The Drivers of Tourism Demand in the UK

A report by

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Executive Summary

This report gives describes the methodology used and presents the results of a project to estimate the drivers of tourism demand in the UK. The project has estimated income and price elasticities for seven source markets, with each market split according to purpose of visit into four categories - holidays, business, visits to friends and relatives (VFR) and study. The main results are:

- An average income elasticity of 1.65 is estimated for inbound tourism. A 1% increase in GDP in source markets would lead to an increase in tourism expenditure in the UK of 1.65%.

- An average price elasticity of -0.61 is estimated for inbound tourism. A 1% increase in UK prices or relative exchange rates would lead to a 0.61% fall in tourism expenditure in the UK by inbound tourists.

- Competitors' prices are found to have little effect overall (an elasticity of 0.04) but this and the other effects have considerable variation between nationalities of tourist and purpose of visit.

- Ireland and Spain are found to be the most price sensitive inbound markets, with elasticities of -1.86 and -1.38. Other markets are relatively insensitive to price changes, with elasticities of -0.42 for inbound tourism from the United States, -0.53 from France and -0.33 from Germany.

- Less variation is evident for income elasticities, but there is some variation, with inbound tourism from the United States (2.01) and Ireland (1.72) having higher income elasticities.

- Holiday markets are more price sensitive than other markets, with an average price elasticity of -1.23, and also exhibit high income elasticities (an average of 1.70).

- Business markets are income elastic (1.70) but are price inelastic, with an average positive elasticity. Positive price elasticities mean that a more expensive destination attract more tourists, and in terms of business tourists may relate to the increased profitability from doing business in the UK rather than individual travellers' consideration of their trip expenses.

- Domestic holiday tourism is more income elastic (1.15) than other domestic tourism markets, but less elastic than inbound markets.

- The domestic holiday market is more responsive to domestic prices than other forms of domestic tourism, but less responsive to foreign prices.

- Weather has no effect on the overall level of domestic tourism expenditure, but is likely to change the timing of domestic tourism trips.

This report is dedicated to the memory of Professor Thea Sinclair, who died tragically in September 2006 during the period that the initial research for this project was undertaken. Professor Sinclair's career included, from an early stage, an interest in modelling tourism demand, and her enormous contribution to the academic field of tourism economics is partly due to her work in tourism demand modelling.

Contents

Introduction

The UK Government's policy includes maximising tourism's contribution to the economy (DCMS 1999: 5). To do this, marketing of the UK abroad and of domestic attractions within the UK are an important strand of UK tourism policy, as well as supply-side policies such as improving skills and service quality. These policies are difficult to implement however, without knowledge of how changes in the drivers of tourism demand will affect the numbers of tourism trips and value of tourism expenditure, both for inbound and domestic tourism. This report aims to assist these policies by providing estimates of the extent to which the drivers of both inbound and domestic tourism demand affect demand levels.

In 2006, expenditure by domestic tourists in the UK was £21 million, whereas expenditure created by inbound tourists was £16 billion. In 2006 the UK ranked sixth in the international tourism earnings UNWTO classification behind the USA, Spain, France, Italy and China. The top five overseas markets for the UK in 2006 were the United States, France, Germany, Irish Republic and Spain. This report will study these five specific countries as well as Italy and the Netherlands. Similarities and differences across countries will be identified and discussed in the present report.

The tourism sector is characterised by continuous change. Tourism destinations are subject to strong competition, particularly from emerging destinations and through prices and the availability of low-cost air transport. The analysis of the drivers of the inbound and domestic tourism demand, paying special attention to the different purposes of visit, can provide a useful tool to the government in order to formulate appropriate policy decisions or recommendations. This report identifies the key drivers of tourism demand in the UK for different markets (nationalities and purposes of visit). By estimating elasticities of demand for these drivers, the report provides useful information that can be used to assess the impact that changes in prices and exchange rates have on inbound and domestic tourism in the UK. The model developed provides the Department for Culture, Media and Sport with state-of-the-art tools for assisting its decision making process.

