100%)			26%	56%	18%

Source: Author's Calculations. Discrepancies are due to rounding.

Table 6 shows the framework decomposed by education level. It is expected that TFP contribution will increase because of the constant returns to scale constraint. Accordingly, it is the single largest contributor to growth (approximately 32.0 per cent). Labour and human capital combined account for 42.3 per cent of GDP growth, whereas capital accumulation remained unchanged. An examination of the respective levels of education helps to explain the development of the education system in St Vincent and the Grenadines and its impact on the labour force. During the period 1970-1990, primary education contributed positively to GDP growth. Beyond this point, the addition of more workers with only primary education to the labour force made no overall contribution to growth. Results also depict the increasing role of tertiary education. Over the period 2001-05, tertiary education contributed more to growth than secondary education. This represented a major

shift in the education landscape of St Vincent and the Grenadines since prior to this, secondary education had been making the most substantial contribution to growth for decades. Notwithstanding this, secondary education did have the greatest overall contribution over the entirety of the period (13.08 per cent compared to 11.76 per cent by tertiary). This is consistent with findings of the earlier regression analysis.

Table 6: Decomposition of GDP Growth Disaggregated Education Level Adjusted for Quality of Capital, SVG 1970-2014 (in per cent)

Time Period	GDP Growth Rates	Contribution of					
		Capital	Labour	Education			TFP
				Primary	Secondary	Tertiary	
1971-75	0.3	0.1	0.8	0.3	0.4	1.2	-2.5
1976-80	7.8	0.5	0.8	0.2	0.8	0.4	5.2
1981-85	4.8	0.6	1.1	0.4	0.7	0.3	1.7
1986-90	5.1	1.0	1.1	0.4	0.7	0.2	1.7
1991-95	3.7	1.0	0.3	-0.4	0.7	0.3	1.7
1996-00	2.6	1.3	0.1	-0.4	0.3	0.2	1.1
2001-05	4.5	1.2	0.4	-0.1	0.2	0.4	2.4
2006-10	1.5	1.5	0.5	-0.3	0.3	0.3	-0.9
2011-14	0.8	0.8	0.5	-0.1	0.1	0.3	-0.8
Average	3.51	0.90	0.62	0.00	0.46	0.41	1.12
Contribution (100%)		25.76%	17.52%	-0.04%	13.08%	11.76%	31.92%

Source: Author's Calculations. Discrepancies are due to rounding.

5.0 Conclusion and Policy Considerations

The limitations of application of the models and interpretative caveats noted in throughout the analysis, necessitate a measured approach when inferring policy implications. However not withstanding those limitations, some policy recommendations can be put forward.

First, given the declining role of primary education in growth, policy should serve to maintain current levels of access while focusing on improving efficiency and quality. Current and future governments should focus on post-primary education including secondary and tertiary levels. Second, with labour force attainment levels of 35.6 per cent and 18.5 per cent respectively, policies that widen access to these levels are desirable. Efforts should not only target those below the working age, but ought to provide opportunities for the economically active population to enhance their qualifications and skills since there appears to be either an unwillingness or inability of large portions of the workforce to do so by re-entering the formal education system.

Unfortunately, thus far the economy of St Vincent and the Grenadines appears unable to adequately accommodate the influx of graduates. The labour market has been unable to employ the growing numbers of persons with higher qualifications and training, which has resulted in underemployment, unemployment, instances of brain-drain, and depressed wage rates caused by an over-supply of more educated workers relative to the skill intensity of the economy. These factors contribute to lower than expected growth returns to education.

This does not negate the need to improve human capital development, but rather, emphasises that there is considerable scope for policy geared at stimulating and increasing the size of the private sector to reduce the burden of the state as being the employer of last resort. The aim is to cultivate greater demand for educated labour while increasing the skill intensity of the economy, which may increase average wages. Additionally, the lack of capital and technological advancement demonstrated throughout has limited the possible returns to a more educated labour force. Consequently, the government should implement policies that allow both itself and the private sector to accumulate and use more technologically advanced forms of capital in a bid to enhance augmentation with an increasingly skilled labour force. Climate change resilience should be made central to this objective given the major losses of infrastructure to natural disaster over the period.

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APPENDIX A

Table 3: Production Function, Average Years of Schooling General Specification with Select Dummy Variables and Quality-Adjusted Capital, 1970-2014

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	(1.829)	(2.084)	(3.345)	(2.039)
% Change of ADJCapital/Worker [-1]	-0.466	-1.021	-0.391	-0.511
	(-0.513)	(-1.300)	(-0.705)	(-0.595)
Log GDP/Worker [-1]	-0.381***	-0.520***	-0.390***	-
	(-3.456)	(-4.990)	(-4.171)	0.443**
Log ADJCapital/Worker [-1]	-0.133	0.165**	0.031	-0.015
	(-1.328)	(2.299)	(0.390)	(-0.198)
Log J Avg Years of Schooling [-1]	-0.489***	0.246***	0.117**	0.681***
	(-3.153)	(4.846)	(2.521)	(3.819)
DUMMY1972[A]	0.138***	0.148***	0.163*	0.150***
	(3.209)	(3.978)	(1.927)	(3.646)
DUMMY1975	-0.122**	-0.125***	-0.117***	-
	(-2.475)	(-2.920)	(-5.136)	0.121**
R-Squared	0.567	0.674	0.589	0.611
Durbin Watson[B]	1.462	1.644	1.607	1.517
S.E. of Regression	0.045	0.039	0.044	0.042
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*** - Significant at 1%, ** - Significant at 5%, * - Significant at 10%, T-statistics in parenthesis, Source: Author's Calculations. A – Only significant dummies are reported. B - Breusch-Godfrey test finds no evidence for the presence of first and second order correlation in the residuals.

Employment for the Future: An Analysis of Saint Lucia's Labour Market -Trends and Prospects

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Abstract:

This paper examines the existing state of Saint Lucia's labour market. The paper aims to provide insight into the high persistent unemployment situation through a descriptive analysis informed by the labour market statistics compiled by the Central Statistics Office. It also aims to identify prospective growth and employment creation sectors over the medium to long term. The analysis reveals that women, youth aged 15- 29 and low skilled individuals have been the most adversely impacted by high and persistent unemployment since the most recent global crisis. The data also suggests a structural shift in the economy, showing that there exists a mismatch between the skills demanded by the labour market vis-à-vis the skills supplied. Government intervention in the economy albeit costly, has not been sufficient in dampening the situation and it is shown that sustainable government job creation is impractical. The paper argues that central government's role therefore, is to facilitate the environment for growth in key growth sectors, namely tourism, agriculture, health, information technology and the creative sectors.

JEL Code: **J08, J24, J43**

Keywords: Employment, Labour Market

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1.0 Introduction

Sustainable, inclusive and quality employment remains a key policy objective of the global policy agenda. Like many developing economies Saint Lucia has struggled with unemployment, this is particularly attributed to the structural nature of the economy being a mono sector economy. Saint Lucia is a small open economy with an estimated nominal GDP of EC$3.8[62] billion as at December 2015, it is also the largest economy in the Eastern Caribbean Currency Union. It has an estimated population of 174,257 (Central Statistics Office, 2015 mid-year estimate) and a labour force[63] of 101,608 (CSO, 2015). Like many of its Caribbean counterparts, unemployment is regarded as one of the most challenging economic problems facing the government today with a lasting solution eluding the domestic situation.

