ANALYSIS OF TOURISM COMPETITIVENESS IN THE CARIBBEAN: A GRAVITY MODEL APPROACH

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ABSTRACT

This paper employs a dynamic tourism gravity model to assess the competitiveness of Caribbean destinations. Using data on 22 Caribbean countries between 1980 and 2002, the framework expresses annual tourist arrivals from major source markets as a function of various destination-specific, source market-specific and time-specific effects. The estimated model is then employed to assess relative tourism competitiveness in the region. The regression results suggest that while arrivals from the main source markets tend to be fairly persistent, the long-term trend in arrivals can be influenced by changes in capacity and the price of tourism in the destination relative to the source country and competing destinations, as well as fluctuations in exchange rates and airfares. These results confirm the findings of previous studies for the region, but what they bring to the fore that the previous studies have generally overlooked is the leading role of destination income — a key indicator of infrastructural development and other aspects of tourism competitiveness — in determining arrivals. Likewise, the tourism competitiveness assessment serves to fill a gap in the regional tourism literature and indicates that Caribbean destinations are generally more competitive than expected given market fundamentals.

***JEL Classification*:** L83; C23; O54

***Keywords*:** Tourism Competitiveness; Gravity Model; Caribbean

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1. Introduction

In recent years, three key international organizations — the World Tourism Organization (UNWTO), the World Travel and Tourism Council (WTTC) and the World Economic Forum (WEF) — have come together in an effort to understand and measure countries' travel and tourism (T&T) competitiveness, defined in WEF (2008) as "the factors and policies that make it attractive to develop the travel and tourism sector".

These organizations' interest in T&T competitiveness is explained by the critical economic importance of the sector to tourism destinations around the world. WEF (2008) indicates that, "*a growing national T&T sector contributes to employment, raises national income, and can improve the balance of payments. In this context, the sector is an important driver of growth and prosperity and, particularly within developing countries, it can also play a role in poverty reduction.*"

Globally, the WTTC estimates that the sector accounts, directly and indirectly, for 10.4 percent of GDP, 12.2 percent of exports, and 9.5 percent of investment [WTTC (2007)]. The emphasis on understanding and measuring competitiveness therefore stems from destinations' need to formulate strategies for developing the sector, as they all compete for a bigger share of this global market.

It is an especially critical issue for tourism-intensive countries such as those in the Caribbean, where the sector generates a significant share of total income and employment, as shown in Table 1. So much so that the WTTC ranks the region number one in the world in terms of the relative contribution of the sector to national economies [WTTC (2004)].

In effect, the T&T sector has been a key engine of growth in the region since the 1970s. Figure 1 shows that in 2002 total long-stay visitor arrivals to the region were estimated at just over 19 million persons, compared to approximately 4 million persons in 1970. This translates into an annual rate of growth of about 11 percent over the sample period.

Table 2 provides a breakdown of these arrivals by destination for the period 1990 to 2002. As WTTC (2004) indicates, "*the most significant trend in arrivals… has been the rise in popularity of the Hispanic Caribbean – Cuba, the Dominican Republic, the Mexican Caribbean and Puerto Rico.*" Outside of these, the Bahamas and Jamaica are the largest regional destinations with respect to long-stay arrivals: the Bahamas received about 1.5 million visitors per year during the review period, while Jamaica reported annual arrivals of about 1.3 million per year. In terms of growth, however, these two destinations had relatively sluggish rates of increase; smaller destinations such as St. Lucia (6.6 percent), the British Virgin Islands (6.4 percent), Grenada (6.1 percent) and Trinidad and Tobago (8.1 percent) had the highest annual rates of increase.

Table 3 shows the arrivals broken down by source market for 2005. The US is by far the largest source market for Caribbean tourism, accounting for more than half of long-stay arrivals, while Europe comprises almost a quarter. Together, Puerto Rico, the Dominican Republic and Jamaica represent nearly 60 percent of total arrivals from the US, whereas the Dominican Republic alone receives over 50 percent of European and Canadian arrivals.

In addition to the long-stay market, the region also benefits from sizeable inflows of cruise visitors. In recent years cruise arrivals have grown almost twice as fast as long-stay arrivals. While the number of cruise visitors to the region remains relatively small, Figure 2 illustrates the remarkable rate of increase in sea visitors relative to air visitors that has taken place over the review period: total cruise-passenger arrivals rose from just 3.8 million in 1980 to just over 16 million in 2002, or about 15 percent per annum. The cruise market has been boosted by the introduction of larger cruise ships which increased the affordability of cruises, the larger number of retired persons in the Organisation for Economic Cooperation and Development (OECD) countries (the major source markets), and the addition of many smaller islands to the cruise ship itineraries.

Despite reporting double-digit growth over the sample period, the region has only just kept pace with tourist arrivals in the rest of the world. The ratio of Caribbean tourist arrivals to total world arrivals has remained virtually unchanged over much of the period, fluctuating between 2.5 and 3.0 percent in the case of long-stay arrivals, which could point to some competitiveness

challenges. It is worth noting, however, that this is not a result of slow or negative growth in the Caribbean tourism industry, but rather of very high growth in world travel exports. Furthermore, the rapid increase in cruise arrivals in recent years may be a reflection of visitors substituting cruise travel for long-stay travel, which could be preventing the region from achieving higher rates of growth in overall arrivals.

As tourist arrivals to the Caribbean have expanded, so have earnings from the industry. Figure 3 suggests that spending by visitors has risen from just US$3.5 billion in 1980 to US$18.8 billion in 2002, an average annual increase of about 20 percent. With world inflation (taken from the International Monetary Fund's International Financial Statistics database) averaging around 14 percent over the 22-year period, real visitor expenditure growth would have averaged roughly 6 percent. In line with their size in terms of tourist arrivals, the majority of these flows went to two islands: the Bahamas and Jamaica. On average, tourism receipts to the Bahamas and Jamaica accounted for approximately 20 percent of total Caribbean receipts; the ratio, however, has fallen from 24 percent in 1990 to 17 percent in 2003. For the region on the whole, Figure 4 shows that average receipts per tourist (or expenditure per arrival) – often used as a rough indication of competitiveness – is above that of all other regional groupings.

Apart from gains/losses in world tourism market share or expenditure per arrival, tourism competitiveness can also be measured using competitiveness indices such as the Tourism Competitiveness Monitor produced by the WTTC between 2001 and 2004, which compared 213 travel destinations (including 16 Caribbean territories) based on indicators of price competitiveness, infrastructural development, environmental quality, technology, human resources, openness and social development. The World Economic Forum later adapted the Monitor for its Travel and Tourism Competitiveness Index (TTCI), which forms the basis for the Travel and Tourism Competitiveness Report published annually since 2005. The TTCI ranks 130 countries (including just 7 Caribbean countries) based on a number of indicators related to the travel and tourism industry, which are grouped into three main sub-indices: (1) Regulatory Framework, (2) Business Environment and Infrastructure and (3) Human, Cultural and Natural Resources.

Table 4 shows the WTTC indicators for Caribbean destinations covered in the 2004 Tourism Competitiveness Monitor, which are generally competitive (in the top 50% of destinations) in all categories except price competitiveness, environment and human resources. Table 5 provides a breakout of the rankings in individual categories for the few Caribbean destinations on the WEF's 2008 TTCI. By this measure, more of a mixed picture emerges of Caribbean territories' competitiveness. Interestingly enough, most of the Caribbean territories perform well in the price competitiveness category under the WEF's methodology, unlike the WTTC's monitor. However, in this regard, it should be noted that many Caribbean countries (though not all) are Small Island Developing States (SIDS) and therefore face size and other constraints that, for the most part, rule out price-based competition as a viable strategy for tourism development.

Figure 5 highlights the competitive positioning of the individual Caribbean destinations. In general, Barbados (29th), Puerto Rico (46th), Jamaica (57th) and the Dominican Republic (63rd) appear to be relatively competitive, i.e. in the top half of the rankings on the TTCI, while Guyana (109th), Suriname (95th) and Trinidad & Tobago (74th) rank in the bottom half.

Figure 6, which plots the performances of 125 (out of 130) countries on the TTCI against their income levels, indicates a significant degree of correlation between the two. This provides some evidence to corroborate the intuitive notion that many of the factors identified as influencing tourism competitiveness should bear some relationship to income. For example, a country with higher per capita income is expected to have a better regulatory framework and business environment, as well as more developed infrastructure.

Furthermore, the trend line in Figure 6 provides a rough indication of the extent to which countries are meeting their potential. Barbados, Jamaica and the Dominican Republic are all above the line – indicating better-than-expected performances given their respective income levels – while Guyana, Suriname and Trinidad & Tobago appear to be performing somewhat below-par, but still broadly in line with their income levels.

Unfortunately, the extremely limited coverage of Caribbean destinations in the TTCI and the mixed results for the few destinations covered provide very little basis for making inferences

about the region's competitiveness. Given the importance of understanding and measuring tourism competitiveness for formulating tourism development strategies, this study will attempt to fill the gap in the research by identifying and employing an alternative methodology (a dynamic tourism gravity model) to assess the competitiveness of a broader sample of 22 Caribbean destinations.

2. Literature Review

Early approaches to assessing tourism competitiveness usually employed tourism demand models. The importance of competitiveness was assessed by including either the real effective exchange rate or a price relative (either compared to the source market or to a close competitor). Using a multilevel constant elasticity of substitution (CES) model, Rosenzwig (1988) analyses the elasticities of tourism substitution for four Caribbean destinations – Jamaica, Bahamas, the Netherland Antilles and Puerto Rico – and finds a highly significant cross-price elasticity of substitution of 1.33 for tourism in these markets for US tourists. Furthermore, when total foreign tourism receipts were included in the analysis, the intra-regional elasticity of substitution rose to 2.45. Rosenzeig therefore concludes that relative prices, as opposed to source market income, seem to be the main influence in the shifting market shares in tourism within the Caribbean.

Some authors, however, argue that the income of tourists in the destination's main source market, rather than relative prices is the main determinant of arrivals to the Caribbean. Worrell et al. (1997), for example, using a Seemingly Unrelated Regression (SUR) approach, find greater explanatory power in incomes. In the absence of a comprehensive tourism price index, Worrell approximates visitor costs by dividing tourism receipts by the number of bed nights, the latter defined as the product of arrivals and the average length of stay. Worrell's results emphasise the role of income in determining demand for tourism, as the coefficients of income elasticities for tourism demand for Barbados from all of the markets under examination (UK, the US, Europe

[1] Antigua and Barbuda, The Bahamas, Barbados, Belize, Cuba, Dominica, Dominican Republic, Guyana, Grenada, Jamaica, Puerto Rico, St. Kitts and Nevis, St. Lucia, St. Vincent, Suriname, Trinidad and Tobago.
[2] Barbados, Dominican Republic, Guyana, Jamaica, Puerto Rico, Suriname, Trinidad & Tobago

and Canada) were high, ranging from 2.6 to 4.6. Tourism prices in Barbados as well as relative prices both had significant, albeit less considerable, impacts. Similar results are obtained by Clarke et al (1986), Carey (1991) and Metzgen-Quemarez (1990) for Caribbean destinations in general.

These studies of tourism demand have been based loosely on traditional consumer choice theory, which assumes that demand is a function of the price of the good, prices of its complements and substitutes and the income of the consumer. However, the application of a contemporary Gravity Model (GM) framework to the analysis of trade flows provides a precise theoretical framework for the specific study of tourism demand. Anderson (1979) notes that the GM has been applied to the analysis of a wide variety of trade issues relating to goods and factors moving across territorial borders and usually produces a good fit.

