

Tourism Demand Modelling and Forecasting

Modern Econometric Approaches



Haiyan Song
and
Stephen F. Witt



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**TOURISM DEMAND MODELLING AND
FORECASTING
Modern Econometric Approaches**

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Preface

The phenomenal growth of both the world-wide tourism industry and academic interest in tourism over the last thirty years has generated great interest in tourism demand modelling and forecasting from both business and academic sectors. However, although econometric modelling and forecasting have experienced considerable changes over the last two decades, these developments have not been incorporated in any of the existing tourism forecasting books. For example, the development of cointegration techniques has enabled researchers to overcome the problems of spurious regression and non-stationarity of time series.

The purpose of this book is to introduce students, researchers and practitioners to the recent advances in econometric methodology within the context of tourism demand analysis, and to illustrate these new developments with actual tourism applications. The book is designed for final-year undergraduate, taught postgraduate and research students in tourism studies, as well as researchers and practitioners who wish to apply the recent advances in econometric modelling and forecasting to tourism demand analysis. It is assumed that the reader has taken an introductory course in statistics and multiple regression analysis and has some knowledge of tourism. The concepts and computations of modern econometric modelling methodologies are introduced at a level that is accessible to non-specialists. The methodologies introduced include general-to-specific modelling, cointegration, vector autoregression, time varying parameter modelling and panel data analysis. In order to help the reader understand the various methodologies, extensive tourism demand examples are provided. The computer packages used for the estimation of the various tourism demand models in the examples are Microfit 4.0 for Windows and Eviews 3.1.

The book starts with an introduction to the fundamentals of tourism demand analysis (Chapter 1). The problems of traditional tourism demand modelling and forecasting, i.e., data mining and spurious regression due to common trends in the time series, are addressed in Chapter 2. Since general-to-specific modelling, including the use of autoregressive distributed lag processes, cointegration analysis and error correction models, has been regarded as a remedy for the problems of data mining (at least to a large extent) and spurious regression, the general-to-specific approach to tourism demand modelling and forecasting is explored in Chapters 3–6. The

size of the tourism industry has experienced a phenomenal increase over the last three decades, and also it is known that the demand for international tourism (both inbound and outbound) is sensitive to regime shifts (changes in government policy, political and economic conditions); therefore demand elasticities are unlikely to have remained unchanged over time. The time varying parameter model together with the use of the Kalman filter as an estimation method is a useful tool for examining the effects of regime shifts on tourism demand elasticities, and this is explored in Chapter 7. Often there is a lack of sufficient time series data in terms of the number of observations on tourism demand variables and this can result in estimation and forecasting biases. The panel data approach is introduced in Chapter 8 as a way of overcoming this problem. The last chapter (Chapter 9) evaluates the empirical forecasting performance of the various models and puts forward general conclusions.

The authors have considerable research experience related to modelling and forecasting the demand for international tourism, with over 70 publications in this area. They have also been teaching tourism demand modelling and forecasting for many years.

November 1999

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1

Introduction to tourism demand analysis

1.1 Introduction

Tourism demand is the foundation on which all tourism-related business decisions ultimately rest. Companies such as airlines, tour operators, hotels, cruise ship lines, and many recreation facility providers and shop owners are interested in the demand for their products by tourists. The success of many businesses depends largely or totally on the state of tourism demand, and ultimate management failure is quite often due to the failure to meet market demand. Because of the key role of demand as a determinant of business profitability, estimates of expected future demand constitute a very important element in all planning activities. It is clear that *accurate* forecasts of tourism demand are essential for *efficient* planning by tourism-related businesses, particularly given the perishability of the tourism product. For example, it is impossible for an airline to recoup the potential revenue lost by a flight taking off with empty seats. The loss resulting from these unsold seats contrasts with the case of, say, a car manufacturer, where if a car does not sell on a particular day it can still be sold subsequently.

The tourism forecasting methods examined in this book are modern econometric approaches. Here the forecast variable is specifically related to a set of determining forces; future values of the forecast variable are obtained by using forecasts of the determining variables in conjunction with the estimated quantitative relationship between the forecast variable and its determinants.

