THE DETERMINANTS OF OUTBOUND TOURISM DEMAND IN BARBADOS: A VECTOR ERROR CORRECTION APPROACH

by

TRAVIS MITCHELL

and

TREVOR CAMPBELL
Research Department
Central Bank of Barbados
P.O. Box 1016
BRIDGETOWN

Presented at the 26th Annual Review Seminar
Research Department
Central Bank of Barbados
July 26-29, 2005

Abstract

This paper, with the use of annual data covering the period 1973 to 2003, seeks to identify the determinants of outbound tourism demand (tourist expenditure outflows) in Barbados. We employ cointegration analysis by utilising a vector error correction (VEC) approach proposed by Johansen (1990) to make inferences about the long run and short run relationships. The results indicate that in the long run, outbound tourism demand is influenced by the exchange rate, per capita income and the cost of tourism. In the short run, only the exchange rate and the cost of tourism have an impact on outbound tourism demand in Barbados.

Introduction

Since the emergence of the tourist industry as a main vehicle of growth and foreign exchange, most research in the area has focused on the impact of spending by tourists coming to Barbados on the economy, its determinants and effect on the balance of payments. In Barbados this has been the case, especially since in the early 1970s when the tourist expenditure became the country's most important source of foreign exchange. Since then, studies based on forecasting and the estimation of tourism demand for Barbados have been popular (see, Dalrymple 1996, Greenidge 1998, Whitehall and Greenidge 2000). However, though we recognise that the inflow of tourism receipts to the island are important, it is also useful to look at the outflows resulting from Barbadian's demand for outbound tourism, defined as travel by a resident from the country of origin to a foreign destination. One of the benefits of outbound tourism to Barbadians is that it provides opportunities for locals to gather experience in foreign

countries and allows them to use such experience to further enhance Barbados' development. Further, the Government of Barbados benefits from outbound tourism by way of the collection of departure taxes, which impacts favourably on the public sector accounts. It should be noted, however, that outbound tourism exerts pressure on a country's net international reserves. As Barbadians increase their holiday travel to abroad, the funds that holiday travellers require for spending abroad are likely to rise. In the case of Barbados, such growth in tourism spending would have a negative impact on the country's foreign reserves, which have been under pressure for the last three years and recorded its largest contraction in 2004.

For this reason, the paper, which is based on the sample period 1973 to 2003, attempts to identify the determinants of outbound tourism demand in Barbados. Following Song *et al* (2000) we use cointegration analysis and estimate variables in logarithm form to evaluate elasticities. However, we use a Vector Error Correction (VEC) approach instead of the usual two-step residual based approach to analyze the long run and short run relationships.

Bearing in mind the limited research on this topic especially in the Caribbean, it is hoped that this paper is expected to make some contribution to the literature. To the best of our knowledge, it is the first study to investigate the determinants of outbound tourism for Barbados and secondly it is one of the few research papers in the existing tourism literature that has used the Vector Error Correction approach to model tourism demand.

The remainder of the paper is organized as follows. Section 2 provides a short review of the literature, while section 3 looks at the trends in outbound tourism demand for Barbados. Sections 4 outlines the model and data sources while section discusses the results of the study. This is followed by concluding remarks.

Section 2.0

A Brief Overview of The Literature

There are very few studies in the literature that have attempted to model outbound tourism demand. Song, Romilly and Liu (2000) conducted an empirical study of outbound tourism demand in the UK. Their aim was to construct and estimate outbound tourism demand models according to the holiday destinations of UK residents and to generate forecasts of UK demand for overseas holidays. To measure the influence on outbound tourism demand, the authors used co-integration analysis and a two-stage error correction approach developed by Engle and Granger (1987). The model was constructed in log-log form. Total holiday visits per capita to each destination by a UK resident was regressed on the cost of living index in each destination, measured by the consumer price index and adjusted by the exchange rate, the explicit deflator of UK, total consumer expenditure abroad adjusted by the corresponding exchange rate and a preference index.

The authors found that the long-run income elasticities for all models ranged from 1.70 to 3.90 with a mean of 2.367, while the short-run elasticities were estimated at 1.05 and 3.78, respectively and the mean was 2.216. These suggested that overseas holidays for UK residents were highly income elastic, and that although the costs of overseas holidays remained an important factor in the determination of international tourism demand, the demand for UK outbound tourism was also relatively own-price elastic.

