Economic Growth and Tourism in Barbados: A Test of the Supply-side Hypothesis

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Abstract

Purpose
The purpose of this study is to examine the supply side hypothesis of tourism demand, that is, to answer the question: Does economic growth in Barbados spur tourism growth.

Design/methodology/approach
In order to answer this question, the techniques of multivariate cointegration and innovation accounting were employed.

Findings
Evidence of a long-run relationship between economic growth and tourism demand were found. Specifically, we find that a 1% expansion in real GDP is associated with a 0.57% increase in tourist arrivals. Another finding was that there is a reciprocal relationship between economic growth and tourist arrivals in the short run.

Originality/value
Results could provide policymakers with further insight into how to position and reposition the Barbadian economy over time.

Key Words: supply side; Barbados; multivariate cointegration; causality; innovation accounting

1. Introduction

Barbados is a small open economy, located in the Caribbean, northeast of Venezuela. The country has a total area of 431 km^2 and a population of about 280,000. Barbados has a fixed exchange rate, the Barbadian dollar (BBD) being tied to the United States dollar (USD) at a rate of 2 BBD = 1 USD. In recent years, the economy has diversified into manufacturing, offshore financial services, information services and tourism. Barbados' economy grew at a rate of 2.4 percent over the 10 years ending in 2006.

Barbados has a natural comparative advantage for the development of its tourism industry. Temperatures vary between 20ºC and 33ºC and there is an abundance of sunshine year-round. Tourism is Barbados' primary source of foreign exchange (see Table 1). Since 1980, its share of total foreign exchange earnings has hovered around 50 percent. Tourism contributed between 10-12 percent of overall gross domestic product (GDP) since 1974. The industry also employed roughly 10 percent of the workforce over the same period. Moreover, Barbados has consistently ranked among the top seven tourist destinations in the Caribbean. A total of 1.27 million visitors were recorded for the year 2004, with estimated tourism receipts of USD $763 million, or 3 percent of the total USD $21.6 billion for the Caribbean region. However, cost considerations and the constraints imposed by size as well as limited resources have prompted Barbadian policymakers to increasingly focus on a niche-market approach. Strategies have increasingly focussed on embedding tourism in the indigenous culture through heritage and eco-tourism.

The main policy tools by successive Barbadian Governments to develop the various tourism sectors have been various supply-side factors, such as favourable incentives and policies geared towards promoting their competitiveness and sustainability. Incentives chiefly take the form of tax concessions for a number of years, including the construction of hotels and duty free imports of some supplies and materials. Governments of Barbados have also directly invested significantly in the tourism industry through marketing, investment in tourism infrastructure and policy initiatives which have allowed investors to reduce the costs of inputs into the industry. Table 2 highlights the contributions from various governmental and public sector bodies. Between 1993 and 2002, total contributions more than doubled. The Barbados Tourism Authority, which has a mandate to plan strategies and programs to develop the sector and promote Barbados as a preferred tourism destination contributed an average of 85 percent of the overall contribution over this period. There are also occasions when the Central Bank of Barbados provides guarantees for the moratoria of repayment of loans by hotels and other tourism businesses to commercial bank intermediaries and other lending institutions, when these businesses are experiencing great financial difficulties caused directly or indirectly by external shocks, such as recessions, natural disasters or incidences of terrorism.

Within this context, the purpose of this study is to examine the supply side hypothesis of tourism demand, that is, to answer the question: Does economic growth in Barbados spur tourism growth. An answer to this question has important policy implications. If findings do indeed show a causal relationship from economic growth to tourism growth, then the approach adopted by policymakers should be to stimulate growth in other sectors of the economy so that overall economic growth will in turn lead to expansion in the tourism industry. Finally, knowing whether the relationship, if it exists, is long-run or short-run can also provide policymakers with further insight into how to position and reposition the country's economy over time.

The plan of the paper is as follows. Section 2 describes the sources of the data and outlines the empirical methodology employed. Section 3 presents the empirical results and analysis. Conclusions are presented in the Section 4.