In Section 1.2 the tourism demand function is examined, and measurement issues relating to demand variables are discussed. The functional form of the demand equation and its relationship to demand elasticities are presented in Section 1.3, and the chapter is summarised in Section 1.4.

1.2 Determinants of tourism demand

Tourism visits can take place for various reasons: holidays, business trips, visits to friends and relatives (VFR), conferences, pilgrimages and so on. Most empirical studies of tourism demand examine either total tourist trips (including all the above-mentioned purposes) or just holiday trips (Witt and Witt, 1995). Since the majority of tourist visits take place for holiday purposes, the determinants of demand are generally taken to be the same as those for holiday trips in those published studies which examine total trips. We shall therefore also focus on the determinants of the demand for holiday tourism.

The term ‘tourism demand’ may be defined for a particular destination as the quantity of the tourism product (i.e., a combination of tourism goods and services) that consumers are willing to purchase during a specified period under a given set of conditions. The time period may be a month, a quarter or a year. The conditions that relate to the quantity of tourism demanded include tourism prices for the destination (tourists’ living costs in the destination and travel costs to the destination), the availability of and tourism prices for competing (substitute) destinations, potential consumers’ incomes, advertising expenditure, tastes of consumers in the origin (generating) countries, and other social, cultural, geographic and political factors.

The demand function for the tourism product in destination i by residents of origin j is given by

$$Q_{ij} = f(P_i, P_s, Y_j, T_j, A_{ij}, \varepsilon_{ij}) \quad (1.1)$$

where Q_{ij} is the quantity of the tourism product demanded in destination i by tourists from country j ;

P_i is the price of tourism for destination i ;

P_s is the price of tourism for substitute destinations;

Y_j is the level of income in origin country j ;

T_j is consumer tastes in origin country j ;

A_{ij} is advertising expenditure on tourism by destination i in origin country j ;

ε_{ij} is the disturbance term that captures all other factors which may influence the quantity of the tourism product demanded in destination i by residents of origin country j .

In empirical investigations it can be difficult to find exact measures of the determinants of tourism demand due to lack of data availability. The variables used in empirical studies of tourism demand functions are now reviewed, and the problems associated with these measures are also addressed.

Dependent variable

International tourism demand is generally measured in terms of the number of tourist visits from an origin country to a destination country, or in terms of tourist expenditure by visitors from the origin country in the destination country. The number of tourist nights spent by residents of the origin in the destination is an alternative tourism demand measure.

International tourism demand data are collected in various ways. Tourist visits are usually recorded by frontier counts (inbound), registration at accommodation establishments (inbound) or sample surveys (inbound and outbound). A problem with frontier counts is that in certain cases a substantial transit traffic element may be present. Accommodation establishment records exclude day-trippers and tourists staying with friends or relatives or in other forms of unregistered accommodation. Sample surveys may be applied at points of entry/exit to returning residents or departing non-residents, or household surveys may be carried out (outbound), but in both cases often the sample size is relatively small. International tourist expenditure data are usually collected by the bank reporting method or sample surveys. The former method is based on the registration by authorised banks and agencies of the buying and selling of foreign currencies by travellers. There are many problems associated with this method of data collection such as identifying a transaction as a tourism transaction, the non-reporting of relevant transactions and the unreliability of its use for measuring receipts from specific origin countries (the geographic breakdown relates to the denomination of the currency and not the generating country). Sample surveys provide more reliable data on tourist expenditures, but as with visit data the sample size is often relatively small.

Explanatory variables

Population. The level of foreign tourism from a given origin is expected to depend upon the origin population. Although population features as a

separate explanatory variable in some tourism demand studies, more often the effect of population is accommodated by modifying the dependent variable to become international tourism demand per capita. However, in many cases the impact of population changes is ignored. The main justification for not having population as a separate variable is that its presence may cause multicollinearity problems, as population tends to be highly correlated with income (see next sub-section). On the other hand, the procedure adopted whereby demand is specified in per capita terms in effect constrains the population elasticity to equal unity (if a power model is under consideration). Although it is theoretically incorrect to exclude population, it is likely that population changes in the generating countries will be small over the short–medium term, and hence the model will be affected only marginally.

