WPS 01/21

EASTERN CARIBBEAN CENTRAL BANK WORKING PAPER

KAREEM MARTIN AND
PETER ABRAHAM JR

What is Driving Tourism Flows to the ECCU?

Insights from a Gravity Model

What is Driving Tourism Flows to the ECCU? Insights from a Gravity Model

By

Kareem Martin and Peter G Abraham Jr.

What is Driving Tourism Flows to the ECCU? Insights from a Gravity Model

Kareem Martin and Peter Abraham Jr[1]

December 2017

Abstract

This study uses a gravity model framework to model tourism demand in the Eastern Caribbean. We analyse data from the territories of the Eastern Caribbean Currency Union over the period 2000 – 2016. Estimation of the gravity equation is done using the Poisson Pseudo Maximum Likelihood technique. This method accounts for the heteroscedasticity problem in the data. The findings show that traditional gravity model variables are significant in explaining tourism demand in the ECCU. Income variables are positive and highly significant, while prices and geographic distance affected tourist arrivals negatively. In addition, the findings show that marketing activity is also an influencer of tourism demand. Thus, well-constructed marketing strategies are a potential tool for increasing tourism flows in the short and long term.

JEL Classification: C23, C40, N76, Z32

Keywords: Eastern Caribbean, Tourism, Gravity Models, Poisson Regression

[1] Kareem Martin is an Economist at the Eastern Caribbean Central Bank, Basseterre, Saint Kitts and Nevis. Email: kareem.martin@eccb-centralbank.org.

Peter Abraham is a Country Economist at the Eastern Caribbean Central Bank, Basseterre, Saint Kitts and Nevis. Email: peter.abraham@eccb-centralbank.org.

Table of Contents

1 Introduction 1

2 The Tourism Industry 2

2.1 Tourism in the Eastern Caribbean 3

3 Literature Review 5

4 Methodology and Data 8

4.1 Data and Sources 9

5 Estimation and Results 9

5.1 Modelling and Estimation 9

5.2 Results and Discussion 12

5.2.1 Economic Size (Income) 13

5.2.2 Prices 14

5.2.3 Population 14

5.2.4 Distance and Other Gravity Variables 15

5.2.5 Marketing Activity 15

6 Policy Considerations 16

7 Conclusion 17

References 19

Appendix 21

A.1 Source Markets 21

A.2 Model Price Formulas 22

A.3 Interpretation of Coefficients 22

1 Introduction

Tourism is the key driver of economic activity in the Eastern Caribbean Currency Union (ECCU). Even in the traditionally agrarian Windward half of the Eastern Caribbean island chain, countries are developing their tourism product. According to Laframboise et al. (2014), tourism's share of GDP in most Caribbean countries ranges from 8.0 to 40.0 per cent. Thus, substantial reliance is placed on tourism to be the main driver of employment, growth, and government revenues. Tourism related inflows are also the main source of finance for the current account deficits of the countries and the primary foreign exchange earner.

The Caribbean's market share of global tourism has declined continuously since the 1990s. In particular, since 2007 ECCU countries have seen their share of the market dwindle, losing market share to regional competitors and countries outside of the region. Though the 2008 global downturn and competitive pressures can explain much of the fall in external demand for tourism services, other regions have since recovered and expanded while the pace of recovery and growth in the sub region remains relatively weak. This has prompted the need for further investigation into the factors that drive tourism flows to the ECCU. Greater understanding of the industry could potentially help policy makers as they develop strategies to stimulate growth in the sector and recover from the poor outcomes in recent times.

This study attempts to further our understanding of the determinants of demand for the tourism products of the ECCU countries. Using gravity model constructs, we analyse the factors that impact tourism flows between the Eastern Caribbean and a sample of its source markets during the period 2000 to 2016. The gravity equation also allowed for the inclusion of traditional tourism demand determinants like income and price. In addition, specific characteristics such as common language, colonial history, and marketing activity are explicitly tested. The latter we deemed quite influential given the monopolistically competitive structure of the tourism industry.[2] Hence, things like advertising and other selling activities become important for product differentiation among a large group of buyers and sellers. For the purpose of this study, we define tourism demand with a

[2] The assumptions of monopolistic competition (large-group model) are the same as those of the classical theory of pure competition, the only exception being the existence of a homogenous product. Under the assumptions of monopolistic competition products of sellers are differentiated but still close substitutes.

geographic perspective. It is the total number of persons who travel and use tourist facilities and services at places away from their places of work or residence (Cooper, Fletcher, Gilbert, & Wanhill, 1993). This demand is measured here as total international tourist arrivals or total stayover visitors. We find that both the size of the destination's economy and that of the source market are significant determinants of tourism flows. Proximity is also a significant factor, on average, arrivals from markets further away were smaller. Relative prices and country populations were also influential factors. Marketing activity is also found to be positive and statistically significant in the analysis. However, the size and magnitude of this relationship we accept with some skepticism, given the simple measure used to denote marketing effort.

The remainder of the paper is as follows. In section 2, we briefly discuss the developments in the tourism industry, both globally and within the ECCU region. We then move to section 3 where the relevant literature regarding tourism demand is presented. In section 4 the methodological and data descriptions are given. Section 5 contains the estimations along with an analysis of the results and in Sections 6 and 7; we discuss policy considerations then conclude respectively.

