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ABSTRACT

The objective of this study was to quantify the effects of marketing expenditure by the Australian Tourist Commission, integrated into Tourism Australia (TA) from 1 July 1994. Co-integration analysis and dynamic modelling approach are used to estimate the elasticity of income, price, price of substitute, cost of travel and marketing expenditure for Australia’s four major tourism markets: USA, Japan, UK and New Zealand. TA marketing expenditure has a positive effect on the international tourism demand and the magnitude of the effect varies from country to country. In promoting international visitor arrivals to Australia, not only TA and non-TA marketing but the ‘word of mouth’ effect and visitor satisfaction leading to repeat visits also play an important role. The performance of the TA marketing strategy measured in dollar return per dollar invested in international tourism marketing is higher in the New Zealand market, followed by UK, Japan and USA markets. The estimated overall average dollar return per dollar invested in international tourism marketing is 8:1.

Acknowledgements
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The authors wish to acknowledge Prof Larry Dwyer and Ray Spurr for their helpful comments.
SUMMARY

The Australian Government allocates a substantial amount of their budget to accomplish the task of promoting tourism to Australia. Tourism Australia (TA) was established on 1 July 2004, bringing together the collective skills and knowledge of four separate organisations: the Australian Tourist Commission; See Australia; the Bureau of Tourism Research and Tourism Forecasting Council. The objective of Tourism Australia (TA) is to create and increase awareness of Australia as a tourist destination and to promote the desire to travel to Australia. In this process the TA is in partnership with the Australian travel industry, and the Federal and State/Territory Governments. As public funds are being used, the return on the investment of TA’s promotional activities must be estimated. This report attempts to estimate the TA marketing expenditure elasticities for the major Australian tourist markets: USA, UK, Japan and New Zealand over the sample period 1980 to 2001 using co-integration analysis and the dynamic modelling approach. In order to assess the performance of TA marketing strategy this study estimates the average dollar return per dollar invested in international tourism marketing for the major tourist markets.

Objectives of Study

The objectives of this study included:

- To quantify the effects of marketing expenditure by the TA on international visitor arrivals from the major tourist markets: USA, Japan, UK and New Zealand.
- To analyse the performance of the TA marketing strategy, estimate the dollar return per dollar invested in international tourism marketing and compare this with Crouch, Schultz and Valerio (1992) and Access Economics (1997, 2002) estimates.

Methodology

The following methods were utilised in this study:

- Tourism demand function equation represent double-log function form
- Co-integration Analysis
- Dynamic Modelling Approach

Key Findings

The following key findings resulted from this study:

- TA marketing expenditure has a positive effect on international tourism demand and this finding is similar to studies by Crouch et al. (1992) and Access Economics (1997, 2002).
- TA marketing expenditure elasticity estimates vary from country to country. This finding is also similar to the study by Crouch et al. (1992).
- The performance of the TA marketing strategy is higher in the New Zealand market followed by UK, Japan and USA markets. The overall average performance of the TA marketing strategy estimated dollar return per dollar invested in international tourism marketing is 8:1.
- In addition to TA and non-TA marketing promotion, this study also found that both visitor satisfaction leading to repeat visits and ‘word of mouth’ effect play important roles in promoting international visitor arrivals to Australia.
- The estimated high-income elasticity indicates that international tourism is a luxury item and it can be highly influenced by the tourist origin country’s economic growth cyclical pattern. This finding is similar to the studies by Crouch et al. (1992), Kulendran (1997) and Access Economics (1997, 2002).

Future Action

The finding suggests that TA should revisit the current tourism marketing strategies in order to increase the impact of TA marketing expenditure and to increase the arrivals from the major tourism markets: USA, Japan, UK and New Zealand.
Chapter 1

INTRODUCTION

International tourism is a traded service and is important to countries as it contributes foreign exchange earnings, employment, and economic growth. In the face of fluctuating global economy, international tourism continued to grow during the last two decades and is considered to be the second largest industry in the world. According to estimates from the World Tourism Organization (WTO), international tourism accounts for 6% of the global Gross Domestic Product (GDP) and 5% of the global employment. Given the significant contribution of this industry and the highly competitive nature of the global tourism market, many countries invest a large amount of scarce resources into tourism marketing in order to increase their market shares.

The Australian Government allocates a substantial amount of their budget to Tourism Australia (TA) to accomplish the task of tourism promotion to Australia. Tourism Australia was established on 1 July 2004, bringing together the collective skills and knowledge of four separate organisations: the Australian Tourist Commission; See Australia; the Bureau of Tourism Research and Tourism Forecasting Council. The objective of the TA is to create and increase awareness as well as the desire to travel to Australia compared to other competing destinations. In this process the TA is in partnership with the Australian travel industry, and Federal and State/Territory Governments. With limited resources, the TA allocates resources to markets and market segments that offer the greatest potential yield (the level of expenditure by international visitors on Australian tourism products). A major share of this expenditure is devoted to four major origin markets, namely Japan, New Zealand, UK and the US (see Figure 1).