Over the last two decades Saint Lucia's economy has been under a transition, from agricultural activities to the services sector. Up until the late 1990's, the economy was largely agriculture based, with the labour intensive sector contributing about 15.0 per cent of GDP at its peak and accounting for the largest share of total employment. Following the decline of the agriculture sector due to changes in the international trading environment, in particular the loss of the EU's preferential trading arrangement for bananas in 1999, the economy experienced a transition to services, particularly tourism. The transition of the economy displaced many persons employed in the agricultural sector. Many shifted to hotel and restaurant services, construction, real estate activities and business services. However this was not enough to soak up the excess labour left over from the agricultural sector.

The global recession of 2008 exposed the vulnerability of the economy. Since the crisis, the major growth sectors experienced severe downturns reeling from declining competitiveness and weak external demand (Gimenez, St. Catherine, Karver, Odawara, 2015). Employment was yet again significantly and adversely impacted. Consequently, the rate of unemployment rose by an average of 21.8 per cent post 2008. In addition, youth unemployment became disparagingly high averaging above 30.0 per cent and reaching its highest at 41.8 per cent in 2014. In the seven years following the great recession of 2008, the economy contracted five of the seven years growing modestly in

[62] Ministry of Finance estimate
[63] Labour Force is defined as the portion of the population 15 years and over either employed or looking for work

2011 and 2015. Overall, economic growth has stagnated and prospects for growth have been weak and uncertain.

Given the high and persistent levels of unemployment, it is fitting to critically examine the labour market, from a demand and supply standpoint, with a view to understanding the idiosyncrasies inhibiting the economy's ability to adjust on its own and the ability of the labour market to revert to its natural rate. Literature on the topic identifies information asymmetries, accessibility to and affordability of skills training that match the labour market's demand, barriers to entry and exit of firms and distortions brought about by excessive labour legislation as some of the possible contributory factors to this rigidity.

Other possible explanations for the high rates of unemployment include structural factors such as the nature of the educational system and its interaction with the needs of the labour market (i.e., the mismatch problem). Additionally, technical change and the use of new capital-intensive techniques of production, permanent shifts in the demand for goods and services especially in export markets, the skill mix of the labour force and available job opportunities and, to a lesser extent, cyclical factors such as the insufficiency of aggregate local and foreign demand for goods and services.

Institutional factors such as the activities of labour unions and labour market regulations have also been raised as possible contributing factors to high levels of unemployment. There has also been an increase in the number of '*discouraged workers'* who are not employed and are not actively looking for work, even though they would like to work. Such high rates of '*open'* and '*disguised'* unemployment represent a serious waste of the human resources and constitute a high cost (social cost) to society.

A vibrant labour market is indispensable to sustainable economic development. As a result, tackling issues of the labour market and its adjustment has to be paramount in national development strategy. It is clear that job creation cannot be led solely by central government. This paper aims to provide a descriptive analysis of the labour market in Saint Lucia with a view to propose areas for growth and employment creation. The remainder of the paper is organized as follows: section 2 will survey some of the literature bon the labour market; in section 3 the methodology is presented; sections 4 and 5 cover the stylized facts about the situation in the labour

market in Saint Lucia with a view to understanding the nature of the unemployment *hysteresis;* Section 6 identifies the key sectors for employment that will contribute to growth and development in the medium to long term and finally section 7 offers the conclusion with policy prescriptions.

2.0 Literature Review

The literature has identified four types of unemployment which exist in an economy. The first type is ***frictional***, which is seen as a natural process in an efficient labour market caused simply because workers are constantly looking for new jobs while firms are constantly looking for the best workers (Wagner, 2014). The second type, ***cyclical*** or ***seasonal*** is attributed to the busts and booms associated with the business cycle (Abraham & Katz, 1984). The theory suggests that the market usually adjusts itself in the short run in the case of the first two types of unemployment.

The third type ***structural*** is trickier because of its tendency to affect the labour market over a prolonged period. Structural unemployment results when the fundamental make-up of the economy is altered following a recession, leaving a mismatch in skills that workers possess and skills that the job market requires (Wagner, 2014). Structural unemployment often leads to other complications including high youth unemployment, obsolete skills and discouraged workers and hence has received a considerable amount of attention in the literature.

The final, is ***disguised*** often found in developing economies. This type of unemployment is described as an individual forced into self-employment in a residual sector in which the individual's activities and income differ little from an unemployment status (Earle & Sarkova, 2000).

In addition to the four types of unemployment, theory differentiates four causes of unemployment. First, the **search and job mismatch theory** which occurs when the labour market faces impediments in moving idle labour due to frictions caused by the time consuming and costly nature of the job search (Birchenall, 2010). The second, **insider- outsider theory** concerned with the conflict of interest between insiders, whose positions are protected by labour turnover costs and outsiders who are not protected (Lindbeck & Snower, 2002). Third, **efficiency wage theory** which hypothesizes that labour productivity depends on the real wage rate paid by the firm. Hence, cutting wages in periods of excess supply can end up raising labour costs (Yellen, 1995). Increased labour costs result in the net loss of labour. The Fourth and final structural unemployment caused

by labour market rigidity. This type of unemployment involves a mismatch between the sufficiently skilled workers looking for jobs and the vacancies available in the sector. Structural unemployment results in the labour market unable to adjust itself when confronted by shocks that affect the economy.

Despite the long standing debate as to the direction of causality in the unemployment-growth association, many economists view the labour force as the engine of growth or at the very least a major contributor to economic growth (Acemoglu & Pischke, 1999). In fact, in the early 2000s, theoretical analysis of what accounts for the differences in growth rates across nations find the role of human capital to be consistently significant (Hanushek & Kimko, 2000). This aligns with the body of research which proposes that economic progress is the result of population dynamics. In particular, places that can attract a labour force with high levels of human capital *will grow with special rapidity because of the entrepreneurial, creative and innovative energies that these workers carry with them* (Storper & Scott, 2009).

As early as the 1960's Okun, an American economist, identified the statistical relationship between the labour force and economic growth. The findings predicted that growth slowdown typically coincides with a rising disengaged segment of the labour force. During the great recessions of the century this phenomenon has been observed. In Saint Lucia, historical data reveal that both growth and unemployment move cyclically (Kandil et al., 2014). Mapping the two against each other shows however, that unemployment moves cyclically but with a lag to growth in some instances, but appears to be mostly constrained as the economy gradually shifted away from banana production (Kandil et al., 2014). A snapshot of the labour market in 2012 provides some evidence of this possible constraint. Of job openings surveyed 44 per cent required tertiary education while only 7 per cent of job seekers surveyed possessed tertiary certification (Labour Market Needs Assessment Survey, 2012).