2. Data and Econometric Approach

2.1 Data

The database employed in this study consists of quarterly data over the period 1978:1 to 2007:4. Total arrivals to Barbados are utilized as a proxy for tourism activity. In terms of the supply side characteristics, economic theory ensures that any supply function should consist of price variable. As price indices for tourism related goods and services are not available for Barbados, we use a relative price index calculated as follows:

$$\sum_{i=1}^{n} w_i \left(e_i \times \frac{P_i}{P} \right) \tag{1}$$

where w_i is the tourist arrival weight for each source market *i*, e_i is the nominal exchange rate between country *i* and Barbados, P_i is the consumer price index in country *i* and *P* the consumer price index for Barbados. It follows that an increase in this index implies that goods and services are relatively cheaper in the destination country and should be associated with a rise in tourist arrivals and vice versa. Finally, we use data on real gross domestic product (GDP) to measure the value of economic development.

Observations on arrivals are taken from the Caribbean Tourism Organization's Annual Statistical Digest while data on RGDP are collected from the Central Bank of Barbados. Data on the nominal exchange rates and consumer price indices for Barbados and its major source markets are obtained from the International Monetary Fund's (IMF) *International Financial Statistics*. It should be noted that all series are expressed in natural logarithms.

2.2 Econometric Approach

As a preliminary step to our analysis, we ascertain the order of integration of the variables. Due to the highly seasonal nature of tourist arrivals, and because the conventional unit root tests assume that there are no other roots in the system, we account for this feature of the data by testing for the presence of seasonal unit roots in the series x_t. If a variable exhibits stochastic seasonality, the series is seasonally integrated and can be of order *I*(0,1) [seasonally integrated only] or order *I*(1,1) [integrated at all frequencies]. The HEGY procedure developed by Hylleberg et al. (1990) is used to assess the separate influence of seasonal and nonseasonal components in x_t. For quarterly data, the test is based on the following regression, which is estimated by ordinary least squares (OLS):

$$\varphi(L)x_t = \pi_1 x_{1,t-1} + \pi_2 x_{2,t-1} + \pi_3 x_{3,t-1} + \pi_4 x_{4,t-1} + \mu_t + \varepsilon_t \tag{2}$$

where $\varphi(L) = (1 - L^4)$ is the seasonal differencing operator; $x_{1,t-1} = (1 + L + L^2 + L^3)x_{t-1}$; $x_{2,t-1} = -(1 - L + L^2 - L^3)x_{t-1}$; $x_{3,t-1} = -(1 - L^2)x_{t-1}$; $x_{4,t-2} = -(1 - L^2)x_{t-2}$; μ_t is a set of deterministic components such as a constant, three seasonal dummies, or linear time trend; and ε_t is a white noise process. Lags of the dependent variable are used to whiten the residuals. A *t* test is used to

examine the significance of π_1 and π_2 respectively; and an *F* test is used for the joint significance of π_3 and π_4. Critical values are taken from Franses and Hobijn (1997).

If the variables are all non-stationary, it follows to study the existence of a cointegrating relationship. To test for the presence of a long-run relationship, the maximum likelihood method developed by Johansen (1988, 1991) is utilized. Johansen (1991) proposes two test statistics for testing the number of cointegrating vectors: the trace and the maximum eigenvalue statistics. The null hypothesis for the trace test is that there are at most *r* cointegrating vectors, while for the max eigenvalue test, the null $r = 0$ is tested against the alternative that $r = 1$; $r = 1$ is tested against the alternative $r = 2$; and so forth. The Schwarz Information Criterion (SIC) is used to select the number of lags *i* required in the cointegration test.

Innovation accounting is used to determine the dynamic responses of the variables. We use the impulse response function to trace how tourism responds over time to a shock in real GDP and relative prices. Variance decomposition provides information concerning the relative importance of each innovation towards explaining the behaviour of endogenous variables. In a nutshell, the decomposition shows the proportion of forecast error variance in a variable that is explained by innovations to itself and other variables. We use the generalized forecast error variance decomposition technique attributed to Koop et al. (1996) and Pesaran and Shin (1998). The results of this method are not sensitive to the ordering of the variables in the VAR.