In its most basic form the gravity equation upon which the GM is based is an economic variant of the Newtonian gravity equation and assumes that attraction between two countries depends directly on their economic sizes and inversely on the distance between them (Gil-Pareja, 2006). Gil Pareja (2007) suggests that tourism demand is dynamic and visitors' demand is not solely predicated on the quality of cultural and natural goods but requires complementary infrastructural services. Since these capital and infrastructural systems are assumed to accompany economic growth and development, the gravity model assumes that countries with higher GDP figures will exert a greater "pull" on visitors. Thus, the GM framework represents a departure from the predominant approach taken in the existing literature by examining income in the destination as a determinant of tourism demand. Further, the model subsumes the conclusion of previous research that points to a positive correlation between income in the source market and demand for tourism in the destination. The theoretical foundation of the GM has been modified and used to analyse a host of economic phenomena. In his GM study of the effect of the European Monetary Union (EMU) on tourism, Gil Pareja concludes that population size and income in the source market are the primary drivers of tourism demand. The coefficient on real GDP in the destination was positive and statistically significant at the 10% level. Using the relative purchasing power parity (RPPP) as a proxy for tourism costs that takes account of

variations in the exchange rates between source and destination, Gil Pareja also finds that an increase in the relative prices in the destination of 1% decreases tourism demand by 0.36%.

Khadaroo and Seetanah (2006) also employ the GM to study tourism flows among 28 countries, treated as both origin and destination. In their analysis, they include in the explanatory variables the baseline gravity model variables as well as other determinants of tourism flows, specifically tourism infrastructure. They find that income, prices and various forms of infrastructure are significant determinants of tourism demand. Durbarry (2008), also using the gravity model approach, determines that tourism demand in the UK is price sensitive, such that increases in real prices (through increases in CPI) as well as relative prices (through exchange rate changes and prices in other destinations) are significant. Durbarry's results also suggest that the impact of income in the destination is significant, although the variables do not have the expected sign. Durbarry's model is of particular relevance since it allows us to determine not only price elasticities, but also allows the determination of cross elasticities between competing countries.

3. Methodology and Data

Most destinations attempt to differentiate themselves from their competitors. A gravity equation provides an ideal framework to model the demand for tourism services which are likely to be differentiated. Using the framework outlined by Feenstra et al (2001), let t_{ik} denote the value of country i's tourism receipts obtained from service k. Letting y_i denote income in country i and y_w world income, each country will demand a share (y_i / y_w) of tourism services. The tourism receipts obtained from service k from country i to j would be $t_{ik}(y_j / y_w)$. Summing over all types of services k provided to visitors, total tourism services from country i to j can be written as $T_{ij} = y_i y_j / y_w$. The demand for tourism services can therefore be written in log-linear form as:

$$\ln T_{ij} = -\ln y_w + \ln y_i + \ln y_j \qquad (1)$$

The simple gravity equation above therefore suggests that the demand for tourism services should be related to both y_i, which can be thought of as destination trip attraction capacity, and y_j, origin trip generation capacity.

The model specification in Equation (1) assumes zero transportation costs and complete specialisation in tourism services. These assumptions are somewhat restrictive and therefore in more recent specifications gravity models, when applied to modelling tourism services, often augment the model with other independent variables that capture these transportation costs, as well as the characteristics of the origin and destination countries. The gravity equation employed in the paper is therefore of the following form:

$$\ln T_{ijt} = \alpha_i + \gamma_j + \lambda_t + \beta_1 X_{ijt} + \beta_2 X_{it}^{*} + \beta_3 X_{jt}^{**} + u_{ijt} \quad (2)$$

where i and j are as defined previously (index of home and source country), t is a time index, α_i, γ_j *and* λ_t are local country-, source country- and time-specific effects, X are explanatory variables that can vary over all three dimensions or just two and u_{ijt} is an error term which is assumed to have normal properties.

Following Durbarry (2000) and Khandaroo and Seetanah (2007), in addition to home and source country income, the explanatory variables included in the regression model were the distance between the home and destination countries, prices at home, relative prices, the bilateral exchange rate of the home and destination country and population size.

Incomes in the home and source country are both expected to be positively associated with tourism demand, as greater capacity at home and greater capacity generation in the source country should be positively associated with total tourist arrivals to the region. Distance is usually employed in gravity models as a proxy for transportation cost, or in the context of this study the cost of air travel. As a result, it should therefore be inversely related to the number of travellers to a particular jurisdiction. Two relative price variables are employed in the model specification: (1) the price of tourism in the destination relative to the source market and (2) the price in the destination relative to other competing jurisdictions. Both prices should be inversely related to both price variables, as higher prices in the destination relative to those in the source

market, as well as in competing destinations, are likely to influence the visitor's decision or whether or not to travel and/or where to travel. A depreciation in the bilateral exchange rate means that it is now cheaper to visit the destination; as a result it is likely to be positively associated with tourism demand. Assuming that travellers are more likely to visit countries with which they have some common cultural link and one that is not overcrowded, it is anticipated that the final variable, population, will be significantly related to the number of tourist arrivals.

A dynamic panel data model is estimated that takes into account the possibility of short-run disequilibrium in a particular year. Tourist arrivals are likely to be persistent since, unless there is a major shock that influences visitor perceptions of the destination (Naudee and Saayman, 2005), if visitors to a destination are reasonably satisfied with their experience, they are likely to return due to reduced uncertainty regarding satisfaction. The model is estimated using the generalised method of moments (GMM) estimator suggested by Arellano and Bond (1991). The estimator attempts to explicitly account for the correlation between the lagged regressor and the error term. The dynamic panel GMM estimator estimates the model in first differences in order to eliminate the country-specific effects.

The database employed in this study contains cross-sectional time-series data on 22 countries from 1980 to 2002 from the World Tourism Organisation (UNWTO)'s Yearbook of Tourism Statistics, the International Monetary Fund's International Financial Statistics (IFS) database, online edition, and the World Bank's World Development Indicators (WDI). The dependent variable employed in this study is annual tourist arrivals from the US, Canada, Europe and the Caribbean. Income (proxied by real per capita income in US dollars) in the home and source markets, prices (proxied by the GDP deflator)[3] and population are obtained from the WDI database. Distance is calculated using the great circle formula:

$$D_{ij} = 3962.6 \arccos[\sin(latitude_i).\sin(latitude_j)] + [\cos(latitude_i).\cos(latitude_j).\cos(longitude_i - longitude_j)] \quad (2)$$

[3] It would have been preferable to employ an index of tourism prices. However, this information was unavailable for the period under consideration.

where longitude and latitude are expressed in radians (obtained by multiplying the location in degrees by 57.3 and -57.3 respectively) and where j stands for region. The common criticism of this measure is that it underestimates the true distance between countries since most flights avoid the north and south poles. However, this error should be fairly small since the paper focuses on one region. To better reflect transportation costs, the distance variable is interacted with the average crude oil price obtained from the IFS. Annual observations of the average bilateral exchange rate were taken from the IFS.

Following the regression calculation, the generated coefficients were used to produce arrival estimates for the period under investigation. To generate two distinct estimation models, the coefficients generated with the GMM methodology were substituted for those generated with the fixed effects (FE) specification. Due to gaps in the available data, estimates were not feasible for St. Maarten, U.S. Virgin Islands, Curacao or Martinique.

4. Results

4.1. Gravity Equation

The data on Caribbean tourist arrivals from the region's four main source markets (the US, Canada, Europe and the Caribbean) are employed to estimate Equation (2) and the results are provided in Table 7. The results from both the FE and the GMM approaches are provided for comparative purposes. In general, the model is able to explain over 90 percent of the annual variation in Caribbean arrivals from the four key source markets.

The results from both models suggest that arrivals to the region are persistent. However, the coefficient on the lagged arrivals variable was significantly larger when the gravity model was estimated using the FE approach compared to the GMM approach. One can calculate the half-life $H(p)$[4] for each approach – a commonly employed measure of the speed at which a unit

[4] The half-life is calculated as $H(\rho) = \frac{\ln(0.5)}{\ln(\rho)}$.

shock to arrivals would dissipate – to show the implication of these estimates. The coefficient estimates on the lagged dependent variable obtained from the FE approach suggest that it takes 3.4 years for a shock to Caribbean arrivals to dissipate. In contrast, the estimates obtained from the GMM estimation approach suggest a significantly faster speed of adjustment: just 1.3 years. The significantly larger half-life obtained for the fixed-effects model is likely due to the failure of the approach to explicitly account for the endogeneity of the lagged endogenous variable. The significance of the lagged dependent variable in both models, nevertheless, suggests a strong level of repeat visitors to the region. Furthermore, this result may be indicative of a *bandwagon effect*, where travellers are induced to visit the Caribbean based on a perception that the region was an attractive one for tourists in the previous period.

The estimated GMM model indicated that the coefficients on both market and destination incomes, proxies for destination trip attraction capacity and origin trip generation capacity respectively, were highly significant and both also had the expected positive signs. Specifically, the results indicate a positive income elasticity of demand for regional tourism in the four source markets of 0.097, while that for the destination income variable was 0.173. These findings suggest that destination attraction capacity seems to play a larger role in attracting visitors to the region relative to trip generation capacity and implies that as territories in the region experience economic growth, the accompanying increase in tourism competitiveness — through infrastructural development, for example — creates a greater incentive for tourists to travel to the Caribbean.

Regarding the price variables, as discussed in the previous section, CPI data were used to impute relative prices. While some research has suggested that a domestic CPI measure may not assign enough weight to goods that are more relevant to tourists, the authors elected to use this measure for two reasons. The first is that CPI data are available across all the territories, making comparison among the countries more efficient. Secondly, in the absence of a tourism index due to data unavailability, and recognising that the largest cost facing visitors – travel – is accounted for by our airfare variable, the CPI may be one of the most meaningful proxies available to compare the countries under investigation since it still captures many of the items associated with visitor spending. Furthermore, domestic prices should be highly correlated in the same

direction with tourism prices. With this in mind, the coefficient estimates on the two relative price variables suggest that these costs have the expected inverse relationship with arrivals. Specifically, a 1 percent rise in destination prices relative to the source market reduces arrivals by about 0.1 percent, while a 1 percent rise in destination prices relative to competing destinations lowers arrivals by approximately 0.2 percent. The relatively larger coefficient for the destination-competitor relative price points to a statistically significant level of destination substitution among Caribbean territories. The coefficient was markedly lower than that estimated in other studies, but this may be due in part to the significantly larger data set used (the current GM study examined 22 regional destinations as compared to, say, four in Rosensweig's CES model), suggesting that there may be larger substitution among the major tourism destinations, but significantly less at the region-wide level.

Exchange rate fluctuations and airfares were also significant determinants of fluctuations in tourist arrivals to the region. The GMM model estimates that for every 10-percentage-point depreciation in the bilateral exchange rate, arrivals contract by about 1.2 percent, while a similar jump in airfares would only reduce arrivals by 0.4 percent. The relatively small coefficient on the airfare variable could suggest that visitors to the Caribbean are more sensitive to relative price changes and exchange rates, when compared to fluctuations in airfares. The population variable was statistically insignificant in both specifications.

4.2. Assessment of Tourism Competitiveness

The coefficient estimates obtained for the gravity model were then employed to estimate equilibrium tourist arrivals to the Caribbean over the sample period. Next, this equilibrium estimate was compared to actual tourist arrivals to provide an assessment of whether or not a particular destination is either over- or under-performing relative to the rest of the region. At the aggregated regional level, both the FE and GMM models suggest that the performance of Caribbean visitor arrivals exceeded potential between 1980 and 2002. Figure 1, which plots the ratios of observed arrivals to the GMM and FE estimates over the 23-year period, illustrates that the ratios are consistently above one, indicating that arrivals were more than 100% of those estimated by the regression. Further, the ratios calculated for the GMM were significantly and

consistently higher than those from the FE specification, with the average ratio of observed arrivals to those predicted by the GMM model being 2.59, 1.36 above the average for the FE model. Against the background that the GMM explicitly accounts for the endogeneity created by the lagged arrivals variable, these observed differences between the estimates of the two models may be indicative of significant country-specific impacts and a concomitant overstatement of potential arrivals under the FE framework.