Section 1 of this report reviews the literature on demand models, providing examples for UK outbound and inbound demand, and discussing the drivers of demand that have been included in models previously, as well as the types of econometric model that have been used. Following this, a demand model for UK inbound tourism demand is specified and the results from its estimation are provided and discussed (Section 2). Data for domestic demand are discussed in Section 3, with two models provided and used, at the annual and quarterly level. The use of two models for domestic demand is driven by data limitations. The conclusions from both inbound and domestic demand are discussed in Section 4.

1. General features of Tourism Demand Modelling

Empirical studies which estimate tourism demand can help to explain the level and pattern of tourism demand and its sensitivity to changes in the variables upon which it depends, for example, income in origin areas and relative rates of inflation and exchange rates between different origins and destinations, as Sinclair and Stabler (1997) highlighted. Such information is undoubtedly useful for public sector policy-making and the private sector. As well as tourism demand estimates, forecasts have a crucial role for destination governments' formulation and implementation of appropriate medium- and long-term tourism strategies (Song and Turner, 2006).

Depending upon whether a person is travelling to or from a certain country, the following types of tourism can be distinguished: (a) *inbound tourism*, involving non-residents received by a destination country; (b) *outbound tourism,* involving residents travelling to another country and; (c) *domestic tourism*, involving residents travelling within a country.

Tourism Demand Measurement

International (or inbound) tourism demand can be measured in different ways. The range of possibilities include number of inbound tourist arrivals; number of international tourist arrivals in per capita terms; tourism expenditure; tourism expenditure shares; number of nights spent by international tourists in the destination or number of nights spent by international tourist in per capita terms. In most cases, the way of measuring tourism demand depends on the availability and quality of data. The chosen measure is defined as the 'dependent variable' in the tourism demand function.

Domestic tourism demand can also be measured by the same variables as international tourism demand. Once again, the choice amongst a range of variables depends on the availability of data. Rigorous studies estimating domestic tourism models have not been previously conducted, largely due to the unavailability of appropriate data.

Tourism demand faced by a destination depends on the price of tourism products in the destination and in alternative destinations, potential consumers' incomes, consumer tastes, and the promotional efforts of the destination and also other social, cultural, geographical and political factors. These factors are the determinants of tourism demand, which are the 'explanatory variables' in the tourism demand function.

1.1 Potential Determinants of Tourism Demand

To identify an appropriate empirical model, the determinants of tourism demand become crucial. Tourism can be motivated by several means: holidays, business, visits to friends and relatives, conferences, pilgrimages and so on. However, most studies take into account the determinants of the tourism demand motivated only by holidays, neglecting an outstanding part of tourism. The potential explanatory variables that are analyzed in the empirical literature as economic drivers of tourism demand are (Sinclair and Stabler, 1997; Song and Witt, 2000; Song and Turner, 2006):

- *Population.* The level of foreign tourism from a given origin is expected to depend upon the origin population, an increase in population resulting in an increase in demand. The most common way to consider the effect of population in the tourism demand function is by modifying the dependent variable to be per capita.

- *Income or Expenditure.* The level of income of the tourists from the country of origin if inbound tourism demand is analysed or tourists' expenditure in the destination if outbound tourism demand is examined is a crucial explanatory variable. It can be represented by disposable income, private consumption or national income. It can be expressed in per capita terms (corresponding to the specification of demand in per capita terms). This variable, whether it is income or expenditure, is expected to have a positive influence on tourism demand – the higher are tourists' incomes, the more they will spend on tourism.

- *Own price*. The appropriate measure of prices that tourists pay is difficult to obtain because of the wide range of products involved. Additionally there are two prices to consider: the cost of travel to the destination, and the cost of living for tourists in the destination. Due to the unavailability of data or correlation problems, a transport cost variable is rarely included as a determinant in the tourism demand function. The common data series used as a proxy for the price of tourism is the consumer price index (CPI). Potential tourists base their decisions on tourism costs in the destination measured in terms of their local currency and thereby the CPI should be adjusted by the exchange rate between the origin and destination currencies. In fact, the exchange rate is sometimes included in the tourism demand function as an explanatory variable separately from the CPI, as tourists are perhaps more aware of the exchange rate rather than the costs of living destination. The price variable is expected to have a negative influence on tourism demand - the higher are tourism prices, the lower tourism demand will be.

