



## Demand elasticity estimates for New Zealand tourism

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### ABSTRACT

Demand elasticities for New Zealand tourism are estimated for 16 different international visitor segments. Segments are differentiated by origin, purpose of visit, and travel style. Elasticities for both international visitor arrivals and on-the-ground expenditure per arrival are estimated for each segment using time-series data. In general, on-the-ground consumption per arrival is more price sensitive than number of arrivals, and Asian market segments are found to be more price sensitive, both in terms of arrivals and on-the-ground expenditure, compared to international visitors from other regions. An application of the results is presented giving the total effect of exchange rate changes on expenditure by international visitors in New Zealand, and management implications are discussed.

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### 1. Introduction

Price is an important factor in tourists' destination choice (Crouch, 1994; Lim, 1997; Witt & Witt, 1995), and for this reason tourist destinations are increasingly interested in the role price plays for visitors in different market segments. Recent events, such as fluctuating oil prices, increases in commodity prices, and the global economic recession with concomitant decreases in price due to discounting, highlight the need to understand tourists' price sensitivity even further.

While prices and tourists' income are the most commonly used variables to explain tourism demand (e.g. Davis & Mangan, 1992; Lim, Min, & McAleer, 2008), there are a number of other factors that affect demand. These include travel distance (Nicolau & Mas, 2006), seasonality (Tsekeris, 2009), business confidence (Njegovan, 2005), trends towards short-haul regional travel as opposed to long-haul travel, the competitiveness of other destinations (Forsyth & Dwyer, 2009, chap. 1.6), and tourism advertising campaigns (Kulendra & Divisekera, 2006; Lee, 1996). All of these (and many others) may moderate the effect of price on tourism demand and influence the price elasticity of different market segments.

Research on responses by tourists to prices has largely focused on individual components of the tourism product. Most notably, price elasticities have been estimated for air transport (Brons, Pels, Nijkamp, & Rietveld, 2002; Gillen, 2004), hotel room demand (Tsai,

Kang, Yeh, & Suh, 2006; Walsh,ENZ, & Canina, 2004), and visitation of National Parks (e.g. Greiner & Rolfe, 2004). A number of studies examined the aggregate effect of price changes, reflected in aggregate price indices, for example for tourists to Denmark (Jensen, 1998) or in the context of destination competitiveness studies (Forsyth & Dwyer, 2009, chap. 1.6).

However, to our knowledge, very rarely do these studies distinguish between different market segments other than those based on either nationality or purpose of visit (e.g. Njegovan, 2005; Qiu & Zhang, 1995). Hence, most existing studies are unable to identify potentially diverse elasticities amongst heterogeneous market segments. In addition, to our knowledge no comprehensive study exists that explores price sensitivities for visitors to New Zealand, although there are a small number of studies that include New Zealand as a destination alongside others, for example in the context of Australian outbound tourism and substitution between international and domestic holidays (Hamal, 1998).

The New Zealand tourism sector is largely dependent on long-distance inbound markets (except for Australia), thus making it a relatively expensive destination to travel to, and as a result it is potentially vulnerable to changes in prices, especially those related to transport (Becken, 2008). In recent years, international visitors have experienced relatively large fluctuations in the 'price' of visiting New Zealand, mainly due to changes in the exchange rate, but also due to changing airfares (e.g. fuel surcharges) and inflation on the ground (Statistics New Zealand, 2008a). Since both transport costs and prices at the destination are important determinants of destination competitiveness (Dwyer et al., 2009; World Tourism Organisation, 2006) and travel behaviour (Allen, Yap, & Shareef,

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2009), stakeholders in the New Zealand tourism industry have an interest in understanding the price sensitivity of different market segments within the currently 2.5 million annual inbound tourists (Ministry of Tourism, 2008).

More specifically, New Zealand tourism stakeholders are interested in i) the number of visitors arriving every year, and ii) how much tourists spend in New Zealand. The former interest is demonstrated by strategic partnerships (among other things), such as joint marketing initiatives between Tourism New Zealand and Air New Zealand. Here, marketing campaigns, such as Tourism New Zealand's (2003) search for the "ideal visitor", are coupled with the airline's routing and pricing strategies. Tourist expenditure on the ground is also closely related to visitor characteristics (Becken & Simmons, 2008). While arrivals and expenditure are important variables, there are other aspects that could also usefully be modelled, such as changes in consumption patterns or length of stay (Alegre & Pou, 2006).

In response to high oil prices in 2008 and other recent economic changes, the objective of this paper is to understand the price sensitivity of international visitors to New Zealand. Consultation with key tourism stakeholders revealed that a detailed market segmentation would be highly beneficial to better understand and develop management strategies. Accordingly, this paper estimates demand elasticities for 16 different visitor segments. Two different types of price elasticity are estimated for each segment: the elasticity of the number of international visitor arrivals, and the elasticity of consumption of New Zealand tourism goods and services per arrival. The remainder of this paper is organised as follows. Section 2 discusses the empirical models that were used and some econometric issues. Section 3 describes the data that was used in the estimation. Section 4 presents the basic elasticity results, and Section 5 gives an application of these results to estimate the effects of exchange rate changes.