Using a similar econometric approach, Sathrendrickumer and Watson (1997) attempted to explain the factors determining outbound tourism from Singapore. Unlike the previous study the author estimated a model for per capita tourism expenditure as a function of the exchange rate and per capita income over the time period 1968 to 1995. After reparmeterisation, the final

specification of the model was one that expressed a relationship between the change in tourism expenditure abroad as recorded in the balance of payment accounts of Singapore between two consecutive years and the dependents variables such as time, a quadratic time trend, the lags of tourism expenditure abroad, the lag of GDP per head, and the change in GDP per head. Based on the estimated coefficients, the authors concluded that a dollar increase in increase in per capita GDP would lead to an increase in tourism expenditure abroad by Singaporean tourists by 4.6 cents. Additionally, a unit increase in the exchange rate, expressed in the number of Singaporean dollars per U.S. dollar, appeared to reduce per capita tourism expenditure of Singaporean tourists abroad by 3.6 cents per resident.

The Tourism Research Council of New Zealand conduced a study aimed at developing methodologies and models to accurately forecast short-run international departures by New Zealand residents. The main destination markets considered in the study were Australia and the rest of the World. In constructing the model, the authors used purpose of travel as the key decision variable for most departures. These were broken down into 4 main categories:

1. Holiday – a person whose main purpose of travel is for holiday or vacation.
2. VFR – a person whose main purpose of travel is to visit friends and/or relatives.
3. Business – a person whose main purpose of travel is to conduct business.
4. Other – all other people whose main purpose of travel does not fall within one of the above categories, including those attending conferences/conventions, stopovers, and those who do not specify their main purpose of travel.

The models were estimated and the results were found to be more accurate than in past studies conducted by the research council.

Section 3.0

A Short Background on Outbound Tourism in Barbados

Data for outbound travel in Barbados are not available before 1993 and do not identify departure destinations. Therefore, in order to provide an analysis of Barbadian holiday travel abroad we look at expenditure by Barbadian holidaying overseas within the last thirty years. According to the figures, there has been a steady growth of foreign exchange outflows resulting from Barbadian tourist expenditure between 1973 and 2003. In fact, between 1976 and 2003 spending by Barbadian tourist accounted for approximately 43% of total travel outflows. This is compared to 33% arising from business travel, 21% from education related travel and a marginal 3% for health related travel expenditure (See figure 1.0).

In the early 1970's Barbadians spent less than $20 on holiday travel (see Balance of Payments of Barbados and Figure 2). The largest outflow from holiday travel during this period was an estimated $15.3 million in 1979, and the average expenditure over the nine-year period was about $12.3 million. In 1980 outbound tourist expenditure surpassed the $20 million mark for the first time in history, rising to $21.4 million and then to $24.7 million in 1981. However, in the two years that followed, when Barbados experienced an economic recession, holiday spending by Barbadians fell marginally. Shortly after, the economy recovered and later recorded six consecutive years of growth in real economic activity. During this period, total spending by Barbadians on holiday rose to $34.2 million, or approximately $14.2 million above the expenditure ceiling observed in the early 1980's.

This trend in tourist spending changed somewhat over the next three years as Barbados was affected by yet another international recession, causing holiday travel spending to decline by over $3 million. In 1994 real economic activity strengthened and continued on an upward path

up until the year 2000. Unlike tourism receipts, which declined twice during the above period, Barbadian holiday expenditure continued to rise and surged to a landmark $50 million in 1994. However, following the September 11 attacks of 2001 and the international recession that same year, there was a sharp fall in foreign exchange receipts to the island. Interestingly though, holiday spending by Barbadians rose by $11 million to $90.7 million during that year. In the following year, however, travel expenditure fell marginally but picked up by $10.5 million during 2003.