Unemployment has been particularly hard on Saint. Lucia's young adults (Gimenez et al., 2015). This is a particularly worrisome circumstance as research points to several adverse socio-economic implications of persistent high youth unemployment. These include *"scarring"*, which describes a situation whereby high youth unemployment could lower permanently the probability of future employment and/or lower future wages (Gregg and Tominey, 2005) by this group or persons, thus undermining future economic growth. Additionally, high youth unemployment is

associated with increased risks of youth engagement in deviant activities particularly amongst males (Carmichael & Ward, 2001). High youth unemployment and emigration of younger members of the workforce could also undermine the sustainability of spending on social safety nets (Banerji, Lin & Saksonovs, 2015). This should be of some concern given the seemingly demographic transition that Saint Lucia is undergoing.

One of the major determinants of employment identified in the Caribbean is government investment (Kandil et al., 2014). However, research argues that expansionary government spending only affects cyclical unemployment and does little to fix the joblessness that result from problems like skills mismatches. Policy interventions to address such mismatches should be "*longer-term in scope involving education and encouraging innovation*" (S, A.C, 2012). It is suggested though that while the structural transformation is yet to take place, fiscal policy should be used to bridge the gap.

In terms of government investment in the labour market, the Government of Saint Lucia has engaged in a number of active labour market interventions in an attempt to ameliorate the state of unemployment. However, despite the government investing nearly 1.0 per cent of GDP into these active labour market policies (ALMP) the evaluation of these costly measures has been poor and national statistics show that unemployment has remained intractably high.

Internationally, reviews of ALMPs suggest that in general programmes focused on well targeted small scale training (Lutz and Mahringer, 2007), private sector hiring subsidies (Kluve, 2010) and programs to improve the efficiency of labour market search and matching and self-employment (Martin & Grubb, 2001) tend to produce the best results. Direct employment programs produce the weakest post-program employment outcomes, especially when geared toward public sector jobs (Card, Kluve & Weber, 2010). The most dismal outcome was observed with respect to out-of-school youths: almost no training programme worked for them (Martin & Grubb, 2001). The conclusion, however, is that there is no one-size-fit-all approach and that policies should be comprehensive and country-specific and focused on reviving growth and advancing labour market reforms (Banerji, Lin & Saksonovs, 2015).

The other major driver of employment and by extension growth and development of which both Smith (1776) and Schumpeter (1911) were proponents is entrepreneurship. Entrepreneurs are key in the creation of dynamic economies characterized by innovation and well-remunerated workers (Lederman, Messina, Pienknagura & Rigolini, 2013). While the verdict on whether individuals can be turned into entrepreneurs is still inconclusive, the precept is that government has the ability to encourage entrepreneurship by crafting policies to improve the incentives and support institutions that facilitate innovation (Lederman, Messina, Pienknagura, & Rigolini, 2013).

3.0 Methodology

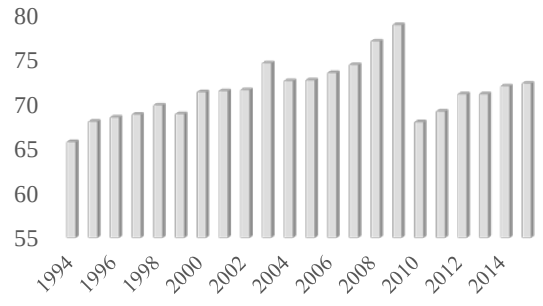
This section lays out the methodology used to understand the labour market in Saint Lucia. The study achieves its objectives through a case study approach involving an analysis of key labour market statistics (labour force surveys 2012-2015 and the labour market needs assessment survey of 2012) compiled by the Department of Statistics (Saint Lucia) and the World Bank over the post 2008 period. The author conducts an overview of government employment programmes to identify its cost and beneficiaries. In order to arrive at the emerging sectors for employment a review of the current government's policy is undertaken as well as consideration is taken for the country's natural endowment, existing infrastructure and demographics.

4.0 Stylized Facts: Labour Force Participation and Unemployment

4.1. Labour Force Participation

Labour force participation rate is a measure of the population 15 years and older, either employed or actively seeking employment. In Saint Lucia, the labour force participation rate averaged 71.3 per cent between 1994 and 2015, peaking at 78.7 per cent in 2009. As at 2015, the participation rate is 72.2 per cent (***Figure 1***).

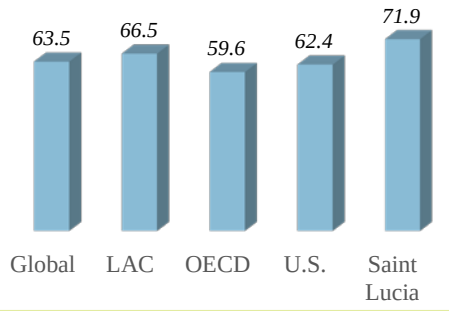
Figure 1: Labour Force Participation Rate (%)



Source: Central Statistics Office, GOSL

On average, Saint Lucia's labour force participation rate has been comparatively higher than that of developed countries and regions like the United States of America and Western Europe (Figure 2). In 2014, labour force participation was 71.9 per cent in Saint Lucia, higher than the estimated global average of 63.5 per cent in the same year. It was also higher than the estimated Latin American and Caribbean region at 66.5 per cent, the USA and the OECD, which had average estimated participation rates of 62.4 per cent and 59.6 per cent, respectively. The high rate of participation in the labour force is perhaps indicative of the absence of social safety nets including the lack of unemployment insurance.

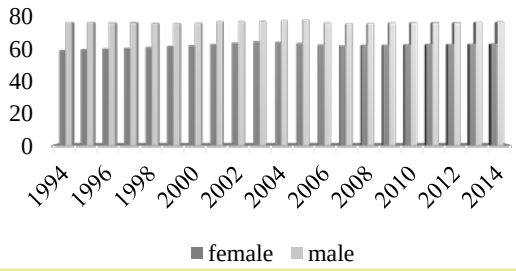
Figure 2: Labour Force Participation Rate, Regional Comparison



Source: World Bank Data (ILO modeled estimate, 2014)

Historically, males have been more involved in the labour market with an average participation rate of 76.1 per cent, compared with 61.9 per cent for women (***Figure 3***). This may be attributable mostly to traditionally defined gender roles, which presume that females are the homemakers while males are the breadwinners.

Figure 3: Labour Force Participation by Gender

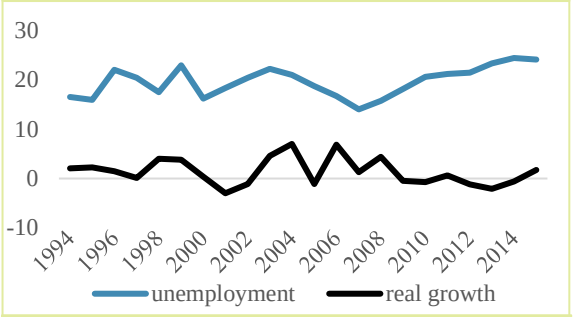


Source: World Bank Data (ILO modelled estimate)

4.2. Unemployment

Unemployment in Saint Lucia has been historically in the double digits (***Figure 4)***. In 1994, while agriculture was still a very significant economic sector, contributing about 8.8 per cent of GDP, the unemployment rate was 16.5 per cent. The collapse of the banana sector in the late 90's owing to the expiration of the preferential arrangement for banana exports to the UK exacerbated the unemployment state resulting in a steady rise in the number of persons left jobless as many farmers were forced to abandon their banana farms.