An analysis of the regional arrivals from the four source markets under investigation also provides some insight into the performance of the sector relative to the potential estimated by the two models. In line with the foregoing analysis of the GMM and FE model specifications, the FE model was a closer fit to the original data and the ratios of observed to estimated arrivals were consistently smaller (closer to unity) than those suggested by the more conservative GMM. According to the GMM estimation, with an average ratio of total observed arrivals to estimated arrivals of 3.1, the performance of the US market between 1980 and 2002 exceeded potential far more than any of the other markets under investigation.

The European market was the next closest in terms of exceeding arrival potential, with observed arrivals averaging 2.54 of estimated. Performance in the Caribbean and Canadian markets were both also stronger than estimated, albeit less so than the US and European visitors, with the ratios of observed to estimated arrivals averaging 1.8 and 1.4 respectively. However, in a comparison among the source markets under the FE model, the results were somewhat different, with Europe recording the highest mean ratio, followed by the Caribbean, the US and Canada.

In country-level analysis, the relative conservativeness of the GMM estimations over the FE model persisted and in general, the ratio of observed to estimated arrivals was higher for GMM estimates. A graphical analysis of the ratio of observed to GMM estimated arrivals suggests that of the 18 countries for which estimates were produced, 14 of these ratios were consistently and significantly above one, suggesting that these countries – Antigua, Aruba, Barbados, Bermuda, the British Virgin Islands, Jamaica, St. Lucia, Trinidad and Tobago, Grenada, the Dominican Republic, Haiti, the Bahamas and, to a lesser extent, the Cayman Islands and Suriname – had performed well above the potential prescribed by the GMM. The average ratios — a general

measure of performance *vis-à-vis* potential — were highest in the Dominican Republic (4.245), the Bahamas (3.333), Jamaica (3.209), Haiti (2.006) and Barbados (1.825).

The GMM estimates for Dominica and St. Vincent were relatively closer to the observed data, with an average ratio of observed arrivals to GMM estimates of 1.03 and 0.903 respectively, implying that these two territories were generally performing in line with potential. In St. Kitts and Montserrat, the GMM observed to estimated arrival ratios were generally below one, implying that visitor arrivals in these countries had generally performed below potential.

Meanwhile, the ratios of observed to FE estimated arrivals were generally closer to one than those generated by the GMM framework. Arrival ratios based on FE estimates for Antigua, Aruba, Barbados, Bermuda, the British Virgin Islands, Jamaica, St. Lucia, Trinidad and Tobago, Grenada, the Dominican Republic, Haiti, the Bahamas, the Cayman Islands, Suriname and the British Virgin Islands, were generally close to one, with country averages ranging between 0.916 and 1.104. In St. Kitts and Montserrat, the arrivals ratios generated by the FE model were in stark contrast to those predicted by the GMM, the former suggesting that these countries were performing above potential.

5. Conclusions

The tourism industry is one of the most important components of most economies in the Caribbean. In some destinations, tourist-generated activity accounts for more than 40 percent of national economic output. It is therefore imperative that the industry in the region remain competitive to ensure its long-term viability. However, the competitiveness indicators derived by the WEF give mixed results for the few Caribbean destinations covered, providing a very limited basis for making inferences about the region's competitiveness. Given the importance of understanding and measuring tourism competitiveness for formulating tourism development strategies, this study attempts to fill the gap in Caribbean competitiveness research.

The paper estimates a gravity model of tourism arrivals from the US, Canada, Europe and other Caribbean countries using annual data covering the period 1980 to 2002 for 22 Caribbean countries. The gravity model specification was chosen since it is an ideal framework to model the demand for goods or services that are likely to be differentiated. The gravity model was estimated using the dynamic panel GMM estimator.

The results suggest that the main determinants of arrivals to the region were the destination trip attraction capacity (destination income), origin trip generation capacity (source market income), relative destination-source market prices, relative destination-competitor prices, exchange rate fluctuations and airfares. The estimated gravity model was then employed to obtain equilibrium estimates of tourist arrivals to the Caribbean over the review period. The results of this analysis suggest that most countries were generally more competitive than expected based on market fundamentals.

These results confirm the findings of previous studies that source market income and, to a lesser extent, relative prices are significant determinants of arrivals to the region. What the results bring to the fore that previous studies for the region have generally overlooked is the leading role of destination income — a key indicator of infrastructural development and other aspects of tourism competitiveness — in determining arrivals. Going forward, if the regional tourism industry is to maintain or improve on its current level of competitiveness, policymakers must focus their competitive strategies on developing their destinations' regulatory frameworks, business environments and infrastructure, as well as their human, cultural and natural resources in relation to the travel and tourism industry.

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Table 1: Contribution of Tourism to Caribbean Economies

	% of GDP	% of Jobs
Antigua	84.1	94.5
Aruba	71.2	83.7
The Bahamas	52.6	65.9
Barbados	42.5	48.0
Bermuda	14.9	17.6
British Virgin Islands	37.1	50.2
Cayman Islands	27.5	33.2
Dominica	26.3	24.1
Dominican Republic	17.5	15.2
Guyana		
Grenada	33.3	30.9
Haiti	7.2	5.7
Jamaica	32.6	28.8
Martinique	9.5	9.9
Netherlands Antilles	21.5	28.5
Puerto Rico	5.8	6.0
St. Kitts and Nevis	38.0	39.3
St. Lucia	41.1	41.1
St. Vincent	33.3	29.9
Suriname	9.3	8.6
Trinidad and Tobago	15.4	18.3
US Virgin Islands	41.0	50.0
Caribbean	15.1	13.1

Source: World Travel and Tourism Council, Tourism Satellite Accounts

Table 2: Tourist Arrivals by Destination

Country	Tourist Arrivals (000)				Average Annual Growth (%)	Market Share (%)			
	1990	1995	2000	2002	1990-2002	1990	1995	2000	2002
Caribbean	11360	14024	17085	15513	3.0				
Anguilla	31	39	44	44	3.5	0.3	0.3	0.3	0.3
Antigua and Barbuda	206	220	207	198	-0.3	1.8	1.6	1.2	1.3
Aruba	433	619	721	643	4.0	3.8	4.4	4.2	4.1
Bahamas	1562	1598	1544	1513	-0.3	13.8	11.4	9.0	9.8
Barbados	432	442	545	498	1.3	3.8	3.2	3.2	3.2
Bermuda	435	387	332	284	-2.9	3.8	2.8	1.9	1.8
Bonaire	37	59	51	52	3.4	0.3	0.4	0.3	0.3
British Virgin Islands	160	219	272	282	6.4	1.4	1.6	1.6	1.8
Cayman Islands	253	361	354	303	1.6	2.2	2.6	2.1	2.0
Cuba	327	742	1741	1656	33.9	2.9	5.3	10.2	10.7
Curacao	219	224	191	218	0.0	1.9	1.6	1.1	1.4
Dominica	45	60	70	69	4.4	0.4	0.4	0.4	0.4
Dominican Republic	1305	1776	2978	2811	9.6	11.5	12.7	17.4	18.1
Grenada	76	108	129	132	6.1	0.7	0.8	0.8	0.9
Guadeloupe	331	640	603		-8.3	2.9	4.6	3.5	0.0
Haiti	144	145	140	140	-0.2	1.3	1.0	0.8	0.9
Jamaica	989	1147	1323	1266	2.3	8.7	8.2	7.7	8.2
Martinique	282	457	526	447	4.9	2.5	3.3	3.1	2.9
Montserrat	13	19	10	10	-1.9	0.1	0.1	0.1	0.1
Puerto Rico	2560	3131	3341	3087	1.7	22.5	22.3	19.6	19.9
Saba		10	9	11	1.4	0.0	0.1	0.1	0.1
St. Lucia	141	231	270	253	6.6	1.2	1.6	1.6	1.6
St. Eustatius		9	9	10	1.6	0.0	0.1	0.1	0.1
St. Kitts-Nevis	73	79	73	68	-0.6	0.6	0.6	0.4	0.4
St. Maarten	545	449	432	381	-2.5	4.8	3.2	2.5	2.5
St. Vincent and the Grenadines	54	60	73	78	3.7	0.5	0.4	0.4	0.5
Trinidad and Tobago	195	260	399	384	8.1	1.7	1.9	2.3	2.5
Turks and Caicos	49	79	152	155	18.0	0.4	0.6	0.9	1.0
US Virgin Islands	463	454	546	520	1.0	4.1	3.2	3.2	3.4

Source: World Tourism Organization (UNWTO)

Table 3: Caribbean Long-Stay Arrivals by Major Source Market - 2005

Destination	United States		Canada		Europe		Other	
	Tourists	% ch.	Tourists	% ch.	Tourists	% ch.	Tourists	% ch.
Anguilla	41,733	16.7	1,792	15.7	8,113	0.9	10,446	20.8
Antigua & Barbuda	68,527	-2.8	10,326	9.2	108,268	-4.6	58,263	11.5
Aruba	532,352	0.2	21,350	3.8	63,181	4.6	115,631	-0.2
Barbados	131,005	1	47,690	-4.7	229,617	-5.9	139,222	8.9
Belize	145,977	6.3	13,579	13.9	33,462	2.1	43,555	-10.7
Bermuda	203,998	-2.4	28,666	8.2	26,678	3.1	10,234	0.3
Bonaire	25,363	-4.7	1,157	-1.5	30,066	7.5	5,964	-19.2
Cayman Islands	118,843	-42.1	10,480	-13.5	12,716	-16.8	25,762	-5.7
Curacao	45,542	5.7	5,223	27.4	94,919	5.8	76,386	-11.7
Dominica	18,492	5.2	1,977	14.7	10,258	0.5	48,530	-4.1
Dominican Republic	1,010,012	8.5	427,074	-4.8	1,395,429	8.4	858,177	10.5
Grenada	25,139	-16.6	4,331	-18.4	22,247	-38.5	46,527	-25.3
Guyana	60,071	-7.5	15,876	-0.2	8,704	-3.9	31,945	-0.4
Jamaica	1,058,317	6.2	116,862	10.6	233,879	-3.3	69,605	-2.1
Montserrat	2,034	-2.4	404	21	3,196	0	4,056	-10.3
Puerto Rico	1,282,369	4.2	18,708	-10.4	39,337	6.4	124,878	1.1
Saba	4,288	2.8	645	9	5,484	8.7	1,045	-13.3
St. Eustatius	2,309	-14.1	194	-8.1	5,400	29.4	2,452	-38.5
St. Lucia	112,557	5.1	16,506	7.8	100,085	2.2	88,791	13.7
St. Maarten	246,858	-1.7	34,506	9	93,821	-2.7	92,676	-3.3
St. Vincent & Grenadines	27,153	8.2	6,187	18.5	19,928	6.8	42,237	11.9
Suriname	4,673	4.7	-	-	99,590	14.6	55,589	19.7
Trinidad & Tobago	166,848	4.6	47,588	9.2	91,163	1.8	154,596	3.1
U S Virgin Islands	524,031	0.5	5,365	2.4	18,723	18.4	61,453	-0.3

Source: Caribbean Tourism Organization (CTO)