With regards to movements in outbound tourists, it is normally felt that the major countries to which Barbadians travel are the USA, UK, Canada and the Caribbean. In addition, according to the available data in Table 1, with the year 2002 excepted, most Barbadians seemed to travel during the summer months of the year. Up until 2001, summer travel accounted for an average of 40% of total holiday travel. Between 1997 and 2002, third quarter holiday travel totalled 155, 955 persons compared to 117,876 persons for the fourth quarter and even lower numbers for the other quarters. In the other quarters, total holiday travel for the second quarter of the five year period was estimated at 100, 937 persons, while first quarter holidays visits was recorded at 36,938 persons. In 1997, a total of 58,203 Barbadians went on holiday overseas. In the following year, this figure decreased by just over 10,000 persons but recovered in 1999 to reach. 94,611 individuals. In 2000, the number of Barbadians travelling abroad to spend their holiday surpassed the 100,000 mark (111,100) for the first time in the country's history but fell by 4.6% in the following year. Most of this decline occurred in the fourth quarter of 2001, shortly after the events of September 11. In 2002, holiday travel by Barbadians bounced back by 7.2% to 113,617 persons.

Section 4.0

Empirical Model and Data

The study adopts the Johansen (1995) cointegration approach to model the demand for outbound tourism in Barbados. The general framework is based on a vector autoregressive representation (VAR):

$$y_t = \eta + \sum_{i=1}^{p} \Pi y_{t-i} + \varepsilon_t$$

where y is an n x 1 vector of variables, η is a n x 1 vector of deterministic variables, Π is a n x n coefficient matrix and ε is a n x 1 vector of disturbances with normal properties. If there exists a cointegrating relationship among the variables, the above equation may be reparameterised into a vector error correction model (VECM) of the form:

$$\nabla y_t = \eta + \sum_{i=1}^{p-1} \Phi_i \nabla y_{t-i} + \Pi y_{t-1} + \varepsilon_t$$

where ∇ is the first difference operator, and Φ is a n x n coefficient matrix. The rank of Π determines the number of cointegrating relationships. If the matrix Π is of full rank, n, then a VAR in levels should be estimated. However, if the matrix Π has a rank of zero, then a VAR in first differences is more suitable. Thirdly, if the rank of Π is less than n, then there exist n x r matrices such that $\Pi = \alpha\beta$ where α is the adjustment matrix and β is the cointegrating vector. Hence the VECM model gives estimates of the long run coefficients and tells us about the speed of adjustment to long run equilibrium.

Similar to Sathrendrickumer and Watson (1997) we regress tourist spending on the exchange rate, and per capita income. It is recognised that while exchange rate may not apply to Barbadians travelling to the USA since the local currency is pegged to the currency of that

country, it will be applicable to travel to Canada, UK and indeed some Caribbean countries on account of their exchange rate flexibility. We also include as an explanatory variable, the cost of tourism as was done by Song, Romilly and Liu (2000) but we do not add a preference variable and we use a more advanced cointegration approach to model outbound tourism. The exchange rate is expected to be negatively related to holiday spending abroad. If prices in the destination country increase and the exchange rate depreciates, it is expected that expenditure on travel will be more expensive and should fall. Likewise if domestic prices rise, then the cost of tourism will increase and therefore we expect that tourist spending should also decline. With respect to income, if the proponents of demand theory hold we expect this to have a positive relationship with tourist spending on outbound travel.

The model is estimated using annual data for the period 1973-2003. Tourism expenditure (TXP) on holiday travel is used to represent outbound tourism demand. Per capita income is captured by Real GDP per capita (RPGDP) and is calculated by dividing real gross domestic product by the mid year population. Passenger fares (PF) is used as a proxy for the cost of tourism. The real effective exchange rate (REEF) is used as a proxy for exchange rate movements between Barbados and its main trading partners. (For further reading see Moore and Skeete 2000). The variable is defined as follows:

$$REER = \sum w_i \ln (e_i * pi/p)$$

where w_i is the trade weight for partner country i, e_i is the bilateral nominal exchange rate, p_i is a measure of prices in trading partner country i, and p is the domestic price index. Data for tourist expenditure were obtained Balance of Payments of Barbados, while data on per capita GDP, mid year population and the CPI were gathered from the Annual Statistical Digest of the Central Bank of Barbados. Figures 3-6 show the general trend in each of the variables.