Finally, to examine whether any short-run relationships exist, the Granger-causality test developed from the seminal paper of Granger (1969) will be employed. Basically, this test seeks to ascertain whether or not the inclusion of past values of a variable *x* do or do not help in the prediction of present values of another variable *y*. If variable *y* is better predicted by including past values of *x* than by not including them, then, *x* is said to Granger-cause *y*.

3. Empirical Results

Table 3 presents the results of the HEGY unit root test. These suggest that tourist arrivals are I(1,1,0), while real GDP and the real effective exchange rate are I(1,0,0), i.e. all series have a unit root at the zero frequency. Accordingly, tests for cointegration are undertaken. The results from the cointegration test are presented in Table 4. Both the trace and maximum eigenvalue test indicate the presence of one cointegrating vector. Thus, there is evidence of a long-run relationship between the variables. Table 3 also presents the cointegrating equation estimates, which imply that there is a significant positive relationship between tourist arrivals and economic growth in Barbados. In fact, the parameter estimates suggest that a 1% expansion in real GDP is associated with a 0.57% increase in tourist arrivals in the long run. However, we find no significant relationship between relative prices and tourism.

Given the existence of a cointegrating relationship, a dynamic vector error correction model is estimated. Such an undertaking provides the speed of adjustment after the growth rate of real GDP, relative prices and arrivals deviates from long run equilibrium in period $t-1$. We find that the adjustment coefficient is only significant in the tourism equation. Moreover, it implies that that on the occasion of a one-percent positive deviation from the long-run relationship, tourist arrivals falls by 0.5 percent in first quarter in order to eliminate the discrepancy. This provides

some preliminary evidence that tourism demand is responsive to conditions in the destination country.

3.1 Impulse Response Functions and Variance Decompositions

In this sub-section, we analyze the impulse response functions and variance decompositions. We are essentially interested in analyzing the behaviour of the output and tourism variables.

The impulse responses of the variables over a 20-quarter forecast horizon are shown in Figure 1. Consistent with growth-led tourism hypothesis, the evidence suggests that an unexpected shock to real output leads to a significant jump in tourist arrivals. Furthermore, this positive effect seems to be fairly persistent. Hence, tourism is strongly affected by economic increases in both the short run and long run. Similarly, an unanticipated increase in relative prices (or a decrease in the cost of living in Barbados relative to the source country) is unexpected rise in the aggregate price level is followed by a very small rise in tourist arrivals. The peak effect occurs in quarter 3, after which, it slowly subsides.

Turning to the case of output, the impulse response functions imply that a positive tourism shock has an unambiguously positive long run effect on output. This result is somewhat expected given the importance of tourism to the economy. Meanwhile, an unexpected rise in relative prices is associates with a small rise in output. However, this effect is relatively short-lived and begins to die out after 7 quarters.

Table 5 presents the results of the variance decompositions. For arrivals, we find that innovations to no other variable appear to explain its future variability in the first quarter. However, as the forecast horizon widens, the explanatory power of output and prices increases dramatically, reaching 16.3% and 7.9% respectively by the tenth quarter and 24.3% and 9.4% by quarter 20 respectively. The estimated decompositions also suggest that the future variation of output is generally governed by tourist arrivals. For instance, the contribution of tourism to output variability ranges between 24% and 35% throughout most of the forecast horizon. This result emphasizes the significant role that tourism plays in Barbados in both the short and long runs; any shocks to the tourism sector will have considerable affect the well-being of the country. In contrast, relative prices explain very little of the variation in output (2-5%), and suggests, to some extent, that the output of the country is not very responsive to changes in prices.