## 2. Empirical methods

### 2.1. Estimated models

Basic economic theory predicts that demand for most 'normal' goods and services is negatively related to the price of the good or service, positively related to income, and may be positively or negatively affected by other factors such as the existence and prices of substitutes and complements (Lim, 1997; Mervar & Payne, 2007; Waggle & Fish, 1998). We have two measures of demand for each market segment – the number of visitor arrivals and on-the-ground (OTG) expenditure (see also Qiu & Zhang, 1995). In each case we are interested in the elasticity of demand with respect to price, controlling for income and other factors that may affect demand.

To estimate the arrivals elasticity, if  $A_t^i$  is the number of visitor arrivals from segment  $i$  in year  $t$ ,  $P_t^i$  is a measure of the price of visiting New Zealand for visitors from that segment, and  $X_t^i$  is a matrix of other variables that may affect arrivals of tourists in the segment, the estimated model is:

$$\ln A_t^i = \alpha + \beta \ln P_t^i + \gamma \ln X_t^i + \varepsilon_t^i \quad (1)$$

This log–log specification was chosen because it is straightforward to estimate (Hamal, 1998; Witt & Witt, 1995) (important given the relatively small number of annual observations available for each segment), and it gives a direct elasticity estimate. In this model, the coefficient  $\beta$  measures the (constant) price elasticity of arrivals. One limitation of this approach is that the elasticity is assumed to be constant at all prices, and it can therefore only provide reliable elasticity estimates for relatively small changes in price around the current level. However given the limited sample sizes, our view is that this is the most appropriate approach. In

addition, constant elasticity demand is easier to interpret and does not depend on the current price level.

The second type of model attempts to estimate price elasticity of consumption of New Zealand tourism goods and services by international visitors. Tourists consume a variety of goods and services, of which expenditure on many is not observed directly. However, as discussed in Section 3 below, we do have data on total expenditure by New Zealand tourists, including international airfares and other goods and services consumed in New Zealand. Assuming this total expenditure represents a single 'tourism' product allows us to derive an elasticity of demand by international visitors for tourism-related goods and services.

Expenditure at a given price is defined as  $E(p) = q(p)p$  where  $q(p)$  is the quantity demanded at a price of  $p$ . It is straightforward to show that the elasticities of expenditure and quantity demanded with respect to price are related in the following way:<sup>2</sup>

$$\varepsilon_D = \varepsilon_E - 1$$

where  $\varepsilon_D$  is the price elasticity of demand and  $\varepsilon_E$  is the price elasticity of expenditure. Accordingly, the second type of model takes the form:

$$\ln E_t^i = \alpha + \beta \ln P_t^i + \gamma \ln X_t^i + \varepsilon_t^i \quad (2)$$

where  $E_t^i$  is expenditure on tourism goods and services by international visitors in segment  $i$  in year  $t$ ,  $P_t^i$  is a price index for tourism expenditure, and  $X_t^i$  is a matrix of other variables that may affect expenditure for this segment. The (constant) price elasticity of demand for segment  $i$  is then estimated by  $\beta - 1$ .

### 2.2. Econometric issues

In the models described above, price is treated as being exogenous from demand. In general, estimating demand elasticity using market-level data requires accounting for the fact that price is endogenously determined, in part by the level of demand. That is, price in a market is determined by the interaction of demand and supply. If the supply curve slopes upwards, an exogenous shock that increases demand will also increase price. Thus price and the error term in the demand equation will be positively correlated, and ordinary least squares estimates of parameters of the demand function will be biased and inconsistent (e.g. Davidson & MacKinnon, 1993).

In the present context, there are several reasons to believe that exogeneity of price is a reasonable assumption. First, the relevant price is expressed in foreign currency terms because, when making consumption decisions, tourists will care about the equivalent price in their own currency, not the New Zealand dollar price per se. Changes in the price in foreign currency terms reflect both changes in the New Zealand dollar price and the relevant exchange rate. For most market segments, exchange rate changes from year to year dominate the New Zealand dollar changes in the underlying local prices, and it is reasonable to assume that exchange rates are exogenously determined.

Second, the size of any given market segment in our study is relatively small compared to the total tourism industry in New Zealand, and is very small compared to the New Zealand economy as a whole. As discussed below in Section 3.3, the price indices that we have calculated to a large extent reflect general economic conditions in New Zealand, and are not highly specific to the tourism sector. Therefore, it is unlikely that a demand shock in one of the tourism market segments examined here will have a large impact on the price experienced by that sector.

<sup>2</sup> Price elasticity of expenditure is  $\varepsilon_E = dE/dp \times p/E = [q(p) + pq'(p)] \times p/pq(p) = 1 + pq'(p)/q(p)$ . Price elasticity of demand is  $\varepsilon_D = dq/dp \times p/q = pq'(p)/q(p)$ , therefore  $\varepsilon_D = \varepsilon_E - 1$ .

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