

Estimates of the Return on Marketing Investment for Australian Inbound Tourism

A Report Written for Tourism
Accommodation Australia

Webber Quantitative Consulting

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About Webber Quantitative Consulting

Webber Quantitative Consulting Pty Ltd is a small boutique consulting firm that specialises in consulting in aviation, tourism and advanced quantitative methods, techniques and modelling. The company has consulted to some of the biggest companies and Government entities in Australia and overseas, including Qantas, Virgin Australia, Telstra, ANZ Bank, KPMG, IATA, Tourism Australia, British American Tobacco, Chevron Australia, Archer Capital, UBS, IATA and Austrade. It was formed in June 2011 by its Managing Director Dr Tony Webber.

Prior to starting the company, Dr Webber was Chief Economist at Qantas, a managing consultant for NECG consulting, a manager and researcher within the Reserve bank of Australia and prior to this an academic for an almost a decade. Dr Webber has presented all over the world on tourism and aviation issues and is regularly interviewed in the Australia and global media discussing airlines and tourism.

0. Executive Summary

- *Webber Quantitative Consulting* has been commissioned by *Tourism Accommodation Australia* to write a brief report on the estimated return on marketing investment generated by the money that has been spent on marketing and promoting Australia. This research has been commissioned with a view to understanding whether there is a case for allocating more public and private sector resources to marketing and promoting Australia.
- Inbound tourism is an important contributor to the Australian economy, generating 2.8% of GDP and 4.7% of Australian employment.
- A number of variables are important in understanding the continued success of the inbound tourism sector in Australia.
 1. As Australia is an island country that is a long distance from most of its key tourism markets, airline capacity is an important driver of the growth in tourism spending.
 2. Travel to Australia is a costly exercise by virtue of the distances that must be travelled, and so the ability of foreign residents to finance the cost of a trip is important.
 3. By virtue of the existence of a number of quality tourism destinations that compete with Australia, such as New Zealand, Hawaii, Guam, Fiji, Phuket and Bali, the relative price of a trip to Australia is also an important consideration.
 4. One of the most important drivers of this relative price is the value of the Australian dollar, the inflated price of which has made it difficult for inbound tourism to grow at average rates over the past decade.
- These key drivers of inbound tourism expenditure must be considered in attempting to isolate the impact of marketing and promotional spending on inbound tourism spending. Multivariate regression analysis applied to time series data is able to separate-out the impact on inbound tourism spending of the abovementioned drivers and marketing and promotional effort.
- There are two metrics that describe the return on marketing investment – the marginal return and the average return.
 - The marginal return metric from an inbound tourism perspective examines the **additional** inbound tourism spending that is generated for an **extra** dollar of marketing and promotional spending.
 - The average return metric calculates the difference between inbound tourism spending in a world with and without marketing and promotional spending and then divides this difference by the actual amount of marketing and promotional spending.

The average return measure is expected to be higher than the marginal return because of 'diminishing returns' to marketing investment. Marginal return is the most frequently used metric for return on marketing investment because it describes the return on **additional** investment and so can be used to assess the virtues of investing more money in marketing and promotion. The average return measure is used more to ascertain the **value** that the **totality** of marketing and promotional expenditure provides.

• Multivariate regression analysis is used to build two statistical relationships between inbound tourism spending, marketing and promotional spending and all other drivers of inbound tourism spending – a quadratic relationship in marketing and promotional spending and a double logarithmic relationship.¹ The regression modelling estimates the following key parameters that link inbound tourism spending to marketing and promotion:

- the logarithmic model finds that each 10% increase in promotional and marketing expenditure leads to a 0.46% increase in inbound tourism expenditure; and
- the quadratic model finds that each 10% increase in promotional and marketing expenditure leads to a 0.65% increase in inbound tourism expenditure at current marketing expenditure levels.

Table E.1: Key Results Box I – Marginal Return

• These parameters imply the following estimates of the marginal return on marketing investment:

- **the marginal return on marketing investment over the 4 years to March 2014 estimated using the double logarithmic model is 13.15, meaning that \$1m of additional spending on marketing and promotion results in an additional \$13.15m of inbound tourism expenditure, 5,962 additional visitors and 74 additional tourism jobs.**
- **the marginal return on marketing investment over the 4 years to March 2014 estimated using the quadratic model is 15.86, meaning that \$1m of additional spending on marketing and promotion results in an additional \$15.86m of inbound tourism expenditure, 7,192 additional visitors and 89 additional tourism jobs.**

¹ Two statistical relationships are estimated because it is not clear, at least conceptually, which relationship is preferred.

Table E.2: Key Results Box II – Average Return

- The average return on marketing investment is found as follows:
 - the average return on marketing investment over the 4 years to March 2014 using the double logarithmic model is 30.45, meaning each \$1m of spending on marketing and promotion results in \$30.45m of inbound tourism expenditure, 13,808 visitors and 171 tourism jobs; and
 - the average return on marketing investment over the 4 years to March 2014 using the quadratic model is 21.75, meaning that each \$1m of spending on marketing and promotion results in \$21.75m of inbound tourism expenditure, 9,863 inbound visitors and 122 tourism jobs.

Table E.3: Key Results Box III – Multiplier Effects

- The statistical modelling contained in this report suggests that marketing and promotional spending has had a considerable influence on inbound tourism spending and that each \$10m increase in the marketing and promotional budget is estimate to increase inbound tourism spending by between AUD130m to AUD160m, increase the number of visitors by between 58,948 and 72,552 and increase the number of tourism jobs by between 1,729 and 1,898.
- Via a tourism multiplier of 1.87, these increases in inbound tourism spending are likely to generate benefits for the wider economy of approximately AUD240m to AUD300m and an additional 1,347 to 1,683 jobs.

*Tourism multiplier sourced from Tourism Research Australia. International Visitor Survey results over the 12 months to March 2014 for inbound expenditure split by item indicate that around 27 cents out of every tourism dollar is spent on accommodation.

Table E.4: Key Results Box VI – Accommodation Sector Effects

- The accommodation sector will receive a significant boost as a result of increases in marketing and promotional effort.
- Each AUD1m increase in marketing and promotional effort is expected to increase spending on accommodation by AUD3.6m to AUD4.5m and create between 50 and 55 additional jobs in accommodation.

1. Introduction and Scope

1.1 Introduction

Inbound tourism is an important source of service exports and thus economic growth for the Australian economy. According to ABS estimates inbound tourists spent just over AU\$56b over the 12 months to March 2014, added AU\$39b in value to the economy in FY13, and contributed 2.8% to the economy's GDP in FY13. The tourism sector is also an important contributor to Australian jobs, with over 546K employed in the sector as at June 2013 representing 4.7% of total employment.

There are a number of different drivers of inbound visitor numbers. As a remote island, Australia relies heavily on airline capacity to transport visitors over long distances. Constraints in air capacity can therefore heavily impact on inbound visitor numbers and spending. Foreign visitors finance their travel plans to Australia from their labour income and/or from their stock of wealth and the returns to that wealth. A strong global economy is therefore important in understanding the growth in visitor numbers to Australia. Australia competes with a number of other premium leisure destinations for the tourism dollar. The price of a holiday in Australia relative to the price of holidaying in a substitute destination is therefore another important driver of international visitation spending. An important driver of that relative price is the exchange rate. An Australian dollar that has almost doubled over the past decade has led to a more subdued level of inbound tourism growth over this period because it has made Australia a significantly more expensive destination.

