AN EMPIRICAL ASSESSMENT OF THE DETERMINANTS OF TOURIST ARRIVALS IN THE CARIBBEAN REGION: EVIDENCE FROM TOBAGO.

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ABSTRACT

The tourism industry is undoubtedly one of the fastest growing industries contributing significantly to growth, foreign exchange and employment in numerous countries around the world. Prior to 2008, many Caribbean countries enjoyed fairly rapid growth in international tourist arrivals, by air, but with the advent of the Global Financial Crisis in 2008/2009, arrivals to these countries declined drastically. Since then, international arrivals, by air to many countries in the region have rebounded; however, international tourist arrivals, by air to Tobago have continued on a downward trend. The factors which account for this continued downward trend in international tourist arrivals, by air to Tobago pose an interesting empirical question. We use data for the period 2010 to 2016 to examine international tourist arrivals, by air to Tobago with a view to assessing the primary factors influencing it and to devise policy measures for the reinvigoration of the tourism industry in Tobago. The results of our Poisson estimation show robust and compelling evidence that familiarity with a destination from previous visits, income in the source market country, and availability of airlift from the source market country to Tobago, all positively affect tourist arrivals while room rates and language negatively influence arrivals.

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1. Introduction

Tourism is one of the fastest growing industries and the primary contributor to economic growth, employment and foreign exchange for many countries around the world. In fact, the tourism industry is the primary driver of economic activity in many countries in the Caribbean region and it is said that the Caribbean region is one of the most tourism dependent regions in the world (CARICOM Caribbean Community, 2016; World Travel and Tourism Council, 2017). In the early 2000s, the tourism industry in the Caribbean region enjoyed impressive growth which was interrupted in 2008/2009 with the advent of the Global Financial Crisis. Since then, although international arrivals, by air have since recovered in many countries in the region, international arrivals, by air to Tobago continue to trend downwards notwithstanding continuing efforts to revitalize the sector on the island.[2]

Data from 2000 to 2016 show that international arrivals, by air, to Tobago increased from 54,000 in 2000 to 88,000 in 2005; then declined to 57,000 in 2008; and further declined from 38,000 in 2009 to about 27,000 in 2016.[3] International arrivals, by air, to St. Lucia exhibited a similar pattern to arrivals to Tobago prior to the Global Financial Crisis. Particularly, arrivals to St. Lucia increased from 270,000 in 2000 to 318,000 in 2005; and then declined to 296,000 in 2008. Distinct from the Tobago arrivals post 2009, arrivals to St. Lucia increased from 278,000 in 2009 to 348,000 in 2016. International arrivals, by air, to Barbados generally fluctuated between 2000 and 2008; and post financial crisis, arrivals increased from 519,000 in 2009 to 632,000 in 2016.[4] Determining the factors which account for the continued downward trend in international tourist arrivals, by air to Tobago is an interesting empirical question and holds significance in terms of policy formulation. It is against this backdrop that this paper seeks to examine international tourist arrivals, by air to Tobago with a view to assessing the primary factors influencing it; and to devise policy measures for the reinvigoration of the tourism industry in Tobago. This study is important given the fact that fluctuations in arrivals have significant impact on other sectors of the Tobago economy.

Although there has been a fairly extensive literature examining the factors which influence tourist arrivals, evident in the literature from Naude & Saayman, 2005; Tsounta, 2008; Habibi &

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[2] Noteworthy is the fact that international arrivals, by cruise to Tobago have been steadily increasing.
[3] Division of Finance and the Economy, Tobago House of Assembly (THA) (2008, 2017)
[4] World Bank (2018)

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Abbasianejad, 2011; Ibrahim, 2013, very few of these studies have examined this issue from a Caribbean standpoint. We, therefore seek to provide fresh empirical evidence on the determinants of tourist arrivals from the perspective of the Caribbean region. In addition, the few studies that examined the determinants of tourist arrivals from the Caribbean context have all tended to examine this phenomenon with respect to specific source markets. We, therefore seek to add to the existing literature by looking at the determinants of arrivals from a broader range of source market countries, using tourist arrival data for Tobago for the period 2010 to 2016.

The remainder of the paper is organised as follows. Section 2 looks at some recent trends in international tourist arrivals, by air to Tobago. Section 3 reviews the empirical literature on the determinants of tourist arrivals. Section 4 outlines the model specification, data and estimation strategy. The empirical results are presented in Section 5 and in Section 6 we present conclusions and recommendations from the study.

2. Recent Trends in International Tourist Arrivals, by Air to Tobago

The tourism industry is of critical importance to Tobago. It is estimated that the industry contributes about 13% to the island's Gross Domestic Product and is a major source of private sector employment and foreign exchange for the island. Figure 2.1 below shows international tourist arrivals, by air to Tobago as well as selected Caribbean countries between 2000 and 2016.
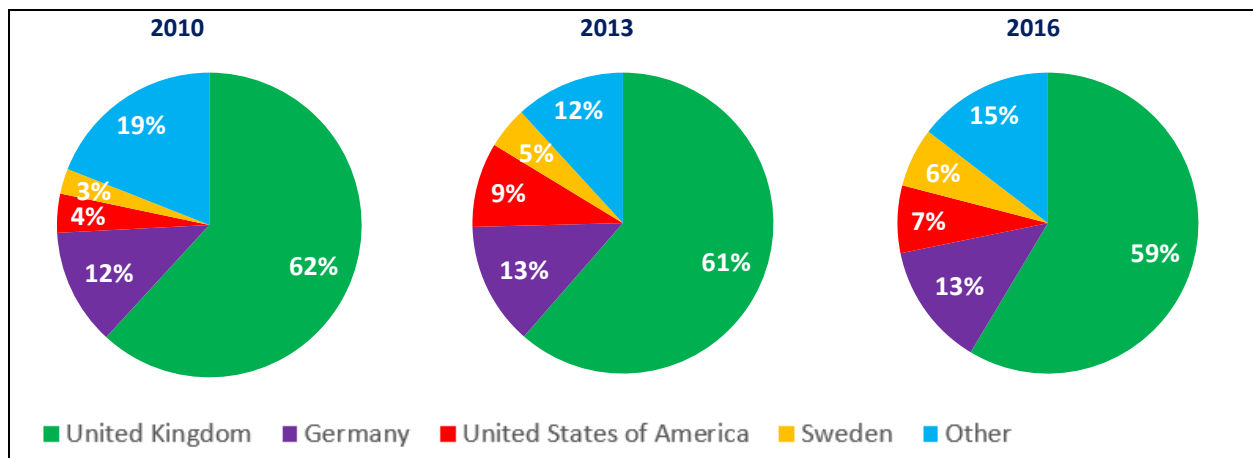
Figure 2.1: International Tourist Arrivals, by Air for Selected Caribbean Islands (2000 – 2016)
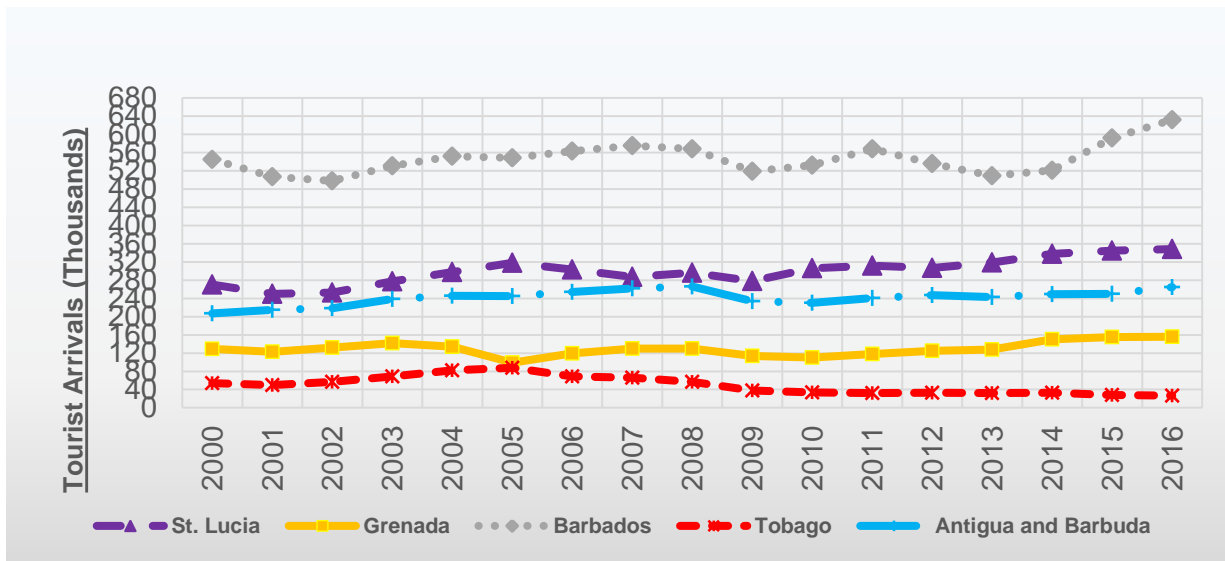
Sources: Data for Tobago from Division of Finance and the Economy, THA and data for St. Lucia, Grenada, Barbados and Antigua and Barbuda from the World Bank.