2 The Tourism Industry

Tourism is big business, not only for small open service-based economies, but also on a global scale. This is easily deduced from the available data on international tourism flows. According to the World Tourism Organization (UNWTO), tourism arrivals in 2016 amounted to an estimated 1.2 billion, accounting for 10.0 per cent of global GDP. In addition, total exports of tourism services worldwide were US$1.4 trillion in 2016, or 30.0 per cent of the total services exports globally.

In many developing countries, tourism services have become the top export category.[3] Moreover, an increasing number of global destinations are investing and opening to tourism. This has transformed tourism into a key driver of socio-economic progress; by way of job and enterprise creation, infrastructure development, and export revenues. This explains to some degree the exponential growth that the tourism industry has experienced worldwide. In 2016, the UNWTO reported that arrivals had reached 1.2 billion.[4]

2.1 Tourism in the Eastern Caribbean

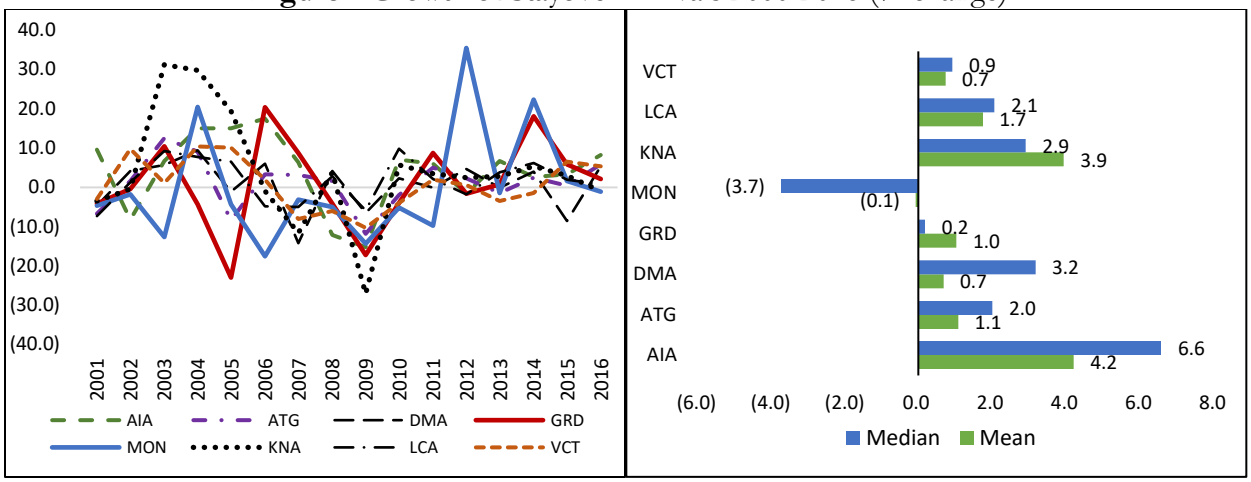
The Eastern Caribbean economies are highly tourism driven. Direct contribution of tourism to GDP in some countries ranges between 15.0 and 20.0 per cent. Majority of the market share in the sub-region (as one would expect) is held by the countries who have traditionally invested heavily into tourism. Antigua and Barbuda and Saint Lucia received over 50.0 per cent of the 1.1 million stayover arrivals for 2016, in other words, 1 in every 2 arrivals into the economic zone was destined for Antigua and Barbuda or Saint Lucia. These 2016 market positions quite well reflect the historical distribution of arrivals across the islands, though the situation was a bit different in 2000. The real movers between 2000 and 2016 have been Anguilla and Saint Christopher (St Kitts) and Nevis, which are both becoming more important destinations.[5] While countries like Commonwealth of Dominica and Saint Vincent and the Grenadines lost a fraction of their market share. In **Figure 1** this is clear; Saint Christopher (St Kitts) and Nevis along with Anguilla recorded the largest average growth rates over the period while Commonwealth of Dominica and Saint Vincent and the Grenadines experienced slower rates. Grenada, Montserrat, and Anguilla have managed the best average performances since 2009, with Montserrat and Grenada recording some significantly impressive years.

[3] According to the UNWTO (2017) tourism ranks third among worldwide export categories. Ranking behind chemicals and fuels and ahead of automotive products and food.

[4] Europe as a region dominates the tourism industry, followed by the Asia-Pacific, the Americas, Africa, and Middle-Eastern regions.

[5] Anguilla moved from a market share of 4.9 per cent in 2000 to 7.2 per cent in 2016, while Saint Kitts and Nevis moved from 8.0 per cent in 2000 to 10.4 per cent in 2016.

Figure 1 Growth of Stayover Arrivals 2000-2016 (% change)