Income. In tourism demand functions, origin country income or private consumption is generally included as a key explanatory variable, and usually enters the demand function in per capita form (corresponding to the specification of demand in per capita terms). If (mainly) holiday demand or visits to friends and relatives are under consideration then the appropriate form of the variable is personal disposable income or private consumption. However, if attention focuses on business visits (or they form an important part of the total), then a more general income variable (such as national income or GDP) should be used, or a measure of business activity such as aggregate imports/exports between the origin and destination countries.

Own price. The appropriate measure of tourism prices is difficult to obtain. In the case of tourism there are two elements of price: the cost of travel to the destination, and the cost of living for tourists in the destination.

Although the theoretical justification for including transport cost as a demand determinant does not appear to be disputed, many empirical studies exclude this variable from the demand function on the grounds of potential multicollinearity problems and lack of data availability. However, it is possible to obtain an approximate measure of transport cost using representative air fares between origin and destination for air travel, and representative petrol costs and/or ferry fares for surface travel.

Usually the consumer price index (CPI) in a destination country is taken to be a proxy for the cost of tourism in that country. The problem with using the CPI as the cost of tourism in the destination is that the cost of living for the local residents does not always reflect the cost of living for foreign visitors to that destination, especially in poor countries. However, this

procedure is adopted on the grounds of lack of more suitable data, i.e., an index 'defined over the basket of goods purchased by tourists, rather than over the usual typical consumer basket' (Kliman, 1981, p. 490). Potential tourists base their decisions on tourism costs in the destination measured in terms of their local currency, and therefore the destination price variable should be adjusted by the exchange rate between the origin and destination currencies.

Exchange rates are also sometimes used separately to represent tourists' costs of living. Although they usually appear in addition to a consumer price index proxy, they may also be used as the sole representation of tourists' living costs. The justification for including a separate exchange rate variable in international tourism demand functions is that consumers are more aware of exchange rates than destination costs of living for tourists, and hence they are driven to use exchange rate as a proxy variable. However, the use of exchange rate alone in the demand functions can be very misleading because even though the exchange rate in a destination may become more favourable, this could be counterbalanced by a relatively high inflation rate. Empirical results presented by Martin and Witt (1987) suggest that the exchange-rate-adjusted consumer price index is a reasonable proxy for the cost of tourism, but that exchange rate on its own is not an acceptable proxy.

Substitute prices. Mostly, those substitution possibilities allowed for in international tourism demand studies are restricted to tourists' destination living costs. There are two possible ways in which these substitute prices may enter the demand function. First, the tourists' cost-of-living variable may be specified in the form of the destination value relative to the origin value, thus permitting substitution between tourist visits to the foreign destination under consideration and domestic tourism. The justification for this form of relative price index is that domestic tourism is the most important substitute for foreign tourism. Second, substitute prices may enter the demand function in a form that allows for the impact of competing foreign destinations by specifying the tourists' cost-of-living variable as destination value relative to a weighted average value calculated for a set of alternative destinations, or by specifying a separate weighted average substitute destination cost variable.

Just as tourists' living costs in substitute destinations are likely to influence the demand for tourism to a given destination, so travel costs to substitute destinations may also be expected to have an impact. However, although some theoretical attention has been paid to the notion of

substitute travel costs in the literature, they do not often feature in tourism demand functions. Substitute travel costs may enter the demand function by specifying the travel cost variable as travel cost to the destination relative to a weighted average value calculated for a set of alternative destinations, or by specifying a separate weighted average substitute travel cost variable.

Tastes. Consumer tastes can have an important influence on tourism demand. They are affected by socio-economic factors such as age, sex, education and marital status, and can change as a result of innovation and advertising, and more fundamentally as a consequence of changing values and priorities, and rising living-standards. However, due to data limitations most empirical studies which allow for consumer tastes use a time trend to represent a steady change in the popularity of a destination country over the period considered as a result of changing tastes. The intention of using a time trend is also to capture the time-dependent effects of all other explanatory variables not explicitly included in the demand equation, such as changes in air service frequencies and demographic changes in the origins. However, the problem of including a time trend in tourism demand functions is its ambiguity. We normally do not know exactly what the trend variable actually captures. In many cases, the inclusion of a time trend also causes problems with the income variable, since these two variables are likely to be highly correlated. Song *et al.* (2000) make an attempt to examine the influence of tastes on tourism demand by using a destination preference index. However, much work is still needed to incorporate appropriately consumer tastes in tourism demand functions.