The focus of this report, however, is another important driver of inbound tourism, which is marketing and promotional effort and spending. By creating awareness and an understanding of the quality and variety of the Australian product, marketing and promotional effort in turn translates into visitation. The reward of that visitation, which includes additional spending by inbound tourists, represents the return on the dollars that are spent on the marketing and promotion of Australia.

1.2 Scope

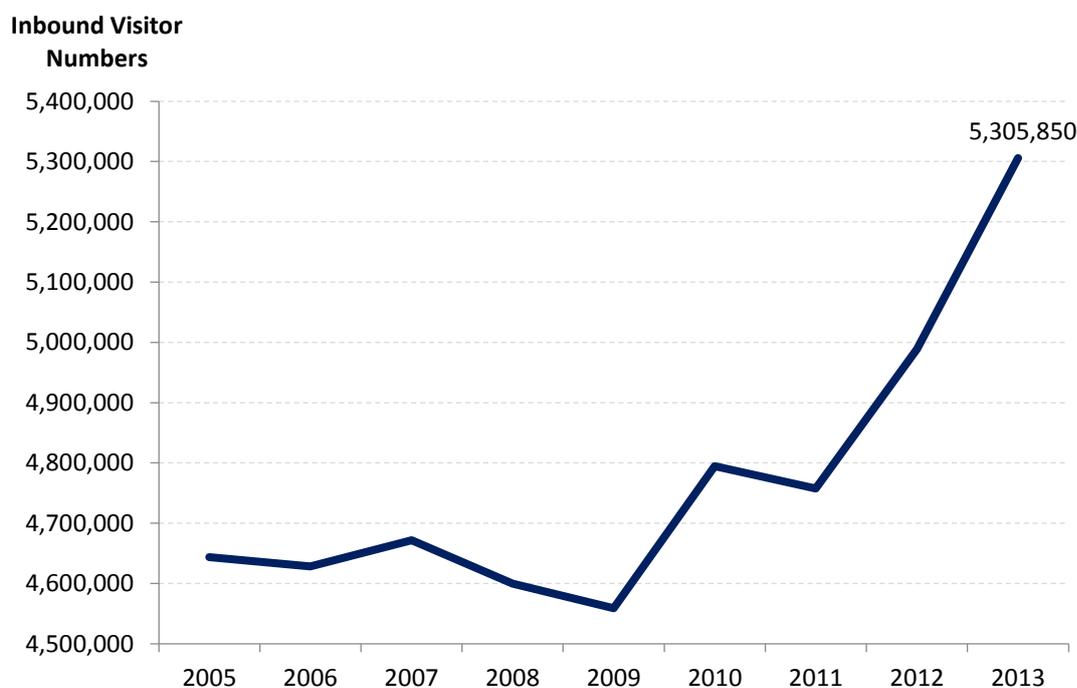
Webber Quantitative Consulting has been approached by *Tourism Accommodation Australia* to estimate the return on marketing investment in the case of aggregate inbound tourism in Australia. The return on marketing investment measures the inbound tourism spending that is generated as a result of spending on marketing and promotion. Two forms of return on marketing investment will be estimated in this report – a marginal return and an average return. The marginal return estimates the return on investment associated with additional spending while the average return estimates the return on investment associated with total spending. Both concepts will be described in detail in this report.

Prior to describing return on marketing investment, however, it is necessary to understand the context for discussion the impact of marketing investment, which is that the tourism industry in Australia is one of the most significant contributors to the economy's growth. This is discussed in section 2. As discussed above, marketing and promotion is just one of many drivers of inbound tourism growth. The impact of other drivers of inbound tourism must be considered in order to isolate the impact of marketing and promotion on inbound tourism spending. This is the topic of discussion of section 3 of this report. Section 4 then describes the analytical details associated with the concept of the return on marketing investment, with focus on the importance of understanding that there are limits on the ability of marketing and promotion to generate additional inbound tourism spending. Section 5 presents the method that is used to estimate return on marketing investment and the results of estimating and modelling inbound visitor spending. Section 6 concludes the report.

2. Inbound Tourism in Australia

Over the 12 months to December 2013, 5.3m tourists visited Australia for all purposes except education and employment – refer to Figure 1 below.²

Figure 1: Number of Inbound Visitors to Australia Excluding Visitors for Employment and Education Purpose



Source: Inbound Visitor Survey, Tourism Research Australia

As indicated in Figure 2 below, the 2013 visitor number figure represents growth of 6.4%, which follows growth of 4.9% in 2012. Prior to the bounce-back in inbound tourism numbers in 2010 just after the Global Financial Crisis, which saw visitor numbers grow by 5.2%, inbound visitor numbers had been in decline for almost half a decade, with visitor numbers in 2009 of 4.600m just under 2% below visitor numbers in 2005 of 4.644m.

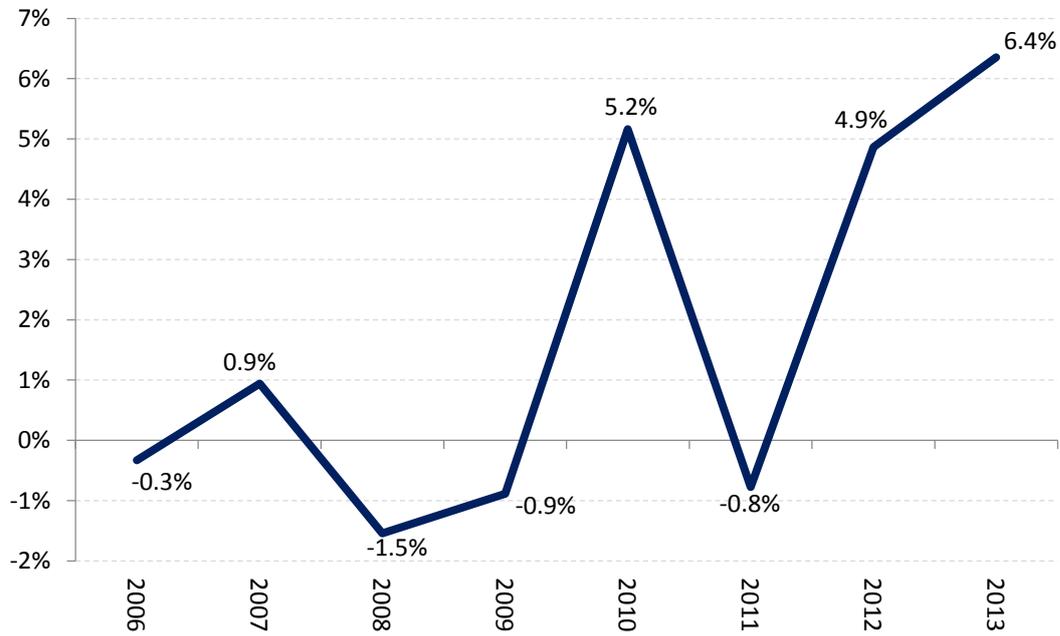
The number of nights spent by inbound visitors in Australia is equal to the number of visitors multiplied by the average length in days that each visitor stays. As indicated in Figure 3 below the average length of stay has been steady at around 26 days for the past 3 years after solid increases between 2005 and 2010.