Table 4: Tourism Receipts by Destination

Country	Tourism Receipts (US$ Mil)				Average Annual Growth (%)	Market Share (%)			
	1990	1995	2000	2003	1990-2002	1990	1995	2000	2003
Caribbean	8721	12236	17145	17966	8.8				
Anguilla	35	50	56	60	6.0	0.4	0.4	0.3	0.3
Antigua and Barbuda	298	247	291	300	0.1	3.4	2.0	1.7	1.7
Aruba	350	521	814	861	12.2	4.0	4.3	4.7	4.8
Bahamas	1333	1346	1734	1757	2.7	15.3	11.0	10.1	9.8
Barbados	494	622	723	758	4.5	5.7	5.1	4.2	4.2
Bermuda	490	488	431	348	-2.4	5.6	4.0	2.5	1.9
Bonaire	18	37	59	84	30.6	0.2	0.3	0.3	0.5
British Virgin Islands	132	211	345	425	18.5	1.5	1.7	2.0	2.4
Cayman Islands	236	394	559	518	10.0	2.7	3.2	3.3	2.9
Cuba	243	963	1737	1846	55.0	2.8	7.9	10.1	10.3
Curacao	120	175	189	223	7.2	1.4	1.4	1.1	1.2
Dominica	25	42	48	54	9.7	0.3	0.3	0.3	0.3
Dominican Republic	900	1571	2860	3128	20.6	10.3	12.8	16.7	17.4
Grenada	38	76	93	104	14.5	0.4	0.6	0.5	0.6
Guadeloupe	197	458	418		-8.3	2.3	3.7	2.4	0.0
Haiti	46	90	128	93	8.5	0.5	0.7	0.7	0.5
Jamaica	740	1069	1333	1355	6.9	8.5	8.7	7.8	7.5
Martinique	240	384	302	247	0.2	2.8	3.1	1.8	1.4
Montserrat	7	17	9	7	0.0	0.1	0.1	0.1	0.0
Puerto Rico	1366	1828	2388	2677	8.0	15.7	14.9	13.9	14.9
St. Lucia	154	230	279	282	6.9	1.8	1.9	1.6	1.6
St. Kitts-Nevis	58	63	58	75	2.4	0.7	0.5	0.3	0.4
St. Maarten	316	349	511	538	5.9	3.6	2.9	3.0	3.0
St. Vincent and the Grenadines	56	53	75	91	5.2	0.6	0.4	0.4	0.5
Trinidad and Tobago	95	77	213	249	13.5	1.1	0.6	1.2	1.4
Turks and Caicos	37	53	285		-8.3	0.4	0.4	1.7	0.0
US Virgin Islands	697	822	1206	1257	6.7	8.0	6.7	7.0	7.0

Source: World Tourism Organization (UNWTO)

Table 5: Competitiveness Scores of Selected Caribbean Travel Destinations

	Price Competitiveness	Infra-structure	Environ-ment	Tech-nology	Human Resources	Open-ness	Social Development
Antigua & Barbuda	6	..	57	90	44	86	69
The Bahamas	..	69	51	77	63	72	58
Barbados	27	87	43	79	85	73	67
Belize	..	41	36	51	35	68	60
Cuba	..	63	41	57	72	..	59
Dominica	37	..	40	67	37	47	64
Dominican Republic	58	54	42	42	49	63	42
Guyana	..	81	48	62	55	48	69
Grenada	..	65	55	55	66	67	37
Jamaica	18	63	19	72	51	79	64
Puerto Rico	..	..	88	85	..	47	..
St. Kitts & Nevis	5	73	66	70	96	70	69
St. Lucia	12	..	65	60	63	59	74
St. Vincent	..	79	47	54	39	67	64
Suriname	..	64	10	58	60	21	56
Trinidad & Tobago	19	69	16	66	60	52	67

Source: World Travel and Tourism Council (WTTC), Tourism Competitiveness Monitor 2004
Note: Index Value 1 = Least Competitive; Index Value 100 = Most Competitive

Table 6: Competitiveness Rankings of Selected Caribbean Travel Destinations

	Barbados	Dominican Republic	Guyana	Jamaica	Puerto Rico	Suriname	Trinidad & Tobago
OVERALL INDEX	29	63	109	57	46	95	74
1. Policy rules and regulations	29	47	120	13	15	129	46
2. Environmental sustainability	26	108	76	99	14	106	129
3. Safety and security	27	89	112	102	55	68	107
4. Health and hygiene	31	65	92	82	60	72	61
5. Prioritization of Travel & Tourism	13	14	66	2	52	125	92
6. Air Transport Infrastructure	30	46	110	53	11	93	58
7. Ground Transport Infrastructure	21	80	108	38	29	117	44
8. Tourism Infrastructure	40	45	127	55	54	65	69
9. ICT Infrastructure	29	75	80	45	50	79	49
10. Price Competitiveness	48	76	36	85	93	63	24
11. Human Resources	38	86	77	69	81	101	75
12. Affinity for Travel and Tourism	2	15	47	4	10	106	113
13. Natural Resources	117	50	65	99	109	41	111
14. Cultural Resources	46	102	110	100	96	50	73

Source: World Economic Forum (WEF), Travel and Tourism Competitiveness Report 2008
Note: Ranking out of 130

Table 7: Regression Results

	FE	GMM
Explanatory Variables	LOG(ARRIVALS +1)	LOG(ARRIVALS +1)
	0.815	0.5938
LOG(ARRIVALS(-1)+1)	(0.032)***	(0.004)***
	0.0699	0.1731
LOG(YIT)	(0.029)**	(0.010)***
	0.0412	0.0975
LOG(YJT)	-0.047	(0.008)***
	-0.123	-0.1159
LOG(PI/PJ)	(0.037)***	(0.014)***
	-0.0091	-0.1637
LOG(PI/PK)	-0.043	(0.013)***
	0.0209	-0.0608
LOG(POPI+1)	-0.049	-0.068
	0.0511	0.1212
LOG(XIJ+1)	(0.026)**	(0.015)***
	-0.0675	-0.0401
LOG(AIRFARES)	(0.023)***	(0.004)***
R-squared	0.981	0.971
S.E. of regression	0.203	0.259
Total panel (unbalanced) observations	1502	1430