Marketing. National tourist organisations engage in sales-promotion activities specifically to attempt to persuade potential tourists to visit the country, and these activities may take various forms including media advertising and public relations. Hence, promotional expenditure is expected to play a role in determining the level of international tourism demand. Much tourism-related marketing activity is not, however, specific to a particular destination (e.g., general travel agent and tour operator advertising) and therefore is likely to have little impact on the demand for tourism to that destination. The promotional activities of national tourist organisations are destination specific and are therefore more likely to influence tourism flows to the destination concerned.

Marketing has not featured often in tourism demand models, but a critical review of studies which do include some form of marketing variable

appears in Witt and Martin (1987a) and a subsequent review appears in Crouch *et al.* (1992).

Expectations and habit persistence. Tourist expectations and habit persistence (stable behaviour patterns) are usually incorporated in tourism demand models through the use of a lagged dependent variable, i.e., an autoregressive term. Once people have been on holiday to a particular country and liked it, they tend to return to that destination. There is much less uncertainty associated with holidaying again in that country compared with travelling to a previously unvisited foreign country. Furthermore, knowledge about the destination spreads as people talk about their holidays and show photographs, thereby reducing uncertainty for potential visitors to that country. In fact this 'word of mouth' recommendation may well play a more important role in destination selection than does commercial advertising. A type of adaptive expectations or learning process is in operation and as people are, in general, risk averse (especially in the case of large outlays of money such as for holidays), the number of people choosing a given destination in any year depends on the numbers who chose it in previous years.

A further justification for the inclusion of a lagged dependent variable in tourism demand functions, which is not related to expectations or habit persistence, is that there may be constraints on supply. These constraints may take the form of shortages of hotel accommodation, passenger transportation capacity and trained staff, and these often cannot be increased rapidly. Time is also required to build up contacts among tour operators, hotels, airlines and travel agencies. Similarly, once the tourist industry in a country has become highly developed it is unlikely to dwindle rapidly. If a partial adjustment mechanism is postulated to allow for rigidities in supply, this results in the presence of a lagged dependent variable in the tourism demand function. This is now demonstrated.

$$Q_t - Q_{t-1} = \mu(Q_t^* - Q_{t-1}) \quad 0 < \mu < 1 \quad (1.2)$$

where Q_t is the quantity of the tourism product provided in destination i for residents of country j in period t ;

Q_t^* is the quantity of the tourism product demanded in destination i by residents of country j in period t ;

μ is the speed of adjustment of the level of tourism provided to the level demanded.

(Subscripts i and j have been omitted for simplicity.) The left-hand side of

Equation (1.2) denotes the change in the level of the tourism product provided between periods $t - 1$ and t . The bracketed term on the right-hand side of Equation (1.2) is the difference between the level of demand for the tourism product in period t and the level provided in period $t - 1$, that is the change demanded in the level of tourism. Thus Equation (1.2) states that the change in the level of tourism provided is a proportion, μ , of change demanded. If $\mu = 0$, then $Q_t = Q_{t-1}$, and there is no movement of the quantity of tourism provided towards the quantity demanded. If $\mu = 1$, then $Q_t = Q_t^*$, i.e., there is complete adjustment of the quantity of tourism provided to the quantity demanded. As we are specifying a *partial* adjustment process, μ lies strictly between zero and unity – there is some adjustment but it is incomplete.

Equation (1.2) may be rewritten as

$$Q_t = (1 - \mu)Q_{t-1} + \mu Q_t^* \quad (1.3)$$

Now Q_t^* is the quantity of tourism demanded and is a function of the set of explanatory variables such as income, own price and substitute prices. Therefore, the only difference between the explanatory variables present in models (1.1) and (1.3) is that the latter includes the dependent variable with a one-period lag – hence the justification for including a lagged dependent variable in tourism demand functions to accommodate supply constraints.