Figure 1: Average TA expenditure (A$1,000) from 1980-2001

![Average TA expenditure (A$1,000) from 1980-2001](image)

The Australian Government funding commitments to the TA’s marketing activities is continuous. For example, Government funding to the TA in 1987 was $47.7 million (in 1997/98 dollars) and in 2003 was $99.7 million (in 1997/98 dollars) in 2003 (see Figure 2).

Figure 2: Federal Government funding to the TA in 1997/98 dollars

![Federal Government funding to the TA in 1997/98 dollars](image)

Source: TA Online Website
When there is spending on public funding, there is a demand for justifying such spending and in particular, the return associated with the TA’s promotional activities. In the past, only a few international tourism demand studies (e.g. Witt & Martin 1987) assess the impact of marketing expenditure on international tourism demand due to the difficulty of obtaining the relevant data. In the case of Australian inbound tourism demand, the first such study by Crouch et al. (1992) covering the period 1970 to 1980 revealed that marketing expenditures have positive effects on tourism demands with elasticities ranging from 0.11, 0.2, 0.25 and 0.14 for USA, Japan, UK and New Zealand respectively. Also, Access Economics reports (1997, 2002) commissioned by TA published the TA marketing expenditure elasticity (0.12 in year 1997 and 0.15 in year 2002) as an aggregate elasticity not specific to USA, Japan, UK and New Zealand. Further, the Access Economics studies estimated a regression on level and first differences of the data series. There is a need for re-estimation of the TA marketing expenditure elasticities for several reasons. Firstly, due to changes in the TA’s marketing strategies, consumers’ preferences, world events and technology, the Crouch et al. (1992) study estimates may not be valid for the current time-period. Secondly, in the tourism demand model estimation Crouch et al. (1992) and Access Economics (1997, 2002) studies failed to take into account the non-stationarity properties of economic variables. If non-stationary time-series are employed in regression analysis, then the asymptotic distribution of the OLS coefficient estimators do not generally follow a normal distribution and the validity of the statistical inferences using the standard t and F tests may be in doubt (Phillips 1986). If the regressors are non-stationary, the regression analysis can be considered in many cases. Estimation using the first differences enables the series to satisfy the condition of stationarity but the draw-back is that differencing eliminates the long-run information. Recent developments in the model estimation include ‘general to specific’ modelling and co-integration analysis, which have provided a methodology to deal with these estimation problems. Within the ‘general to specific’ dynamic models, a number of studies (Song & Witt 2003; Song, Witt & Jensen 2003; Song, Wong & Chon 2003) used the simple autoregressive distributed lag model (ADLM) to estimate the tourism demand model, where other studies (Divisekera 1995; Kulendran 1996; Kulendran & King 1997; Lim & McAleer 2001; Song, Wit & Jensen 2003) used the co-integration and error-correction mechanism (ECM). The theory of co-integration tries to study the inter-relationships between long-run movements in economic time-series. The advantage of using ADLM and co-integration analysis is that one can obtain both long and short run elasticity estimates. Kulendran and Witt (2001) indicated that:

‘Whenever the stationarity assumption underlying least squares regression models is violated, the models may be mis-specified, and as such are likely to offer poor advice. By contrast, the co-integration/ECM approach is likely to offer much more reliable information with regard to policy formulation.’

This report attempts to estimate the TA marketing expenditure elasticities for the major Australian tourist markets: USA, UK, Japan and New Zealand over the sample period 1980 to 2001 using co-integration analysis and dynamic modelling approach. The remainder of the paper is organised as follows: Tourism demand modelling strategy is discussed in Chapter 2. The time-series properties of data and co-integration analysis are discussed in Chapter 3. Dynamic modelling approach is discussed in Chapter 4. Cost-effectiveness analysis is considered to estimate the dollar return per dollar invested in the international tourism marketing in Chapter 5. Chapter 6 provides the concluding remarks.
Chapter 2

TOURISM DEMAND MODELLING STRATEGY

The consumer theory of choice postulates that the demand for a given commodity depends on consumer’s income, prices and any other variable specific to the commodity in question. In the context of tourism, the level of discretionary income available to individuals and the costs associated with foreign travel are the key economic determinants of foreign travel. These determinants together with non-economic factors such as destination attributes also influence destination choices. In the absence of complete information regarding destinations and their attributes, it is reasonable to assume that marketing and promotional efforts by the destination countries could have a significant effect on the choice of destinations. Accordingly, visitor flows from a given origin country $Q$ (number of visitors) to a given destination may be expressed as a function of income, prices and marketing expenditure:

$$Q = f(Y, P, PS, AF, A)$$

In this equation, $Y$ is the tourist disposable income, $P$ is the price of tourism goods and services at the destination, $PS$ is the price of broadly competing (or alternative) destinations, $AF$ is the one-way economic airfare from the origin to the destination, and $A$ represents marketing/advertising expenditure.