It is evident from Figure 2.1 above, that following significant growth in international arrivals, by air to Tobago in the early 2000s, from 2006 tourist arrivals to the island have trended downwards. It is also evident that international tourist arrivals, by air to the Caribbean were negatively impacted by the advent of the Global Financial Crisis in 2008/2009. However, although arrivals to the other Caribbean countries rebounded since the Global Financial Crisis, arrivals to Tobago continue on a downward trajectory. Figure 2.2 below shows the arrivals to Tobago from major source markets.

Figure 2.2: International Arrivals, by Air to Tobago, by Source Market Countries (various years)

Source: Division of Tourism, Culture and Transportation, THA

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It is evident from Figure 2.2 above that international arrivals, by air to Tobago are highly concentrated in a few source markets. The European market remains Tobago's most important market, accounting on average for about 81% of all arrivals to Tobago by air. Together, the United Kingdom (UK), Germany, Sweden and the United States of America (USA), on average account for approximately 85% of arrivals to Tobago by air.

3. Review of the Empirical Literature

There exists a fairly extensive body of empirical literature on the determinants of tourist arrivals. This literature has its foundation in the theory of demand.

3.1 The Coverage

Table 3.1 below shows selected scholarly papers which examined the determinants of tourist arrivals.

Table 3.1: Coverage of Selected Empirical Literature on the Determinants of Tourist Arrivals

Number	STUDY	DESTINATION COUNTRIES	SOURCE COUNTRIES	YEARS	DATA
1	Naude and Saayman (2005)	African Countries	World	1996-2000	Panel Data
2	Khadaroo and Seetanah (2007)	Mauritius	Europe, America and Asia	1978–2003	Panel Data
3	Tsounta (2008)	ECCU	US, UK, CAN, TT, JAM, BDOS	1979–2005	Panel Data
4	Onder, Candemir and Kumral (2009)	Izmir (Turkey)	OECD Countries	1980-2005	Time Series Data
5	Leitão (2010)	Portugal	European Union	1995-2006	Panel Data
6	Saray and Karagöz (2010)	Turkey	Various Countries	1992-2007	Panel Data
7	Fourie and Santana-Gallego (2011)	Various Countries	Various Countries	1995-2006	Panel Data
8	Habibi and Abbasianejad (2011)	Malaysia	Europe	1998–2007	Panel Data
9	Surugiu, Leitão and Surugiu (2011)	Romania	Europe	1997-2008	Panel Data
10	Ibrahim (2013)	Egypt	European Countries, UK, US and Saudi Arabia	1990–2008	Panel Data
11	Laframboise, Mwase, Park and Zhou (2014)	Caribbean Countries	US, UK, CAN	2000–2013	Panel Data
12	Pivčević, Kuliš and Šerić (2016)	LAC Countries	-----	1995-2012	Panel Data

It is evident from Table 3.1 above, that there exists fairly recent literature on the determinants of tourist arrivals. It is also evident that although studies have examined the determinants of tourist arrivals in a wide range of countries, many (i.e studies 2, 3, 4, 5, 8,9,10 and 11) have analyzed the phenomenon with respect to specific source markets. Studies have been conducted over both long (i.e studies 2 and 3) and relatively short time periods (i.e studies 9 and 1). Moreover, all the studies with the exception of study 4, utilized panel data.

3.2 Previous Empirical Specifications

Table 3.2 below shows the previous empirical specifications of selected studies examining at the determinants of tourist arrivals.

Table 3.2: Empirical Specifications of Selected Literature on the Determinants of Tourist Arrivals

		1	2	3	4	5	6	7	8	9	10	11	12	Expected Sign
INDEPENDENT VARIABLES														
PUSH FACTORS														
1	Income – GDP per capita, Source	x	x	x	x	x	x	x	x	x	x			+
2	Unemployment Rate, Source											x		-
3	Population, Source					x	x	x	x	x				+
4	Internet Users, Source	x												+
5	Terrorist Attack, Source			x								x		-
PULL FACTORS														
6	Tourist Arrivals$_{t-1}$	x	x			x			x			x		+
7	Income – GDP per capita, Destination				x			x				x		+
8	FDI, Destination			x										+
9	Urbanization Rate, Destination	x												+
10	Population, Destination													
11	Number of Rooms, Destination	x	x						x			x	x	+
12	Transport Infrastructure, Destination		x		x									+
13	Non Transport Infrastructure, Destination		x											+
14	Political Stability, Destination	x							x			x		+
15	Crime - Homicide, Destination											x	x	-
16	Health Risks - Malaria/SARS, Destination	x							x					-
17	Hurricane, Destination			x								x		-
18	Sporting Event, Destination							x						+
19	Promotional Programme implemented by the Destination								x					+
20	World Heritage Sites, Destination												x	+
RESTRICTIVE FACTORS														
21	Relative Price	x	x	x		x		x	x	x	x		x	-
22	Substitute Price			x					x		x			+

		1	2	3	4	5	6	7	8	9	10	11	12	Expected Sign
23	Exchange Rate				x						x	x		-
24	Distance	x	x			x	x	x		x				-
25	Number of Airlines											x		+
26	Trade					x		x		x	x			+
27	Language							x						+
28	Border							x						+
29	Landlocked	x												+
30	Colony							x						+
31	Currency Union							x						+

As shown in Table 3.2 above, there exists significant heterogeneity in the range of explanatory variables used to model the determinants of tourist arrivals. Examination of the data reveals that the studies control for three broad groups of factors. The first group of factors are push factors which refer to characteristics of the source or outbound market such as GDP per capita, population size and internet usage. The second group of factors are referred to as pull factors or attractive factors and captures characteristics of the destination such as political stability, transport infrastructure, non-transport infrastructure, homicide rate and health risk. The final group of factors are resistance factors such as prices, distance, language, border and colonial ties and these capture the constraints of travelling between the source market and the destination.

As it relates to push factors, most studies control for GDP per capita in the source market countries (all except studies 11 and 12) and the population size in source markets (5, 6, 7, 9 and 10). Studies also control for unemployment rate in source countries (11), the number of internet users in source markets (1) and the incidence of terrorist attacks in the source market (3 and 11).