- *Substitute prices*. The impact of competing destinations can enter into the tourism demand function in two ways: (i) the tourists' cost of living variable may be specified in the form of the destination value relative to the origin value; (ii) the tourists' cost of living variable may be specified as destination value relative to a weighted average value calculated for a set of alternative destinations, or by specifying a separated weighted average substitute destination cost variable. Moreover, travel costs to substitute destinations may be expected to have an impact in tourism demand although they are not usually included in demand functions due to the data unavailability (see Song and Turner 2006 for greater detail). Substitute prices and travel costs, if included in the equation, are expected to have a positive influence; that means the higher are the prices and travel costs of the substitute destinations, the more the tourists will visit and spend in the destination under consideration.

- *Tastes.* Consumer tastes are supposed to have a relevant influence on tourism demand. Due to lack of suitable data, this is sometimes included as a time trend, implying that tastes are moving either in favour or against the destination, at a constant rate. This is often, however, very difficult to justify and interpret.

- *Marketing*. Promotional expenditure might play a positive role in determining the level of international tourism demand. The lack of suitable data means that this possible explanatory factor does not commonly appear in tourism demand functions.

- *Lagged dependent variable*. Tourist expectations and habit persistence are incorporated in tourism demand models by including the dependent variable lagged by one time period. Once tourists have been to a destination and liked it, they may return to that destination in the future. Therefore, if this variable is included in the model, it is expected to have a positive influence.

- *One-off Events.* Dummy variables are often included in tourism demand functions to allow for the impact of extraordinary events. These can be positive events such as hosting the Olympic Games and negative ones such as terrorism attack or political instability. Knowledge of the effect that these events have on tourism demand is an essential first step in being able to determine the effects that they have on the wider economy (e.g. Blake *et al*. 2003).

Tourism Demand Elasticities

As well as identifying the determinants of international tourism demand and their influence, these models provide the demand elasticities which become crucial for policymakers and planners in the destination under analysis. Demand elasticities such as income (or expenditure) elasticity, price elasticity (also named own-price elasticity) or competitors' price elasticity (also named substitute price elasticity) measure the percentage change in the quantity of tourism demanded or expenditure in a destination country as a result of a one per cent change in one of the determinant variables, while holding the rest of the determinants constant. For example, if demand is income elastic (income elasticity > 1), a 1% increase in source market income would lead to a greater than 1% increase in tourism expenditure while if demand is income inelastic (income elasticity < 1), a 1% increase in income would lead to an increase in tourism of less than 1%.

In general, tourism is considered to be a luxury good, so that it would be expected that total tourism expenditure on all types of tourism would be greater than 1, but demand for individual markets could be less than 1, for instance when tourists might move on to more expensive, exclusive or remote destinations when their incomes increase. Own-price elasticities would be expected to be negative, but the size of the elasticity could be inelastic (an absolute size of less then 1, e.g. an elasticity between -1 and 0) or elastic (less than -1, e.g. an absolute size greater than 1). There is no reason to presume that there is any relationship between income and price elasticities; a 'luxury' market with a high income elasticity could well be price elastic or inelastic. An elastic price elasticity could be interpreted as tourists being sensitive to prices, perhaps because of the presence of similar alternatives.

Substitute price elasticities are normally expected to be positive, as increases in prices in another destination should drive tourists away from that destination to the destination in question. A negative substitute price elasticity could be possible if the alternative destination is in fact complementary rather than a substitute for the destination in question.

Therefore, elasticity values quantify the sensitivity of tourism demand to changes in the key drivers of demand. Information about the price and income elasticities of demand is very useful for policy formation in relation to pricing, exchange rate and taxation (Sinclair and Durbarry, 2000), and can assist the development of marketing strategies towards different origins. For example, it is important to supply price competitive products and service to tourists characterised by high price elasticities of demand, whereas higher priced tourism 'products', such as upper category accommodation, may be targeted at tourists with low price elasticities and who are less sensitive to price rises. Thus, knowledge of the values of the price elasticities of demand for different origins and types of tourist is necessary.