Variable Specification and Data

The simple model defined above assumes that the visitor flows from a given country to a destination can be explained by the disposable income of the tourist, the price of tourism products at the destination, the price of tourism products at the substitute destination, the price of travel (cost of transport) to that destination, and marketing expenditures. The real personal disposable income is clearly the most appropriate measure of income for our purpose. However, as such data is not available for all source countries, real GDP divided by the population (to remove the population effect) is considered as a proxy for tourist income. The main economic indicators from the Department of Statistics, Organisation for Economic Cooperation and Development (OECD) publish annual time-series of GDP for the countries. In relation to tourism prices, a realistic measure should reflect the cost of a common basket of goods and services consumed by tourists (Divisekera 2003). Due to unavailability of the relevant data, the real exchange rate is used as a proxy for tourism prices. To calculate the price of tourism products in Australia, the Australian consumer price index (CPI) is divided by the origin country CPI and multiplied by the bilateral exchange rate. This tourism price formulation is based on the assumption that tourists compare the cost of living in Australia with domestic tourism. The cost of transport was measured by the one-way economic airfare from London, Tokyo, Auckland and San Francisco to Sydney. This data was obtained from the ABC World Airways Guide and Passenger Air Tariff monthly publications.

To construct the substitute price, past tourism demand studies (Martin & Witt 1988; Kulendran & Witt 2001; Song, Wong & Chon 2003) have used the weighted average (based on the previous market share) of cost of living for tourists in competing destinations. To select the substitute destination, attributes such as geographic location, culture, distance of travel, climate and sandy beaches have been considered in the past. In the case of Australian tourism, past tourism demand studies (Kulendran 1996; Kulendran & King 1997) did not consider the weighted average approach to calculate the substitute price for USA, Japan, UK and New Zealand tourists but selected a substitute destination for USA, UK and Japan based on characteristics such as sandy beaches and climate. To select the substitute destination for USA, Japan and UK tourists, this study considered the previous Australian tourism demand studies by Kulendran (1996) and Kulendran and King (1997). While the use of weighted average of prices has its advantages when competing destinations are located relatively close to the tourist’s origin country, it is not necessarily superior to the use of one destination as a substitute for long haul destinations such as Australia because of their uniqueness.

For USA tourists, Hawaii is a substitute long-haul holiday destination for Australia. Queensland and Hawaii have a lot in common, such as sandy beaches and climate. This shows that USA tourists compare the cost of holidaying in Australia with a domestic holiday. This is similar to the construction of price of tourism for USA. As a result, for the USA model there is no substitute price variable.

For UK tourists, Hawaii or California is considered as a substitute long-haul destination for Australia due to similar attributes such as sandy beaches and climate. For the UK model, the substitute price is defined as the Australian price relative to the USA price level.
Japanese tourists, compare the living cost in Australia with Hawaii because Queensland and Hawaii have a lot in common such as sandy beaches and climate. Furthermore, for Japanese tourists the travel distance to Hawaii and Australia are almost same. For the Japan model the substitute price is defined as the Australian price relative to the USA price.

New Zealand is geographically closer to Australia and the tourist arrivals pattern from New Zealand to Australia is different to the arrivals from the USA, UK and Japan. Its proximity to Australia permits a high level of one-day return trips. For the New Zealand model there is no substitute price, it is natural for New Zealanders to compare the costs of domestic holiday with one in Australia.

Marketing expenditure data were obtained from Crouch et al. (1992) and the TA budget progress reports. This data contains TA expenditure and industry contributions to TA expenditure. The nominal marketing expenditures (in $A) converted to tourist origin country currency by multiplying the origin country/Australian exchange rate and dividing by the CPI of the origin country. The resulting variable represents the purchasing power of the expenditure on marketing in each of the foreign countries. Finally, the dependent variables in this study measured as the number of annual tourist arrivals from the origin country to Australia in any year divided by the population of the origin country, and the relevant visitor arrivals data was obtained from the Australian Bureau of Statistics (ABS) publications. A dummy variable (D1 = 1, when t = 2000, 0 otherwise) was included in the tourism demand model to represent the Olympic games in Sydney, Australia in the year 2000. Another dummy variable (D2 = 1, when t = Sept 2001 and Dec 2001, 0 otherwise) was included in the model to represent the September 11, 2001 incident in the USA.