Sources: ECCB, Authors' calculations

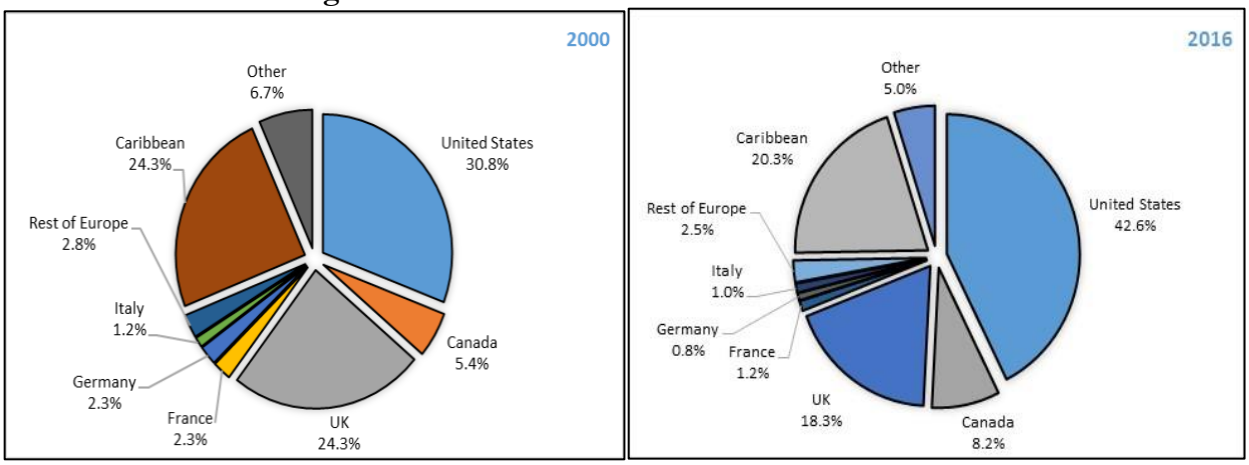
Looking at the differentials between the two measures of central tendency above, the observation is one of volatility. Arrivals growth in the countries are highly susceptible to shocks whether they emanate from the source market or the destination. They could also be related, inter alia, to changes in economic circumstances, behavioural deviations, and competition.

From a region-wide (the Americas) point of view, the ECCU has lost its importance as a major tourist port as a larger share of the tourists visit North, South and Central America. In 2016, about 25.0 million people visited the Caribbean; the Eastern Caribbean captured 4.3 per cent of this Caribbean market. This represents a decline from levels such as 5.6 per cent in 1995 and 4.8 per cent in 2010. Moreover, the UNWTO is projecting that by 2030 the Caribbean region will only have a 1.7 per cent share of the global market, down from its current 2.0 per cent.[6] Nonetheless, tourism remains one of the main drivers of economic development in these small island states.

Looking specifically at the origin countries for tourists, we observe that the main source markets for arrivals have not evolved significantly overtime (see Figure 2). The distribution captured in 2000 has essentially prevailed to present day.

[6] This could be a reflection of increased travel in regions like Asia and the Pacific. Especially as their inhabitants, continue to ascend through income segments.

Figure 2 ECCU Main Source Markets 2000 and 2016



Sources: ECCB, Author's calculations

The United States (US), United Kingdom (UK), and the Caribbean are the dominant source markets. These source markets accounted for some 81.2 per cent of all arrivals in 2016, a slight increase from 79.4 per cent in 2000. Canada and the US increased their arrivals share between 2000 and 2016, with US market importance improving upward of 10.0 percentage points. Of the main markets, the United Kingdom and the Caribbean were the only two markets that experienced a slide in their share. For instance, the UK market appears to be more responsive to shocks and has a slow recovery rate. The arrivals from the UK have not yet returned to pre-financial crisis levels. This source market analysis also provides some justification regarding the countries used in the study.

3 Literature Review

The literature on tourism is quite vast; hence, the aim here is to focus on the studies that examine the factors influencing tourism demand and the methodologies used.

Many different methodologies have been used in the literature to estimate tourism demand. In recent times, gravity models have re-emerged as a way for modelling tourism demand (Morley, Rossello, & Santana-Gallego, 2014). Looking firstly at the work of Santeramo and Morelli (2015). The researchers estimated a gravity data model using quantile regression to study the international demand for Italian agritourism. The dataset covered thirty-three countries of origin for the period 1998-2010. The authors found that distance and income were major determinants of the tourism flows, but additionally discovered that mutual agreements and high urbanization rates in the source countries were associated

with larger incoming arrivals. Similarly, (Hanafiah 2008) used a modified Gravity model to estimate international tourist arrivals in Malaysia. Key economic factors like exchange rate, income, price, CPI, distance, population, and an economic crisis dummy were part of the analysis. The period of study was 1990 to 2003 and covered arrivals from seven countries. All of the included variables were found to be significant in explaining tourism demand in Malaysia.

In a paper by Kaplan and Aktas (2016) the authors estimated tourism demand for Turkey with a gravity model. Their tourism demand model was evaluated using a utility function. They also used a more robust estimation technique, the Poisson Pseudo Maximum Likelihood (PPML) method.[7] This allowed the authors to account for the heteroscedasticity problem in the data. Consistent with the gravity model literature they found that the income of country pairs affected inbound tourists positively, the distance variable was found to be negative in all the estimations. The study covered arrivals from ninety-two countries between 1996-2014. In another application of the gravity model; Lorde, Li and Airey (2015) found that traditional gravity variables are significant in explaining tourist demand in the Caribbean. Specifically, they looked at population, gross national product, price, and transportation costs. In addition, habit persistence and climate distance were investigated as determinants.[8] Using a panel Generalized Method of Moments (GMM) estimation for eighteen Caribbean destinations between 1980 and 2008, they found that arrivals displayed a high level of habit persistence. Climate distance was also found to be positive and statistically significant.

Some researchers have also opted for more traditional techniques to estimate tourism demand. For instance, using a simple least squares regression Öndera, Aykan Candemirb and Kumrala (2009) investigated the international tourism demand in Izmir with time series data from 1998-2005. They used real exchange rate, GDP per capita of OECD countries, and GDP per capita and public transportation capital stock of Izmir to explain the international tourist arrivals to that country. Their results showed that price and income are the main determinants of tourist demand, with the income and price elasticities being above one. The local development factors were found to have no significant effect on tourist arrivals in Izmir.