Figure 4: Real Growth and Unemployment



Source: Ministry of Finance, ECCB Data Series

The economic activity leading up to the 2007 cricket world cup exerted downward pressure on this unemployment trend in the mid-2000s, with the unemployment rate reaching as low as 14.0 per cent in 2007. However, this window of opportunity ended following the global crisis of 2008 and unemployment resumed an upward trajectory. Since 2008 unemployment has averaged above 20 per cent and reached its highest thus far of 24.4 per cent in 2014.

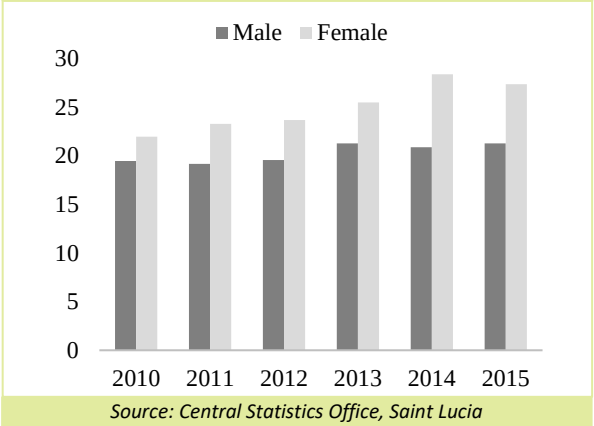
4.3. Characteristics of the Unemployed

4.3.1 Gender

The characteristics of the unemployed lend some insight to the nature of the problem at hand. ***Figure 5*** shows that females have been disproportionally affected by joblessness than males. Over the last six years, females were on average 1.2 times more likely to be unemployed than males. Male unemployment was on average 20.3 per cent while female unemployment was 25.1 per cent. This disparity suggests a differentiation in traditional gender involvement in the labour market.

Figure 5: Unemployment by Gender

Source: Central Statistics Office, Saint Lucia

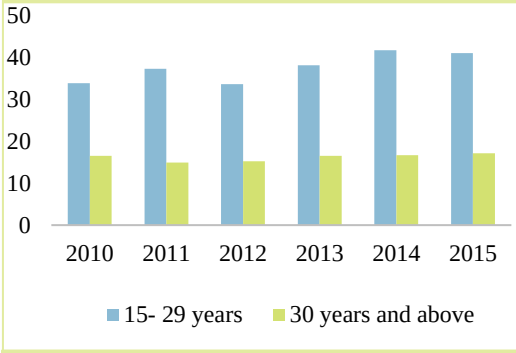


Source: Central Statistics Office, Saint Lucia

4.3.2 Age

Along the age demography, young persons between the ages of 15 to29 years have been disparagingly affected by unemployment. While young people make up approximately half of the total unemployed, unemployed youth account for 30.0 per cent of the youth labour force. This is the highest unemployment rate in any age category. Youth unemployment reached its highest in 2014 with about 41.8 per cent of the young labour force being out of work.

Figure 6: Youth Unemployment

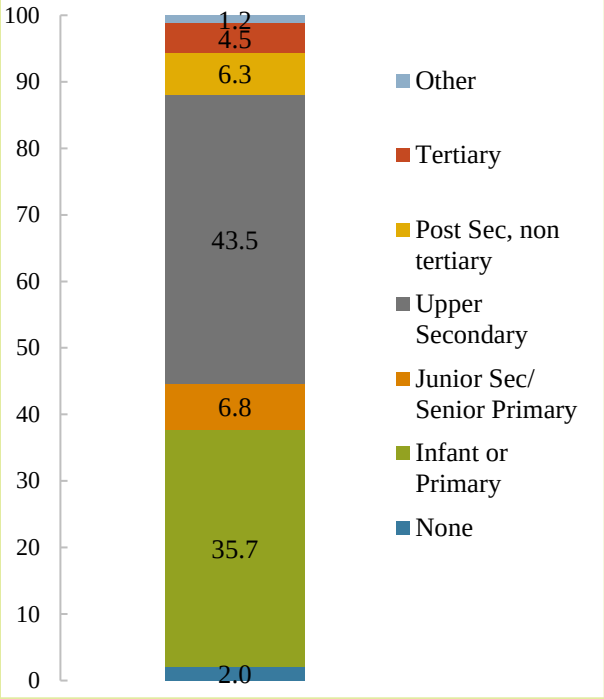


Central Statistics Office, Saint Lucia

4.3.3 Education

An examination of survey data on the educational background of the unemployed suggests that an individual's highest level of educational attainment influences the likelihood of being unemployed.

Figure 7: Unemployment by Highest Level of Educational Attainment (%)



Source: Central Statistics Office, Saint Lucia

The survey revealed that persons having attained upper secondary schooling, that is, completed forms 4 to 5 and persons having only completed infant or primary school experienced the greatest levels of unemployment, 43.5 and 35.7 per cent respectively. Those completing upper secondary schooling made up 43.5 per cent of the unemployed while individuals who had completed only infant or primary school made up 35.7 per cent of the unemployed. Individuals with no formal schooling, tertiary education and other forms of educational attainment were the least likely to be unemployed.