While the average length of stay has increased the average spend per day has been in trend decline – refer to Figure 4 below. Visitors to Australia, excluding those who visit for education or employment purposes, currently spend around \$84 per day. This is \$10 lower than the spend per day in 2005 and is down from \$100 per day in 2007.

² The focal point of this report will be inbound visitor spending attributable to visitors who are likely to be most affected by marketing and promotion spending. As a result, visitors to Australia for the purpose of education or seeking/starting a job are excluded.

Figure 2: Year-on-Year Change in Inbound Visitors to Australia *

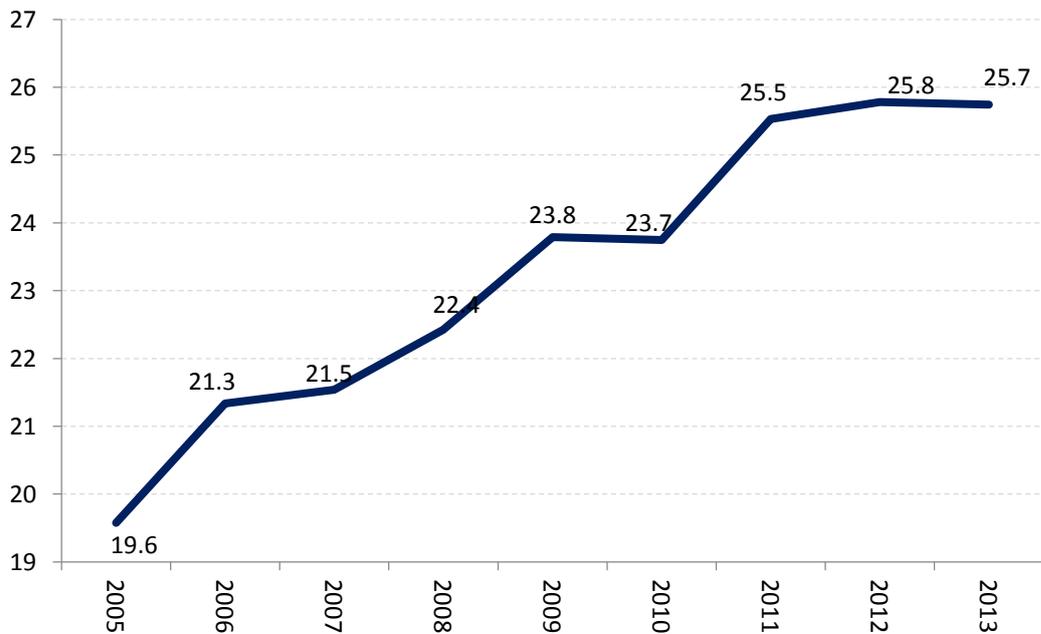
YoY Growth in Inbound Visitors



Source: Inbound Visitor Survey, Tourism Research Australia, calculations by Webber Quantitative Consulting

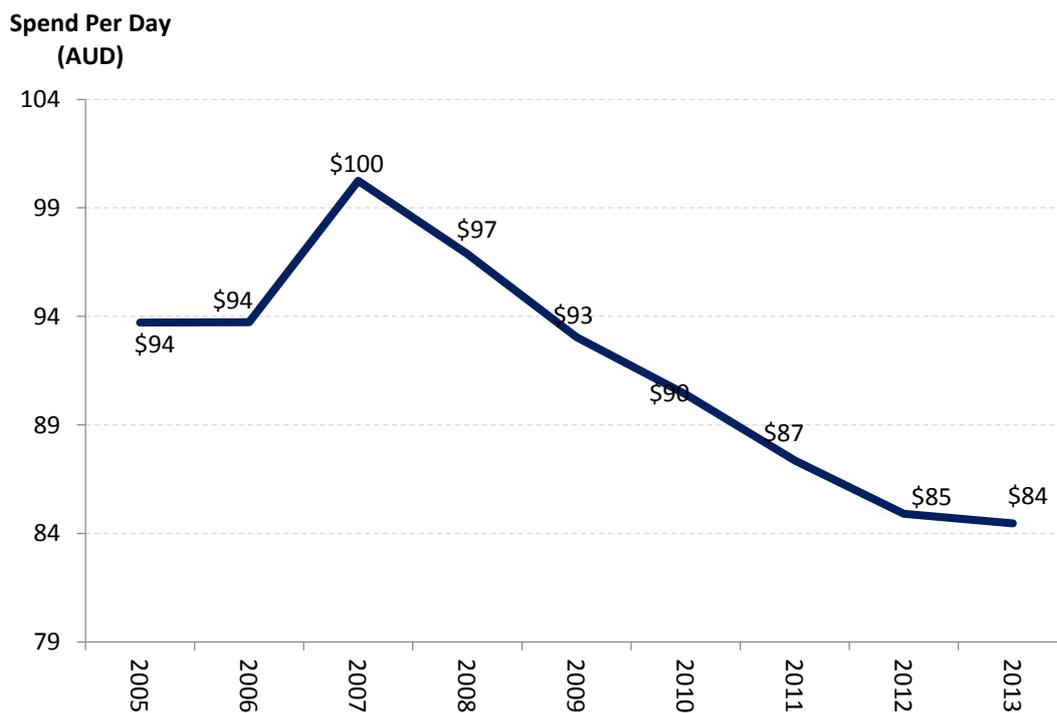
Figure 3: Average Length of Visitor Stay

Average Length of Visitor Stay (Days)



Source: Inbound Visitor Survey, Tourism Research Australia, calculations by Webber Quantitative Consulting

Figure 4: Average Spend Per Day Inbound Visitors



Source: Inbound Visitor Survey, Tourism Research Australia, calculations by Webber Quantitative Consulting

All three components of international visitor spending - visitor numbers, average length of stay and spend per day - are equally important in driving additional inbound tourism spending. Strategies to raise the inbound tourism yield or spend per day should be encouraged with equal enthusiasm as strategies to raise the average length of stay and the number of visitors. International marketing and promotional activities should not only be aimed at raising awareness of Australia and enticing more people to come to the country, but it should also be aimed at encouraging visitors to stay longer (and to visit as many tourism regions as possible) and to spend more when they arrive.

3. What Drives Inbound Tourism Expenditure?

3.1 Context

To isolate the impact of marketing and promotional spending on inbound visitor spending it is necessary to model all of the forces that might impact inbound tourism expenditure and then use techniques to isolate the impact of marketing spending on visitor spending. The purpose of this section is to introduce the key driver variables of inbound visitor spending and use this as the basis for constructing a suitable framework for estimating the return on marketing investment.

By definition, inbound tourism expenditure is the product of three component parts (as discussed in section 2):

$$\text{Inbound Tourism Expenditure} = \text{Number of Inbound Visitors} \times \text{Average Length of Stay} \times \text{Spend Per Day}$$

Each component of inbound tourism spending is driven by different forces, which will now be described in some detail.

3.2 Inbound Visitor Numbers

Australia is a large island continent that is only accessible by foreign visitors in the main part by air.³ As a result of this constraint, the volume of airline capacity is an incredibly important driver of international passenger volumes, both inbound and outbound.

When airlines sell seats they often allocate a certain number of seats for sale to passengers that buy their ticket to Australia in their home country (something airlines call foreign point of sale), with the remaining seats sold to passengers who buy their ticket in Australia. Airlines determine the split of seats to foreign and Australian points of sale according to the relative strength of demand – the stronger is foreign point of sale demand relative to Australian point of sale the more seats that will be allocated to the foreign point of sale.