[7] The PPML is also better at handling (when compared to the OLS estimation procedure) the situation of zero observations.

[8] The study uses the tourism climate index (TCI) by Mieczkowski (1985). It is a composite index that assesses the climate elements most relevant to the quality of the experience for the average tourist.

Jack (2010) used ordinary least squares to model the international tourism demand for the Commonwealth of Dominica. The data covered 1980-2008 and included variables such as; source market income per capita, foreign direct investment, oil prices, and the effect of hurricanes. Income and the real exchange rate were found to positively impact tourism demand, while oil prices and hurricanes were negatively related. In a similar study, Sahely (2005) found that tourism products in the ECCU were quite sensitive to movements in prices and incomes. Another ECCU based study Tsounta (2008), used a panel setting to model tourism data from 1979 to 2005. Only the six IMF/ECCU member countries were used in the study. The findings of the study suggest that tourism is a luxury good and is quite susceptible to source market business cycles. On the supply-side, foreign direct investment along with the number of airlines servicing a destination were found to positively affect tourism flows. Price, hurricanes, and terrorist attacks were all found to affect tourism flows negatively.

The key similarities in the literature appears to be the economic factors employed for the empirical analysis, which are income, price, exchange rate, consumer price index, distance, and population. All have been found to exhibit strong relationships (both positive and negative) with the travel behaviour of tourists. However, the most popular explanatory variables used have been income, tourism prices, and transportation costs as well as dummy variables to proxy various special events and deterministic trends. There are also other activities that can potentially impact demand in the tourism industry and are worth investigating.

In Chamberlin's large-group model, marketing can be considered a policy variable that influences the demand for a firm's product (Koutsoyiannis, 1979). The same holds for the tourism industry. Tourism marketing in its broadest sense is the business discipline of attracting visitors to a specific location (Grassi, 2015). It involves finding out what tourist want, developing suitable packages, telling them what is available and where to get the offering, in order for them to obtain a value for the offering (George, 2007). A study by Basera (2018) concluded that tourism service providers were embracing tourism marketing strategies, using them to appeal to the international and domestic market. The author also noted that tourism stakeholders were competing against each other instead of collaborating to promote the area. He further notes that tourists are nowadays consuming destinations and not the products of individual players. This supports the current thrust for destination marketing.

Many researchers doubt the effectiveness of advertising and marketing in general. Their argument is that there is no solid proof of the financial value of marketing, tourism included. However, research by Siegel (2009) provides substantial evidence of the importance of marketing specifically in the tourism space. The state of Colorado eliminated its tourism marketing function in 1993, cutting the budget from US$12.0m to zero. In two years its domestic market share fell by 30.0 per cent, equivalent to a loss of over US$1.2b in tourism revenue annually. It was not until the year 2000 that fundung was reinstated. The author stated that there was return on investment (ROI) of 12:1 on the effectiveness of the state's tourism campaigns. Destination marketing is clearly a generator of increased tourism revenues. Empirically, it is not a popular variable that is incorporated into tourism demand models. Data availability on detailed marketing expenditure and allocations may limit its explanatory abilities. Nonetheless, promotion expenditure has been shown to positively influence, though small, the level of tourism flows (Ledesma-Rodriguez, Navaro-Ibanez, & Perez-Rodriguez, 2001).

4 Methodology and Data

According to gravity model concepts, the bilateral flows among countries or regions are proportional to the mass of the countries (measured by economic size, i.e. GDP, per capita GDP, etc.), and inversely related to their respective distance. The basic gravity model can be depicted as follows:

$$\boldsymbol{X}_{IJ} = \mathrm{A}\frac{(GDP_I)^{\beta}(GDP_J)^{\gamma}}{(Dist_{IJ})^{\delta}}U_{IJ} \qquad (1)$$

Equation (1) can be log transformed to express a linear relationship:

$$ln\boldsymbol{X}_{IJ} = \alpha + \beta lnGDP_I + \gamma lnGDP_J - \delta lnDist_{IJ} + \varepsilon_{IJ} \qquad (2)$$

where X_{IJ} represents the international flows between countries, GDP_I and GDP_J are the measures of economic mass for the country of origin and destination country respectively, $Dist_{IJ}$ is the geographic distance between the two countries, I and J, ε_{IJ} is a normal error term. The term α is a regression constant. Model (2) will be augmented to capture the tourism flows of the regional destinations.

Gravity models earned their name due to the close resemblance of the nonlinear equation (1) and *Newton's Law of Universal Gravitation*. However, in Newton's law the attractive force between two objects is inversely proportional to the "square" distance between them, unlike here. In trade theory, these gravitational laws suggest that larger country pairs will engage in more trade, while countries that

are geographically further apart will trade less. Likewise, we expect that the larger economies will attract more tourists and fewer arrivals will originate from the more distant countries. The latter being a clear depiction of the negative effect of higher travel costs.

Borrowing from the trade literature, a number of traditional gravity model dummy variables will also be tested. These should help to account for the mean differences in flows among the country pairs.

4.1 Data and Sources

The data for this paper spans 17 years from 2000-2016 and covers the eight territories of the ECCU and nine source markets. Tourist arrivals data was obtained from the ECCB and the World Bank. GDP and GDP per capita, the consumer price index (CPI), and exchange rates were obtained from the World Bank's World Development Indicators.[9] Data on distances were taken from the CEPII gravity model database. This database also contains information on common language and borders, trade agreements, colonial history, etc. These bilateral and cultural data variables become very important in determining the bilateral forces that influence trade flows.