Section 5.0

Results

Before we can proceed with the model estimation it is best to conduct some pre-modelling data analysis so as to determine the appropriate specification of the above model. The first step is to test for stationarity among the variables. In order to test for stationary we use both the Augmented Dickey-Fuller and the Phillips-Perron test for unit roots. The results in table 2 show that all of the variables are stationary at first difference. This means that the variables are integrated of order one or I(1), and that a VAR in levels is not appropriate. Therefore, the next step is to see whether these variables together are cointegrated, that is, if a linear combination of the first order variables I(1) is stationary, that is, of order zero or I(0). A test for cointegration or long run equilibrium can be conducted using either the Engle and Granger two-step residual based approach or through the Johansen and Juselius (1990) Vector autoregressive procedure. We utilize the latter approach.

As seen in table 3, using option four in the cointegration specification (intercept and trend in cointegration equation- no trend in VAR), the trace and max eigen statistics indicate at least one cointegrating relationship at both the five and ten percent levels. Therefore we estimate the Vector Error Correction Model. The estimates from the Vector Error Correction shown in table 4 indicate that the cost of tourism as represented by passenger fares has almost unitary elasticity (-0.94). This suggests that a one percent change in the cost of tourism would negatively affect outbound tourism demand in almost the exact same proportion. The strength of the per capita GDP coefficient (1.24) implies that outbound tourism for Barbadians is highly income elastic. Exchange rate movements also seem to have a significant impact on outbound tourism. According to the elasticity coefficient, fluctuations in the real effective exchange rate will cause

about 60% of the variation in outbound tourism demand. With regard to the non-economic influences on outbound tourism, which is captured by the trend variable, the results suggest that as time passes people are likely to increase the amount they spend while on holiday overseas. The R^2 value of 0.78 suggests a good fit for the model.

Let us now examine the short run results, which are also presented in table 4. In the short run the signs are in keeping with the a priori expectations. A one percent rise the cost of tourism would reduce outbound tourism by around sixty six percent and a similar change in the real effective exchange rate would decrease outbound tourism spending by fifty percent. Per capita income is not significant in the short run. This suggests that temporary increases in per capita income may be spent on other goods rather than on outbound tourism. The error correction coefficient is negative, with a value of 0.74, and significant as required. This shows that the series converges and does not explode. Thus we can infer that about 74% of the disequilibrium will be corrected in the short run and that the long run relationship between outbound tourism and its determinants is relatively stable.

Concluding Remarks

The main purpose of this paper has been to look at the determinants of outbound tourism for Barbados. Using annual data for the period 1973 to 2003 and the Vector Error Correction methodology, the study finds that within a systems framework the real exchange rate, per capita income and the cost of tourism are responsible for changes in outbound tourism in Barbados. This is indicated by the statistical significance and direction of the explanatory variables.

In the short-run, we find that only the real exchange rate and the cost of tourism are significant. Real per capita income does not appear as an explanatory variable in the short run. This is not altogether surprising since in the short term, with higher per capita incomes, Barbadians may place more emphasis on spending on goods rather than on taking a vacation overseas. The results also indicate that real per capita income has the greatest impact on outbound tourism in Barbados in the long run while the cost of tourism has the greatest impact in the short term. This implies that if it became necessary for Government to pay specific attention to outbound tourism in order to address any balance of payments difficulties, the cost of tourism and per capita income should be the variables receiving immediate focus. However, it is hoped that Government will continue its efforts at putting measures in place to stimulate output in the foreign exchange earning sectors in order to minimise the possibility of targeting outbound tourism activity anytime in the future.

References

Annual Statistical Digest, Central Bank of Barbados, Various Issues.

Balance of Payments of Barbados, Central Bank of Barbados, Various Issues

Dalrymple K.; Tourism as a Development Strategy for Barbados, Central Bank of Barbados, working papers, 1998, pp.260-269.

Dickey, D. and W. Fuller; Co-integration and Error- Correction, Representation, Estimation and Testing, *Econometrica*, Vol.55, no.2, March 1987, pp.251-276

Engle, R. and C. W. Granger; Co-intergration and Error Correction; Representation, Estimation and Testing, *Econometrica*, Vol.55, No.2, March 1987, pp.251-276.

Eviews 5.0, Quantitative Micro Software, Irvine C.A

Greenidge K.; Forecasting Tourism Demand in Barbados, Central Bank of Barbados, Working Papers, 1996, pp. 260-269.

Haiyan, S., P. Romilly and X. Liu; An Empirical Analysis of Outbound Tourism Demand in the UK, *Applied Economics*, vol. 32, pp. 611-624.