There are a number of forces that drive the demand for air travel:

- the strength of income in the economy;
- the strength of wealth in the economy and returns to that wealth;⁴
- consumer and business confidence;
- the cost of touring Australia, including airfares, the price of accommodation, the price of land transport on arrival, the price of food and beverages, the price of entertainment and other tourism activities and the exchange rate; and
- structural shocks, both favourable and unfavourable, that impact international air travel, examples of which include the SARS virus, events of terrorism such as September 11 and the Bali bombings, Olympic Games and other major sporting and entertainment events, ash cloud from volcanic eruptions and Tsunamis.

³ Some visitors arrive in Australia by cruise ship but this is a very small proportion of total visitor arrivals.

⁴ Both wealth and income are important drivers of airline demand. Most tourism analyses tend to focus on income, primarily through a consideration of GDP, however wealth is important because a large proportion of consumers finance their consumption decisions by drawing on their wealth, or a combination of their wealth and income. With an ageing population, wealth and the returns to wealth become a significantly more important variable in terms of understanding the demand for inbound visitation.

Each of these factors may play a part in determining how airlines allocate their seats between foreign and Australian point of sale, which will in turn determine the number of inbound visitors to Australia.

3.2 Average Length of Stay

The length of time that a visitor stays in Australia will depend on a number of different forces. This will include the cost of staying in Australia, which will have a base price and an exchange rate element. Average length of stay will also be affected by the capacity of visitors to afford staying a lengthy period of time, which will depend on the income and wealth variables discussed in section 3.1 above. While visitors may have strong desires to stay for a long period of time, those desires will only translate into reality if the consumer has the financial capacity to pay for that extra period of time.

The average length of stay will also depend heavily on the country mix of inbound travel. Passengers are more likely to stay for a short period of time in Australia if the travel distance to Australia is relatively short, because the lower cost of travelling a short distance allows the visitor the ability to afford a greater number of relatively short visits. It is for this reason that visitors from neighbouring countries such as New Zealand, the Pacific Islands and Papua New Guinea stay for shorter periods of time than visitors from the UK and the USA. Purpose of travel is also another important driver of average length of stay, with business travellers likely to stay a shorter period of time than travellers who come to Australia to visit friends and relatives.

Average length of stay will also depend on the constraints that visitors face in terms of the annual leave that is available to them. For countries that permit their residents only a relatively short period of annual leave, as is the case in the USA and Japan, then it is more difficult for those passengers to spend a lengthy period of time away in Australia.

3.3 Average Spend per Day

Average spend per day will be driven by the cost of producing the goods and services that are consumed by inbound visitors. The retail price that visitors pay will be some mark-up over the cost of producing those goods. As long as that mark-up is reasonably stable then the biggest driver of the average spend per day will be production costs. And the main driver of production costs will be wages by virtue of the labour intensity of providing tourism services

The exchange rate is another important driver of average spend per day. If foreign visitors have a trip budget in foreign currency, and have locked-in the number of days they wish to spend in Australia then an appreciation in the Australian dollar will reduce the Australian dollars that are earned from foreign visitors. This is because the same foreign currency units will translate into fewer Australian dollars.

Spend per day will also be driven by the capacity of foreign visitors to pay for higher prices. This will depend on movements in the income and wealth of the visitor. The stronger is the growth in income and wealth the stronger is the ability of foreign visitors to pay for higher prices. If visitors are required to pay higher prices they will want to be rewarded with a better product or value for money. If additional value for money is not forthcoming however, this weakens the likelihood that visitors will pay higher prices.

3.4 Summary Drivers of Visitor Spend

In summary, the variables that are likely to be important in driving inbound passenger spend across time, aside from marketing and promotion spend, will include:

- airline capacity;
- international income and wealth growth;
- the cost of producing goods in Australia as proxied by the Australian CPI;
- exchange rate movements; and
- structural events.

These variables are only potential drivers of inbound tourism spending. Whether that potential is realised will depend on the statistical significance of those variables, which will be tested.

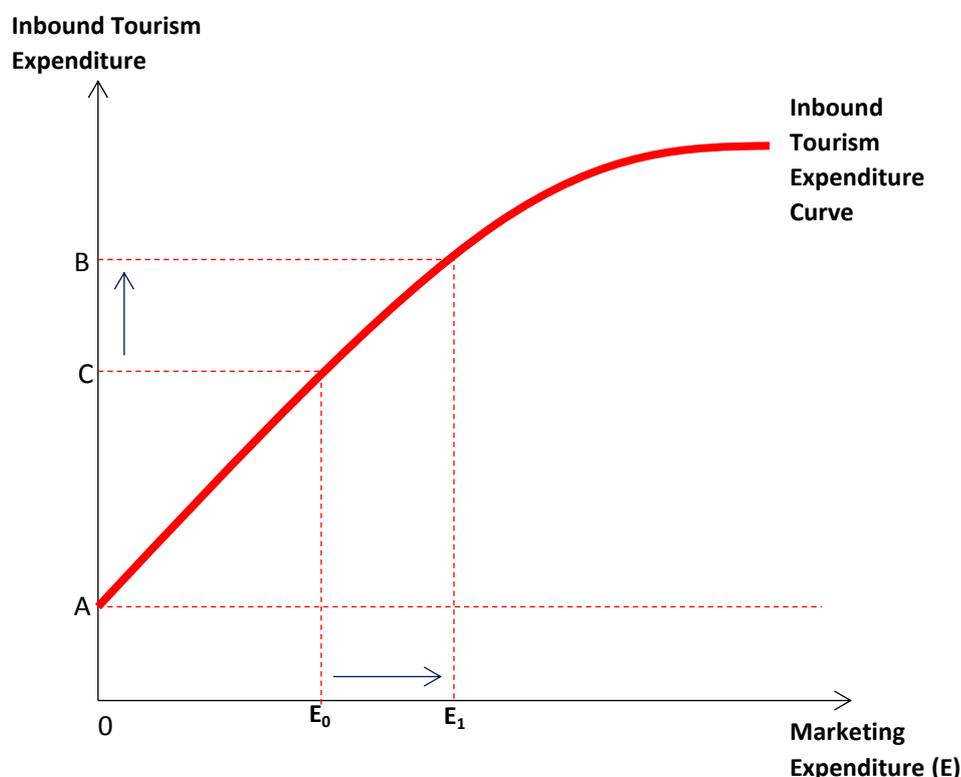
4. Analytical Representation of the Return on Marketing Investment

4.1 Limits of Marketing Effectiveness

The return on marketing investment (ROMI) from an inbound tourism perspective in Australia measures the spending by inbound tourists in Australia that is generated as a result of spending money on marketing and promotion of Australia to international destinations. The key to estimating the ROMI accurately is in understanding that there is a limit to the success of any marketing effort. This means that there is a point at which the addition to inbound tourism spending that results from additional marketing effort will not exceed the additional cost of marketing.

To see this from a more analytical perspective, consider the inbound tourism spending function in Figure 2 below.