5 Estimation and Results

5.1 Modelling and Estimation

Gravity models, just as their usefulness in modelling trade patterns and flows can be manipulated to capture tourist flows. This is because the same general assumptions tend to hold. Therefore, the following log-linearized gravity equation can be used to model the tourism flows in the ECCU countries:

$$ln\boldsymbol{X}_{IJt} = \alpha + \beta_1 \ln gdp_{it} + \beta_2 \ln gdp_{jt} + \beta_3 \ln dist_{ij} + \beta_4 \ln rel_{ijt} + \beta_5 \ln sub_{ikt} + \beta_6 \ln pop_{jt} + \beta_7 \ln pop_{it} + \beta_8 lan_{ij} + \beta_9 comcol_{ij} + \beta_{10} mkt_{ij} + \ln \varepsilon_{IJt} \quad (3)$$

Here in equation (3), the dependent variable *X* is the logarithm of the volume of tourist arrivals from country *J* to *I*. *GDP* is the real level of output in each country, entering the equation in logs. *Dist* is the geodesic weighted distance between country I and J. *Rel* and *sub* are tourism price variables,

[9] Data for Anguilla and Montserrat obtained from the ECCB AREMOS database.

intended to capture the cost of living of the destination relative to the source country and to competing destinations respectively. *Pop* measures the impact of population movements in both the destination and origin country on tourism flows. Income and population variables are considered indicators of potential supply on the destination end, and potential demand indicators as it relates to the source market. The dummy variables *lan* (common language) and *comcol* (colonial ties) take the value of 1 when the two countries share a common language or share colonial history, respectively. In addition, we create and test a marketing dummy (*mkt*), which takes the value of 1 if country *I* has a tourist office in country *J*, and 0 otherwise.

Based on the prevailing theoretical literature and our knowledge of the underlying tourism industry, we expect the following relationships (Table 1) to hold a priori:

Table 1 A Priori Expectations of Explanatory Variables

Variables	Definition and measurement	Expected signs
Income	Level of real GDP in the source market and the destination (in $US)	+
Distance	The geodesic distance between country pairs measured in kilometres	-
Relative price*	The relative price differentials between source market and destination, measured using the consumer price index	-
Substitute price*	Weighted price differential between the destination and its main competitors	-
Population	The total population in both the source market and the destination	+
Common language	D = 1 if the countries share a common language, 0 if otherwise	+
Colonial past	D = 1 if the countries had a colonial relationship, 0 if otherwise	+

Marketing activity	D = 1 if the destination has an official tourist office in the source market, 0 if otherwise	+

Source: Based on a priori expectations
Notes: Price formulas are discussed further in the appendix.

A number of techniques can be employed to estimate equation (3). One could use fixed or random effects estimators, of which, the choice between each would depend implicitly on the assumed characteristics of the unobserved heterogeneity.[10] The validity of the former depends on the key assumption that the error terms are independent of the regressors. So in the presence of heteroscedasticity this leads to inefficiency of the estimatiors. As Santos Silva and Tenreyro (2006) point out, the log-linear transformation of the gravity equation changes the properties of the error term. In equation (3) the variance of the error term depends on the independent variables (*gdp, dist, etc*,.) which means that the expected value of *ln epsilon* will also depend on them. This violates the ordinary least squares (OLS) assumption that the conditional mean of the error terms should be zero.[11] The violation of this assumption gives rise to heteroscedasticity. Though these OLS estimators would remain unbiased, they would not be the Best Linear Unbiased Estimators (BLUE) because of inefficiency (Mamingi, 2005; Gujarati, 2003). In addition, the usual test statistics could become invalid, leading to greater likelihood of type II errors. Such behaviour is expected from the gravity model data, therefore, classical linear regression models may not be optimal.

We opt for a non-linear method in the Poisson regression, a pseudo maximum likelihood estimator. This particular technique uses the method of Santos Silva and Tenreyro (2010), which identifies and then drops predictor variables that might cause the non-existence of the likelihood estimates. The advantage of this estimator is that it generates estimators that are BLUE even in the presence of heteroscedasticity. Thus the estimated empirical gravity model for arrivals will take the following functional form under the PPML:[12]

[10] If zero correlation is expected between the individual effects and the regressors then the random effects estimators are preferred, however, if constant correlation is assumed (a priori) over time then the fixed effects estimators become more consistent.
[11] Mathematically this is written as $E(\varepsilon|X) = 0$.
[12] The PPML addresses both the problem of inconsistency with OLS and the zero flows between countries. The model is of the form $y_i = \exp(x_i\beta)$

$$\boldsymbol{Arrivals}_{ijt} = \exp\left[\ln \alpha + \beta_1 \ln gdp_{it} + \beta_2 \ln gdp_{jt} + \gamma \ln dist_{ij} + \delta \ln K_{ijt} + \theta \ln Z_{ij} + \nu_t + \eta_{ij}\right] \varepsilon_{ijt} \quad (4)$$

Where *K* is a set of time-varying explanatory variables (as in equation 3) and *Z* a set of binary time-invariant categorical variables. The regression effects ν_t and η_{ij} are time and country effects respectively. The dependent variable (*arrivals*) is the total number of stayover arrivals from the source markets to each individual ECCU destination.