As it relates to pull factors, studies control for arrivals the year before (1, 2, 5, 8 and 10), GDP per capita in the destination (4, 7 and 12), the room stock in the destination (1, 2, 8, 11 and 12), political stability in the destination (1, 8 and 10), crime rate in the destination (9 and 10), health risk in the destination (1 and 8) and the incidence of hurricanes in the destination (3 and 9). Other studies control for the level of foreign direct investment in the destination (3), the quality of non-transport infrastructure in the destination (2), the occurrence of sporting events in the

destination (7), promotional programmes implemented by the destination (8) and whether or not the destination is a world heritage site (10).

As it relates to resistance factors, studies control for relative prices (all except study 4 and 9), substitute prices (study 3, 8 and 10), the exchange rate (4, 10 and 11), geographic distance between the source country and the destination (1, 2, 5, 6, 7, and 9) and the volume of trade between the source countries and the destination (5, 7, 9 and 10). Other resistance variables used in study 7 include language, border, colonial ties and currency union.

3.3 Preferred Estimation Strategy

The preferred estimation strategy used in previous studies on the determinants of tourist arrivals is shown in the Table 3.3 below.

Table 3.3: Preferred Estimation Strategy of Previous Studies on the Determinants of Tourist Arrivals

		1	2	3	4	5	6	7	8	9	10	11	12
	ESTIMATION STRATEGY												
1	Generalized Method of Moments	x	x			x			x				x
2	Ordinary Least Squares				x			x				x	
3	Method of Least Squares Model			x									
4	Random Effects Model						x						
5	Fixed Effects Model									x			
6	Seemingly Unrelated Regression										x		

As shown in Table 3.3 above, the studies used a range of estimation techniques to examine the determinants of tourist arrivals. However, the two must popular techniques seem to be Generalized Method of Moments (GMM) used in studies 1, 2, 5, 8 and 12 and Ordinary Least Squares (OLS) used in in studies 4, 7 and 11.

3.4 Results of Previous Studies

The results of empirical testing on the determinants of tourist arrivals are shown in the table below.

Table 3.4: Results of Previous Studies on the Determinants of Tourist Arrivals

		1	2	3	4	5	6	7	8	9	10	11	12	Expected Sign
INDEPENDENT VARIABLES														
PUSH FACTORS														
1	Income – GDP per capita, Source	- NS	+ *	+ ***	+ ***	+ **	+ ***	+ ***	+ ***	+ ***	+ ***			+
2	Unemployment Rate, Source											- ***		-
3	Population, Source					+ ***	+ ***	- NS		+ **	- ***			+
4	Internet Users, Source	- NS												+
5	Terrorist Attack, Source			- ***								- ***		-
PULL FACTORS														
6	Tourist Arrivals$_{t-1}$	- *	+ *			+ ***			+ ***				+ ***	+
7	Income – GDP per capita, Destination				+ NS				+ ***				+ ***	+
8	FDI, Destination			+ ***										+
9	Urbanization Rate, Destination	+ NS												+
10	Population, Destination							- *						+
11	Number of Rooms, Destination	+ **	+ **						+ ***			- NS	+ ***	+
12	Transport Infrastructure, Destination		+ *		- NS									+
13	Non Transport Infrastructure, Destination		+ NS											+
14	Political Stability, Destination	+ **							+ **				+ ***	+
15	Crime - Homicide, Destination											- NS	- ***	-
16	Health Risks - Malaria/SARS, Destination	+ NS							- ***					-

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		1	2	3	4	5	6	7	8	9	10	11	12	Expected Sign
17	Hurricane, Destination			- ***								- **		-
18	Sporting Event, Destination							+ ***						+
19	Promotional Programme implemented by the Destination								+ ***					+
20	World Heritage Sites, Destination											+ ***		+
RESTRICTIVE FACTORS														
21	Relative Price	- NS	- ***	- ***		- NS		- ***	- **	- ***	- ***		- ***	-
22	Substitute Price			- ***					- ***		+ ***			+
23	Exchange Rate				- ***						- ***	- ***		-
24	Distance	+ NS	- **			- **	+ **	- ***		+ NS				-
25	Number of Airlines											+ ***		+
26	Trade					+ **		+ ***		+ ***	+ ***			+
27	Language							+ ***						+
28	Border							+ ***						+
29	Landlocked, Destination	- NS												+
30	Colony							+ ***						+
31	Currency Union							+ *						+

As shown in Table 3.4 above, as it relates to pull factors, most of the studies controlling for per capita GDP in source countries find the positive and highly significant relationship with tourist arrivals, suggesting that arrivals increase with income of source market countries. Also, the sole study controlling for the unemployment rate in the source country find the expected negative and highly significant relationship between the unemployment rate in source countries and tourist arrivals, suggesting international arrivals decline with higher unemployment rates in source market countries. The results of the studies controlling for population size in source markets were mixed with some studies (5, 6 and 9) finding the expected positive and highly significant

relationship between population size in source country and tourist arrivals, and some studies (7 and 10) finding negative relationships between population size in the source country and arrivals. In the case of study 7, the coefficient was not significant. In addition, the sole study controlling for the number of internet users in source markets did not find the expected positive relationship with tourist arrivals but the result was not significant. Further, all studies controlling for the occurrence of a terrorist attack in the source countries find the expected negative relationship with tourist arrivals.

As it pertains to pull factors, most of the studies controlling for past arrivals find the expected positive and highly significant relationship with tourist arrivals, suggesting that familiarity with the destination positively impacts arrivals. Likewise, most of the studies controlling for GDP per capita in destination find the expected positive and significant relationship with tourist arrivals, suggesting that the higher the level of development in the destination, the greater the arrivals. The exception is study 4 where the relationship was positive but not significant.

Most of the studies controlling for the room stock in the destination find the expected positive relationship with tourist arrivals, suggesting that arrivals increase with the room stock. The results of the two studies controlling for the quality of transport infrastructure in the destination were mixed, with one study (2) finding the expected positive but moderately significant relationship with tourist arrivals, and the other study finding a negative yet insignificant relationship. The sole study controlling for non-transport infrastructure in the destination finds the expected positive relationship but the result was not significant. In addition, the results of the two studies controlling for the health risks in the destination were mixed, with study 8 finding the expected negative and highly significant relationship with tourist arrivals and study 1 finding a positive but insignificant relationship. The two studies controlling for the incidence of hurricanes in the destination (3 and 11) find the expected negative and highly significant relationship with tourist arrivals, suggesting that the occurrence of hurricanes in the destination reduces arrivals.

As it relates to resistance factors, studies which control for relative prices find the expected negative and highly significant relationship with tourist arrivals, suggesting that higher relative prices reduce arrivals. The only exceptions were studies 1 and 5, where although negative, the variable was not significant. The results of studies controlling for substitute prices were mixed,

with one study reporting the expected positive and highly significant relationship with arrivals (study 10), and two studies reporting negative and highly significant relationships (3 and 8). In addition, the results of studies controlling for geographic distance between source markets and the destination were mixed, with some studies (2, 5 and 7) reporting the expected negative and highly significant relationship with arrivals and study 6 reporting a positive and highly significant relationship. The sole study controlling for the number of airlines operating between the source market and the destination finds the expected positive and highly significant relationship with arrivals, suggesting that arrivals increase with airlift. All the studies controlling for the volume of trade find the expected positive and highly significant relationship with arrivals, suggesting that arrivals increase with the volume of trade between source markets and the destinations. Finally, the sole study (7) controlling for language, common border, colonial ties and currency union find the expected positive relationship with arrivals.