Figure 2: Inbound Tourism Expenditure Function



In Figure 2, inbound tourism expenditure is measured on the vertical axis and marketing expenditure (E) is measured on the horizontal axis. As marketing expenditure increases along the horizontal axis the result is in an increase in inbound tourism expenditure on the vertical axis but the rate of increase in inbound tourism expenditure decreases as marketing expenditure increases. This characteristic of the inbound expenditure function is represented by the fact that the inbound expenditure function (the thick red line in the figure) is a curve that gravitates slowly to a maximum point, or the curve slowly begins to bend over.

The curve meets the vertical axis at the point A. This is an important point as it represents the inbound tourism expenditure that would be realised if there were no marketing expenditure at all.

As actual marketing expenditure rises above zero then the red curve begins to rise above the point A.

Why is there a limit on the effectiveness of marketing and promotional effort? There are a number of potential reasons for the existence of a limit.

- While marketing and promotional campaigns may create awareness and a desire to travel to Australia, visitors won't come to Australia if they can't afford it. The income and wealth of households and businesses place a constraint on the ability to travel to Australia. There will be a point at which marketing campaigns have attracted every person to Australia that can feasibly afford to make the trip, which creates an upper limit on marketing and promotional effectiveness.
- Following this point, the value of the Australia dollar has been a major deterrent to inbound visitor growth over more recent years. With the Australian dollar in late 2000 rising to more than double its value in early 2000 (the dollar was worth 48 cents US back in April 2001 and rose to as high as 111 cents in July 2011) this had added considerably to the cost of visiting Australia and places a significant constraint on the ability to drive higher visitor numbers and spending via increased marketing and promotional effort.
- For many visitors to Australia the length of travel time is exceptionally high with visitors from Europe and certain parts of the USA spending almost 24 hours in the air. For many visitors this represents a large percentage of the available time to travel to Australia, and will prevent many visitors from coming to the country or increasing the time they spend in the country regardless of the marketing effort.
- Airline capacity can also place a binding constraint on the ability of additional marketing effort to attract visitors to Australia. If the planes are full, and there is little chance of airlines adding more capacity to international routes, then it won't be possible to attract more visitors to Australia, which places a natural upper limit on the effectiveness of marketing spend. It is also the case that aviation capacity between Australia and particular countries is governed by bilaterally negotiated Air Service Agreements. If these agreements generate capacity growth that falls behind demand growth then this may also inhibit the ability to expand inbound tourism and limit the impact of marketing and promotional spending. This would seem to be a particularly relevant argument for the Chinese inbound market, which over the past 3 years has grown at an average pace of 18.8%.

4.2 Defining Marginal and Average Return on Marketing Investment

We are able to use Figure 2 to determine the increase in inbound tourism expenditure in response to a given increase in marketing expenditure. If marketing expenditure is allowed to increase from E_0 to E_1 then inbound tourism expenditure, as read from the graph in Figure 2, rises from C to B. This information allows us to construct a measure called the marginal return on marketing investment:

$$\text{Marginal Return on Marketing Investment} = \frac{\text{Addition to Inbound Tourism Spending}}{\text{Addition to Marketing Spending}} = \frac{B-C}{E_1-E_0}$$

The marginal return on marketing investment measures the return on the last dollar of marketing and promotional effort that is spent. As the impact of the last dollar of marketing effort that is spent

could be quite different from the impact of the first dollar of marketing and promotional effort then the marginal return on marketing investment is a useful concept.

An alternative measure of return on marketing investment is the average return on marketing investment. This measures the addition to inbound tourism expenditure when marketing expenditure rises from zero to some actual level. We can describe this concept with the aid of Figure 2 once again.

In Figure 2, when actual marketing spending is E_0 the level of inbound tourism spending is equal to C. The addition to total inbound tourism spending as a result of marketing spending that is equal to E_0 rather than 0 is equal to C minus A. The average return on marketing investment is then equal to:

$$\text{Average Return on Marketing Investment} = \frac{\text{Additional Inbound Tourism Spending}}{\text{Total Marketing Spending}} = \frac{C-A}{E_0}$$

The average return metric measures the return on marketing investment for all of the money that is spent on marketing and promotion rather than the last dollar that is spent.

5. Estimating the Return on Marketing Investment

5.1 The Approach

Multiple regression analysis is used to estimate a quarterly relationship between inbound tourism spending in Australia and the following explanatory variables:

- tourism Australia marketing and promotional spending (Spend);
- airline capacity (Seats);
- global economic activity, wealth and confidence, as proxied by the Dow Jones Industrial Average (DJIA) equity index;
- the Australian trade weighted index (TWI); and
- seasonal dummy variables.⁵

Two sets of multiple regression specifications are estimated. The first is a double logarithmic specification and the second is a linear regression specification that is quadratic in the marketing and promotion variable. The double logarithmic and quadratic multivariate regression equations are respectively:

$$\begin{aligned} \ln \text{ Inbound Tourism Spending}_t = & \alpha_0 + \alpha_1 \times \ln \text{ Seats}_t + \alpha_2 \times \ln \text{ DJIA}_{t-i} + \alpha_3 \times \ln \text{ Spend}_{t-k} \\ & + \alpha_4 \times \ln \text{ TWI}_{t-j} + \alpha_5 \times \text{ MAR}_t + \alpha_6 \times \text{ JUN}_t + \alpha_7 \times \text{ SEP} + \text{ Residual}_t \end{aligned}$$

$$\begin{aligned} \text{ Inbound Tourism Spending}_t = & a_0 + a_1 \times \text{ Seats}_t + a_2 \times \text{ DJIA}_{t-i} + a_3 \times \text{ Spend}_{t-k} + a_4 \times (\text{ Spend}_{t-k})^2 \\ & + a_5 \times \text{ TWI}_{t-j} + a_6 \times \text{ MAR}_t + a_7 \times \text{ JUN}_t + a_8 \times \text{ SEP} + \text{ Residual}_t \end{aligned}$$

where the subscript t is in reference to time and Residual_t is the difference between the actual and predicted value of inbound tourism spending.

Both the double logarithmic specification and a quadratic expression are estimated so that we are able to replicate an inbound tourism expenditure curve that starts to bend over as marketing and promotional effort is increased. There is no theoretical reason why a double logarithmic should be preferred over a quadratic equation, which is why both regression forms are estimated.

Critical to the amount of bend in the inbound expenditure curve is the coefficient associated with the logarithm of marketing spend, which is α_3 in the double logarithmic regression and the coefficients associated with marketing spend (a_3) and marketing spend squared (a_4) in the quadratic multiple regression. The closer is α_3 to zero, and the more negative is a_4 , the more bend that is likely to appear in the inbound tourism expenditure curve.

To estimate this multiple regression specification we use the method of Ordinary Least Squares. All of the independent variables except for airline capacity is described with a time lag (refer to the time subscript for the relevant variables in the equation). The lag length is determined on the basis of choosing a suitably long initial lag length (four in the case of this investigation because the

⁵There are three constructed or dummy variables that are used to explain the seasonality in inbound tourism spending – one each for the March, June and September quarters. These variables are binary dummy variables that take on the value 1 if the quarter in question is activated and 0 otherwise. The use of deterministic seasonal dummy variables to capture the seasonal process is one of a few standard ways to capture seasonality in multivariate regression analysis.

investigation is quarterly) and then testing the individual significance of lower lag lengths using t-tests. The timeframe over which the equation is estimated is September 2009 through to March 2014, representing 18 quarterly observation points (which is the limit of the marketing and promotional spend data supplied by Tourism Australia).