Jarque, C. and K. Bera; Efficient Tests for Normality, Homoscedasticity and Serial Dependence of Regression Residuals, *Economic Letters*, vol.6, pp. 255-259.

Johansen, S.; Statistical Analysis of Co-integrating Vectors, *Journal of Economic Dynamics and Control*, Vol. 12, 1988, pp. 231-254

___ and K.Juselius; Maximum Likelihodd Estimation and Inference in Co-Integration with Application to the Demand for Money, *Oxford Bulletin of Economics and Statistics* (1990) vol.52, pp 169-210.

Jordan, A.; A New Methodology for Estimating Expenditure Incurred by Barbadians Travelling abroad, *Central Bank of Barbados Working Papers*, Central Bank of Barbados, 2003, pp. 87-92.

Moore, W., R. Skeete and K. Greenidge; Estimates of the long-run equilibrium exchange rate in three Caribbean countries, *Central Bank of Barbados Economic Review,* Vol. 31, No.3, Central Bank of Barbados, December 2004, pp. 28-39.

Phillips, P.C.B. and P. Perron; Testing for a Unit Root in Time Series Regression, *Biometrika*, Vol. 75, 1998, pp.335-346

Sathiendrakumar, R. and R. Watson; Outbound Tourism from Singapore, Asian Research Centre, Working Paper, no.69, 1997.

Tourism Research Council New Zealand; *New Zealand Outbound Tourism Forecasts 2004-2010*, August 2004.

Whitehall, P. and K. Greenidge; Tourism Maturity and Demand: A Co-Integration Approach, *Central Bank of the Bahamas Caribbean Centre for Monetary Studies*, 1998,

Appendix 1

Figure 1.0

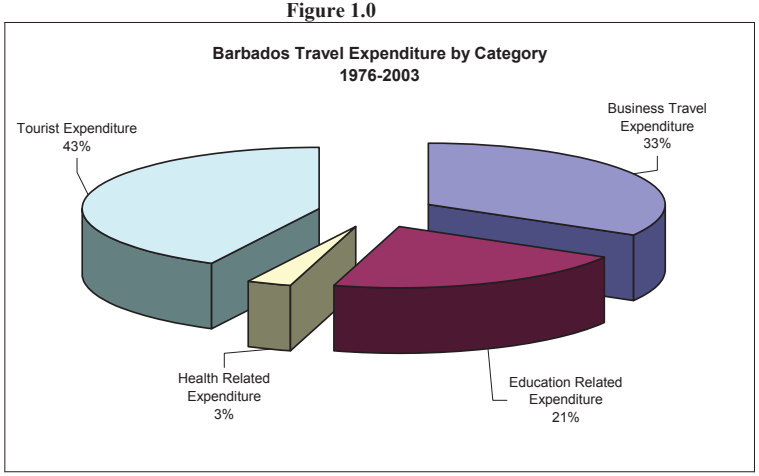
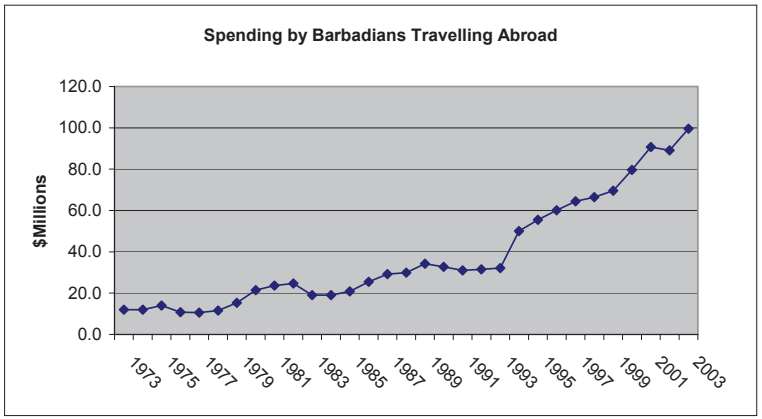