Qualitative effects. Dummy variables can be included in international tourism demand models to capture the impacts of ‘one-off’ events. For example, when governments impose foreign currency restrictions on their residents (e.g., the £50 annual limit introduced in the UK during 1966 to late 1969), this is expected to reduce outbound tourism. Similarly, the 1973 and 1979 oil crises are expected to have temporarily reduced international tourism demand; although the impacts of the oil crises on holiday prices and consumer incomes are incorporated in these explanatory variables, a further reduction in international tourism demand is likely on account of the psychological impact of the resultant uncertainties in the world economic situation. Witt and Martin (1987b) discuss a range of ‘one-off’ events which have been accommodated by dummy variables.

1.3 Functional form and demand elasticities

Equation (1.1) is a theoretical model of tourism demand which is simply a mathematical statement that indicates that there is a relationship between

the variables under consideration. However, in exactly what form these variables are related is unknown. In practice, we need to specify the form of the tourism demand function, i.e., the manner in which tourism demand is related to its determinants. The two commonly used demand equations assume either a linear relationship or a power relationship between Q_{ij} and its determinants.

The simplest relationship is the linear relationship, and this is expressed as:

$$Q_{ij} = \alpha_0 + \alpha_1 P_i + \alpha_2 P_s + \alpha_3 Y_j + \alpha_4 T_j + \alpha_5 A_{ij} + \varepsilon_{ij} \quad (1.4)$$

where the variables Q_{ij} , P_i , P_s , Y_j , T_j and A_{ij} are defined as in Equation (1.1); $\alpha_0, \alpha_1, \dots, \alpha_5$ are the coefficients that need to be estimated empirically; and ε_{ij} is the disturbance term. Linear tourism demand equations are popular for the following two reasons. First, empirical studies have shown that many tourism demand relationships can be approximately represented by a linear relationship over the sample period under consideration (Edwards, 1985; Smeral *et al.*, 1992). Second, the coefficients in the linear model can be estimated relatively easily.

Based on Equation (1.4), we can examine how sensitive tourism demand is to changes in the independent variables. The measure of responsiveness of demand to changes in the independent variables is the demand elasticity, which is measured by:

$$\tilde{\omega}_X = \frac{\Delta Q_{ij}/Q_{ij}}{\Delta X/X} = \frac{\Delta Q_{ij}}{\Delta X} \times \frac{X}{Q_{ij}} \quad (1.5)$$

where X denotes an independent variable and Δ denotes ‘change in’. Equation (1.5) shows the percentage change in quantity demanded, Q_{ij} , attributable to a given percentage change in an independent variable, X . This equation measures arc elasticity, namely the elasticity over some finite range of the function. At the limit, where ΔX and ΔQ_{ij} are very small, the point elasticity may be obtained:

$$\tilde{\omega}_X = \frac{\partial Q_{ij}}{\partial X} \times \frac{X}{Q_{ij}} \quad (1.6)$$

The partial derivative sign denotes that we are examining the impact on quantity demanded resulting from a change in X , holding all other factors constant. Applying formula (1.6) to Equation (1.4) allows various demand

elasticities to be calculated. For example, the own-price elasticity is calculated as:

$$\tilde{\omega}_X = \frac{\partial Q_{ij}}{\partial P_i} \times \frac{P_i}{Q_{ij}} = \frac{\partial(\alpha_0 + \alpha_1 P_i + \alpha_2 P_s + \alpha_3 Y_j + \alpha_4 T_j + \alpha_5 A_{ij} + \varepsilon_{ij})}{\partial P_i} \times \frac{P_i}{Q_{ij}} = \alpha_1 \times \frac{P_i}{Q_{ij}} \quad (1.7)$$

From Equation (1.7) we can see that the point elasticity is obtained from a linear demand function by multiplying the regression coefficient of the variable X by the value of X/Q_{ij} at that point. Given that the value of X/Q_{ij} varies over the time period, the point elasticities based on the linear demand model therefore also vary over time. The substitute price elasticity, income elasticity, etc., are calculated in the same manner.