*,**,*** = Significant at 10%, 5% and 1%

Figure 1: World and Caribbean Tourist Arrivals

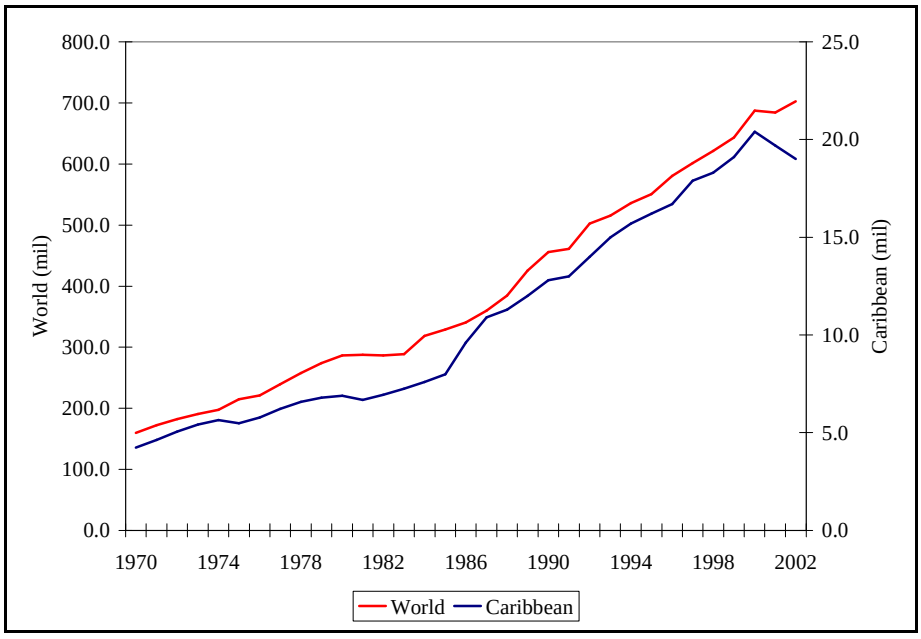


Figure 2: Long-Stay and Cruise Arrivals to the Caribbean

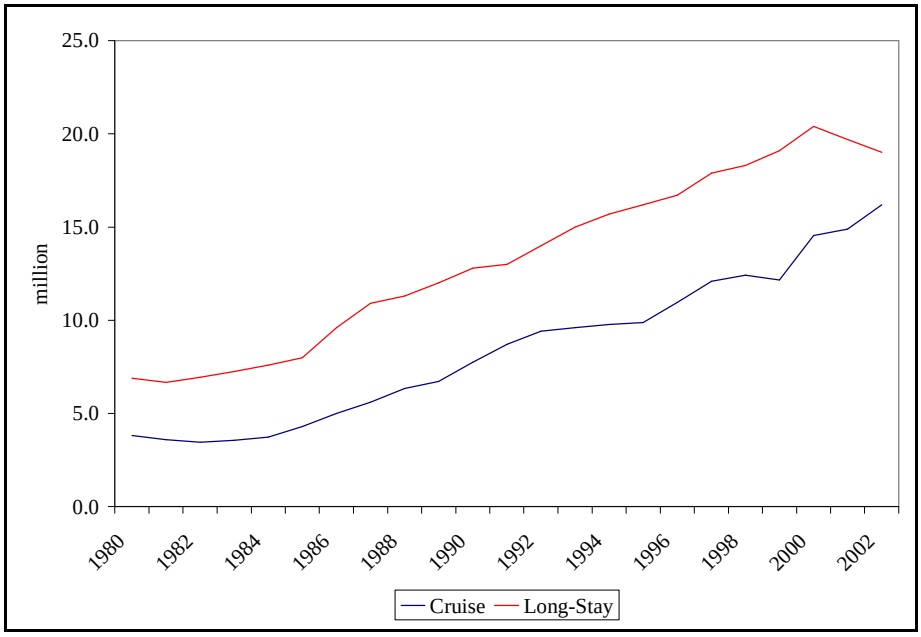


Figure 3: Visitor Expenditure in the Caribbean

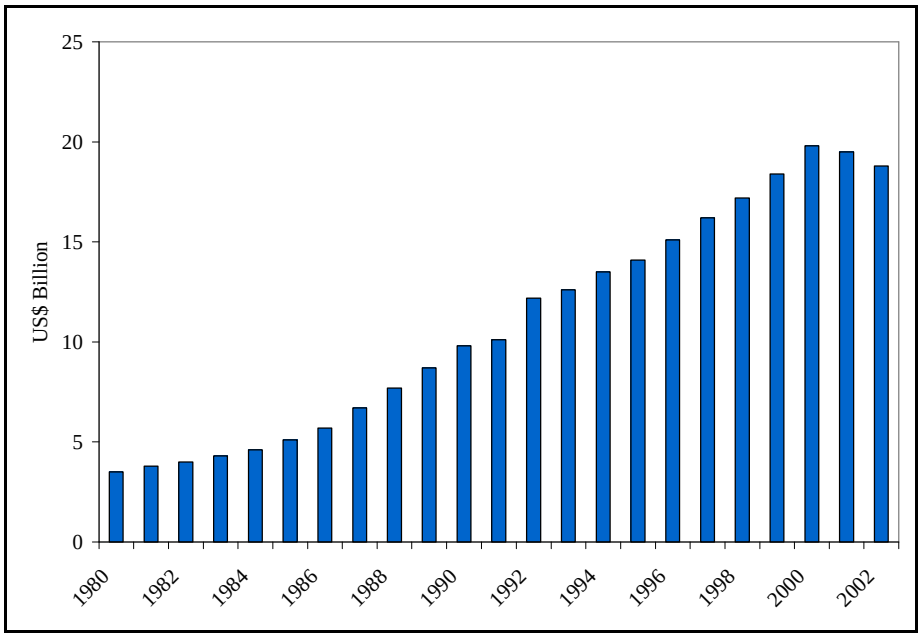
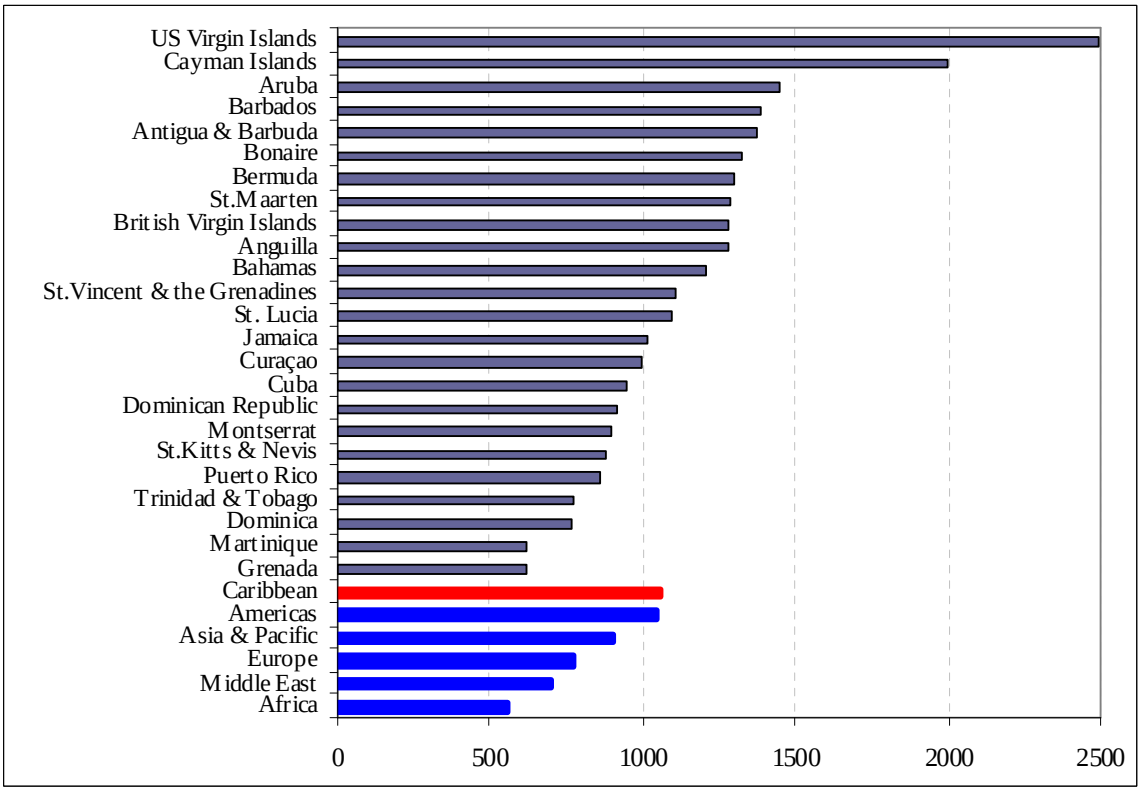
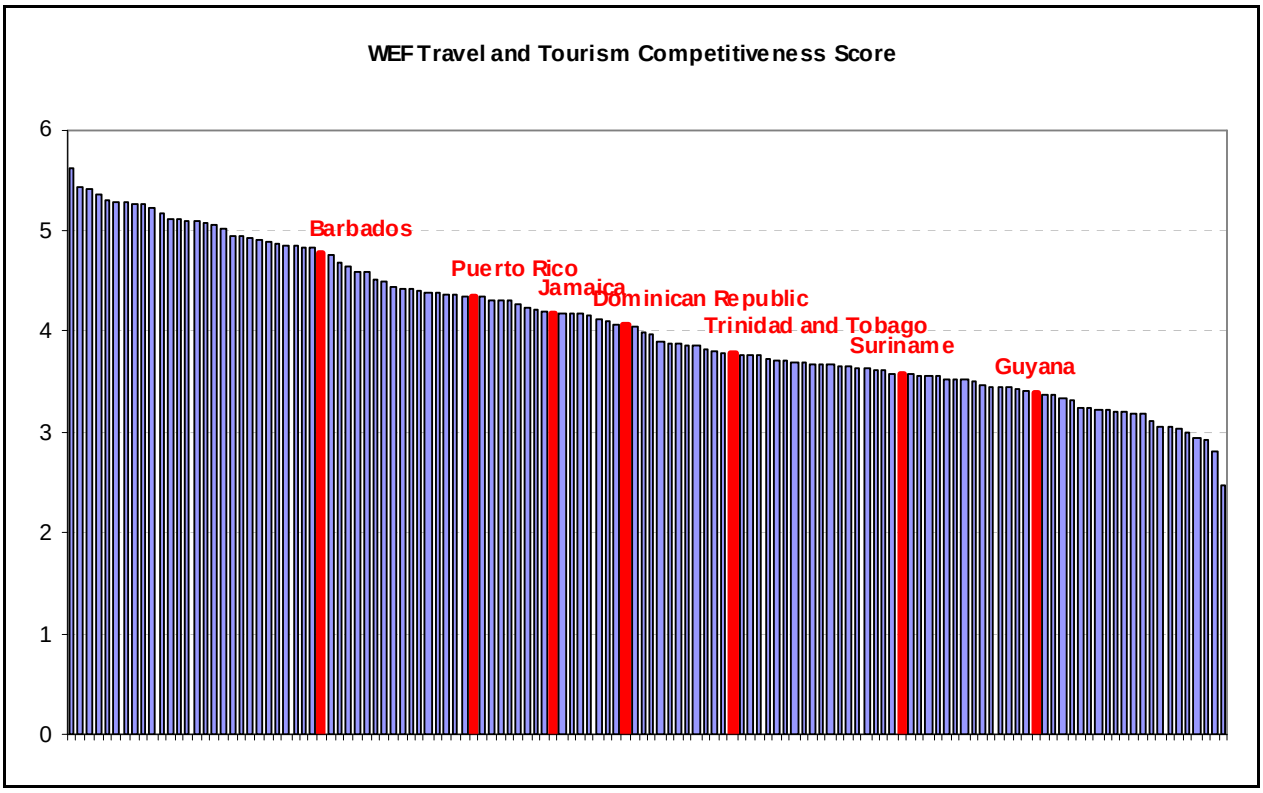


Figure 4: Caribbean Tourism Receipts per Arrival (US$, million)



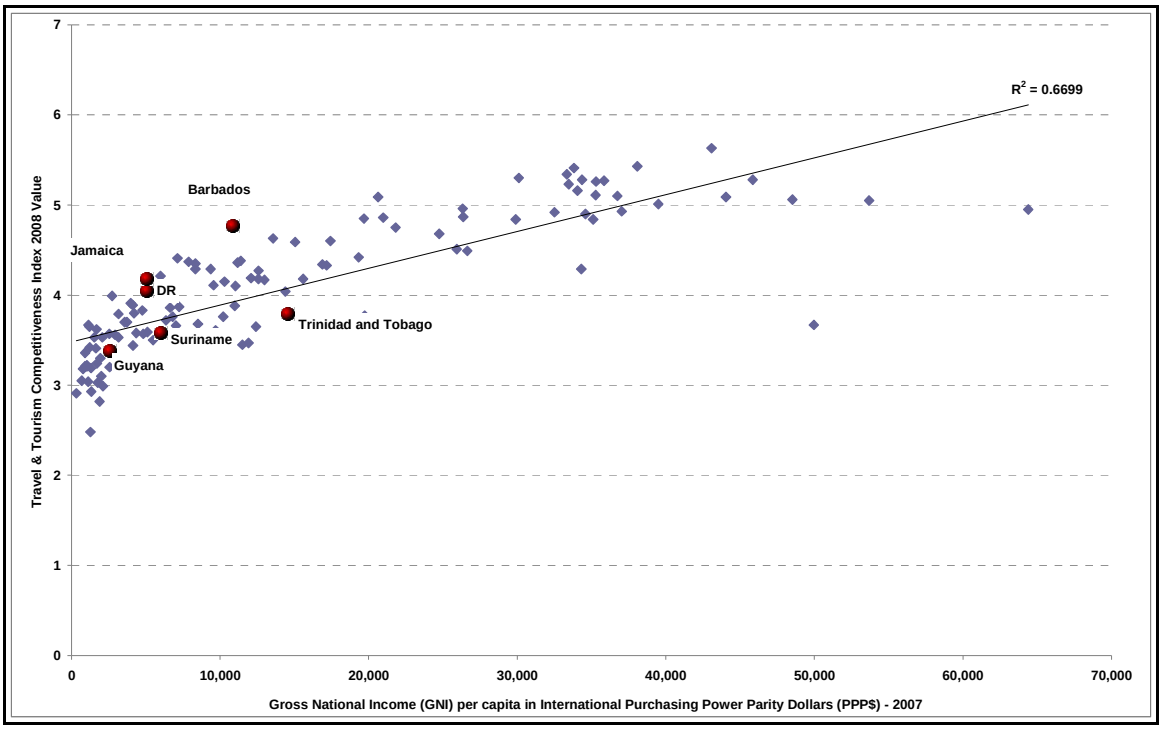
Source: World Tourism Organization (UNWTO), Tourism Market Trends – 2006 Edition (Annex)
Note: As of last year with data available

Figure 5: Travel and Tourism Competitiveness of Selected Caribbean Economies



Source: World Economic Forum (WEF), Travel and Tourism Competitiveness Report 2008
Note: Index Value 0 = Least Competitive; Index Value 6 = Most Competitive

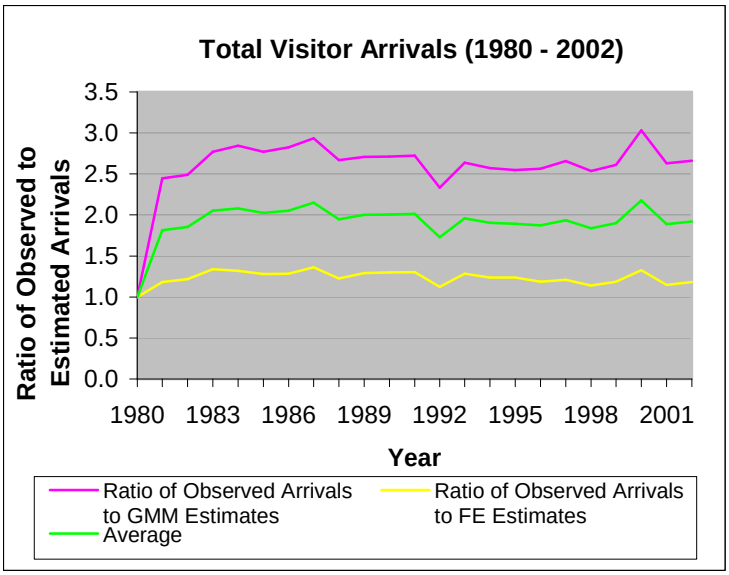
Figure 6: Plot of Tourism Destinations' TTCI Scores Against Per Capita Income