3.2 Short-run Causality Tests

To formally investigate the short-run relationship between tourist arrivals, output and relative prices, Granger-causality tests are conducted within the VECM estimated earlier and results reported in Table 6. From the *F*-statistics, the null hypothesis that output does not cause or precede arrivals is clearly rejected and confirms our inferences in section 3.1; that is, economic growth is significant in the growth of the tourism. The Granger causality test also lends further support to the validity of tourism-led growth hypothesis for Barbados, that is, the economic fortunes of the country are closely tied to its tourism industry, thereby justifying Government's keen tourist-attracting policies. These findings are consistent with those attained by Dritakis (2004), Dubarry (2004), Kim et al (2006) and Lee and Chang (2008) who also report bidirectional causality between tourism and economic growth. However, we could find no evidence to support the notion that relative prices impact the country's tourism sector or gross output.

3.3 Implications of findings

To recap, this paper has analyzed the relevance of supply-side characteristics of Barbados as determinants of growth of its tourism industry. Among our key results, we find evidence of a reciprocal relationship between economic growth and tourist arrivals. This implies that prolonged economic growth in Barbados will increase tourism demand, and, due to the backward linkages, the rise in tourism activity will in turn further boost domestic output.

What is particularly interesting is that relative prices appear to have little effect on tourism demand; it seems as though tourists place more weight on the level of economic development of the country than the price level. This could, in large measure, be related to the nature of the Barbadian tourism product, that is, natural physical attributes (namely sun, sea and sand), various modes of entertainment and friendly people. In other words, since Barbados is not a shopping destination per se, prices of goods and services may be a somewhat irrelevant factor for tourism demand. Alternatively, this finding may be due to use of an aggregate price index as a proxy for the cost of tourism in Barbados. The goods and services consumed by tourists may not necessarily be those consumed by the typical local consumer and as a result, given a much smaller weighting in the Barbadian CPI. In other words, it may not fully capture the price effect on tourism demand.

Taken at face value, our results seem to justify the optimistic view of specializing in tourism. It is reasonable to believe that Government's commitment to promoting the tourism sector is valid. However, it should be noted that tourism is indeed a fickle industry and is largely influenced by external shocks beyond the control of domestic entities. For instance, in 2001, the Barbados tourist industry was temporarily crippled by the terrorist attacks on the US and their aftermath and as a result, real GDP slowed markedly. As such, a sole reliance on this volatile industry can lead to macroeconomic instability in the long run. It is recommended that policy makers simultaneously pay attention to not only the tourism industry, but all other major industries as well.

4. Concluding remarks

The aim of this study was to determine if economic growth in Barbados spurs growth in its tourism industry. We find evidence of a long-run relationship between these variables. Specifically, we find that a 1% expansion in real GDP is associated with a 0.57% increase in tourist arrivals. Another finding was that there is a reciprocal relationship between economic growth and tourist arrivals in the short run. Together, these results imply that prolonged economic growth in Barbados will enhance the growth of tourism in the long run and, due to the backward linkages in the short run, the rise in tourism activity will in turn further boost domestic output.

While this study has provided a first step to understanding the influence of supply side characteristics on tourism demand in Barbados, it has also generated further research questions. First, does the response of tourism to economic growth or prices differ across the various source markets? Information provided regarding the different degrees of responses to particular variables may assist policymakers in tailoring their marketing strategies towards the different source markets. Second, how do tourist respond to socio-economic variables such as the country's crime rate, the health of the country as well as the level of education would also be useful. Clearly, there is a need for future research to build on the findings of this paper.

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Table 1: Summary Indicators for Barbados Tourism Industry 1974-2004

	1974-1979	1980-1989	1990-1999	2000-2004
GDP (BDS$ Mn.)	866.6	2,155.5	3,250.7	4,295.0
Tourism (BDS$ Mn.)	89.3	237.0	399.5	497.9
Tourism Share of GDP (%)	10.3	11.0	12.3	11.6
Tourism Growth (%)	18.5	10.1	2.6	5.0
Tourism Employment (000 persons)	8.0	7.8	11.1	13.8
Tourism Share of Overall Employment (%)	9.3	8.5	10.1	10.6
Foreign Exchange Earnings by Tourism Industry (BDS$ Mn.)	NA	738.1	1,185.4	1,418.0
Tourism Share of Total Foreign Exchange Earnings (%)	NA	48.0	56.1	52.1

Notes: The data is sourced from the Statistical Department of Barbados. All figures are averages for the period indicated. 2 BDS$ = 1US$. Mn means million. NA means "not available".