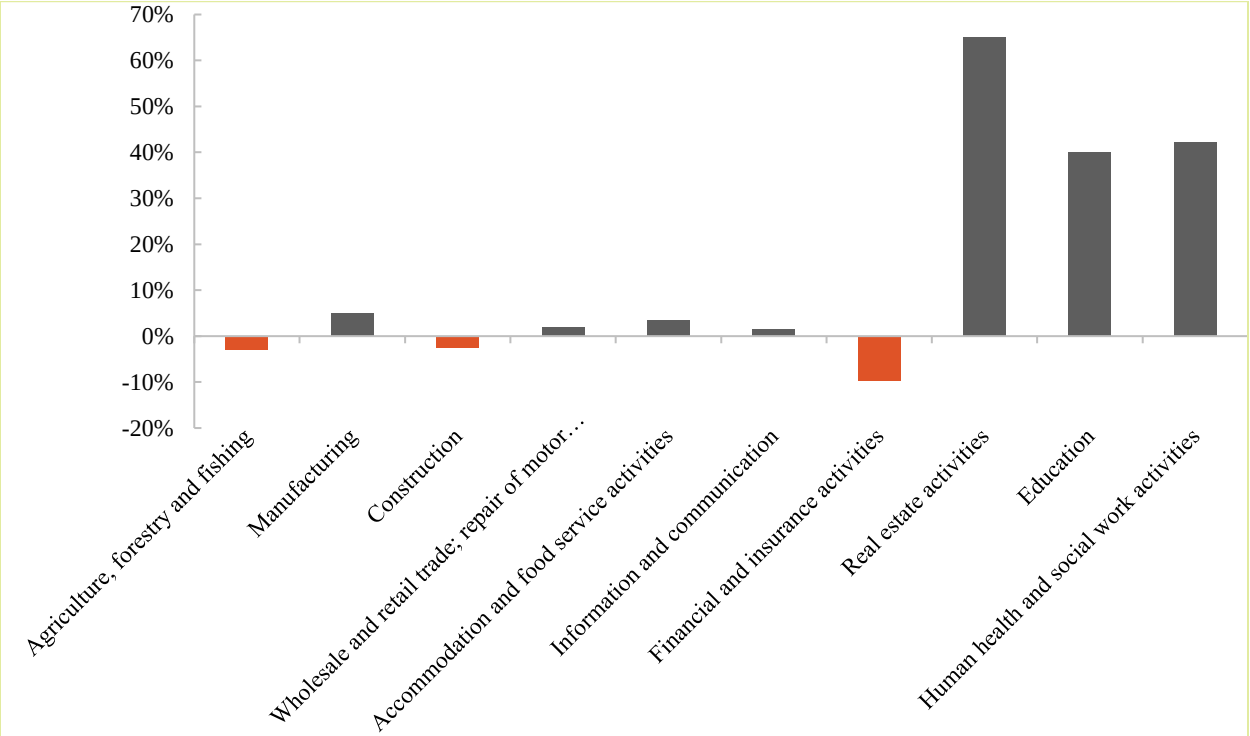
4.4 Labour Market Demand

4.4.1 Employment Demand by Sector

Employment growth in the major sectors following the 2008 crisis has been weak (***Figure 8***). Notably, net average job losses were observed in the agriculture sector due to external factors including rising input prices; construction sector attributed to declining public sector and foreign direct investments; and the financial services sector due to streamlining of operations to boost profitability.

Net jobs were created in manufacturing, wholesale and retail trade and repair of motor vehicle and motorcycles, accommodation and food service activities, information and communication, real estate, education and human health and social work activities. Although real estate activities showed considerable volatility, the average sector performance was positive. Employment in education was led by activities of five offshore colleges, four of which are medical schools. This is believed to have provided the corresponding boost in human health and social work activities. Wholesale and retail sector, (34 per cent of all jobs created in the sector), manufacturing (15 per cent) and construction (14 per cent) created the most part-time employment.

Figure 8: Average Sector Growth 2010- 2015

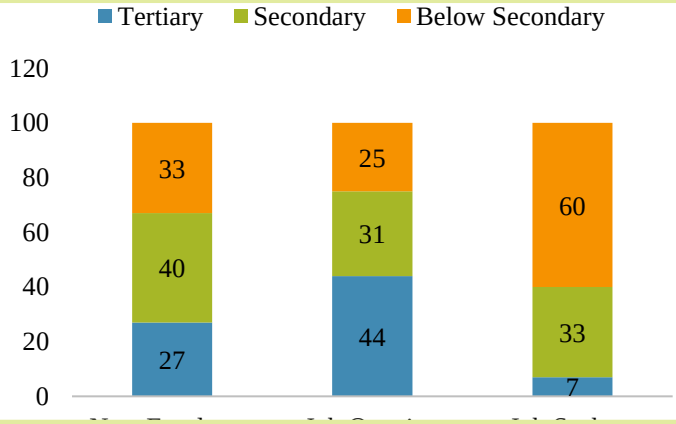


Source: Central Statistics Office, Saint Lucia

4.4.2 Employment Demand by Educational Attainment

In addition, the labour needs survey reports a mismatch between the skills required by job openings and the skills attained by job seekers. It shows that while 44.0 per cent of job openings required tertiary qualification a mere 7.0 per cent of job seekers had tertiary qualification and while 25.0 per cent of job openings sought below secondary qualifications an excess of 60.0 per cent of job seekers fell in that bracket.

Figure 9: Job Market by Educational Attainment

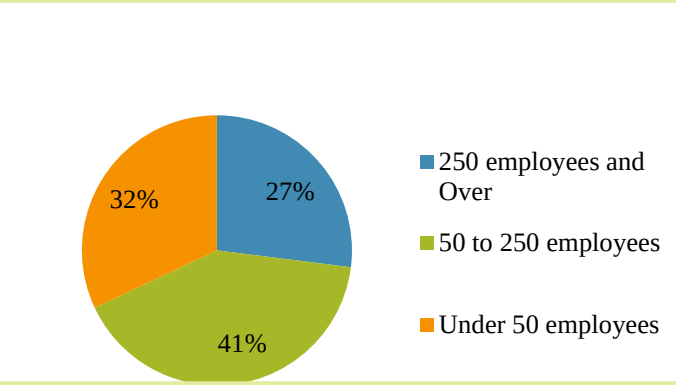


Source: Central Statistics Office, Saint Lucia

4.4.3 Employment Demand by Employer Type

The survey also revealed that in total more than 70.0 per cent of all jobs were created by small and medium sized firms, that is, firms with less than 250 employees (Figure 10) lending credence to the theory that small and medium enterprises play a very significant role in creating employment activity in developing economies.

Figure 10: Job Creation by Company Size



Source: CSO, Saint Lucia- Labour Market Needs Assessment Survey

4.5 The Major Issues in the Labour Market in Saint Lucia

The above analysis of the labour statistics in Saint Lucia brings to fore the following issues facing the labour market in Saint Lucia:

i. High and persistent rates of unemployment;

ii. High youth unemployment;

iii. High unemployment amongst women;

iv. High unemployment among lower educated groups and;

v. Structural shifts in the economy and a mismatch between the skills sought vis-à-vis the skills available.

5.0 Government Intervention in the Labour Market

There have been a number of active labour market initiatives[64], over the last ten years, targeting both the supply and demand side of the labour market. In 2015, there were eight such programmes being funded by the government and being instituted by various government agencies. Three of the programmes guaranteed direct employment for participants (STEP, NICE, YAEP) while five of the programmes provided training with the hope of enhancing the marketability of the trainees. Table 1 below shows the estimated number of beneficiaries per programme alongside government expenditure on the programmes. The figures suggest that the majority of the active labour market programmes (ALMPs) are costly and unsustainable in addressing unemployment over the medium and long term.

[64] See appendix item 1 for a full descriptive list of the initiatives

Table 1: Approximate Number of Beneficiaries per Programme						
	Expenditure (EC$ million)		**Number of Beneficiaries**		**Implicit Cost per Beneficiary (EC$)**	
Programme	**2013**	**2015**	**2013**	**2015**	**2013**	**2015**
STEP	4.0	3.0	2577*	1840*	1,552.19	$1,630.43
NICE	18.0	16.6	1578	n/a	11,406.84	-
SMILES	0.5	0.5	n/a	91**	-	5,494.51
YAEP	0.1	2.3	78**	78**	1,282.05	29,487.18
YEP	0.2	0.5	n/a	89**	-	5,617.98
HOPE	2.0	2.0	509	120	3,929.27	16,667.67
Cruise Ship Employment	-	3.4	-	91		37,362.64
CARCIP	-	1.5	-			
TOTAL	**24.8**	**29.8**	**~4,742**	**~2,309**		

n/a not available

*average employment over three cycles

**number of individuals trained

In addition, the majority of jobs provided are short term and the number of quality jobs generated are not sufficient to impact unemployment over the medium term. . In 2013 for instance, it was estimated that 2,400 net new jobs would have been necessary to keep unemployment unchanged from its level in 2012.