5.2 Estimated Regression Results

5.2.1 Double Logarithmic Results

A summary of the estimated regression results in the case of the double-logarithmic regression is presented in Table 1 below.

Table 1: Double Logarithmic Regression Results

Variable	Coefficient	Standard Error	t-Value	p-Value
Intercept	6.55547	2.98873	2.19340	0.0530
Dummy Variable for March	-0.12610	0.02111	-5.97453	0.0001
Dummy Variable for June	-0.37565	0.02613	-14.3766	0.0000
Dummy Variable for September	-0.31696	0.02807	-11.2912	0.0000
Logarithm of Seats _t	0.42581	0.25257	1.68594	0.1227
Logarithm of Marketing Spending _{t-1}	0.04644	0.01544	3.00841	0.0132
Logarithm of Trade Weighted Index _{t-3}	-0.35281	0.11203	-3.14935	0.0103
Logarithm of Dow Jones Industrial Average _{t-2}	0.25166	0.14952	1.68315	0.1233
R² = 99.2%				

The results indicate that the key statistically significant driver variables were found to be:

- the seasonal dummy variables;
- the logarithm of seats, which was found to be significant at the 12% level, and with the correct positive sign;
- the logarithm of marketing spend was found to be statistically significant at the 1% level with a lag of one quarter and the correct positive sign;
- the logarithm of the Australian trade weighted index was found to be statistically significant at the 1% level with an expected negative sign and a 3 quarter lagged impact on the logarithm of inbound tourism spending; and

- the logarithm of the Dow Jones Industrial Average stock market index was found to be statistically significant at the 12% level with the correct positive sign and a two quarter lagged impact on the logarithm of inbound tourism spending.

While the airline seats and Dow Jones variables were found to be marginal insignificant at conventional levels they have been retained in this regression because their weak significance is likely to be attributable to their significant correlation, 94%, over the period of estimation.

The key parameter of interest is that associated with the logarithm of marketing and promotional spending. This estimated coefficient, which is an elasticity, is 0.046 and is interpreted in the following way:

each 10% increase in marketing and promotional spending causes a 0.46% increase in inbound tourism spending, other things being equal.

This parameter estimate is critical to estimating the marginal and average returns on marketing investment, which are presented in section 5.3 below.

5.2.2 Quadratic Regression Results

A summary of the estimated regression results in the case of the quadratic regression is presented in Table 2 below.

Table 2: Quadratic Regression Results *

Variable	Coefficient	Standard Error	t-Value	p-Value
Intercept	1,468,413	375,880.0	3.90660	0.0036
Dummy Variable for March	-377,436	78,814.60	-4.78892	0.0010
Dummy Variable for June	-964,678.6	92,349.18	-10.4460	0.0000
Dummy Variable for September	-917,082.3	113,593.2	-8.07339	0.0000
Seats _t	0.22078	0.02474	8.92461	0.0000
Marketing Spending _{t-1}	0.02765	0.01566	1.76093	0.1112
(Marketing Spending _{t-1}) ²	-4.28×10^{-10}	4.96×10^{-10}	-0.8640	0.4100
Trade Weighted Index _t	9,848.388	9613.571	1.12212	0.2909
Trade Weighted Index _{t-1}	-18,076.35		-1.88030	0.0928
R² = 98.8%				

*The dependant variable in this regression is defined in terms of thousands of Australian dollars while the marketing spend variable is defined in terms of Australian dollars.

The results indicate that the key statistically significant driver variables were found to be:

- the seasonal dummy variables;
- airline seats, which was found to be significant at all conventional significance levels and with the correct positive sign;
- marketing spend was found to be statistically significant at the 11% level with a lag of one quarter and the correct positive sign;
- marketing spend squared was found to be statistically significant at the 41% level with a lag of one quarter and the correct negative sign; and
- the contemporaneous Australian trade weighted index was found to be statistically significant at the 29% level and a one quarter lag of the Australian trade weighted index was found to be significant at the 9% level.

While the marketing spend variables and the Australian trade weighted index terms were found to be insignificant at conventional significance levels they have been retained in this regression because their weak significance is likely to be attributable to their significant correlation with each other. In addition, we wish to compare estimates of the marginal and average return on marketing investment for the double logarithmic model with that generated by the quadratic model despite the insignificance.

The key parameters of interest are those associated with the marketing and promotional spend variables. These estimated coefficients imply the following elasticity of inbound tourism spending at current levels of marketing and promotion spending:

each 10% increase in marketing and promotional spending causes a 0.65% increase in inbound tourism spending, other things being equal.

This elasticity and the coefficient estimates in the quadratic multivariate regression are now used to estimate the marginal and average returns in marketing investment as presented respectively in sections 5.3 and 5.4 below.

5.3 Return on Marketing Investment Estimates

5.3.1 Double Logarithmic Model

The marginal return on marketing investment is computed using equation (A.4) of Technical Appendix A and the relevant parameters obtained from the multivariate regression equation estimates of section 5.2.1 above. The results are presented in Figure 3 below.

Figure 3 below presents estimates of the marginal return between March 2010 and March 2014. The marginal return varies considerably with the seasonality of inbound tourism spending and marketing spending, but of most importance is the average marginal return over the period (the orange line in the figure) which is estimated to be 13.15. This marginal return estimate is interpreted as follows:

the marginal return on marketing investment over the 4 years to March 2014 estimated using the double logarithmic model is 13.15, meaning that \$1 of additional spending on marketing and promotional by Tourism Australia results in an additional \$13.15 of inbound tourism expenditure.

Figure 4 below presents estimates of the average return between March 2010 and March 2014.