3.5 Evaluation of the Literature

A careful examination of the existing literature on the determinants of tourist arrivals points to two fundamental gaps emphasizing the need for further research. Firstly, only a few of the studies have examined the phenomenon from the perspective of the Caribbean region (3 and 11), and policy conclusions derived from studies that fail to capture the specific nuances of the Caribbean could be misleading. We, therefore seek to provide fresh empirical evidence on the determinants of tourist arrivals from the perspective of the Caribbean region. Secondly, the studies that examined the determinants of tourist arrivals from the Caribbean context have all tended to examine this phenomenon with respect to specific source markets. The results of these studies could be biased and lack general applicability. We, therefore seek to add to the existing literature by examining arrivals from a broader range of source market countries.

4. Model Specification, Data and Estimation Strategy

In order to examine the determinants of tourist arrivals, we specify the following econometric model in line with previous specifications by Fourie and Santana-Gallego (2011) and Surugiu, Leitão and Surugiu (2011).

$$LnTA_{ijt} = \beta_0 + \beta_1 LnLagTA_{ijt-1} + \beta_2 LnGDPpc_{jt} + \beta_3 LnDestGDPpc_{it} + \beta_4 RREER_{ijt} + \beta_5 RmRate_{it}$$

$$+ \beta_6 CRIME_{it} + \beta_7 DFT_{ijt} + \beta_8 LnDistance_{ij} + \beta_9 Language_{ij} + \lambda_t + \mu_{ijt} \qquad (1)$$

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Where i indicates destination country (Tobago), j indicates tourism source market countries and t represents time. Thus, the dependent variable $LnTA_{ijt}$ is the natural logarithm of the number of international tourist arrivals, by air to Tobago from country j in year t. Our explanatory variables are defined as follows:

$LnLagTA_{ijt-1}$ is the natural logarithm of international tourist arrivals, by air to Tobago from country j in year t - 1; $LnGDPpc_{jt}$ is the natural logarithm of real GDP per capita of country j in year t; $LnDestGDPpc_{it}$ is the natural logarithm of real GDP per capita of Tobago in year t; $RREER_{ijt}$ is the relative real effective exchange rate between countries i and j in year t; $RmRate_{it}$ is the average price of a hotel and guest house room in Tobago in a given year t; $CRIME_{it}$ is the number of homicides in Tobago in a given year t; DFT_{ijt} is a binary variable capturing whether or not there are direct flights to Tobago from country j in year t, and takes value 1 if a direct flight is available, 0 otherwise; $LnDistance_{ij}$ is the bilateral distance between Tobago and the capital city of country j; $Language_{ij}$ is a binary variable which takes the value 1 if countries i and j share a common official language, and 0 otherwise; and $β_0$ is the constant, $λ_t$ is time fixed effects and $μ_{ijt}$ is a well-behaved disturbance term. We provide the descriptions and sources of all the variables in our model in Appendix II.

The variable $LnLagTA_{ijt-1}$ captures familiarity of tourists to the destination; and the operation of reputation effects (Khadaroo & Seetanah, 2007). We expect the effect of $LnLagTA_{ijt-1}$ on the number of international tourist arrivals, by air to Tobago to be positive and thus $β_1$ is expected to be positive. It is expected that tourists will return to a particular destination and encourage others to visit the destination if they visited and had a prior good experience. We also control for the level of income in the country of origin by $LnGDPpc_{jt}$. Our apriori expectation is that the effect of $LnGDPpc_{jt}$ on the number of international tourist arrivals, by air to Tobago is positive. Thus, the coefficient $β_2$ is expected to be positive. We expect, as income increases in source market countries, more residents can afford to visit other countries hence, international tourist arrivals is a positive function of income (Tsounta, 2008; Leitão, 2010; Surugiu, Leitão & Surugiu, 2011). We also control for the level of economic development in Tobago by $LnDestGDPpc_{it}$. We expect the effect of $LnDestGDPpc_{it}$ on the number of international tourist arrivals, by air to Tobago to be positive. Thus, the coefficient $β_3$ is expected to be positive.

From this perspective, the higher the GDP per capita, the greater the level of economic development, and the greater is tourist arrivals (Pivčević, Kuliš & Šerić, 2016).

The next variable in our model $RREER_{ijt}$ proxies for relative prices and measures the effective prices of goods and services in Tobago relative to the country of origin. It is given by $REER_i/REER_j$ where $REER$ refers to real effective exchange rate. Our apriori expectation is that the effect of the relative real effective exchange rate on international tourist arrivals, by air to Tobago is negative and thus the coefficient β_4 is expected to be negative. As the cost of living in Tobago relative to tourism source market countries increases, tourism demand decreases and thus, the number of international tourist arrivals is an inverse function of relative prices (Surugiu, Leitão & Surugiu, 2011; Ibrahim, 2013).

The next variable in our model captures the average room rate in Tobago and is denoted by $RmRate_{it}$. We expect the average price of a room in Tobago to have a negative effect on international tourist arrivals, by air to Tobago, and thus the coefficient β_5 is expected to be negative. Higher room rates render the destination more expensive and is expected to reduce arrivals. The next variable in our model $CRIME_{it}$ captures the level of criminal activity in Tobago as measured by the number of homicides. We expect the number of homicides in Tobago to have a negative effect on the number of international tourist arrivals, by air to Tobago, and thus coefficient β_6 is expected to be negative. Sequera and Nunes (as cited in Pivčević, Kuliš & Šerić, 2016) noted that the presence of crime in the destination makes the destination more risky and previous studies have concluded that criminal activity is a negative determinant of tourist arrivals. We proxy supply factors in the destination by DFT_{ijt}. Our apriori expectation is that the effect of direct flights to Tobago on the number of international tourist arrivals, by air to Tobago will be positive. Thus, the coefficient β_7 is expected to be positive. The existence of direct flights provides for greater access to the destination and less stress in travel and we anticipate access to direct flights to passively influence tourist arrival.

In the above specification we proxy the cost of transportation by $LnDistance_{ij}$. We expect the effect of $LnDistance_{ij}$ on the number of international tourist arrivals, by air to Tobago to be negative. Thus, the coefficient β_8 is expected to be negative. The idea is that as distance increases, transportation costs, discomfort levels and opportunity costs also increase and arrivals

are expected to decrease (See Khadaroo & Seetanah, 2007). $Language_{ij}$ captures cultural ties between the country of destination and the country of origin. We expect the effect of $Language_{ij}$ on the number of international arrivals, by air to Tobago to be positive, and thus the coefficient β_9 is expected to be positive (Fourie & Santana-Gallego, 2011).

We also control for time fixed effects to capture unexplained variations in the dependent variable over time. This captures all influences that may vary over time but however remain constant across countries.

The descriptive statistics of the variables in the model are presented in Appendix III. We also provide a correlation matrix of the variables in the model in Appendix IV. It is evident from our correlation matrix in Appendix IV that the exogenous variables are generally not highly correlated, the only exception being the high correlation between the variables *LnDestGDPpc* and *RmRate*. Hence, *LnDestGDPpc* was excluded from our analysis. Scatter plots are also presented in Appendix V. Some of the relationships in the scatter plots are generally in line with expectations while others differ.

Our preferred estimation method is Poisson regression because the number of international tourist arrivals, by air to Tobago is a count variable. Poisson regressions are adept at estimating count data and was outlined by Coleman (as cited in StataCorp, 2013). It fits models of the number of occurrences (counts) of an event and assumes that:

- there is a quantity called the incidence rate which is the rate at which events occur;
- the incidence rate can be multiplied by exposure to obtain the expected number of observed events;
- over very small exposures ε the probability of finding more than one event is small compared with ε; and
- nonoverlapping exposures are mutually independent.