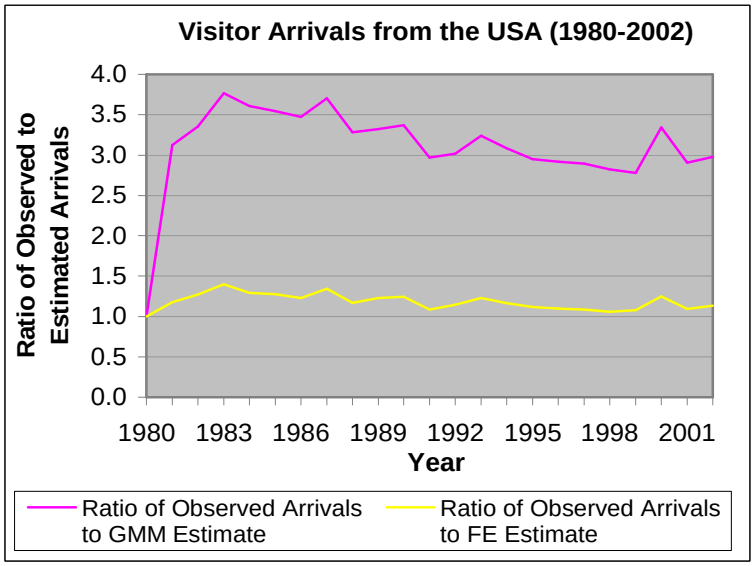


Sources: World Economic Forum (WEF), Travel and Tourism Competitiveness Report 2008 World Bank, World Development Indicators (WDI) Database

Note: Index Value 0 = Least Competitive; Index Value 6 = Most Competitive

Appendix I


Total Visitor Arrivals (1980 - 2002)
Ratio of Observed to Estimated Arrivals
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
1980 1983 1986 1989 1992 1995 1998 2001
Year
Ratio of Observed Arrivals to GMM Estimates
Ratio of Observed Arrivals to FE Estimates
Average


Visitor Arrivals from the USA (1980-2002)
Ratio of Observed to Estimated Arrivals
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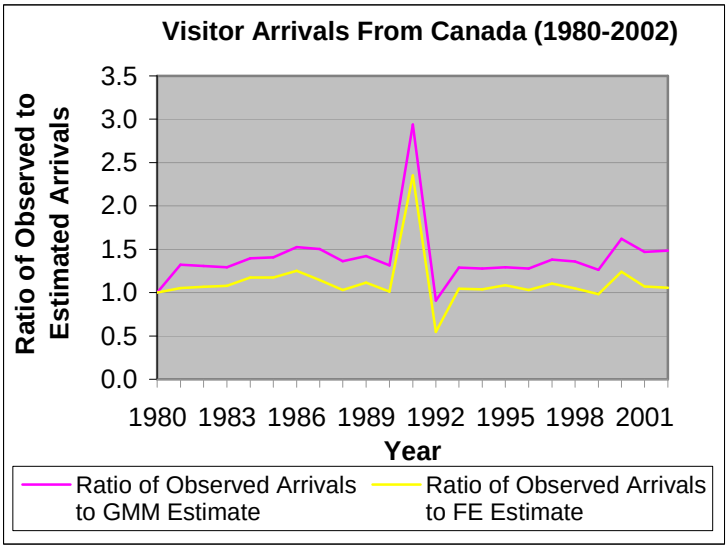
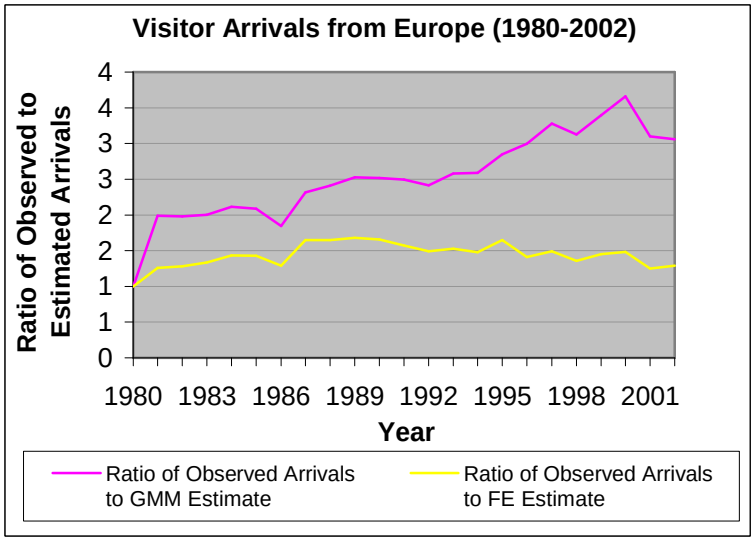
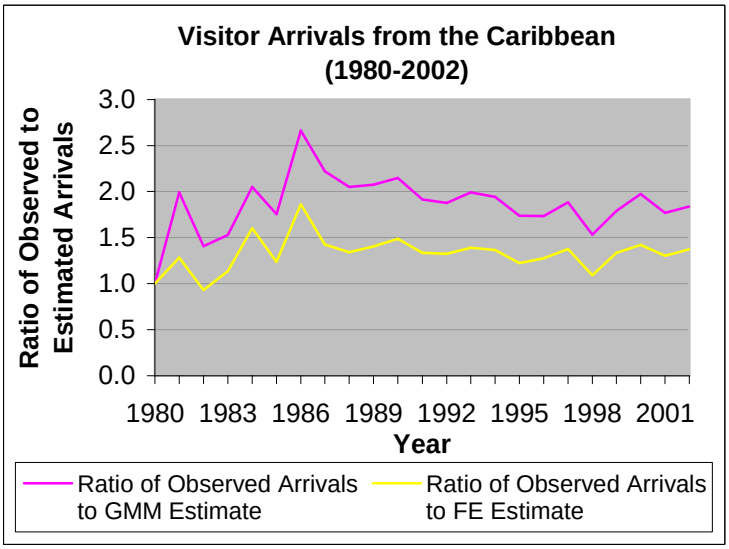
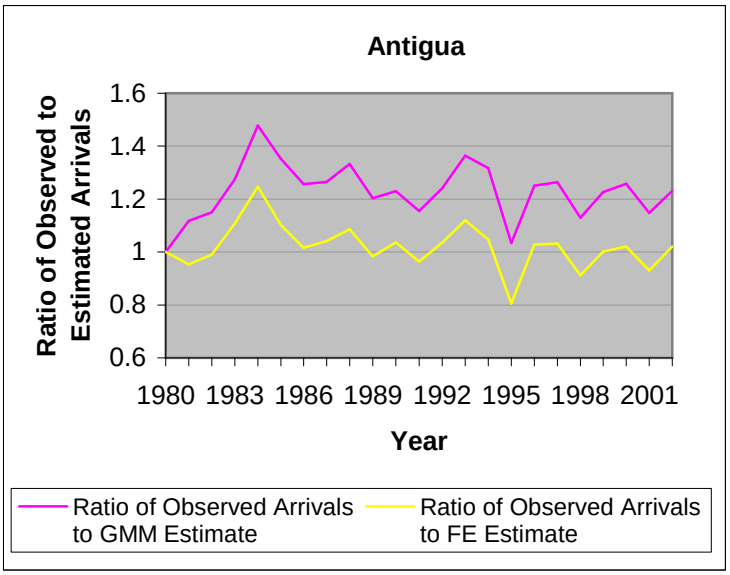
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
1980 1983 1986 1989 1992 1995 1998 2001
Year
Ratio of Observed Arrivals to GMM Estimate
Ratio of Observed Arrivals to FE Estimate

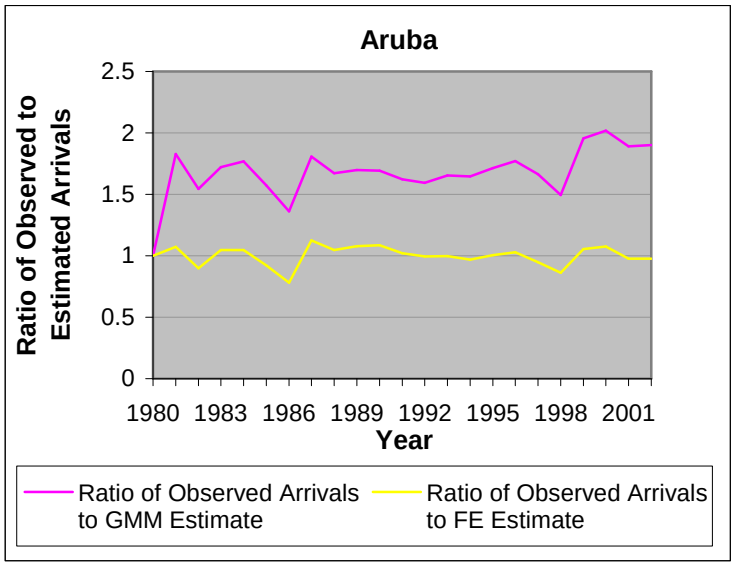

Visitor Arrivals From Canada (1980-2002)
Ratio of Observed to Estimated Arrivals
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
1980 1983 1986 1989 1992 1995 1998 2001
Year
Ratio of Observed Arrivals to GMM Estimate
Ratio of Observed Arrivals to FE Estimate


Visitor Arrivals from Europe (1980-2002)
Ratio of Observed to Estimated Arrivals
4
4
3
3
2
2
1
1
0
1980 1983 1986 1989 1992 1995 1998 2001
Year
Ratio of Observed Arrivals to GMM Estimate
Ratio of Observed Arrivals to FE Estimate


Visitor Arrivals from the Caribbean (1980-2002)
Ratio of Observed to Estimated Arrivals
3.0
2.5
2.0
1.5
1.0
0.5
0.0
1980 1983 1986 1989 1992 1995 1998 2001
Year
Ratio of Observed Arrivals to GMM Estimate
Ratio of Observed Arrivals to FE Estimate

Appendix II


Antigua
Ratio of Observed to Estimated Arrivals
1.6
1.4
1.2
1
0.8
0.6
1980 1983 1986 1989 1992 1995 1998 2001
Year
Ratio of Observed Arrivals to GMM Estimate
Ratio of Observed Arrivals to FE Estimate


Aruba
Ratio of Observed to Estimated Arrivals
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0.5
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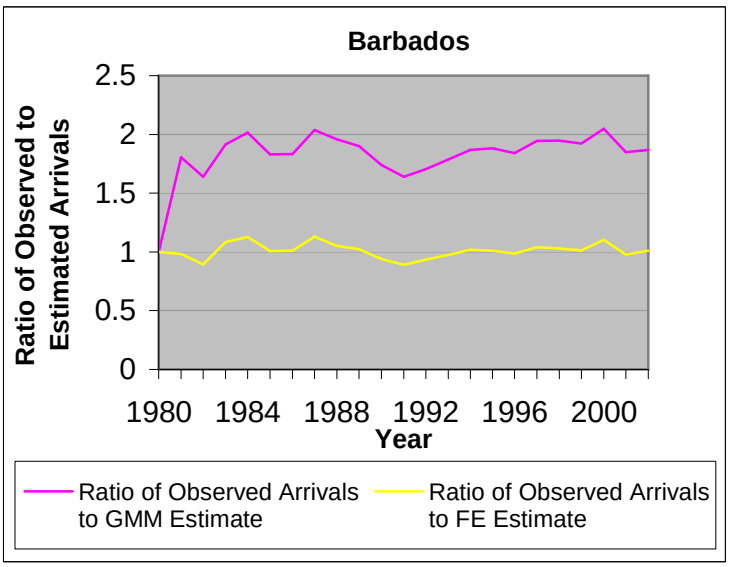
Year
Ratio of Observed Arrivals to GMM Estimate
Ratio of Observed Arrivals to FE Estimate