Limitations

It is recognised that there are some limitations in the selection of a substitute destination for Australia because USA and UK tourists may choose other long-haul holiday destinations as an alternative to Australia. The cost of travel to a competing destination is not included in this study due to data limitations. Marketing expenditure data included in this estimation contains TA marketing expenditure and industry contributions to TA expenditure but do not contain non-TA private sector and state/territory government marketing expenditure data, which could not be obtained from the source.

The tourism demand equation defined below represents the double-log functional form and has the advantage that the estimated parameter $\beta_1$, $\beta_2$, $\beta_3$, $\beta_4$, and $\beta_5$ can be readily interpreted as income, price, price of substitute and marketing expenditure elasticities.

$$\ln Q_t = \alpha_0 + \beta_1 \ln Y_t + \beta_2 \ln P_t + \beta_3 \ln P_{St} + \beta_4 \ln AF_t + \beta_5 \ln A_t + e_t$$

where $e_t$ is the error term.
Chapter 3

CO-INTEGRATION ANALYSIS

Co-integration analysis begins with testing unit root in the economic variables. The Augmented Dickey Fuller (ADF) unit root test procedure was used to test whether the dependent and independent variables in the tourism demand models are non-stationary. The test has the null hypothesis $H_0$: non-stationary time-series (or unit root), when the null hypothesis is not rejected, it shows that the series has stochastic non-stationary trend and the order of integration is I(1). Unit root tests in this study were carried out using Microfit 4.0 (Pesaran & Pesaran 1997) and the results show that the variables $Q_t$, $Y_t$, $P_t$, $P_{St}$, $AF_t$ and $A_t$ in the tourism demand model are non-stationary and have the order of integration I(1). Having identified that the economic variables are I(1), co-integration analysis was considered to identify the long-run co-integration relationship. Previous Australian tourism demand studies (Kulendran 1996; Kulendran & King 1997) used Johansen’s (1988) Full-Information Maximum Likelihood (FIML) method to estimate the long-run co-integration relationships. The advantage of using FIML approach is that it can detect more than one long-run co-integration relationship between variables. However, for a small sample FIML procedure is not effective and therefore it is not considered. This study used Engle and Granger (1987) two-step procedure to estimate the long-run co-integration relationship and it assumes that there is only one long-run co-integration relationship. This procedure involves firstly estimating the static regression by OLS (Ordinary Least Squares) method and then estimating the ECM with the error correction term by the OLS method. All the model estimation in this study were carried out using SAS program (version 8) and Microfit program (version 4.0). In the long-run co-integration estimation procedure, all variables included in the model are in level and they are deleted from the model only when the variables appear with the incorrect sign. In the ECM modelling, all variables are first differenced ($\nabla$ stationary time-series and the t test were used to select the preferred model. The long-run information lost through differencing is reintroduced via an error correction term, which measures the extent to which the endogenous variables have temporarily departed from the long-run relationship. The estimated long-run co-integration relationship and ECM short-run dynamic models by OLS method are presented in Table 1 and Table 2.

Table 1: Long-run co-integration models (1980-2001)

<table>
<thead>
<tr>
<th>Countries</th>
<th>Co-integration Models</th>
</tr>
</thead>
<tbody>
<tr>
<td>USA</td>
<td>$\ln Q_t = 22.27 + 3.13 \ln Y_t - 0.30 \ln P_t + 0.03 \ln A_t$</td>
</tr>
<tr>
<td>Japan</td>
<td>$\ln Q_t = 57.63 + 6.21 \ln Y_t - 0.37 \ln P_t + 0.02 \ln A_t$</td>
</tr>
<tr>
<td>UK</td>
<td>$\ln Q_t = 24.32 + 2.41 \ln Y_t - 0.32 \ln P_t + 0.05 \ln A_t$</td>
</tr>
<tr>
<td>NZ</td>
<td>$\ln Q_t = 14.81 + 1.46 \ln Y_t - 0.94 \ln P_t - 0.93 \ln A_{St} + 0.08 \ln A_t$</td>
</tr>
</tbody>
</table>
Table 2: ECM models (1980-2001)