Forecasts generated, using a similar method as that employed by the U.S. Congressional Budget Office, show that in 2016, just to keep the unemployment rate unchanged approximately 640 net new jobs are required. An additional 1000 net jobs are then required to reduce the unemployment rate by 1 per cent. The forecasts suggest that over the next five years an average of 1,700 net jobs would have to be created annually to keep the unemployment rate at its current level and an average 2,400 jobs annually to reduce unemployment by 1 per cent per annum. Cumulatively, approximately 12,000 jobs are required over the next 5 years to reduce unemployment by some 5.0 percentage points.

It is evident that the Government's ALMP are not long-term solutions for job creation and growth. More appropriately, government's intervention should be the facilitation of a favourable economic environment to enable strategic sectors to lead the growth agenda. Economists believe that structural change, like economic growth, is not an automatic process and that deliberate and targeted action in the appropriate direction is essential. Successful regions around the world have done this effectively, facilitating investment, the development of human skills and jobs in the priority areas. Singapore is an example of how this has been done well. Similarly, a national growth plan is needed in Saint Lucia to guide the limited resources and investments into sectors where they are likely to have the best returns.

6.0 Labour Market Prospects:What are the Viable Sectors for Job Creation?

6.1. Tourism

In 2015, Travel & Tourism in total contributed US$7.2 trillion to world GDP, representing 9.8 per cent of global GDP. The sector supported 284 million jobs globally (World Travel & Tourism Council, 2016). In 2015, growth in Caribbean tourism grew by 7.0 per cent surpassing global tourism growth of 4.0 per cent. The Travel & Tourism sector is forecasted to grow, in terms

of GDP contribution, by 4.0 per cent on average per year over the next ten years, supporting 370 million jobs in total globally by 2026, equating to 1 in every 9 jobs worldwide.

Saint Lucia with its captivating, scenic natural landscape, politically stable environment and culturally warm people has made a name globally in the tourism industry and it is expected that the sector will continue to grow over the medium to long term. The new government has expressed its commitment to continue the thrust towards expanding and diversifying the sector both locally and internationally. Given the favourable natural, political and tax environment, it is expected that the Citizen by Investment Programme enforced by Act no. 14 of 2015 will attract further investment in the sector over the medium term.

The government has expressly stated its desires towards developing the cruise, yacht, heritage, health and sports sub-sectors of the industry. If this portends the development strategy, it is foreseen that there will be scope for new employment in services to these sub-sectors which will require technical vocational, post-secondary and tertiary training. These include repair and maintenance of yachts, health and fitness professionals, therapeutic and recovery services.

There is a challenge to use the natural resources more sustainably. Short term gains will quickly be overturned once the natural resources have been depleted. It is imperative government promotes green tourism as part of the strategy. Green spaces and natural products should be complementary part of all tourism products. By so doing creating employment in related sectors including the environment, agriculture and renewable energy technologies.

6.2. Agriculture

There is still a major role for the agricultural sector in growth and development in Saint Lucia and for the overall well-being of the country. In 2015, Saint Lucia imported food to the estimated value of EC$336.24 million, including fruits and vegetables at an estimated value of EC$57.16 million. This went towards feeding the estimated population of 175,000 plus the 1,073,017 visitors who were estimated to have visited the island’s shores during the year as stay over, excursionists, yacht and cruise visitors. The real potential of the sector has been largely unrealized due to poor cooperation and coordination among the actors in the various sub-sectors which has led to gaps

along the supply and demand chain and due to weak linkages with other sectors particularly the tourism sector.

The tourism link provides a real opportunity to supply an existing demand. If the link between the two sectors can be strengthened, such that the agriculture sector adapts to the demands of the tourism industry and the tourism sector is mandated to procure these agricultural goods from local suppliers, this would provide a real boost to the sector. There are opportunities for non-traditional crops, which have been known and grown locally for decades with little economic consideration under the new hemispheric thrust towards wholesome, organic foods. Some of these crops include soursop, turmeric and breadfruit.

There is also room to expand livestock, both chicken and pork (Saint. Lucia is self- sufficient in egg production) given that the country only produces locally around 30.0 and 15.0 per cent respectively of the national consumption of these meats. It is hoped that government will not abandon the opening of the national abattoir in the south and increasing the local requirement to qualify for an import license from 25.0 to 40.0 per cent which will provide a guaranteed market for local producers and will provide a boost to production and employment in these sub- sectors.

Without looking outwards, the potential to create growth activity and employment in agriculture, which is a labour intensive industry, is significant. In addition, there are potential opportunities associated with servicing the global economy, which should be explored and exploited. y. For example, opportunities exist to supply less agriculture-based economies regionally, particularly those of the northern Leeward Islands, who are themselves also heavily tourism driven. National and regional initiatives targeting the setting up of an agriculture information system and affordable and reliable transportation would certainly provide impetus to this.

6.3. Health

As the old adage goes, the health of the nation is the wealth of the nation. Focusing on the health sector will not only improve the provision of health care nationally but will create high quality jobs that are productive, attract a decent income and contribute to the well-being of the overall populace.

Currently, Saint Lucia's epidemiological context is characterized by a decline in infectious diseases and an increase in chronic non-communicable diseases. Over the last five years the leading causes of death have been overtaken by chronic non-communicable diseases including cancers, cerebrovascular diseases, heart diseases, diabetes mellitus and it complications including renal failure, hypertension and chronic lower respiratory diseases. However, health infrastructure and professionals have not quite caught up to the changing epidemiological context and because of this every year there is a great number of Saint Lucians who travel to Cuba, neighbouring Martinique and the USA for treatment of their ailments by specialists who have access to better technology.

The commissioning of two new hospitals, the St. Judes Hospital in the south and the Owen King EU National Hospital in the north, provides an opportunity to not only address the infrastructural deficiencies but to tackle the technological, human resource and research deficits as well. In terms of human resource, there is a shortage in specialist physicians and nurses as it relates to chronic non-communicable diseases. There is also very little research into the localized causes and solutions.

Government should continue to facilitate training for health professionals in specialized areas, such as in diabetes treatment and renal care. Partnerships with friendly foreign neighbours like Cuba as well as with the University of the West Indies should be continued however, these partnerships should extend to the offshore medical schools on the island, which not only can provide support for human resource training but can serve as a channel for financing to support quality research on localized epidemics.

The health sector is principally financed through government fiscal allocations, donor contributions, out-of- pocket payments and private insurance schemes. Opening up the services beyond national shores could be considered as an additional means of financing. Globally, health tourism generates billions annually. In that regard, the country could leverage costs compared to the US dollar and the Euro and the attractiveness of the destination in selling the island as a designated research and treatment center.

6.4. Informatics and Information Technology

Informatics and information technology (IT) involve the storage, retrieval and sharing of data utilizing computer systems and telecommunications. In most industries today this science plays a critical role in enabling functions such as knowledge management, business intelligence, administrative and legal tasks and has played a pivotal role in enhancing the efficiency and competitiveness of businesses globally. In 2011, it was estimated that that information technology boosted world economic output by nearly US$200 billion and created 6 million jobs (Bilbao-Osorio, Dutta & Lanvin, 2013).