Barbados
Ratio of Observed to Estimated Arrivals
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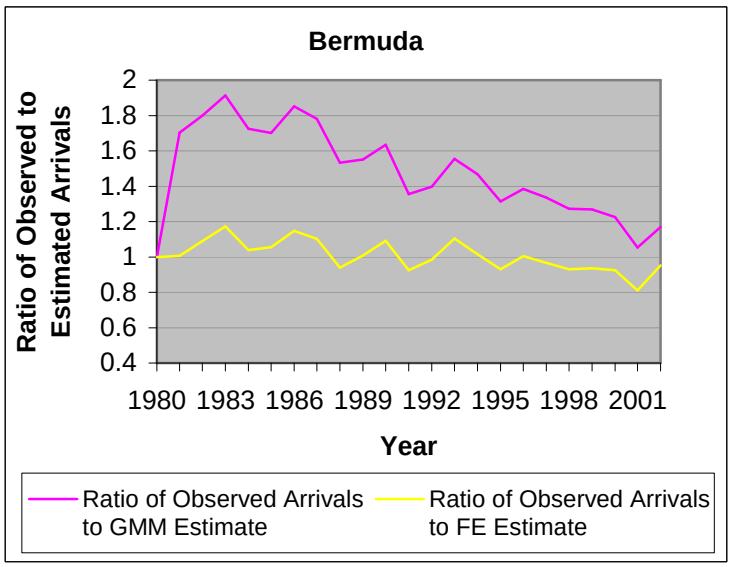
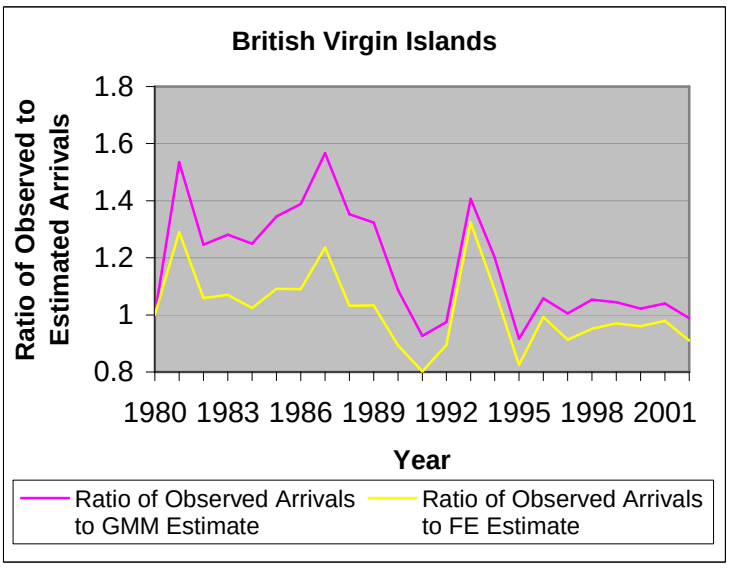
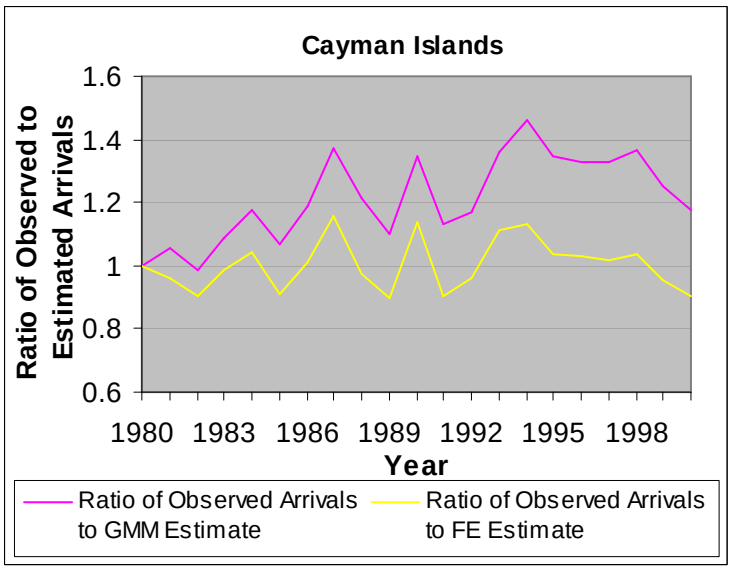
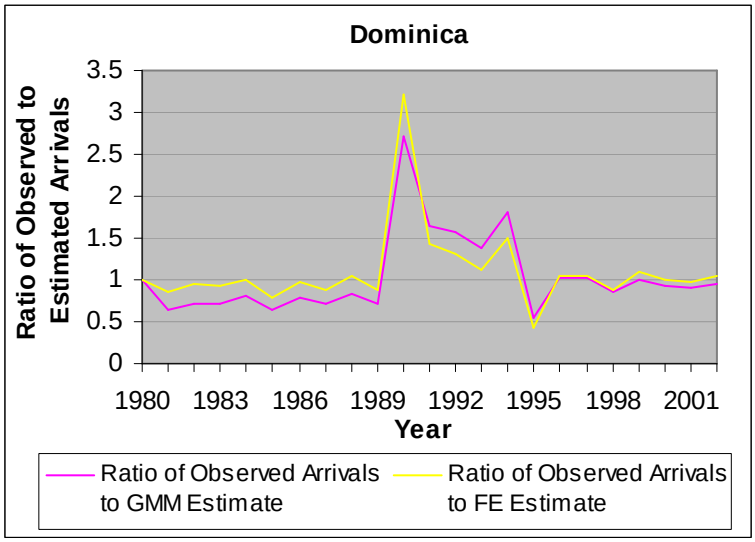
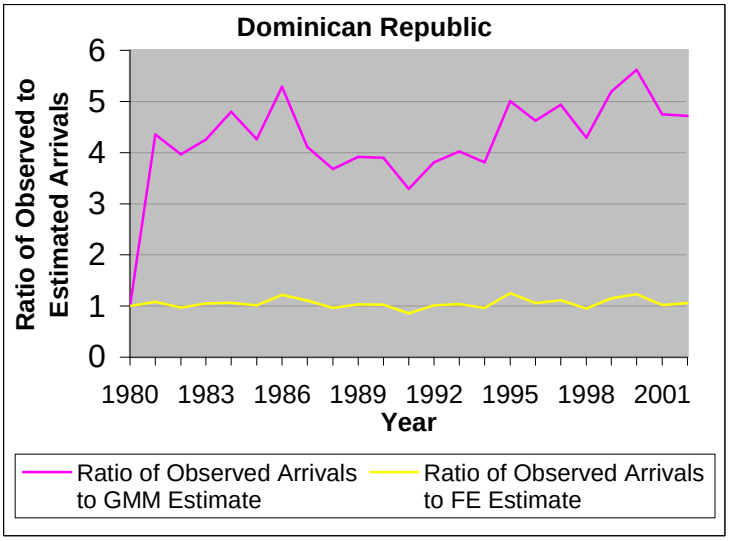
2
1.5
1
0.5
0
1980 1984 1988 1992 1996 2000
Year
Ratio of Observed Arrivals to GMM Estimate
Ratio of Observed Arrivals to FE Estimate

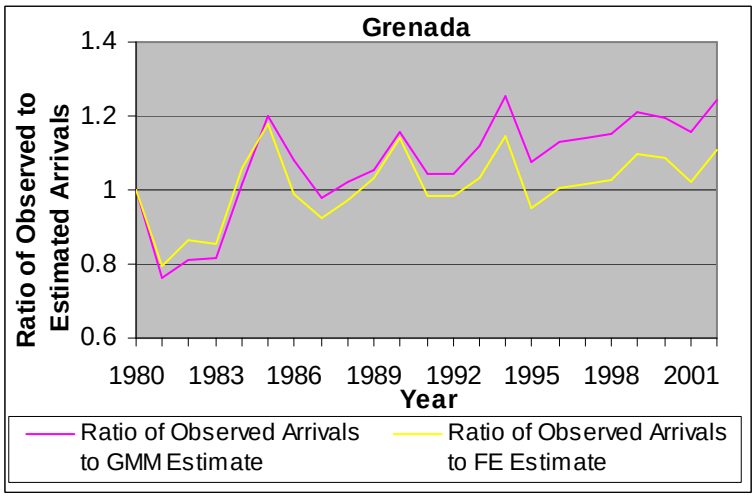

Bermuda
Ratio of Observed to Estimated Arrivals
2
1.8
1.6
1.4
1.2
1
0.8
0.6
0.4
1980 1983 1986 1989 1992 1995 1998 2001
Year
Ratio of Observed Arrivals to GMM Estimate
Ratio of Observed Arrivals to FE Estimate

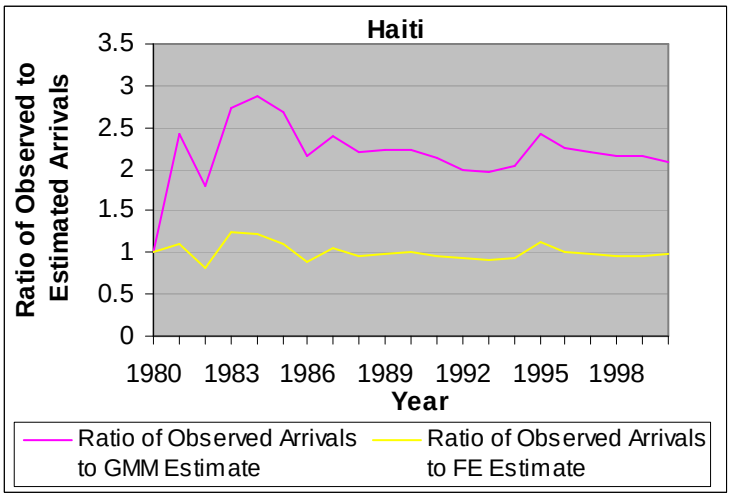

British Virgin Islands
Ratio of Observed to Estimated Arrivals
1.8
1.6
1.4
1.2
1
0.8
1980 1983 1986 1989 1992 1995 1998 2001
Year
Ratio of Observed Arrivals to GMM Estimate
Ratio of Observed Arrivals to FE Estimate

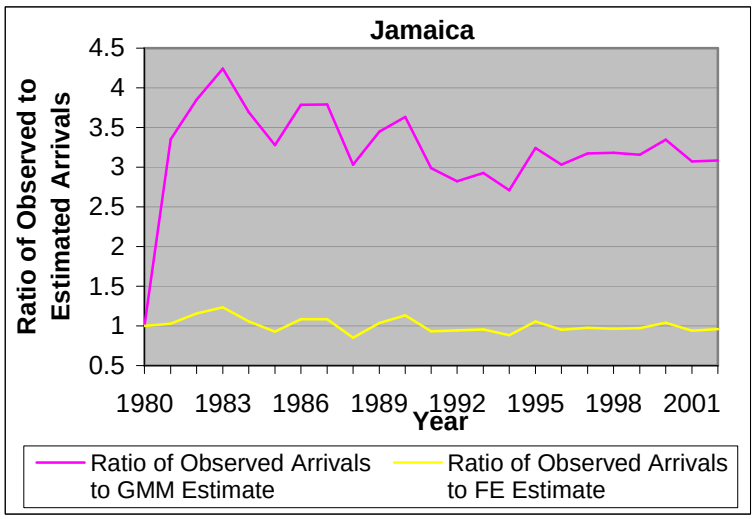

Cayman Islands
Ratio of Observed to Estimated Arrivals
1.6
1.4
1.2
1
0.8
0.6
1980 1983 1986 1989 1992 1995 1998
Year
Ratio of Observed Arrivals to GMM Estimate
Ratio of Observed Arrivals to FE Estimate