Information about the values of the income elasticities of demand is also important (Han, Durbarry and Sinclair, 2006). High values indicate that the demand for tourism rises significantly as income

in origin countries increases. Thus, high values would indicate that the country of destination is providing tourism products and services for which demand is increasing as income to benefit from the long run growth of income in other countries. In practice, the elasticities values are higher for some origin countries than for others, indicating the origin markets that the destination may wish to target as significant sources of further growth. On the other hand, low income elasticities of demand indicate that the destination should consider altering its tourism offer to meet the requirements of tourists from those origins.

1.2 Tourism demand modelling

Tourism demand can be analysed for a country, a group of countries, regions and also can be disaggregated by categories such as purposes of visit (for instance, holidays, business, visits to friends and relatives or study), or tourist type (for instance, nationality).

Two approaches have been used in the literature: the single equation model and the system of equations model (Sinclair and Stabler, 1997). On the one hand, the single equation approach involves theorising the determinants of demand and using the technique of multiple regression analysis to estimate the relationship between demand and each of the determinants. A demand function might be written as $D = f(x_1, x_2,\ldots x_n)$ where D is tourism demand (endogenous variable) and $x_1 \ldots x_n$ are the explanatory (exogenous) variables which determine demand. Amongst the advantages of this approach it is outstanding the non-difficulty for implementing it and the calculation of the elasticities of demand. Most economic studies have used the single equation methodology to explain international tourism demand, usually at the national level, as demonstrated by the reviews by Archer (1976), Johnson and Ashworth (1990) and Sheldon (1990).

On the other hand, the system of equation models is used to estimate the demand of tourism in a range of destination countries by consumers from one origin or a range of countries. These models are formulated under microeconomic theories of demand (see Sinclair and Stabler, 1997). The most commonly model of system of equations used in the literature is the Almost Ideal Demand System model developed by Deaton and Mellbauer (1980) and widely used to estimate outbound tourism demand.

Since the first studies on tourism demand appeared in the 1960s (Gerakis, 1965; Gray, 1966), great advances have been made both in terms of the availability of data and of the way that demand models are specified. Uysal and Crompton (1985), Sheldon and Var (1985), Johnson and Ashworth (1990), Crouch (1994a,b) and Lim (1997) provided influencial reviews of a large volume of papers on tourism demand modelling and forecasting. They identify which models, which variables and which econometrics techniques were employed and evaluate their suitability. Furthermore, during the 1990s the attention paid to tourism demand modelling and forecasting has increased considerably. The most recent contribution in literature review on tourism demand is a survey by Li, Song and Witt (2005). These authors reviewed eighty-eight empirical studies on tourism demand published during the period 1990-2004, presenting the most recent developments in econometric modelling and forecasting.

Overall, the main econometrics models employed to estimate and to forecast the tourism demand are briefly explained next.

(i) Vector autoregressive (VAR) model: a VAR model consists of a system of equations simultaneously estimated where all the variables apart from the deterministic variables (trend, intercept and dummy variables) are modelled purely as dynamic processes (i.e. all variables are treated as endogenous). Some authors that have employed to approach to estimate international tourism demand are Shan and Wilson (2001), Lim and McLeer (2001, 2002), Song, Witt and Li (2003), De Mello and Nell (2005) and Song and Witt (2006).

(ii) Cointegration and error correction (ECM) model: an ECM is a VAR model incorporating the cointegration vector previously found, therefore this is also a system of equations model. Several authors have applied this technique to estimate international tourism demand. Some of the works that use this model are Dritsakis (2004), Kulendran and Witt (2001), Song, Witt and Jensen (2003).

(iii) Almost ideal demand systems (AIDS) model: an AIDS model consists of a system of equations simultaneously estimated which permits to analyse the interdependence of budget allocations to different consumer goods/services. This model is usually employed to estimate outbound tourism demand. Some examples are Papatheodorou (1999), Lyssiotou (2000), De Mello, Pack and Sinclair (2002), Divisekera (2003), Durbarry and Sinclair (2003), Li, Song and Witt (2004), De Mello and Fortuna (2005), Han, Durbarry and Sinclair (2006).