<table>
<thead>
<tr>
<th>Countries</th>
<th>ECM Models</th>
</tr>
</thead>
</table>
| USA       | ∇Ln(Q)_t = 0.032 + 0.629∇Ln(Q)_{t-1} - 1.29 D_2 - 0.651e_{t-1}  
(t = 2.09) (t = 4.68) (t = -2.15) (t = -5.25)  
AdjR^2 = 0.615, F(2,17) = 16.2, DW = 1.81, LM(1) = 0.001  
RESET(1) = 0.48, JB(2) = 0.55, BP(1) = 0.01 |
| Japan     | ∇Ln(Q)_t = 0.049 + 0.793∇Ln(Q)_{t-1} - 0.187∇Ln(A)_{t-1} - 1.143e_{t-1}  
(t = 1.66) (t = 4.64) (t = -3.07) (t = -3.84)  
AdjR^2 = 0.62, F(3,15) = 11.13, DW = 2.21, LM(1) = 7.86,  
RESET(1) = 4.59, JB(2) = 1.11, BP(1) = 0.123 |
| UK        | ∇Ln(Q)_t = 0.068 - 0.711e_{t-1}  
(t = 4.63) (t = -4.00)  
AdjR^2 = 0.43, F(1,19) = 15.99, DW = 1.92, LM(1) = 2.75,  
RESET(1) = 0.925, JB(2) = 0.96, BP(1) = 1.31 |
| NZ        | ∇Ln(Q)_t = 0.035 - 0.89 ∇Ln(P)_{t-1} - 0.364e_{t-1}  
(t = 1.41) (t = -2.97) (t = -1.80)  
AdjR^2 = 0.49, F(2,17) = 9.98, DW = 1.49, LM(1) = 0.85,  
RESET(1) = 0.00029, JB(2) = 0.908, BP(1) = 0.325 |

NOTE: DW, Durbin Watson Statistics; LM(1), Lagrange multiplier chi-square statistics to test the first order serial correlation; RESET, chi-square functional form test; BJ(2), Bera and Jarque test for the normality assumption; BP(1), Breusch and Pagan test to test the null of homoscedasticity.

In the ECM model estimation, one lag of change in tourist arrivals, income, price, substitute prices, airfare and marketing expenditure were considered and Table 2 shows only significant lags. Among the dummy variables, the Olympic event is statistically insignificant while the September 11 incident is significant at the 5% level. The error-correction term ($e_{t-1}$) in the ECM constructed from the long-run co-integration relationship is significant at the 5% level and has the expected negative sign. Estimated ECM’s shown in Table 2 are valid because the F statistics and the diagnostic tests for the error terms are generally satisfactory at the 5% level.

As summarised in Table 3, all income, price and marketing expenditure elasticities have expected signs, income elasticities are positive and vary from 1.46 and 6.21. Also, they are greater than unity implying that international demand for Australian tourism is income elastic. This finding is consistent with a priori expectations as international tourism is a luxury consumption. High-income elasticity implies that a small increase (or decrease) in tourist origin country income is likely to increase (or decrease) high flow of tourist arrivals. As a result, tourist origin country income can be considered as a powerful variable in explaining the tourist flows to Australia. In comparison, New Zealand has the smallest income elasticity, whereas long haul destinations generally have high-income elasticity. The estimated income elasticity suggests that a 1% increase in real income results in a 3.13%, 6.21%, 2.41% and 1.46% increase in tourist arrivals to Australia from USA, Japan, UK and New Zealand respectively. Income elasticity estimates are important to determine whether international tourism is a luxury item, normal item or inferior item. Estimated high-income elasticity shows that tourism is considered as a luxury item. Estimated price elasticity coefficients are less than one and inelastic. This implies that changes in tourism prices have less impact on tourist arrival. The marketing expenditure elasticity estimates are less than unity or inelastic, varying from 0.02 to 0.08, and has the expected positive signs confirming our a priori expectations. The marketing expenditure elasticity estimates suggest that a 1% increase in marketing expenditure results in a 0.03%, 0.02%, 0.05% and 0.08% increase in tourist arrivals to Australia from USA, Japan, UK and New Zealand respectively. The price of substitutes is not appearing in all long-run co-integration relationships and the cost of airfare is appearing only in New Zealand’s long-run relationship.

Table 3: Tourism demand elasticity estimates (1980-2001)

<table>
<thead>
<tr>
<th>Countries</th>
<th>Y</th>
<th>P</th>
<th>PS</th>
<th>PS</th>
<th>AF</th>
<th>A</th>
</tr>
</thead>
<tbody>
<tr>
<td>USA</td>
<td>3.13</td>
<td>0.30</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>0.03</td>
</tr>
<tr>
<td>Japan</td>
<td>6.21</td>
<td>0.37</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>0.02</td>
</tr>
<tr>
<td>UK</td>
<td>2.41</td>
<td>0.32</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>0.05</td>
</tr>
<tr>
<td>NZ</td>
<td>1.46</td>
<td>0.94</td>
<td>-</td>
<td>0.93</td>
<td></td>
<td>0.08</td>
</tr>
</tbody>
</table>
Chapter 4

DYNAMIC MODELLING

In the dynamic modelling approach, dependent variable $Q_t$ is expressed as a function of its own lagged values, and the current and lagged values of all explanatory variables. For a small sample, Banerjee, Dolado, Galbraith and Hendry (1993) suggested it is better to use dynamic modelling than static regression approach to avoid bias in the long-run estimates. When economic variables are non-stationary, estimation of dynamic models by OLS method has been discussed in Wickens and Breusch (1988) and Banerjee et al. (1993). Dynamic models can be estimated by the OLS method when economic variables are non-stationary, only if variables have the same order of integration and combination of dynamic specification of variables are I(0) or stationary. The problem with the dynamic modelling procedure is that if the current and lagged terms are non-stationary and not co-integrated then the true process become non-stationary.