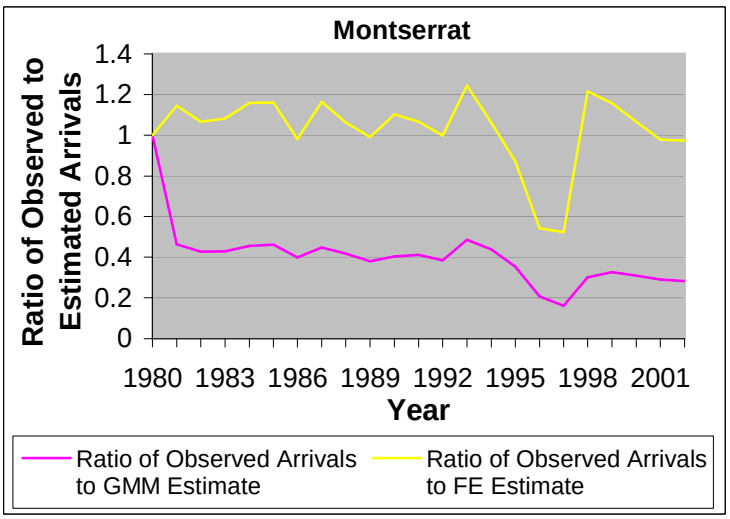

Dominica
Ratio of Observed to Estimated Arrivals
3.5
3
2.5
2
1.5
1
0.5
0
1980 1983 1986 1989 1992 1995 1998 2001
Year
Ratio of Observed Arrivals to GMM Estimate
Ratio of Observed Arrivals to FE Estimate

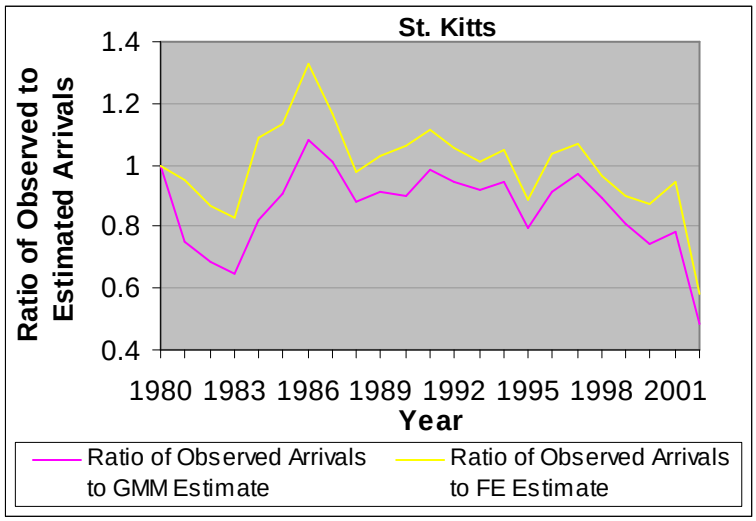

Dominican Republic
Ratio of Observed to Estimated Arrivals
6
5
4
3
2
1
0
1980 1983 1986 1989 1992 1995 1998 2001
Year
Ratio of Observed Arrivals to GMM Estimate
Ratio of Observed Arrivals to FE Estimate

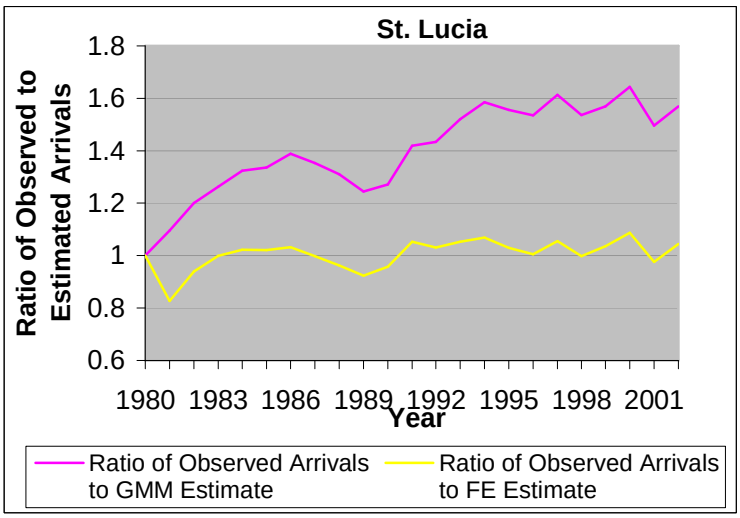

Grenada
Ratio of Observed to Estimated Arrivals
1.4
1.2
1
0.8
0.6
1980 1983 1986 1989 1992 1995 1998 2001
Year
Ratio of Observed Arrivals to GMM Estimate
Ratio of Observed Arrivals to FE Estimate

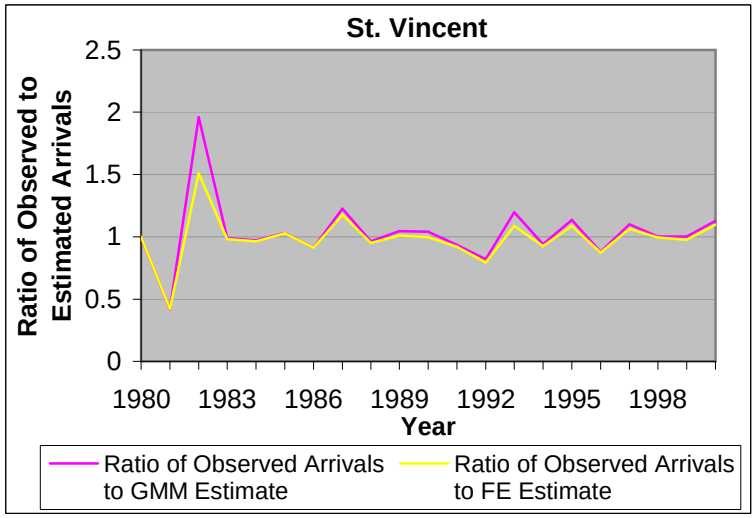

Haiti
Ratio of Observed to Estimated Arrivals
3.5
3
2.5
2
1.5
1
0.5
0
1980 1983 1986 1989 1992 1995 1998
Year
Ratio of Observed Arrivals to GMM Estimate
Ratio of Observed Arrivals to FE Estimate

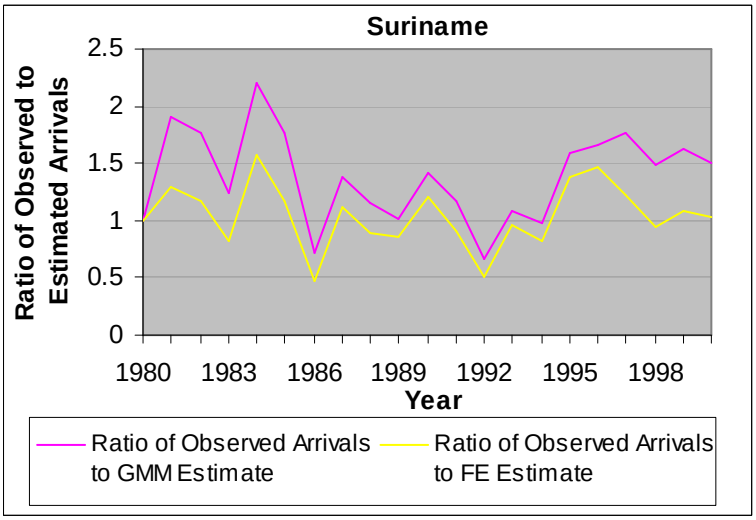

Jamaica
Ratio of Observed to Estimated Arrivals
4.5
4
3.5
3
2.5
2
1.5
1
0.5
1980 1983 1986 1989 1992 1995 1998 2001
Year
Ratio of Observed Arrivals to GMM Estimate
Ratio of Observed Arrivals to FE Estimate

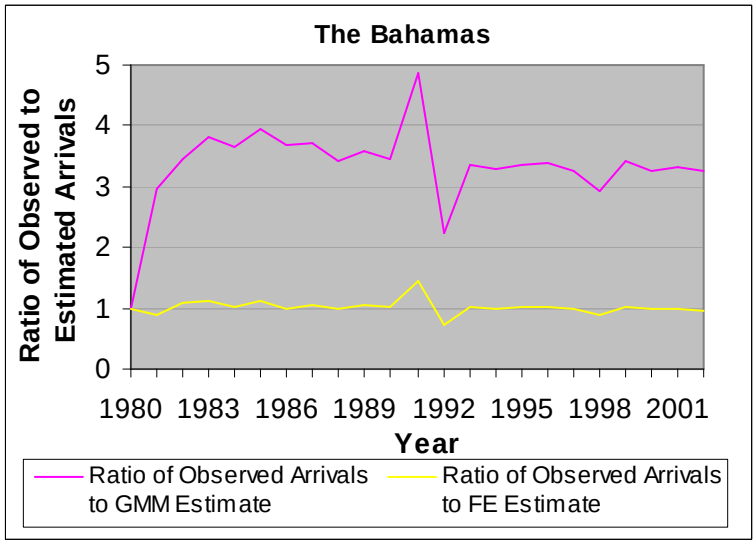

Montserrat
Ratio of Observed to Estimated Arrivals
1.4
1.2
1
0.8
0.6
0.4
0.2
0
1980 1983 1986 1989 1992 1995 1998 2001
Year
Ratio of Observed Arrivals to GMM Estimate
Ratio of Observed Arrivals to FE Estimate

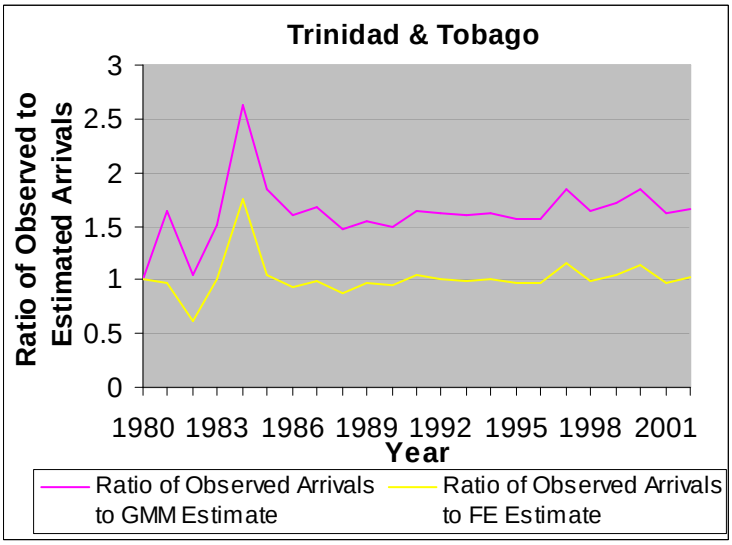

St. Kitts
Ratio of Observed to Estimated Arrivals
1.4
1.2
1
0.8
0.6
0.4
1980 1983 1986 1989 1992 1995 1998 2001
Year
Ratio of Observed Arrivals to GMM Estimate
Ratio of Observed Arrivals to FE Estimate


St. Lucia
Ratio of Observed to Estimated Arrivals
1.8
1.6
1.4
1.2
1
0.8
0.6
1980 1983 1986 1989 1992 1995 1998 2001
Year
Ratio of Observed Arrivals to GMM Estimate
Ratio of Observed Arrivals to FE Estimate


St. Vincent
Ratio of Observed to Estimated Arrivals
2.5
2
1.5
1
0.5
0
1980 1983 1986 1989 1992 1995 1998
Year
Ratio of Observed Arrivals to GMM Estimate
Ratio of Observed Arrivals to FE Estimate


Suriname
Ratio of Observed to Estimated Arrivals
2.5
2
1.5
1
0.5
0
1980 1983 1986 1989 1992 1995 1998
Year
Ratio of Observed Arrivals to GMM Estimate
Ratio of Observed Arrivals to FE Estimate


The Bahamas
Ratio of Observed to Estimated Arrivals
5
4
3
2
1
0
1980 1983 1986 1989 1992 1995 1998 2001
Year
Ratio of Observed Arrivals to GMM Estimate
Ratio of Observed Arrivals to FE Estimate


Trinidad & Tobago
Ratio of Observed to Estimated Arrivals
3
2.5
2
1.5
1
0.5
0
1980 1983 1986 1989 1992 1995 1998 2001
Year
Ratio of Observed Arrivals to GMM Estimate
Ratio of Observed Arrivals to FE Estimate