However, in Saint Lucia the social and economic impact ensuing from the use of IT remains low due to the sluggishness of the adaptation of new technology and new functions of existing technology in the private and public sector. As a result the country is yet to enjoy any substantial gains from the role that IT can play in supporting economic growth and creating high quality jobs. In the private sector, the use of IT is pivotal to enhancing product quality, product marketability through widening the geographical scope of potential markets and enhancing profitability through lower transaction and administrative costs and improved efficiencies. In the public sector IT can result in administrative efficiencies including cost and time savings. IT is central to the development agenda if the country is aiming to create a contemporary, efficient and innovative economy.

Jobs requiring an IT background span all sectors of the economy. Many specialised jobs in this sector rely on tertiary training. Specialised jobs include systems analysts, database administrators, network security specialists and software developers. However, because of the wide spread use of computers in both the private and public sectors, IT should be as fundamental as numeracy and literacy skills and thus should be compulsory at both primary and secondary school levels. Jobs in IT not requiring tertiary level training include data entry clerk, application developer and technical support.

6.5. Creative Industries

The creative sector covers advertising, architecture, books, gaming, movies, music, newspapers/magazines, performing arts, radio, television and visual arts. It is estimated that the creative industries accounted for 29.5 million jobs globally in 2015 with revenue to the sector

equating to US$2.3 trillion or roughly 3.0 per cent of the world's GDP (CISAC & UNESCO, 2015). Visual arts, books and music were the major sub-sectors worldwide.

Table 2: Sectors of the creative industries					
Advertising	advertising agencies	**Music**	sound recording, music publishing industry, live music	**Radio**	Radio broadcasting activities
Architecture	architectural firms	**Movie**	motion picture production, post production and distribution	**TV**	programming production and broadcasting including cable and satellite
Books	physical and digital books (including scientific, technical and medical books)	**Newspapers and Magazines**	newspaper and magazine publishing industry	**Visual Arts**	Visual arts creation, museums, photographic and design activities
Gaming	video game publishers, developers and retailers, equipment sales	**Performing Arts**	Dance, theatre, live music, opera, ballet etc.		

Source: Cultural Times, 2015 from worldcreative.org

In Saint Lucia the creative industries has largely been informal and underdeveloped despite this being a great potential foreign earner. A great opportunity would have been lost under the Economic Partnership Agreement (2009), which main purpose was to make it easier for people and businesses between the EU and CARICOM to invest in and trade with each other. Under chapter 3 speaking to cross border services and chapter 4 the temporary presence of natural persons for business purpose (articles 80 and 81) there is provision explicitly for persons within the creative sectors namely advertising services, fashion model services, architectural services and entertainment services other than audiovisual services.

Additionally, given the ease and speed of technology, technology's ability to access the most remote geographical markets and the demand for Caribbean entertainment in particular, the creative sectors potential for growth is huge. The potential to contribute to employment, particularly youth employment can be significant. Experiences from Europe, show that the creative sectors typically employ individuals aged 15–29 years more than any other sector. Women are also more likely to participate in this industry compared to the traditional industries. Moreover, creation is driven by individuals or small businesses, giving rise to less dependency on central government employment.

7.0 Conclusion and Policy Recommendations

In conclusion, it is evident that Saint Lucia's economy is undergoing a structural change with women, youth and the low –skilled bearing the brunt of this change. As a result, there is a demand for more skilled workers than is currently available. The education system has not adapted to this change in reality and is doing a poor job at equipping students for the labour market. It is further evident that direct government interventions in the labour market are costly and unable to sustainably create the sheer number of quality jobs to positively impact the situation. Government's role therefore is to facilitate the environment for the private sector to lead growth in key development sectors. This environment includes a skilled and modern labour force, an encouraging regulatory space for small businesses and a free flow of capital. Based on the foregoing analysis the following are policy recommendations:

1. Education reform should be given high priority. The structure of the education system particularly, secondary education is biased towards traditional professions (medicine, law, accounting, teaching). It does not adequately prepare young persons to be functionally part of the new economy. The impact of secondary school is important given that the majority of secondary school leavers are unable to pursue tertiary education due to the high cost. As a result, a high number of persons end up in the labour force with no marketable skill or experience. In response government is expending exorbitantly to correct this failure of the secondary system with little return.

2. Support more tertiary training and create an environment that would encourage some of the best to stay. The gap in skills shows the need for more training at the tertiary level. A special national fund should be set up to financially assist students in pursuing tertiary education. Complementary efforts should be made to make tertiary training more physically attainable by continuing to encourage the establishment of offshore institutions of higher learning as well as to explore the conversion of Sir Arthur Lewis Community College to a full-fledged university.

3. Information Technology should be compulsory at primary and secondary school. Given that modern day is driven by computers it is unacceptable that students leave formal schooling without computer and IT literacy. This is imperative if the country is serious about improving competitiveness, efficiency and productivity.

4. Create an environment for small and medium enterprises to start up, survive and thrive. Economists argue that there is little evidence to show that good education and retraining alone equates to good labour market performance. Eliminating the employment problem requires a long term commitment to growth. In that regard, it is necessary to create an environment where the private sector is able to innovate, produce and adapt to the changing consumer needs. A snapshot of the economy suggests that the private sector plays a huge role in driving growth and in providing employment. Hence there should be a critical review of policy to ensure that there are little barriers to the growth of the private sector's small and medium enterprises.

5. Review Employment Legislation. Economic growth alone may not be a sufficient condition to correct the labour market issues in Saint Lucia. Legislative reviews and reforms are necessary to ensure that regulation does not negatively impact the efficient functioning of the market. This includes legislation on wages and employment benefits.

6. Encourage research and development in business. Without research there is little innovation and without innovation there is little growth. If innovation locally is only by adopting products and production processes that have already been '*discovered*' then growth will always be moderated. The biggest returns are realized when firms are able to get in the game early with new or differentiated products. Saint Lucia may not be able to compete with advanced economies amongst the technology frontiers, however the country should encourage a culture of trying to stay ahead of the game in the sectors that matter the most to the economy. These include tourism and agriculture. Research in those areas may be encouraged through research grants to individuals/ institutions in specific areas or tax incentives for new and differentiated products.