The simplest dynamic tourism demand model can be written as:

$$
\ln Q_t = \alpha_0 + \alpha_1 \ln Q_{t-1} + \delta_1 \ln Y_t + \delta_2 \ln Y_{t-1} + \delta_3 \ln P_t + \delta_4 \ln P_{t-1} + \delta_5 \ln P_{St} + \delta_6 \ln P_{St-1} + \delta_7 \ln A_{Ft} + \delta_8 \ln A_{Ft-1} + \delta_9 \ln A_t + \delta_{10} \ln A_{t-1} + \epsilon_t
$$

where $\epsilon_t$ is the error term and $\alpha_t < 1$. This model can be estimated using the OLS method.

In dynamic modelling many lags can be introduced if quarterly or monthly data are used in the model estimation. In this study, where annual data is used, only one lag period is considered due to the small sample size assuming it is sufficient to capture the dynamic nature in tourism. To obtain the long-run income, price, price of substitutes, airfare and marketing expenditure elasticity estimates we need to use some algebraic manipulation and assume that in the long-run:

$$
\ln Q_t = \ln Q_{t-1}; \ln Y_t = \ln Y_{t-1}; \ln P_t = \ln P_{t-1}; \ln P_{St} = \ln P_{St-1}; \ln A_{Ft} = \ln A_{Ft-1}; \text{and} \ln A_t = \ln A_{t-1}.
$$

Tourism demand dynamic model can be written as;

$$
\ln Q_t = \alpha_0 / (1-\alpha_1) + (\delta_1 + \delta_2) / (1-\alpha_1) \ln Y_t + (\delta_3 + \delta_4) / (1-\alpha_1) \ln P_t + (\delta_5 + \delta_6) / (1-\alpha_1) \ln P_{St} + (\delta_7 + \delta_8) / (1-\alpha_1) \ln A_{Ft} + (\delta_9 + \delta_{10}) / (1-\alpha_1) \ln A_t + \epsilon_t
$$

Income elasticity estimate $\beta_1 = (\delta_1 + \delta_2) / (1-\alpha_1)$;
Price elasticity estimate $\beta_2 = (\delta_3 + \delta_4) / (1-\alpha_1)$;
Price of substitute elasticity estimate $\beta_3 = (\delta_5 + \delta_6) / (1-\alpha_1)$;
Airfare elasticity estimate $\beta_4 = (\delta_7 + \delta_8) / (1-\alpha_1)$; and
Marketing expenditure elasticity estimate $\beta_5 = (\delta_9 + \delta_{10}) / (1-\alpha_1)$.

The above dynamic modelling approach captures the time-adjustment process in tourism demand modelling by assuming that current tourism demand is not only influenced by the current values of income, price, price of substitutes, airfare, marketing expenditure but also the past values. TA marketing expenditure has long-term effects on the tourism demand, but that effect diminishes as time passes. Inclusion of lagged value of marketing expenditure assumes that current and past advertising expenditures are likely to influence the current demand. The lagged dependent variable is included to capture the ‘word of mouth effect’ (Witt, Brooke & Buckley 1991), which also plays an important role in destination selection. Tourists obtain information about a particular destination from other tourists who have already visited that destination. Further, a lagged dependent variable is included in the tourism demand modelling to capture the repeat visits, which indicates that tourists tend to return to the same destination if they like it, in order to avoid risk. Dynamic models were estimated by the OLS methods and only the significant variables are presented in the Table 4. The effect of the special events of the Olympic Games and September 11, 2001 were also examined including dummy variables in the dynamic models and they are not significant at 5 percent level. The models shown in Table 4 are valid because the $\text{adjR}^2$, the $F$ statistics and the diagnostic tests for the error terms are generally satisfactory at the 5% level.
Table 4: Estimated dynamic models