Figure 3: Marginal Return on Marketing Investment (ROIM) – Logarithmic Model

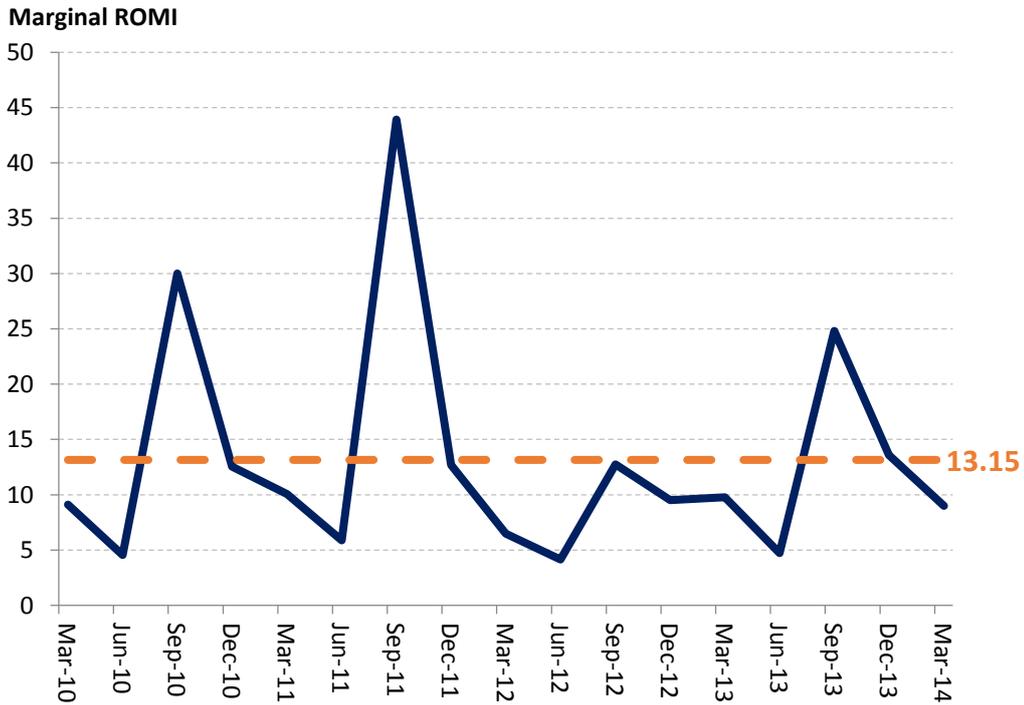
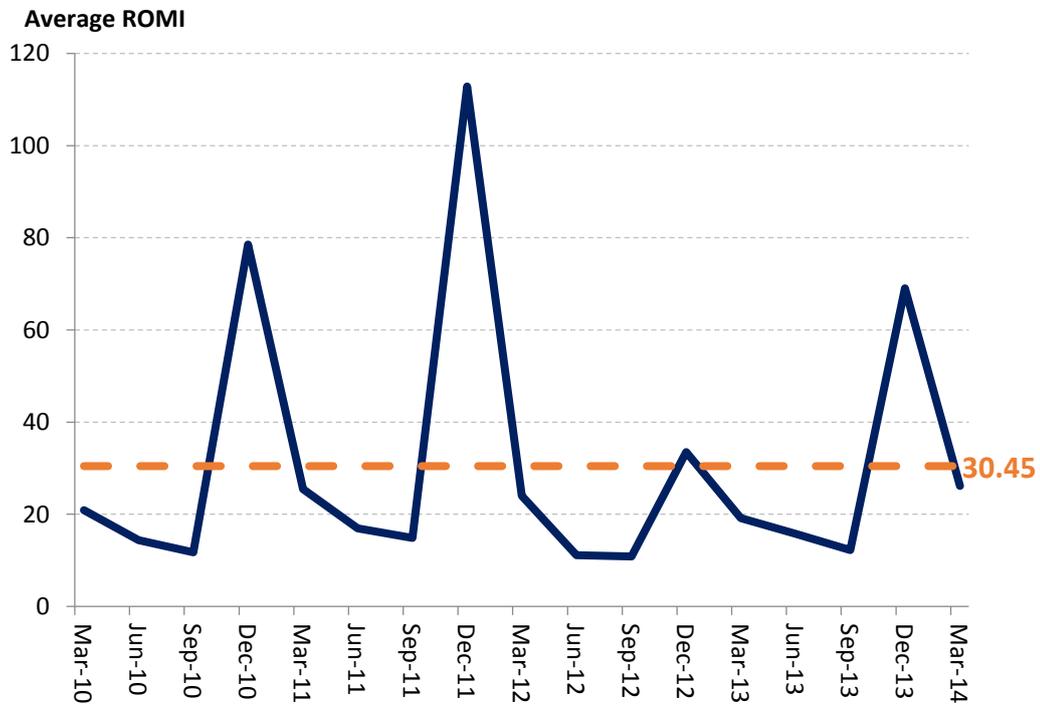


Figure 4: Average Return on Marketing Investment (ROIM) – Logarithmic Model



The average return is computed using equation (A.5) of Technical Appendix A. The average return is much higher than the marginal return as one would expect given that increases in

marketing and promotion expenditure is estimated to have a diminishing effect on inbound tourism expenditure. The average estimate for the average return on marketing investment over the past four years is estimated to be 30.45. This average estimate is interpreted as follows:

the average return on marketing investment over the 4 years to March 2014 estimated using the double logarithmic model is 30.45, meaning that on average each dollar of marketing and promotional spending by Tourism Australia results in an additional \$30.45 of inbound tourism expenditure.

5.3.2 Quadratic Model

The marginal return on marketing investment in the case of the model that is quadratic in marketing and promotional spending is computed using equation (B.4) of Technical Appendix B and the relevant parameters obtained from the multivariate regression equation estimates of section 5.2.2 above. The results are presented in Figure 5 below.

Figure 5: Marginal Return on Marketing Investment (ROIM) – Quadratic Model

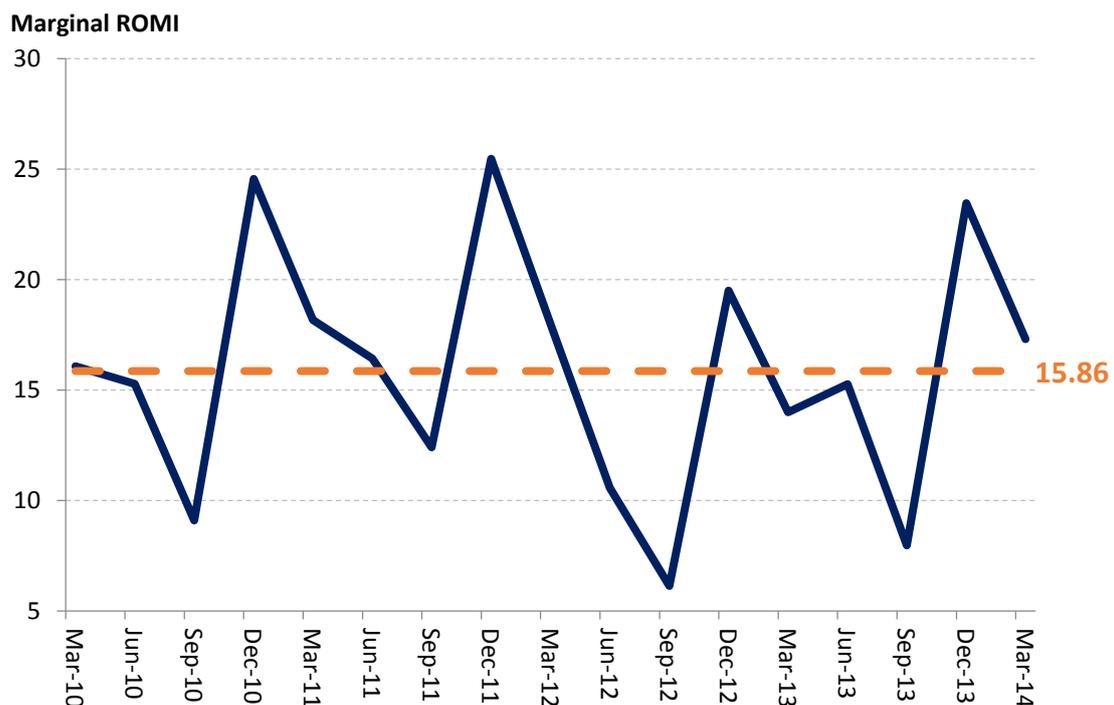
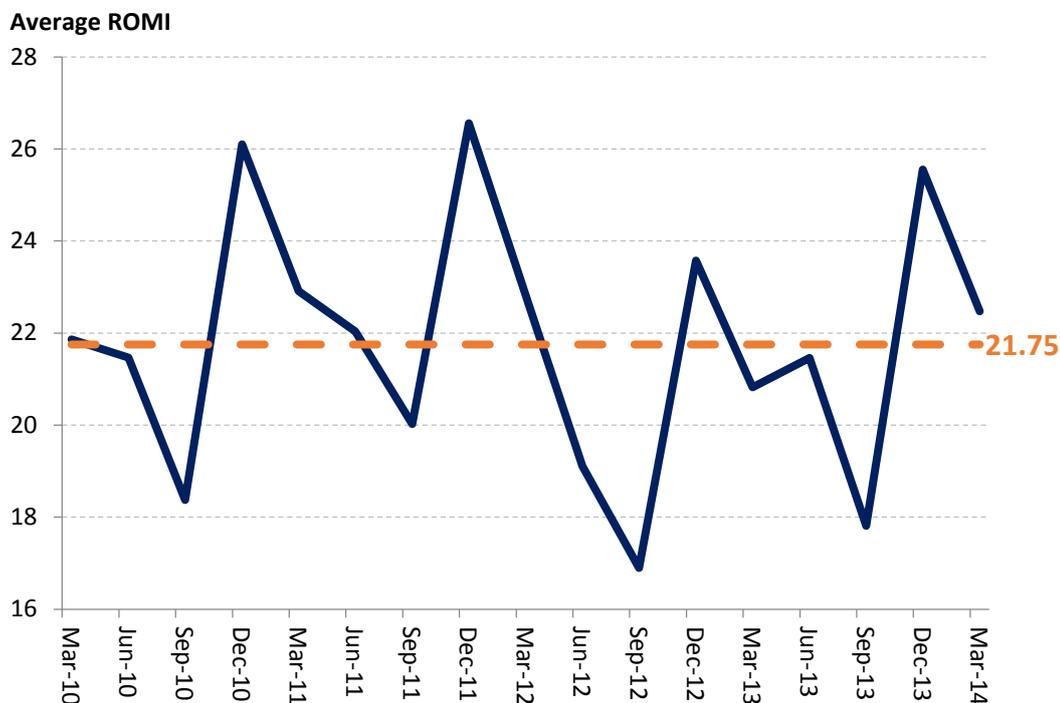