The most commonly used functional form in tourism demand analysis is the power model (Witt and Witt, 1995). This can be expressed as:

$$Q_{ij} = A P_i^{\alpha_1} P_s^{\alpha_2} Y_j^{\alpha_3} T_j^{\alpha_4} A_{ij}^{\alpha_5} u_{ij} \quad (1.8)$$

where A , α_0 , α_1 , ..., α_5 are coefficients; the variables are as defined previously; and u_i is the disturbance term. The popularity of the power function is due to its features discussed below, but also due to its relatively good empirical performance. For example, Witt and Witt (1992) and Lee *et al.* (1996) found that the power model outperformed the linear model in terms of expected coefficient signs and statistical significance of the coefficients.

The power function has three important features. First, Equation (1.8) implies that the marginal effects of each independent variable on tourism demand are not constant, but depend on the value of the variable, as well as on the values of all other variables in the demand function. This can be seen by taking the partial derivative of Equation (1.8) with respect to, say, income:

$$\frac{\partial Q_{ij}}{\partial Y_j} = A \alpha_3 P_i^{\alpha_1} P_s^{\alpha_2} Y_j^{\alpha_3 - 1} T_j^{\alpha_4} A_{ij}^{\alpha_5} u_{ij} \quad (1.9)$$

Equation (1.9) shows that the marginal effect of a change in income on tourism demand depends not only on the level of income but also on all the other explanatory variables. This changing marginal relationship is perhaps more realistic than the constant relationship assumed in the linear model. For example, when consumers' disposable income is low, a given increase in income tends to have a large impact on foreign holiday expenditure; but when disposable income is high, the increase in foreign holiday expenditure

resulting from the given increase in income is likely to be smaller. This may be due to external constraints imposed on consumers' leisure time, or because consumer demand shifts to a higher order such as buying new houses.

The second feature of the power tourism demand function is that Equation (1.8) may be transformed into a linear relationship using logarithms, again making estimation relatively easy. The transformed Equation (1.8) is

$$\ln Q_{ij} = \alpha_0 + \alpha_1 \ln P_i + \alpha_2 \ln P_s + \alpha_3 \ln Y_j + \alpha_4 \ln T_j + \alpha_5 \ln A_{ij} + \varepsilon_{ij} \quad (1.10)$$

where $\alpha_0 = \ln A$ and $\varepsilon_{ij} = \ln u_{ij}$.

The third feature of the power demand function is that the estimated coefficients in Equation (1.10) are estimates of demand elasticities (which are constant over time). For example, own-price elasticity is measured by:

$$\tilde{\omega}_{P_i} = \frac{\partial Q_{ij}}{\partial P_i} \times \frac{P_i}{Q_{ij}} \quad (1.11)$$

From Equation (1.8)

$$\begin{aligned} \tilde{\omega}_{P_i} &= A \alpha_1 P_i^{\alpha_1 - 1} P_s^{\alpha_2} Y_j^{\alpha_3} T_j^{\alpha_4} A_{ij}^{\alpha_5} u_{ij} \frac{P_i}{Q_{ij}} \quad (1.12) \\ &= A \alpha_1 P_i^{\alpha_1 - 1} P_s^{\alpha_2} Y_j^{\alpha_3} T_j^{\alpha_4} A_{ij}^{\alpha_5} u_{ij} \times \frac{P_i}{A P_i^{\alpha_1} P_s^{\alpha_2} Y_j^{\alpha_3} T_j^{\alpha_4} A_{ij}^{\alpha_5} u_{ij}} \\ &= \alpha_1 \frac{A P_i^{\alpha_1} P_s^{\alpha_2} Y_j^{\alpha_3} T_j^{\alpha_4} A_{ij}^{\alpha_5} u_{ij}}{P_i} \times \frac{P_i}{A P_i^{\alpha_1} P_s^{\alpha_2} Y_j^{\alpha_3} T_j^{\alpha_4} A_{ij}^{\alpha_5} u_{ij}} \\ &= \alpha_1 \end{aligned}$$

Hence, the own-price elasticity is the same as the coefficient of the own-price variable, and does not depend on the price:quantity ratio. This constant demand elasticity feature holds for all the variables in Equation (1.8) (and therefore also Equation (1.10)). The constant demand elasticity property is useful in that it is easy to understand from a managerial point of view; it allows policymakers to assess the percentage impact on tourism demand resulting from a 1% change in one of the independent variables, while holding all other explanatory variables constant.