<table>
<thead>
<tr>
<th>Countries</th>
<th>Estimated Dynamic Models (1980-2001)</th>
</tr>
</thead>
<tbody>
<tr>
<td>USA</td>
<td>Ln(Qt) = 19.38 + 2.5459Ln(Yt) - 0.66714Ln(Pt) + 0.0441ln(At-1) (t = 7.04) (t = 6.28) (t = -3.313) (t = 1.403) AdjR2 = 0.93, F(3,17) = 93.38, DW = 1.38, LM(1) = 1.17, RESET(1) = 1.9 JB(2) = 1.50, BP(1) = 0.21</td>
</tr>
<tr>
<td>Japan</td>
<td>Ln(Qt) = 51.77 + 5.5594ln(Yt) – 0.45167Ln(Pt-1) + 0.078Ln(At-1) (t = 18.53) (t = 17.04) (t = -4.29) (t = 2.74) AdjR2 = 0.99, F(3,17) = 1496.5, DW = 1.72, LM(1) = 0.024, RESET(1) = 7.18 JB(2) = 0.27, BP(1) = 0.009</td>
</tr>
<tr>
<td>UK</td>
<td>Ln(Qt) = 22.94 + 2.17ln(Yt) – 0.556Ln(Pt-1) + 0.054ln(At-1) (t = 9.25) (t = 7.58) (t = -3.102) (t = 2.048) AdjR2 = 0.96, F(3,17) = 212.1, DW = 1.85, LM(1) = 0.061, RESET(1) = 4.1 JB(2) = 13.19, BP(1) = 1.54</td>
</tr>
<tr>
<td>New Zealand</td>
<td>Ln(Qt) = 11.339 + 0.419 Ln(Qt-1) + 1.464Ln(Yt) – 0.986Ln(Pt-1) + 0.042Ln(At-1) (t = 4.36) (t = 2.92) (t = 3.33) (t = -3.09) (t = 2.12) AdjR2 = 0.92, F(4,16) = 60.60, DW = 1.71, LM(1) = 0.44, RESET(1) = 3.83 JB(2) = 0.215, BP(1) = 0.156</td>
</tr>
</tbody>
</table>

Notes: DW, Durbin Watson Statistics; LM(1), Lagrange multiplier chi-square statistics to test the first order serial correlation; RESET, chi-square test of functional form; BJ(2) Bera and Jarque test for the normality assumption; BP(1), Breusch and Pagan test to test the null of homoscedasticity.

Estimated long-run elasticity coefficients from dynamic modelling are presented in Table 5. Income elasticity estimates vary between 2.17 and 5.55 and are greater than unity. The estimated income elasticity suggests that a one percent increase in real income results in a 2.54%, 5.55%, 2.17% and 2.52% increase in tourist arrivals to Australia from USA, Japan, UK and New Zealand respectively. For USA, Japan and UK price elasticity estimates are less than unity. This implies that changes in price have less of an impact on tourist arrivals. For New Zealand, price elasticity is greater than unity. The marketing expenditure elasticity estimates are less than unity, they vary from 0.04 to 0.08 and have the expected positive signs confirming our a priori expectations. The estimated marketing expenditure elasticity estimates suggest that a 1% increase in marketing expenditure results in a 0.04%, 0.08%, 0.05% and 0.07% increase in tourist arrivals to Australia from USA, Japan, UK and New Zealand respectively.
COST-EFFECTIVENESS ANALYSIS

In the past, to examine the TA marketing strategy performance in the major tourism markets and to estimate the dollar return per dollar invested in international tourism marketing Crouch et al. (1992) study estimated the benefit-cost ratio. Dwyer and Forsyth (1993) indicated the problem of using the gross receipts from inbound tourism as the benefits to destination country. Cost-Effectiveness (CE) analysis is a technique that can be used as a tool for addressing the issues of efficiency in the allocation of scare resources, and it is about marginal (also called incremental) cost and effectiveness. Marginal cost of a simple strategy is the difference between the cost of a simple strategy and the cost of doing nothing. The calculation is similar for effectiveness. The final outcome measure for the analysis is the CE ratio: the ratio of marginal effectiveness to the ratio of marginal cost. The marginal effectiveness from the TA marketing is the increase in tourist receipts that arise from tourism marketing and the marginal cost is the increase in expenditure that is actually incurred by implementing the Australian government tourism marketing policy. CE analysis shows the relationship between the estimated marketing expenditure elasticity estimates and the ratio between increased tourist receipts and the increased marketing expenditure. To obtain the increase in tourist receipts increase in international visitor arrivals due to TA marketing policy were multiplied by the average expenditure of international visitors in Australia and the average expenditure of international visitors was obtained from the International Visitor Survey (Australian Tourist Commission 1981-1985 and Bureau of Tourism Research 1986-2002). The calculated CE ratio for USA, Japan, UK, and New Zealand are presented in Table 6.

The CE ratio shows the dollar return per dollar invested in the tourism marketing. The following table indicates that New Zealand market has the highest return per dollar invested (25.89:1), followed by UK, Japan and USA markets.