Figure 2.0



Source: Balance of Payments of Barbados

Figure 3

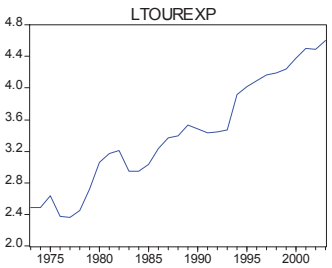


Figure 4

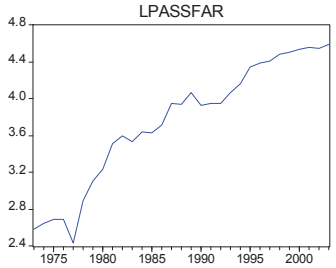


Figure 5

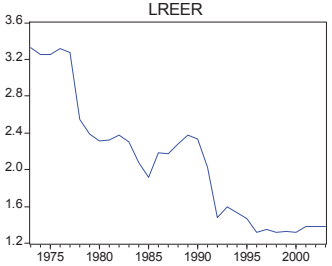


Figure 6

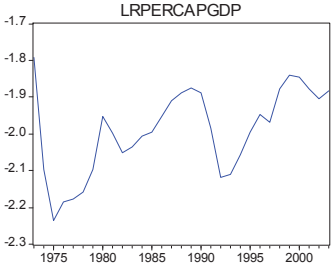


Table 1

Number of Barbadians Travelling Overseas on Holiday					
Years	**1st Quarter**	**2nd Quarter**	**3rd Quarter**	**4th Quarter**	**Total**
1997	4512	11863	23861	17967	58203
1998	6228	10506	18477	12152	47363
1999	4373	16080	31862	22423	74738
2000	7166	21640	32603	22454	83863
2001	8150	19805	32174	18816	78945
2002	6509	21043	16978	24064	68594
2003	10185	19600	N/A	N/A	29785

Source: Jordan (2003)

Table 2
Testing For Unit Roots

	Augmented Dickey-Fuller		Phillips-Perron	
Variables	Level	First Difference	Level	First Difference
LTXP	-0.018682	-5.649792*	-2.298278	-7.051819*
LREER	-2.651942	-4.47319*	-1.834855	-5.953738*
LRPGDP	-3.542733	-5.152563*	-4.251482**	-7.119569
LPF	-1.463891	-4.742784*	-1.824427	-5.705637*

Note: *, ** indicates significance at the 1 and 5 percent level, respectively.
The ADF statistic was chosen based on the Hannan and Quinn criterion.

Table 3
Johansen Test for Cointegration
(LTXP, LREER, LRPGDP, LPF)

Null Hypothesis	Eigen Value	Trace Statistic	Critical Value
r=0	0.766717	77.715540	63.876100
r=1	0.492175	35.505950	42.915250
r=2	0.279751	15.855010	25.872110
r=3	0.196330	6.338419	12.517980

1. r stands for the number of ranks
2. The trace statistic are Johansen's trace eigenvalue statistics for testing cointegration. The null hypothesis is in terms of the cointegration rank r and rejection of r=0 is evidence in favour of at least one cointegrating vector. Max-Eigen statistics were also calculated but are not reported since they yielded the same conclusions.

Table 4

Vector Error Correction Estimates				
Long Run				
Ltourexp (-1)	*Lreer (-1)*	*Lpf (-1)*	*Lrpgdp (-1)*	*C*
1.00000	0.60024	0.94236	-1.24334	-9.21567
Short Run	*Model 1*	*Model 2*	*Model 3*	*Model 4*
Cointegration Eqn. 1	-0.74107	-0.00074	-0.32103	-0.06770
	[-8.32780]	[-0.000322]	[-2.49785]	[-0.97427]
D (LTXP (-1))	0.09126	0.21532	0.48581	0.04767
	[0.83257]	[0.75974]	[3.06869]	[0.55688]
D (LREER (-1))	0.49528	0.28994	0.01241	0.05104
	[4.60515]	[1.04263]	[0.07988]	[0.60772]
D (LPF (-1))	0.66295	0.57561	-0.23155	0.10245
	[4.78704]	[1.60749]	[-1.15766]	[0.94738]
D (LRPGDP (-1))	-0.30925	-0.30319	-0.06827	0.23082
	[-1.61427]	[-0.61210]	[-0.24674]	[1.59152]
C	0.05375	-0.10015	0.04954	0.00156
R^2	0.78697	0.22388	0.46257	0.27878