The magnitude of the estimated price elasticity of demand can provide useful information for policymakers. Total tourism revenue may increase, decrease or remain the same as a result of a change in tourism prices, and this depends on the value of the price elasticity. There are three ranges of values that are relevant.

- $|\tilde{\omega}_{P_i}| > 1$: If the absolute value of the price elasticity exceeds unity, the demand for tourism is price elastic. An increase in tourism price will result in a more than proportionate decrease in quantity demanded, and as a result total tourism revenue will fall.
- $|\tilde{\omega}_{P_i}| = 1$: If the absolute value of the price elasticity equals unity, the demand curve is a rectangular hyperbola. Total tourism revenue will remain constant with a change in tourism price.
- $|\tilde{\omega}_{P_i}| < 1$: If the absolute value of the price elasticity is less than unity, the demand for tourism is price inelastic. An increase in tourism price will result in a less than proportionate decrease in quantity demanded, and as a result total tourism revenue will rise.

According to economic theory, the total revenue (TR) will continue to increase as long as marginal revenue (MR) is positive. If we know the price elasticity of demand at a point, the value of MR can be calculated. This is illustrated as follows:

$$TR = P_i Q_{ij}$$

$$MR = \frac{dTR}{dQ_{ij}} = P_i + Q_{ij} \frac{dP_i}{dQ_{ij}} = P_i \left(1 + \frac{Q_{ij}}{P_i} \frac{dP_i}{dQ_{ij}} \right) = P_i \left(1 + \frac{1}{\tilde{\omega}_{P_i}} \right)$$

This equation states that the MR relates to the price of tourism and price elasticity. If we know the value of the price elasticity, we can calculate the sign of the MR , and hence we can see whether or not the TR is increasing. For example, if the price elasticity of demand for tourism is estimated to be -1.5 , the MR revenue will be $0.333P_i$. Since the price of tourism is always positive, the MR is positive. The managerial implication of this would be that a decrease in the tourism price holding other variables constant will bring about an increase in total tourism revenue. However, if the calculated price elasticity is -0.5 , the MR will be $-P_i$, which is negative. This suggests that a decrease in the tourism price holding other variables constant will bring about a less than proportionate increase in tourism demand, and so total tourism revenue will decline.

Knowledge of income elasticities is also important for tourism planners. A low income elasticity of demand implies that the demand for tourism in a particular destination is relatively insensitive to the economic situation in the origin country. However, if the calculated income elasticity exceeds unity, then a rise in income in the origin country will be accompanied by a more than proportionate rise in tourism demand in the destination. Destinations should therefore pay particular attention to forecasting the

expected levels of future economic activity in those tourism generating countries with high income elasticities.

Price elasticities for substitute destinations also contain useful information for tourism policymakers. If the substitute price elasticity in the tourism demand function for a particular destination is high, this means that tourism in this destination is very sensitive to price changes in other destinations. Planners and decision-makers in the destination under consideration should therefore keep a close watch on prices in competing destinations in order to ensure that the relative price level does not increase significantly.

1.4 Summary

This chapter has introduced some basic concepts related to tourism demand modelling and forecasting. The demand for the tourism product faced by a destination depends on the price of tourism for that destination, the price of tourism for alternative destinations, potential consumers' incomes, consumer tastes, and the promotional efforts of the destination, as well as other social, cultural, geographic and political factors. Demand elasticities such as own price elasticity, income elasticity and substitute price elasticity measure the percentage change in the quantity of tourism demanded in a destination country as a result of a 1% change in one of the determinant variables, while holding the rest of the determinants constant in the tourism demand function. A decline in the price of tourism in a destination results in an increase in total tourism revenue in that destination if demand is price elastic, a decrease in total tourism revenue if demand is price inelastic, and unchanged total tourism revenue if the price elasticity equals unity.

Understanding demand elasticities is very important for tourism policymakers and planners in the destinations. For tourism demand forecasters, correctly identifying the determinants of tourism demand and appropriately specifying the tourism demand models are crucial for the generation of accurate forecasts of future tourism demand.

References

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