5.2 Results and Discussion

Table 2 contains the results of four separate estimations, the sample was adjusted after each estimation. This was done to assess any observed deviation among the source markets. The results are robust throughout the different sample specifications. Variables have the expected sign and significance, the only observed differences were the small variations in the coefficients across the models. The fit of model is also good with a R-squared of around 89.0 per cent. Interpretation of the coefficients from the PPML can be expressed similarly to those of a least square regression. Though our dependent variable enters in levels and not natural logarithms, we can interpret the logged predictor variables as simple elasticities.[13] These short run elasticities are discussed below. Analysis is based upon the results of model 1 unless otherwise stated.

[13] See appendix for further discussion and explanation.

Table 2 Results from the PPML Estimations

VARIABLES	(1) Full	(2) w/o SA	(3) w/o EU	(4) Main Markets
Destination Income	0.381***	0.377***	0.360***	0.389***
	(0.127)	(0.126)	(0.128)	(0.134)
Source market Income	0.439***	0.434***	0.488***	0.507***
	(0.0121)	(0.0109)	(0.0148)	(0.0161)
Relative price	-0.112***	-0.119***	-0.0814***	-0.0782***
	(0.0134)	(0.0141)	(0.0168)	(0.0174)
Substitute price	-0.118**	-0.138***	0.0255	0.0904*
	(0.0519)	(0.0422)	(0.0444)	(0.0477)
Population (J)	-0.220***	-0.223***	-0.222***	-0.234***
	(0.0144)	(0.0133)	(0.0150)	(0.0153)
Population (I)	-0.0546***	-0.0485***	-0.118***	-0.153***
	(0.0194)	(0.0178)	(0.0181)	(0.0198)
Distance	-0.528***	-0.523***	-0.570***	-0.579***
	(0.0209)	(0.0214)	(0.0275)	(0.0294)
Marketing activity	0.258***	0.253***	0.332***	0.365***
	(0.0250)	(0.0268)	(0.0316)	(0.0331)
Common language	2.254***	2.261***	2.070***	
	(0.0438)	(0.0388)	(0.0586)	
Colonial history	0.807***	0.804***	0.872***	0.899***
	(0.0610)	(0.0615)	(0.0654)	(0.0659)
Constant	9.395***	9.485***	8.571***	10.20***
	(0.466)	(0.411)	(0.407)	(0.393)
Observations	1,020	969	833	544
R-squared	0.886	0.884	0.882	0.856

Source: Model estimates
Notes: Estimation method is the Poisson Pseudo Maximum Likelihood estimator. We account for individual and time effects in all specifications. Dependent variable enters as the level of arrivals for all specifications. Robust standard errors in parentheses and *** p<0.01, ** p<0.05, * p<0.1

5.2.1 Economic Size (Income)

The gravity model parameters have signs that are consistent with the literature. Economic mass of both the origin and destination countries were found to increase the flow of tourists between countries. So as income increases in both countries, tourism demand is impacted positively. In other words, the income elasticity of demand is such that a 10.0 per cent increase in source country income increases the level of arrivals by 4.4 per cent on average. This points to the positive relationship between income and leisure, increased purchasing power of tourists bodes well for the ECCU. Thus, when trading partners increase their income the greater their demand for the goods and services exported by the destination. The coeffcient on the destination income was smaller than that of the

source market, a 10.0 per cent rise in destination income leads to a 3.8 per cent rise in inbound arrivals. One would expect larger countries to possess greater export capacity; in tourism terms this could mean more hotels, villas, restaurants, etc. In other words, a more established tourism product. This is a valid observation, Saint Lucia and Antigua and Barbuda have the largest mass (economies) in the ECCU with both having more matured tourism sectors than the other islands. Thus, their tourism export capacity would have been augmented seven-times over leading to greater export propensity. In addition, over the years they would have built a relatively large tourist base and penetrated source markets to a greater degree than the other islands.

5.2.2 Prices

The price elasticity of demand was found to be negative and highly significant. Such that a 10.0 per cent increase in destination prices relative to the source market decreases arrivals by just about 1.1 per cent in the short-run. As it relates to the substitute price (cross-price elasticity), a 10.0 per cent rise in destination prices relative to its competitors reduces arrivals by 1.2 per cent, approximately. In the sample adjusted estimations, (3) and (4), the same relationship did not hold. There is a clear reduction in substitutability as estimations transitioned to the main source markets. This likely speaks to a high degree of habit persistence and preference as these main market tourists are less swayed by the prices of competitors. Nonetheless, policy makers must bear in mind the increased number of competitors in the business of beach tourism.

5.2.3 Population

The destination and source market population elasticities are all negative and significant across the four estimations. Hence, a growing population in the destination does not directly equate to increased provision of tourism services. As small island states with limited factors of production, resources such as human capital must be allocated across a wide array sectors. The need for public goods like health, national defense, and education grows as the population increases. Source market population was also negative and significant, divergent from the literature. This result could be a function of the review period where exogenous events could have altered the relationship. In addition, the variable may just be too broad based failing to capture age demographics and travel trends among age groups which tend to differ.

5.2.4 Distance and Other Gravity Variables

Distance was found to reduce the level of arrivals from a country. On average, every 10.0 per cent increase in distance between country pairs leads approximately to a 5.3 per cent decline in arrivals. One explanation for this negative relationship is travel cost, which tend to increase as the distance between countries widen. We also posit that convenience may be another contributing factor. It is just more convenient and time efficient for a tourist to travel for instance, from the United States to the Caribbean than to Oceania. The other traditional gravity variables were also significant, these included common language and colonial history. Tourists are more likely to visit a country where the language is common than those where it differs. Indeed, the data does show greater travel between the French West Indies and Dominica and Saint Lucia. Dominica and Saint Lucia also received on average more visitors from mainland France than the other ECCU destnations. We believe that this is a function of not only distance but common colonial past and language.