Table 2: Government Investment in Barbados Tourism Industry

	Source					
	Min. of Tourism ($)	**BTA ($)**	**BIDC ($)**	**CTO ($)**	**Tourism Development Program ($)**	**Total Investment ($)**
1993-1994	967,212	29,380,363	898,985	40,000	19,030	31,305,590
1994-1995	912,343	32,657,860	594,074	40,000	242,094	34,446,371
1995-1996	1,069,592	35,787,529	3,134,918	40,000	785,730	40,817,769
1996-1997	1,451,998	42,399,228	3,956,375	40,000	5,438,538	53,286,139
1997-1998	1,568,538	37,050,000	2,719,368	40,000	5,539,366	46,917,272
1998-1999	1,519,803	43,364,474	1,760,123	40,000	5,160,378	51,844,778
1999-2000	1,960,081	42,769,590	1,063,612	40,000	1,749,328	47,582,611
2000-2001	4,189,188	48,698,000	3,364,562	40,000	NA	56,291,750
2001-2002	2,077,593	50,150,138	19,056,404	52,000	NA	71,336,135

Notes: The data is sourced from the Statistical Department of Barbados. The fiscal year runs from April 1st to March 31st. All figures are in Barbados dollars. 2 BBD = 1USD. BTA stands for Barbados Tourism Authority; BIDC stands for Barbados Industrial Development Corporation, and CTO stands for Caribbean Tourism Organization. NA means "not available".

Table 3: Unit root tests

Series	HEGY		
	π_1	π_2	$\pi_3 \cap \pi_4$
log(t)	-0.865	-1.513	2.944*
log (p)	-1.509	-2.451**	3.981**
log (y)	-1.919	-1.732*	3.186**

Notes: *** indicates significance at the 1% level; ** indicates significance at the 5% level; and * indicates significance at the 10% level.

Table 4: Johansen Cointegration Tests

Null Hypothesis	Alternative Hypothesis	Test Statistic	P-Value
Trace Test			
r = 0	r ≤ 1	42.953*	0.050
r = 1	r ≤ 2	11.841	0.823
r = 2	r ≤ 3	2.906	0.888
Maximum Eigenvalue Test			
r = 0	r = 1	31.112***	0.009
r = 1	r = 2	8.935	0.731
r = 2	r = 3	2.906	0.888
Long Run Parameter Estimates Dependent Variable (Tourism)			
Output	0.571**		
	(0.256)		
Relative Prices	0.045		
	(0.143)		

Notes: ***, ** and * indicate significance at the 1, 5 and 10 percent levels respectively. Standard errors are in parentheses

Table 5: Variance Decomposition

Dependent Variable					
	Period	Standard Error	Tourism	Output	Relative Prices
Tourism	1	0.062	100.000	0.000	0.000
	5	0.090	85.616	9.243	5.142
	10	0.100	75.843	16.280	7.877
	15	0.106	70.250	20.797	8.953
	20	0.110	66.331	24.314	9.356
Output	1	0.028	24.793	75.207	0.000
	5	0.051	32.780	64.241	2.980
	10	0.070	31.145	65.106	3.749
	15	0.082	29.136	66.642	4.194
	20	0.092	27.652	67.575	4.774

Table 6: Granger Causality Tests

Causality	*F-Statistic*	*P-Value*
Output $\not\rightarrow$ Tourism	28.580***	0.000
Relative Prices $\not\rightarrow$ Tourism	5.815	0.325
Tourism $\not\rightarrow$ Output	10.206*	0.070
Relative Prices $\not\rightarrow$ Output	5.642*	0.343

Notes: The notation Output $\not\rightarrow$ Tourism represents the null: Output does not Granger-cause Tourism. A similar interpretation follows for the remaining hypotheses. ***, ** and * indicate significance at the 1, 5 and 10 percent levels respectively.

Figure 1: Dynamic effects on Tourism and Output