Figure 5 below presents estimates of the marginal return between March 2010 and March 2014. The average estimate of the marginal return over the period is 15.86. This marginal return estimate is interpreted as follows:

the marginal return on marketing investment over the 4 years to March 2014 estimated using the quadratic model is 15.86, meaning that \$1 of additional spending on marketing and promotional by Tourism Australia results in an additional \$15.86 of inbound tourism expenditure.

Figure 6 below presents estimates of the average return between March 2010 and March 2014.

Figure 6: Average Return on Marketing Investment (ROIM) – Quadratic Model



The estimate for the average of the average returns between March 2010 and March 2014 is 21.75. This estimate is interpreted as follows:

the average return on marketing investment over the 4 years to March 2014 estimated using the quadratic model is 21.75, meaning that on average each dollar of marketing and promotional spending by Tourism Australia results in an additional \$21.75 of inbound tourism expenditure.

6. Conclusion

This report has estimated the marginal and average returns on marketing investment for aggregate inbound tourism in Australia using multivariate regression analysis and after taking into consideration all other drivers of inbound tourism expenditure. Two sets of estimates are found – the first from a double logarithmic model of inbound tourism spending and the second from a quadratic model.

We find that the marginal return on marketing investment between 2010 and 2014 lies between around 13 and 16. This suggests that each additional dollar of marketing and promotional spending by Tourism Australia results in additional inbound tourism expenditure of between \$13 and \$16.

The estimates for the average returns on marketing investment are higher than the marginal returns because there is 'diminishing returns' to marketing and promotional investment. The estimates of the average return using the double logarithmic and quadratic models ranges between 21.75 and 30.45. These estimates suggest that each dollar of Tourism Australia marketing and promotional spending generates tourism spending of between \$21.75 and \$30.45.

The marginal estimates suggest that if Tourism Australia were to increase its spending on marketing and promotion by a further AU\$10m then the wider benefits to the Australian economy, which includes tourism multiplier effects, would be in the order of AU\$240m to AU\$300m.

Appendix A: Return on Marketing Investment Analytics – Double Logarithmic Form

A.1 Key Terms

Inbound tourism expenditure can be described by the following exponential function:

$$S = a \times E^\varepsilon \quad (\text{A.1})$$

In a world without inbound tourism marketing effort ($E=0$) the amount of tourism expenditure will be 0 in this model. The net benefit from advertising is simply (A.1) less the dollar value of advertising, which is:

$$B = a \times E^\varepsilon - E \quad (\text{A.2})$$

A.2 Marginal Return on Marketing Investment

This measures the addition to inbound tourism spending in response to an additional dollar of marketing effort. It is found by first differentiating (A.1) with respect to E as follows:

$$\frac{dS}{dE} = \varepsilon \times a \times E^{\varepsilon-1} \quad (\text{A.3})$$

We then substitute into (A.3) the actual amount of tourism expenditure. If E^A is the actual amount of inbound tourism expenditure then the addition to total inbound tourism expenditure of an extra dollar of marketing effort is:

$$\text{Marginal Return on Marketing Investment} = \varepsilon \times a \times (E^A)^{\varepsilon-1} \quad (\text{A.4})$$

A.3 Average Return on Marketing Investment

This measures the addition to total inbound tourism spending in response to total marketing effort. It is found by determining the addition to total inbound tourism spending as a result of actual marketing effort and then divides by the dollar amount of marketing spending. This is computed by determining (A.1) at the actual amount of marketing effort and then dividing through by the actual amount of marketing effort as follows

$$\text{Average Return on Marketing Investment} = \frac{a \times (E^A)^\varepsilon}{E^A} = a \times (E^A)^{\varepsilon-1} \quad (\text{A.5})$$

Appendix B: Return on Marketing Investment Analytics – Quadratic Form

B.1 Key Terms

Inbound tourism expenditure can be described by the following quadratic function:

$$S = a_0 + a_1 \times E + a_2 \times E^2 \quad (\text{B.1})$$

In a world without inbound tourism marketing effort ($E=0$) the amount of tourism expenditure will be a_0 in this model. The net benefit from advertising is simply (B.1) less the dollar value of advertising, which is:

$$B = a_0 + a_1 \times E + a_2 \times E^2 - E \quad (\text{B.2})$$

B.2 Marginal Return on Marketing Investment

Marginal return is found by first differentiating (B.1) with respect to E as follows:

$$\frac{dB}{dE} = a_1 + 2 \times a_2 \times E \quad (\text{B.3})$$

We then substitute into (B.3) the actual amount of tourism expenditure. If E^A is the actual amount of inbound tourism expenditure then the addition to total inbound tourism expenditure of an extra dollar of marketing effort is:

$$\text{Marginal Return on Marketing Investment} = a_1 + 2 \times a_2 \times E^A \quad (\text{B.4})$$

B.3 Average Return on Marketing Investment

This measures the addition to total inbound tourism spending in response to total marketing effort. It is found by determining the addition to total inbound tourism spending as a result of actual marketing effort and then divides by the dollar amount of marketing spending. This is computed by determining (B.1) at the actual amount of marketing effort subtracting (B1) determined at zero marketing effort (equal to a_0) and then dividing through by the actual amount of marketing effort as follows

$$\text{Average Return on Marketing Investment} = \frac{a_1 \times E^A + a_2 \times (E^A)^2}{E^A} = a_1 + a_2 \times E^A \quad (\text{B.5})$$