5.2.5 Marketing Activity

Our marketing dummy was positive and significant. Thus, the mean value of arrivals where there is an active promotional strategy is expected to be 35.0 per cent higher than in countries without; all things being equal.[14]

The significance of the marketing variable could prove be important for the Eastern Caribbean countries. Marketing is a known influencer of demand, particularly in a monopolistic market structure like tourism where product differentiation is paramount. Given, the growing prominence of tourism in other countries, marketing could be pivotal to increasing and maintaining market interest. A very timely consideration given the market share and real per capita inertia that the sub-region has experienced in recent times.

[14] The formula $((e^{b_i} - 1) * 100\%)$ is used to calculate this effect.

Competition in the tourism industry should not be seen solely as a function of hotels, restaurants, tour operators, etc., the real competition is between the vast number of destinations around the world. Thus, it is necessary for the countries to differentiate themselves from their regional and global competitors, that is, through destination marketing. Bearing this in mind, any implemented marketing campaign should hinge on the fundamental attractive forces that determine the level of tourism flows to these countries. Therefore, things like distance, economic size, language, and history can be used as guides for designing promotional strategies. The point is to create the right feeling in the potential customers, one that eventually increases their desire to travel.

6 Policy Considerations

Though the study found that several variables were important determinants of demand, not many are directly controlled by the policy makers. We know that decision makers have no direct control over source market income and partial influence on the income of their respective destinations. Attracting established brand hotels could signal to potential tourists the presence of higher quality accommodations, and likely influence their decision to travel to the destination. In addition, most brand hotels have loyalty and rewards programs that nudge tourists to travel.

Components like distance and the other gravity variables are constants. Essentially, all these relationships have to be taken as exogenous. However, marketing is an activity in which regional governments assume control. Though the proxy for marketing activity was less than ideal, the results of the exercise suggest that marketing is an influencer of tourism flows. In light of this, strengthening marketing strategies could lead to increased demand for the destinations. Given that promotional budgets already exist; realignment of strategies should come at no significant fiscal cost.

There are numerous benefits to be derived from improved marketing effectiveness. It could smooth arrivals, reducing some of the volatility in annual arrivals; like during the off-season and following natural disasters or other negative events. Reference is made to a strategy that was implemented post 9-11. The "Life Needs the Caribbean Campaign" was a successful joint venture by Caribbean destinations that sought to remedy the slow pace of arrivals after the attacks on the World Trade Center. The ECCU countries can use these types of strategies to minimise the impact of such shocks on the flow of arrivals.

Another positive of increased marketing is its impact on destination awareness and branding. This will not solely appeal to travellers but also potential investors, which could boost service export capacity. These investments usually take the form of hotel projects and infrastructural improvements, which ultimately attract more tourists. However, any successful marketing thrust would require more data to be collected to better design and develop strategies. Therefore, exit surveys can be designed to capture tourist attributes, their likes and dislikes, detailed origin, etc. This feedback mechanism will improve the marketing process and help to enhance the quality and standards of tourism service providers. Coupled with that we know from the empirical results that closeness and convenience are major pull factors, something marketing campaigns should leverage.

Price is another modifiable factor that policy makers can use, and a key component of the marketing mix. The relative price inelasticity and low substitutability means that tourists, especially from main markets, essentially prioritize travel to the Eastern Caribbean destinations. Thus, arrivals growth would not be largely responsive to pricing policy adjustments in the short-run. However, in the long-run demand tends to be more price elastic; switching costs tend to be much lower and tourists would have more time to explore alternative options (substitutes). Foreign and airline travel in particular are observed to be highly price elastic in the long-run (Gwartney, Stroup, Sobel, & Macpherson, 2014). Hence, the destinations would need to maintain their competitiveness in the long-term, to prevent any major attrition in their market share and market position. Crouch (1994) recommends full cooperation, coordination and integration among all tourism units in the destination, so hotels, restaurants, tour companies, government agencies, etc. For example, collaboration could give birth to competitive packages, which tend to lure tourists. In addition, there must be a destination vision, shared and developed by all entities.

7 Conclusion

This study focused on the flow of visitor arrivals between the Eastern Caribbean countries and several of their source markets. The authors employed a gravity equation in an attempt to model the historical flow of tourist demand over the period 2000-2016. The models included traditional gravity variables along with additional factors that the authors sought to assess. Results were generated from a Poisson Pseudo Maximum Likelihood (PPML) estimator, which was intended to correct for heteroscedasticity in the dataset. As expected, the findings suggested that source and destination country income are

positive determinants of tourism demand, while prices and distance negatively impact demand. The latter suggests that only limited resources should be expended on distant source markets. Gravity dummies like common language and colonial history were also positive. In addition, the authors introduced a marketing dummy that was also found to impact tourist arrivals positively.

Finally, the authors believe that further research into the area should include two things. Firstly, to capture relative prices among competitors it would be useful to assess average accommodations or travel package prices. This could serve as an improvement on the traditional CPI based proxy for relative prices, which includes a wide basket of goods that may not be relevant to travel or tourists' spending decisions. Tourists usually compare packages and accommodation prices before a final travel decision is made. Secondly, if detailed promotion expenditure data becomes available one could estimate the marketing elasticity of demand for the ECCU. This could help policy makers better align marketing budget allocations and quantify the return on marketing expenditure.