With these assumptions, to find the probability of *k* events in an exposure of size *E*, divide *E* into *n* subintervals $E_1, E_2, \dots E_n$ and approximate the answer as the binomial probability of observing *k* successes in n trials. If you let $n \to \infty$, you obtain the Poisson distribution.

In the Poisson regression model, the incidence rate for the *j*th observation is given by:

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$$r_j = e^{\beta_0 + \beta_1 x_{1,j} + \cdots \beta_k x_{k,j}}$$ (2)

If E_j is the exposure, the expected number of events, C_j, will be:

$$C_j = E_j e^{\beta_0 + \beta_1 x_{1,j} + \cdots \beta_k x_{k,j}}$$ (3)

$$= e^{\ln(E)_j + \beta_0 + \beta_1 x_{1,j} + \cdots \beta_k x_{k,j}}$$ (4)

Unobserved heterogeneity, zero flows and endogeneity are three major concerns surrounding our estimations. These will be discussed in sections 5.1, 5.4 and 5.5.

5. Empirical Results

5.1 Benchmark Results

We estimate equation 1 using Poisson estimation and we present the results in the following table.

Table 5.1: Poisson Estimation – Baseline Model
Dependent Variable: LnTA

VARIABLES	BASELINE MODEL
LnLagTA	0.15
	(0.02)***
LnGDPpc	0.22
	(0.04)***
RREER	-0.17
	(0.24)
RmRate	-0.02
	(0.01)**
CRIME	0.02
	(0.02)
DFT	0.40
	(0.11)***
LnDistance	0.01
	(0.04)
Language	-0.14
	(0.06)**
Constant	0.06
	(0.77)
Pseudo R^2	0.24
Observations	382

Robust Standard Errors in Parentheses

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

As shown in Table 5.1 above, we find several interesting results; some of which are consistent with the results of previous empirical studies on the determinants of tourist arrivals and some of which differ. Not surprisingly, we find the coefficient on *LnLagTA* positive and highly significant. This suggests that familiarity with the destination from previous visits positively influences arrivals. This result seems plausible given that Tobago has a high number of repeat visitors.[5] Our findings are in line with several empirical studies inclusive of Khadaroo and Seetanah (2007), Habibi and Abbasinejad (2011) and Pivčević, Kuliš and Šerić (2016). As expected, we find the variable *LnGDPpc* positive and highly significant, suggesting that higher GDP per capita in tourism source market countries positively impacts arrivals. This finding seems credible, in that, higher income in tourism source markets implies persons would have greater disposable income thereby having the means to travel more frequently. Our findings in this regard are consistent with several empirical studies such as Tsounta (2008), Saray and Karagöz (2010) and Ibrahim (2013).

We find the variable *RREER* negative but not significant, suggesting that the relative real effective exchange rate does not matter for arrivals. In this regard, our results differ from empirical studies such as Önder, Candemir and Kumral (2009), Ibrahim (2013) and Laframboise, Mwase, Park and Zhou (2014), which find a negative and significant relationship between the exchange rate and tourist arrivals. As it relates to the variable *RmRate*, as expected we find a negative and highly significant relationship with tourist arrivals, suggesting that higher room rates act as a disincentive to arrivals. This result seems plausible given the highly competitive nature of the tourism industry. Higher room rates could also mean that visitors may choose comparatively cheaper destinations, and thus arrivals are reduced. Notably, we find the variable *CRIME* positive but not significant, suggesting that for Tobago, the crime rate (homicide) does not matter for arrivals. This result seems plausible given the relatively low crime rate in Tobago. Our results with respect to crime differ from that of Pivčević, Kuliš and Šerić (2016) who examining data for Latin America and Caribbean countries (LAC) for the period 1995 to 2012, find a negative relationship between homicide rate and tourist arrivals.

Moreover, not surprisingly, we find the variable *DFT* positive and highly significant, suggesting that the existence of direct international flights to Tobago boosts arrivals to the island. Again,

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[5] It is estimated that approximately 37.6% of the visitors to Tobago are repeat visitors (Division of Tourism, Culture and Transportation, THA, 2016).

this result seems plausible as the availability of direct international flights to a destination allows for greater ease of travel to the destination and positively impacts tourist arrivals. Interestingly and surprisingly, we find the variable *LnDistance* positive but insignificant which suggests that transport costs from the source market country do not seem to matter for tourist arrivals to Tobago. We expect greater distance to mean greater cost of travel to the destination and this would be a disincentive to travel. Our results with respect to distance differ from those of Saray and Karagöz (2010) who find a positive and significant relationship between distance and arrivals and those of Khadaroo and Seetanah (2007), Leitão (2010) and Fourie and Santana-Gallego (2011) who all find negative and significant relationships between distance and arrivals.

Surprisingly as well, we find the variable *Language* negative and highly significant, suggesting that arrivals to Tobago are lower from countries where English is the main official language. This seemingly surprising finding may be attributable to the significant importance of both the German and the Scandinavian markets to Tobago. Our findings with respect to language differ from those of Fourie and Santana-Gallego (2011) who find tourist arrivals increase when the source market and the destination share a common official language.

We then control for unobserved heterogeneity by using regional fixed effects based on the continents and the results are presented in Appendix VI. The results are largely consistent with our benchmark results. The only exception is that the variable *Language* is now positive and loses significance. It is evident that our results seem robust to the inclusion of regional fixed effects.

5.2 Alternative Samples

We recognize a significant proportion of the international visitors to Tobago come from the European market and the factors influencing tourist arrivals may vary across markets. To assess whether or not our results are similar for European *vis a vis* non-European countries, we spilt our sample into European and non-European countries and our estimation results for equation 1 are presented in the table below.

Table 5.2: Alternative Samples using Poisson Estimation –European Countries and Non-European Countries

Dependent Variable: LnTA

VARIABLES	BASELINE MODEL	EUROPEAN COUNTRIES	NON-EUROPEAN COUNTRIES
LnLagTA	0.15	0.15	0.10
	(0.02)***	(0.03)***	(0.03)***
LnGDPpc	0.22	0.27	0.06
	(0.04)***	(0.06)***	(0.04)
RREER	-0.17	-0.14	-0.45
	(0.24)	(0.27)	(0.44)
RmRate	-0.02	-0.02	-0.01
	(0.01)**	(0.01)***	(0.01)
CRIME	0.02	0.03	-0.01
	(0.02)	(0.02)*	(0.04)
DFT	0.40	0.25	0.89
	(0.11)***	(0.15)*	(0.17)***
LnDistance	0.01	0.14	0.09
	(0.04)	(0.26)	(0.04)**
Language	-0.14	-0.09	0.29
	(0.06)**	(0.10)	(0.15)*
Constant	0.06	-1.35	0.19
	(0.77)	(2.63)	(1.62)
Pseudo R^2	0.24	0.24	0.18
Observations	382	202	180

Robust Standard Errors in Parentheses

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

As shown in Table 5.2 above, as it relates to European countries, it is evident that our results seem fairly consistent with our baseline results. The only exceptions are that *RmRate* now has stronger significance, *CRIME* gains moderate significance, *DFT* is now only significant at the 10% significance level, and the variable *Language* loses significance. As it relates to non-European countries, our results also seem fairly consistent with our baseline results. In fact, the variables *LnGDPpc and RmRate* lose significance, *LnDistance* gains significance, and *Language* is now positive and has weaker significance. Therefore, for both European and non-European countries, our baseline results seem fairly robust.