<table>
<thead>
<tr>
<th>Market</th>
<th>Marketing elasticity</th>
<th>Average marketing expenditure (2000-2001) (000)</th>
<th>Average tourist arrivals (000)</th>
<th>Marketing increase by 1% (000)</th>
<th>Arrivals increase (000)</th>
<th>Tourist average expenditure (2000-2001) (000)</th>
<th>Receipts increase (000)</th>
<th>Effectiveness-cost ratios</th>
</tr>
</thead>
<tbody>
<tr>
<td>USA</td>
<td>0.035</td>
<td>21,876</td>
<td>488</td>
<td>218.76</td>
<td>0.1708</td>
<td>2,425</td>
<td>414.19</td>
<td>1.89</td>
</tr>
<tr>
<td>Japan</td>
<td>0.05</td>
<td>17,319</td>
<td>697</td>
<td>173.19</td>
<td>0.3485</td>
<td>1,327</td>
<td>462.45</td>
<td>2.67</td>
</tr>
<tr>
<td>UK</td>
<td>0.05</td>
<td>25,779</td>
<td>599</td>
<td>257.79</td>
<td>0.2995</td>
<td>2,725</td>
<td>816.13</td>
<td>3.16</td>
</tr>
<tr>
<td>New Zealand</td>
<td>0.075</td>
<td>2,869</td>
<td>816</td>
<td>28.69</td>
<td>0.6120</td>
<td>1,214</td>
<td>742.96</td>
<td>25.89</td>
</tr>
</tbody>
</table>

a: average marketing elasticity estimates form co-integration analysis and dynamic modelling; d: 1 percent increase in b; e: as the result on average c would increase by the percentage of a; g: e multiply by f; h: g divided by d.
Chapter 6

CONCLUSION

In this report a single equation demand model was estimated to quantify the effects of marketing expenditure on Australian inbound tourism demand. Two modelling approaches were used: co-integration and dynamic modelling. Parameter estimates in relation to marketing expenditure derived from both models are positive implying that marketing has a significant effect on the tourist flows. The degree of sensitivity of marketing expenditure revealed from two models is broadly similar in magnitude with one exception and namely Japan. The long-run marketing expenditure derived from the co-integration modelling approach are 0.03, 0.02, 0.05, 0.08 for USA, Japan, UK and New Zealand, respectively, while the dynamic model estimates are 0.04, 0.08, 0.05 and 0.07. In small sample estimation, dynamic modelling approach seems to provide more reliable estimates than the co-integration analysis (Maddala 2001). The estimated effects of TA marketing expenditure on international visitor arrivals derived from this study are less than the estimates of the study by Crouch et al. (1992). Hence the findings suggest that TA should revisit the current tourism marketing strategies in order to increase the impact of TA marketing expenditure and to increase the arrivals from the major tourism markets USA, Japan, UK and New Zealand.

To assess the performance of TA marketing strategy in the major tourism markets USA, Japan, UK and New Zealand this study estimated the dollar return per dollar invested in tourism marketing and the estimates are, 1.89:1, 2.67:1, 3.16:1 and 25.89:1 respectively. These estimates show that the New Zealand market has the highest return and this finding is similar to the finding by Crouch et al. (1992) study followed by UK, Japan and USA markets. Based on the individual market estimates, calculated overall average dollar return per dollar invested in tourism marketing is 8:1. Crouch et al. (1992) estimates are 9:1, 41:1, 24:1, 24:0.1 12:1 and 220:1 for USA, Japan, UK, (West) Germany, New Zealand and USA respectively and overall average estimate for these markets is 61:1. In comparison, Crouch et al. (1992) estimates are much higher than the estimates made in this study. However, when comparing overall average this study estimate (8:1) is closer to the Access Economics (1997) estimate (8 to 10:1) but smaller than the Access Economics study (2002) estimate (11 to 16:1). Overall, the Crouch et al. (1992) estimate (61:1) is much higher than this study estimate and Access Economics study (2002) estimates.

In addition to TA and non-TA marketing promotion, this study also found that the both ‘word of mouth effect’ and visitor’s satisfaction leading to repeat visits also plays an important role in promoting international visitor arrivals to Australia. Lagged dependent variable included in the tourism demand model to capture the both word of mouth effect and repeat visits is significant in the short-run dynamic models and dynamic models. TA acknowledge that the ‘Visitor satisfaction, leading to repeat visits and word of mouth recommendations is more compelling motivator than advertising’ (ATC 1993). TA uses satisfaction studies of visitors to monitor their impressions/experiences and reactions to their visit to Australia and to identify areas in which services and performance can be improved.

The estimated high-income elasticity indicates that international tourism is a luxury item and it can be highly influenced by the tourist origin country’s economic growth cyclical pattern. For USA, Japan and UK, price elasticity is less than unity and international tourism demand is less responsive to changes in the prices of tourism where as New Zealand tourism demand is more responsive to changes in prices.
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