References

Öndera, Ö., Aykan Candemirb, A., & Kumrala, N. (2009). An Empirical Analysis of the Determinants of International Tourism Demand : The Case of Izmir. *European Planning Studies, 17*(10.2009), 1525-1533.

Basera, V. (2018). Tourism Marketing Strategies and Domestic Tourism Demand in Kariba Resort (Zimbabwe). *Journal of Tourism and Hospitality, 7*(2), 1-7. doi:10.4172/2167-0269.1000344

Cooper, C., Fletcher, J., Gilbert, D., & Wanhill, S. (1993). *Tourism: principles & practice.* Harlow, UK: Longman.

Crouch, G. (1994). Price Elasticities in International Tourism. *Hospitality Research Journal, 17*(3), 27-39.

George, R. (2007). *Managing Tourism in South Africa.* South Africa: Oxford University Press.

Grassi, C. (2015, August 29). *The Definition of Tourism Marketing* . Retrieved May 30, 2018, from https://www.linkedin.com/pulse/definition-tourism-marketing-carlomaria-grassi

Gujarati, D. (2003). *Basic Econometrics.* New York: McGraw-Hill.

Gwartney, J., Stroup, R., Sobel, R., & Macpherson, D. (2014). *Microeconomics: Private and Public Choice.* Boston: Cengage Learning.

Hanafiah, M. (2008). Estimating Tourism Demand in Malaysia. *The 7th Asia Pacific Forum for Graduate Students Research in Tourism.* Selangor, Malaysia: ISBN 978-967-305-146-5.

Jack, J. (2010). An Econometric Analysis of International Tourism Demand in the Nature Isle, Dominica. *ECCB Staff Research Paper.*

Kaplan, F., & Aktas, A. (2016). The Turkey Tourism Demand: A gravity model. *The Empirical Economics Letters, 15*(3), 265-272.

Koutsoyiannis, A. (1979). *Modern Microeconomics.* London: Macmillan Press Ltd.

Laframboise, N., Mwase, N., Park, J., & Zhou, Y. (2014). Revisiting Tourism Flows to the Caribbean: What is Driving Arrivals? *IMF Working Paper, WP/14/229*.

Ledesma-Rodriguez, F., Navaro-Ibanez, M., & Perez-Rodriguez, J. (2001). Panel Data and Tourism: A Case Study of Tenerife. *Tourism Economics, 7*, 275-284.

Lorde, T., Li, G., & Airey, D. (2015). Modelling Caribbean Tourism Demand: An Augmented Gravity Approach. *Journal Of Travel Reasearch*, 1-11.

Mamingi, N. (2005). *Theoretical and Empirical Exercises in Econometrics.* Mona: University of the West Indies Press.

Mieczkowski, Z. (1985). The Tourism Climatic Index: A method of evaluating world climates for tourism. *The Canadian Geographer, 29*(3), 220-233.

Moore, W. (2010). The Impact of Climate Change on Caribbean Tourism. *Current Issues in Tourism, 13*(5), 495-505.

Morley, C., Rossello, J., & Santana-Gallego, M. (2014). Gravity Models for Tourism Demand: theory and use. *Annals of Tourism Research, 48*, 1-10.

Sahely, L. (2005). Modelling Tourism Demand from Major International Markets to the ECCU. *ECCB Staff Research Paper.*

Santeramo, F., & Morelli, M. (2015). Modeling Tourism Flows through Gravity Models: A quantile regression approach. *Current Issues in Tourism*. doi:dx.doi.org/10.1080/13683500.2015.1051518

Santos Silva, J., & Tenreyro, S. (2006). The Log of Gravity. *Rev Econ Stat, 88*, 641-658.

Santos Silva, J., & Tenreyro, S. (2010). On the Existence of the Maximum Likelihood Estimates in Poisson Regression. *Economics Letters, 107*(2), 310-312.

Siegel, B. (2009). What Happens When You Stop Marketing? The rise and fall of Colorado tourism. *Nevada Tourism Summit*. Nevada: Longwoods International .

Tsounta, E. (2008). What attracts Tourist to Paradise. *IMF Working Paper*, 3-19.

Appendix

A.1 Source Markets

Source Countries (Importers)
North America *United States of America Canada*
Europe *European Union* ***Then individually:*** *Germany United Kingdom* *France Holland*
South America *Venezuela Peru* *Brazil Chile* *Colombia Argentina*
Caribbean *CARICOM member countries* *French West Indies – Martinique and Guadeloupe*

A.2 Model Price Formulas

$$R_p = \left(\frac{P_{it}}{P_{jt}}\right) * \left(\frac{Ex_{jt}}{Ex_{it}}\right)$$

$$S_p = \sum_{k=1}^{n} (P_{kt}/Ex_{kt}) w_{jkt}$$

w is the share of international arrivals to country k. In this study, both regional and extra-regional destinations were used as substitutes. These include:

Bahamas, The
Barbados
Dominican Republic
Jamaica
Fiji
Maldives
Malta
Aruba

A.3 Interpretation of Coefficients

As economists, we are usually interested in marginal effects and elasticities.

If we consider a simple model:

$$y = \beta x + \varepsilon$$

Given the above, $\beta = \frac{\partial y}{\partial x}$ is the marginal effect of *x* on *y*.

In the case of the PPML, the marginal effects are given by:

$$\frac{\partial E[y|x]}{\partial x_j} = \beta_j exp(x'\beta)$$

This means that β_j is an elasticity if x_j is measured on a logarithmic scale as in equation (4).