5.3 Alternative Estimation Technique

We tried to assess whether our results are sensitive to our choice of estimation technique, we therefore replicated our estimations using OLS and the results are presented in Appendix VII.

It is evident from our OLS results that the estimation results for our full sample are generally in line with the results of our Poisson estimation. The only exceptions are that *RmRate* now has stronger significance, *LnDistance* gains significance, *Language* now has weaker significance. As it relates to our results for European countries, again our results are largely consistent with the results of our Poisson estimation. The only exceptions are that *RmRate* now has stronger significance*, CRIME* gains significance, and *Language* loses significance. As it relates to non-European countries, our results are also generally consistent with our Poisson estimation. In fact, *LnGDPpc* now has weaker significance, *RmRate* loses significance, *LnDistance* gains significance, and *Language* now has a positive sign. Our results therefore seem fairly robust to alternative estimation techniques.

5.4 Zero Flows

We know that our previous estimation techniques and specifications only consider positive arrival numbers and ignore zeros. We are therefore mindful that our results could be affected by the omission of zero flows. The issue of zero flows arises because there are some countries (present in our dataset) from which Tobago did not receive any arrivals in specific years. Ignoring zeros could potentially lead to biased and inconsistent estimates.[6] We, therefore incorporate zeros by placing a zero value for those countries and years where Tobago did not receive any arrivals in a specific year. Our full sample consists of 38% zeros. As suggested by Silva and Tenreyro (2006), we estimate our regressions using the Poisson Pseudo-Maximum Likelihood Estimation (PPML). In general, the PPML has as its advantages the fact that it gives consistent estimates in the presence of heteroscedasticity and it provides a natural way of addressing zeros in the dependent variable. The PPML results are presented in the table which follows.

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[6] This is a phenomenon commonly encountered in trade simply because some pairs of countries did not trade in a given period (Silva and Tenreyro, 2006).

Table 5.3: Zero Flows Estimation using PPML – Full Sample, European Countries and Non-European Countries

Dependent Variable: LnTA

VARIABLES	BASELINE MODEL	FULL SAMPLE	EUROPEAN COUNTRIES	NON-EUROPEAN COUNTRIES
LnLagTA	0.15	0.20	0.16	0.15
	(0.02)***	(0.02)***	(0.03)***	(0.04)***
LnGDPpc	0.22	0.27	0.29	0.13
	(0.04)***	(0.04)***	(0.05)***	(0.04)***
RREER	-0.17	0.11	0.39	-0.31
	(0.24)	(0.28)	(0.31)	(0.53)
RmRate	-0.02	-0.01	-0.02	-0.00
	(0.01)**	(0.01)**	(0.01)***	(0.01)
CRIME	0.02	0.06	0.09	0.02
	(0.02)	(0.02)***	(0.02)***	(0.03)
DFT	0.40	0.27	0.22	0.75
	(0.11)***	(0.13)**	(0.14)	(0.23)***
LnDistance	0.01	0.03	0.38	0.07
	(0.04)	(0.04)	(0.29)	(0.05)
Language	-0.14	-0.02	-0.02	0.63
	(0.06)**	(0.06)	(0.09)	(0.16)***
Constant	0.06	-1.80	-4.48	-1.75
	(0.77)	(0.55)***	(2.82)	(0.79)**
Pseudo R^2 / R^2	0.24	0.65	0.76	0.49
Observations	382	537	217	320

Robust Standard Errors in Parentheses

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

It is evident from Table 5.3 that the inclusion of zeros does not alter our baseline results in any material way. As it relates to our full sample, *CRIME* gains significance, *DFT* now has weaker significance, and *Language* loses significance. As it relates to European countries, the results seem fairly consistent with our earlier Poisson estimation results. The only exceptions are that *RmRate* now has stronger significance, *CRIME* gains significance, and the variables *DFT* and *Language* lose significance. As it relates to non-European countries, the results are generally consistent with our earlier Poisson estimation results. The only exceptions are that *RmRate* loses significance, and *Language* is now positive with stronger significance. In general, our baseline results seem fairly robust to the inclusion of zero flows in our sample.

5.5 Controlling for Endogeneity

We are mindful of the fact that endogeneity could result in biased and inconsistent coefficient estimates. Our endogeneity concerns relate primarily to the variable D*FT*. In our estimations, we are trying to that establish the existence of direct flights to Tobago increases arrivals. However, it may be that direct flights are established in source market countries from which Tobago receives significant arrivals. We try to minimize endogeneity concerns by using instrumental variable regression and modelling *DFT* as an endogenous variable. The results are presented below and diagnostic tests are reported in Appendix VIII.

Table 5.4: Controlling for Endogeneity using IV – Full Sample, European Countries and Non-European Countries
Dependent Variable: LnTA
Endogenous Variable: DFT

VARIABLES	BASELINE MODEL	FULL SAMPLE	EUROPEAN COUNTRIES	NON-EUROPEAN COUNTRIES
LnLagTA	0.15	0.41	0.51	0.10
	(0.02)***	(0.07)***	(0.10)***	(0.08)
LnGDPpc	0.22	0.42	0.77	0.06
	(0.04)***	(0.07)***	(0.15)***	(0.08)
RREER	-0.17	-0.79	0.41	-1.37
	(0.24)	(0.45)*	(0.72)	(0.52)***
RmRate	-0.02	-0.04	-0.08	-0.02
	(0.01)**	(0.02)*	(0.02)***	(0.03)
CRIME	0.02	-0.00	0.11	-0.05
	(0.02)	(0.05)	(0.06)*	(0.09)
DFT	0.40	4.42	3.64	5.40
	(0.11)***	(0.76)***	(0.88)***	(0.55)***
LnDistance	0.01	0.44	0.81	0.48
	(0.04)	(0.11)***	(0.73)	(0.12)***
Language	-0.14	-0.53	-0.43	0.30
	(0.06)**	(0.17)***	(0.32)	(0.21)
Constant	0.06	-1.74	-6.65	-0.38
	(0.77)	(2.27)	(7.55)	(3.07)
Pseudo / Adjusted R^2	0.24	0.64	0.81	0.33
Observations	382	382	202	180

Robust Standard Errors in Parentheses

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

As shown in Table 5.4 above, when we control for endogeneity, we find our full sample results fairly consistent with our benchmark results. The only exceptions are that RREER gains moderate significance, *RmRate* now has weaker significance, *LnDistance* gains significance, and *Language* now has stronger significance. As it relates to our results for European countries, our results are fairly consistent with the results of our baseline model. The only exceptions are that

RmRate now has stronger significance, *CRIME* gains moderate significance and *Language* loses significance. By contrast, as it relates to non-European countries, the differences from our baseline results seem more fundamental. In fact, the variables *LnLagTA, LnGDPpc, RmRate* and *Language* lose their significance and *RREER* and *LnDistance* gain significance. Therefore, especially for our full sample and European countries, our baseline results seem fairly robust.

6. Conclusion and Recommendations

In this paper, we set about to examine international tourist arrivals, by air to Tobago with a focus on assessing the primary factors influencing it, and to devise policy measures for the reinvigoration of the tourism industry in Tobago. Our study unearths several interesting findings, some of which are in line with existing studies and some of which differ. Not surprisingly, we find robust and compelling evidence to suggest that familiarity with the destination from previous visits positively influences arrivals to Tobago. Especially in the case of arrivals from European countries, we unearth strong evidence to suggest that higher income in tourism source market countries positively impacts tourist arrivals to Tobago. We also find strong evidence to suggest that higher room rates act as a disincentive to arrivals to Tobago, particularly in the case of arrivals from European countries. As expected, we unearth robust and compelling evidence to suggest that the existence of direct international flights to Tobago positively impacts arrivals to the island. Additionally, we find weaker evidence to suggest that arrivals to Tobago are lower from countries where English is the main official language but our results seem to be sensitive to our sample selection.