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APPENDIX: **Item 1: <u>Active Labour Market Programmes from 2008-2015</u>**

	Programme	Year	Description	Target	Sector Targeted	Skills Imparted
1.	Short Term Employment Programme (STEP)	Launched 1997; 1997- 2006 2011-2016	Cyclical community and roadside clean up, one week long 3 times annually. Also included employment in composting project in conjunction with the Belle Vue Farmers Coop. and Rehabilitation of a private farm in Canaries	Unskilled	Agriculture	None
2.	National Initiative to Create Employment (NICE)	2012-2016	Temporary public sector attachments; care for elderly, housekeeping for senior citizens	16-45 years	Health, Social Welfare, Agriculture, multimedia production, business services	Also three components NAPP, SBTAP, CPIP Farm Labour Support Program, apprenticeships and training programs. These include crop production, small

	Programme	Year	Description	Target	Sector Targeted	Skills Imparted
						engine boat maintenance, multimedia production, customer service office administration and beauty therapy
3.	Single Mothers in Life Empowerment Programme (SMILES)	2012-2013	Three- four month training in office admin, massage therapy, accounting clerk, cookery, hair design, pastry, self-defense, IT after which CVQs are received. 1 month job attachment	Mothers under the age of 40	ICT	gender awareness training, self-defense, parenting skills; first aid training, ICT training and financial management
4.	*Youth Agricultural Entrepreneurship Programme (YAEP)	2011	Component of the Agricultural Transformation Project. Youth undergo training in Proposal Writing, Records Keeping,	18-25 years	Agriculture	Proposal Writing, Business Management

	Programme	Year	Description	Target	Sector Targeted	Skills Imparted
			and Business Management. Assistance with startup capital			
5.	Youth Empowerment Programme (YEP)		Replaced USAID funded CYEP which ended in 2013. Offers training in bartending, auto mechanics, office admin, hair and nail designs, furniture making, welding, plumbing, general maintenance. CVQs received afterwards While 5 loans have been approved, only 3 persons have gone on to draw down the funds and start their own businesses		Business Services	Life and employability skills, Entrepreneurship Training
6.	Saint Lucia Youth Business Trust		Loan opportunities for persons 18-35 years; Maximum EC$20,000 at interest rate 11.5%- no collateral required, every sector, feasible business	18- 35 years		

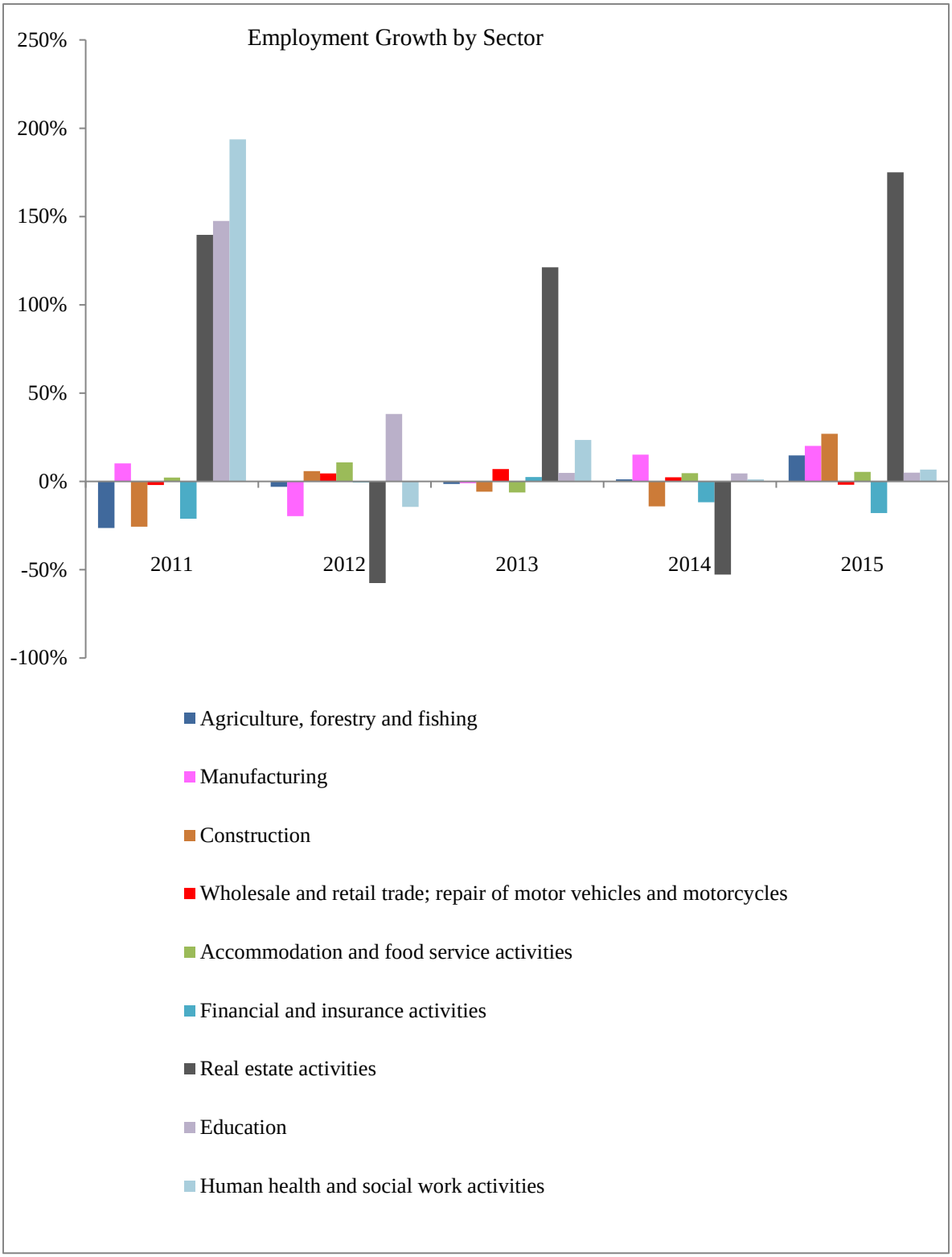
	Programme	Year	Description	Target	Sector Targeted	Skills Imparted
			proposal, repayment flexible; 18 mentors			
7.	Holistic Opportunity for Personal Empowerment (HOPE)		Main employment private sector and small infrastructural contracts. HOPE subsidises salary most often pays half salary but sometimes pays full salary of beneficiaries	17-30 years Unskilled/ Semi- skilled		Participants engage in on job training as well as Productivity Enhancement Programme (PEP) by NSDC; soft skills, vocational
8.	Community Development Programme		Programme provides life skills and character building training and academic support for on average 2 ½ hours, 4 days a week. (Sports, music, theatre, sewing, home management various based on the resources of the community. Also hoping to add on ICT) Currently there are 15 centers island wide each with approx.			

	Programme	Year	Description	Target	Sector Targeted	Skills Imparted
			46 students- more than 600 beneficiaries.			
9.	Cruise Ship Employment Programme	2013	Low interest loans provided for individuals to undergo training with Springboard Training Institute in order to obtain employment on cruise ships	Unemployed youth	Tourism, Cruise	Hospitality, Bartending, Hospitality, Bartending, HACCP, Food Safety and Management Training
10.	CARCIP	2013	Free ICT Training and Certification for Unemployed Youth in the South through collaboration with International American University (IAU) ICT Business Incubator and Training Grant Programme	17-35 minimum 3 CXCs / one year job experience in field		ICT

	Programme	Year	Description	Target	Sector Targeted	Skills Imparted
11.	OECS Skills for Inclusive Growth		Subsidize training of unemployed youth and their placement in traineeships with private firms to gain on- the-job experience. Training implemented by the National Skills Development Centre (NSDC)			

*In the case of YAEP, logistical delays prevented participants from engaging immediately in production activities and so participants have just been trained

Appendix item 2: Employment growth from 2011- 2015



Appendix Item 3: Top Vacancies and New Hires by Educational Attainment