Interestingly, our results suggest that relative prices, proxied by the relative real effective exchange rate, do not seem to matter for arrivals to Tobago. Our findings also suggest that crime does not seem to influence arrivals to Tobago. This is not surprising given the relatively low crime rate in Tobago when compared to other Caribbean islands. Additionally, we find that transport cost, proxied by distance, does not seem to have any significant impact in influencing arrivals to Tobago, especially in the case of arrivals from European countries.

The findings of our study have special implications for policy formulation. Our study suggests that economic conditions in source market countries influence arrivals and hence, policy makers need to monitor and pay particular attention to economic conditions when devising policies aimed at increasing arrivals to Tobago. Our study also suggests that if Tobago wants to increase

arrivals, focus should be placed on increasing airlifts. Specifically, there is a need for a greater number of direct flights to Tobago; this is especially true for the North American market. Additionally, the findings of our study suggest that to boost arrivals to Tobago, owners of hotels and guesthouses in Tobago should consider adjusting the prices of their room stock. In the regional context, the current rates may be too high. The new pricing structure should be regionally competitive, and the room rates on the island should vary based on the class of accommodation. Moreover, the quality of the room stock should be exceedingly high to guarantee that visitors get value for their money.

Our study provides fresh empirical evidence on the determinants of tourist arrivals from the perspective of the Caribbean region. We add to the empirical literature by examining the determinants of arrivals in the Caribbean region from a broader range of source market countries using tourist arrival data for Tobago for the period 2010 to 2016. Our study is not without limitations. Ideally, we would have preferred to model arrival data from as early as 2000 to capture the occurrence of major events such as the 2008/2009 Global Financial Crisis, however, data for international tourist arrivals, by air to Tobago by source market country were only available from 2010. We would have also preferred to proxy supply factors by the number of flights from the source market country to Tobago in order to capture intensity. However, data were not readily available and hence, we use a dummy variable to capture the existence of a direct flight from the source country to Tobago. The destination's marketing spend on promotional activities in the source market country is an important factor in assessing tourist arrivals, but unfortunately, this crucial component was excluded from our analysis due to the unavailability of accurate data.

Our study focussed solely on Tobago, but in subsequent research papers, we intend to broaden the scope of our current study by examining the determinants of international tourist arrivals in other Caribbean countries to allow for comparative analysis.

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APPENDIX I

Figure A1: International Tourist Arrivals, by Air to Tobago (2010 – 2016)
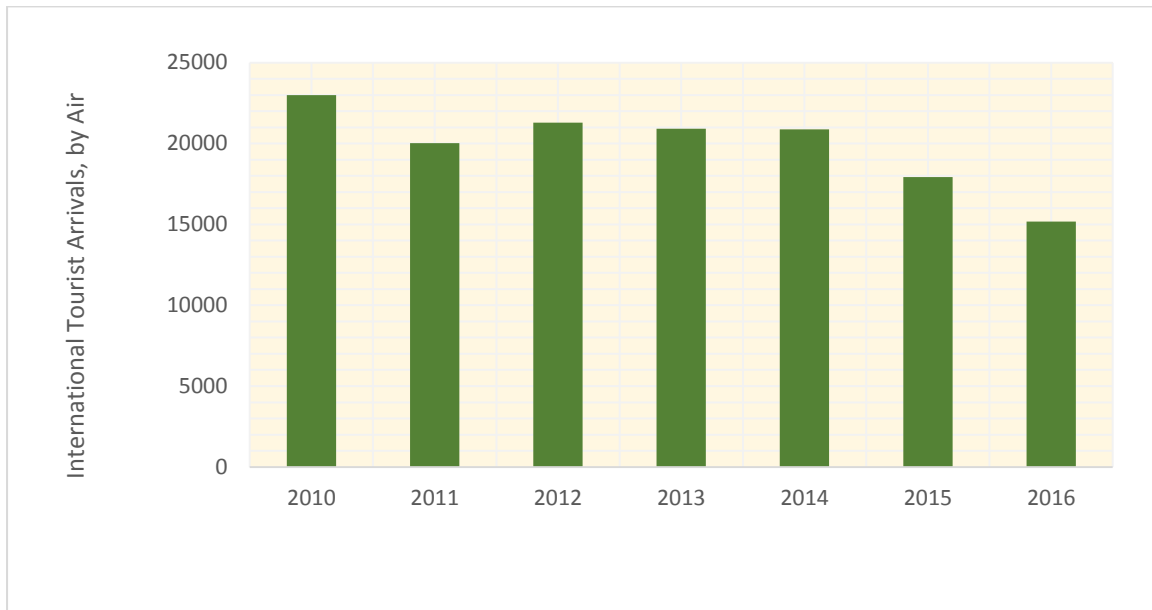
Source: Division of Tourism, Culture and Transportation, THA

APPENDIX II.

Table AII: Descriptions and Sources of Variables in the Model

Variable	Description	Sources
TA	The number of international tourist arrivals, by air to Tobago from source market countries, 2010 - 2016.	Division of Tourism, Culture and Transportation, Tobago House of Assembly.
LagTA	The number of international tourist arrivals, by air to Tobago from source market countries in year t-1.	Division of Tourism, Culture and Transportation, Tobago House of Assembly.
GDPpc	The real GDP per capita (constant 2010 US$) in source market countries.	World Development Indicators of World Bank website.
DestGDPpc	The real GDP per capita (constant 2011 US$) in Tobago.	Division of Finance and The Economy, Tobago House of Assembly.
RREER	The relative real effective exchange rate between Tobago and source market countries. It measures the effective prices of goods and services in Tobago relative to source market countries and is given by REER TT / REER ORIGIN.	Global Economic Monitor of World Bank website.
RmRate	The average room rate for hotels and guesthouses in Tobago.	Division of Tourism, Culture and Transportation, Tobago House of Assembly.
CRIME	The number of homicides in Tobago.	Trinidad and Tobago Police Service.
DFT	A binary variable capturing whether or not there are direct flights to Tobago from source market countries, and takes value 1 if a direct flight is available, 0 otherwise.	Division of Tourism, Transportation and Culture, Tobago House of Assembly.
Distance	The bilateral distance between Tobago and the capital cities of the countries of origin.	CEPII (Centre d'Etudes Prospectiveset d'Informations Internationales) website.
Language	A binary variable which is unity if the country of origin and Tobago share a common official language and zero otherwise.	CEPII (Centre d'Etudes Prospectiveset d'Informations Internationales) website.

APPENDIX III

Table AIII: Descriptive Statistics of Variables in the Model

Variable	Obs	Mean	Std.Dev.	Min	Max
LnTA	535	2.432	2.115	0	9.562
LnLagTA	534	2.436	2.115	0	9.562
LnGDPpc	483	9.619	1.227	6.082	11.879
LnDGDPpc	535	8.463	.116	8.326	8.622
RREER	384	1.141	.201	.122	1.862
RmRate	535	97.956	7.998	88.1	110.013
CRIME	535	6.073	2.268	4	10
DFT	535	.086	.281	0	1
lnDistance	505	8.612	1.072	5.083	9.834
Language	505	.382	.486	0	1

APPENDIX IV

Table AIV: Correlation Matrix of the Variables in the Model

Variables	*LnTA*	*LnLagTA*	*LnGDPpc*	*LnDestGDPpc*	*RREER*	*RmRate*	*CRIME*	*DFT*	*LnDistance*	*Language*
LnTA	1.000									
LnLagTA	0.752	1.000								
LnGDPpc	0.518	0.434	1.000							
LnDestGDPpc	-0.041	0.091	0.007	1.000						
RREER	-0.080	-0.015	0.005	0.573	1.000					
RmRate	-0.056	0.058	-0.006	0.960	0.669	1.000				
CRIME	0.004	-0.183	-0.023	-0.163	-0.093	-0.117	1.000			
DFT	0.524	0.418	0.109	0.017	-0.002	0.013	0.013	1.000		
LnDistance	0.027	0.007	0.132	-0.009	0.065	-0.007	-0.009	-0.362	1.000	
Language	-0.093	-0.065	-0.249	0.024	-0.052	0.021	0.022	0.245	-0.278	1.000

APPENDIX V

Figure AV.1: Scatter Plot of Tourist Arrivals and Lagged Tourist Arrivals
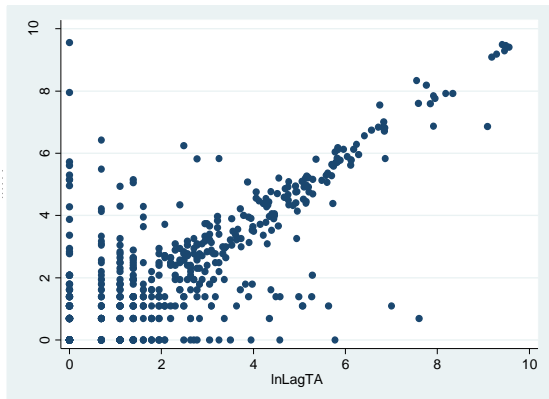

Figure AV.2: Scatter Plot of Tourist Arrivals and GDP per capita in Source Countries
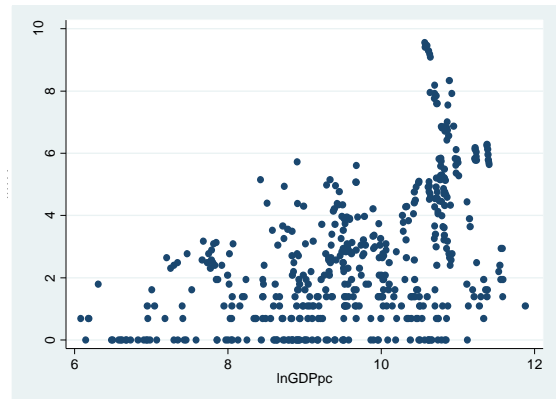

Figure AV.3: Scatter Plot of Tourist Arrivals and Relative Real Effective Exchange Rate between Tobago and the Source Countries
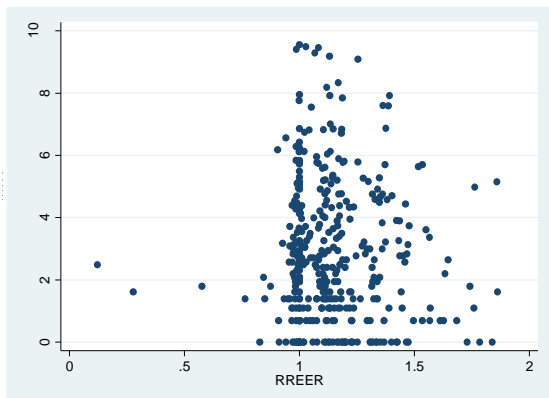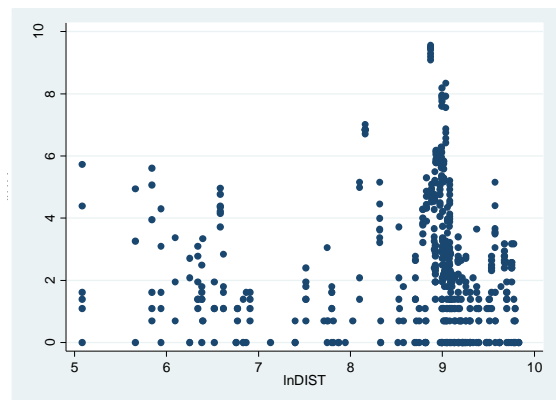

Figure AV.4: Scatter Plot of Tourist Arrivals and Distance between Tobago and the Source Countries

APPENDIX VI

Table AVI: Poisson Estimator with Regional Fixed Effects
Dependent Variable: LnTA

VARIABLES	BASELINE MODEL	FULL SAMPLE
LnLagTA	0.15	0.14
	(0.02)***	(0.02)***
LnGDPpc	0.22	0.18
	(0.04)***	(0.04)***
RREER	-0.17	-0.31
	(0.24)	(0.34)
RmRate	-0.02	-0.01
	(0.01)**	(0.01)**
CRIME	0.02	0.01
	(0.02)	(0.02)
DFT	0.40	0.40
	(0.11)***	(0.10)***
LnDistance	0.01	0.04
	(0.04)	(0.12)
Language	-0.14	0.01
	(0.06)**	(0.08)
Constant	0.06	-0.24
	(0.77)	(1.41)
Pseudo R^2	0.24	0.25
Observations	382	382

Robust Standard Errors in Parentheses
* $p<0.1$; ** $p<0.05$; *** $p<0.01$

APPENDIX VII

Table AVII: Alternative Estimation Technique using OLS – Full Sample, European Countries and Non-European Countries
Dependent Variable: LnTA

VARIABLES	BASELINE MODEL	FULL SAMPLE	EUROPEAN COUNTRIES	NON-EUROPEAN COUNTRIES
LnLagTA	0.15	0.55	0.62	0.29
	(0.02)***	(0.06)***	(0.08)***	(0.07)***
LnGDPpc	0.22	0.42	0.66	0.15
	(0.04)***	(0.08)***	(0.15)***	(0.08)*
RREER	-0.17	-0.44	0.20	-0.70
	(0.24)	(0.40)	(0.68)	(0.50)
RmRate	-0.02	-0.04	-0.08	-0.02
	(0.01)**	(0.02)***	(0.02)***	(0.02)
CRIME	0.02	0.02	0.13	-0.03
	(0.02)	(0.05)	(0.06)**	(0.07)
DFT	0.40	2.26	2.23	2.59
	(0.11)***	(0.35)***	(0.57)***	(0.41)***
LnDistance	0.01	0.22	0.91	0.19
	(0.04)	(0.08)***	(0.74)	(0.06)***
Language	-0.14	-0.26	-0.08	0.44
	(0.06)**	(0.14)*	(0.31)	(0.21)**
Constant	0.06	0.25	-6.11	1.15
	(0.77)	(2.01)	(7.63)	(2.75)
Pseudo / Adjusted R^2	0.24	0.70	0.83	0.53
Observations	382	382	202	180

Robust Standard Errors in Parentheses
* $p<0.1$; ** $p<0.05$; *** $p<0.01$

APPENDIX VIII

Table AVIII: Diagnostic Tests for IV Regression

	FULL SAMPLE	EUROPEAN COUNTRIES	NON-EUROPEAN COUNTRIES
Instrumented	DFT		
Instruments	TA_t, TA_{t-1}, TA_{t-2} and TA_{t-3}		
Endogeneity Tests 1. Robust score chi2(1)	4.70**	3.25**	19.19***
2. Robust regression (F Statistic)	12.82***	7.25***	22.37***
DFT is Endogenous	**Yes**	**Yes**	**Yes**
Relevance Test F-Statistic	15.30	21.77	15.90
Instruments are Relevant	**Yes**	**Yes**	**Yes**
Validity Test Score chi2(3)	5.63	3.86	3.62
Instruments are Valid	**Yes**	**Yes**	**Yes**

Endogenous Regressor: DFT

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