(iv) Panel data model: a panel data model consists of a single equation which is estimated using panel data which implies that cross-section and time series data are considered simultaneously. For instance, it is possible to estimate the inbound tourism demand in a certain destination from a period time and taking account of different countries of origin. Some empirical articles using panel data are Garín-Muñoz and Pérez-Amaral (2000), Durbarry (2000), Ledesma-Rodríguez *et al.* (2004), Garín-Muñoz (2006), Naudé and Saayman (2005), Garín-Muñoz (2007).

(v) Structural time-series model (STSM): the STSM belongs to the category of single-equation models. This approach incorporates stochastic and seasonal components (specified in the state space form) into the classical econometric model. Several studies have shown that can successfully capture the time varying properties of the time series and reflect the seasonal behaviour of demand tourism. Some of these studies are González and Moral (1995, 1996), García-Ferrer and Queralt (1997), Greenidge (2001), Turner and Witt (2001a, b), Kulendran and Witt (2003), Kim and Moosa (2005), Blake *et al.* (2004, 2006), Vu (2006).

(vi) Time-varying parameter (TVP) model: the TVP model belongs to the single-equation models category. This model is presented as an alternative to STSM since it permits that all the coefficients vary over time (while in STSM trend, seasonal and cyclical components can vary over time but not the explanatory variables). A few studies can be found using this approach, see Ridington (1999), Song and Wong (2003), Li *et al.* (2006).

There are several econometric techniques to estimate and to forecast tourism demand. However not all of them are equally useful. For instance the AIDS model is employed to estimate outbound

tourism demand whereas panel data and TVP models are employed to estimate inbound tourism demand, and none of these can be used for forecasting. VECM and VAR are not useful for forecasting but not for analysing the drivers of tourism demand. While STSM are mostly used for forecasting, it also provides elasticity estimates to show the relative importance of the different drivers of tourism demand. For this reason, it is the modelling technique employed here. Details about STSM model for UK inbound tourism demand are explained in Section 2.1.

1.3 Previous studies of UK tourism demand

Following the previous explanation of the alternative econometric modelling approaches, it is relevant to identify and describe previous empirical studies focused on the analysis of the demand of tourism in the UK. Some empirical studies focus on either the inbound UK tourism demand or outbound UK tourism demand. Interestingly, no previous study has been found dealing with the UK domestic tourism demand. A description of the existing articles on UK tourism demand is presented next.

Outbound Tourism Demand studies for UK

Regarding the outbound tourism demand, that is British tourists going overseas, a large number of studies have been found. For example, Syriopoulos and Sinclair (1993), Papatheodorou (1999), Song, Romilly and Liu (2000), De Mello, Pack and Sinclair (2002) and Li, Song and Witt (2004) investigated the UK tourism demand for some of the following Mediterranean countries: Spain, Italy, Greece, France and Portugal. Song, Romilly and Liu (2000) also included Germany. These studies do not estimate total outbound demand, but only the demand to the destinations included in the analyses.

As mentioned previously, one of the important practical aspects of estimating and forecasting tourism demand is to obtain price and income elasticities. To compare the present project results we present some findings in terms of elasticities derived from the empirical studies mentioned above. Therefore Table 1 provides the income elasticities obtained by each empirical study, whilst Table 2 contains own-price elasticities for the same empirical studies.

From Li, Song and Witt (2004) it can be observed that, except for demand for tourism to Italy, the values of the expenditure elasticities are greater than unity, no matter whether the long run or the short term is concerned. This is also the case in the findings of Song, Romilly and Liu (2000) although the magnitudes are greater than the previous study. This suggests that travelling to those countries is generally regarded as a luxury by UK tourists. De Mello, Pack and Sinclair (2002) found that UK tourism demand is expenditure elastic for Spain (expenditure elasticity is above unity) but expenditure inelastic for France and Portugal (expenditure elasticity are below unity). As the authors remark, the UK expenditure share of France is less responsive to variations in UK real tourism expenditure than those of Spain or Portugal. Mixed results are found by Papatheodorou (1999) and Syropoulos and Sinclair (1993).

All the own-price elasticities in these studies (see Table 2) are negative. Long-run elasticities are generally greater than short-run elasticities in terms of the absolute magnitude in both the results from Li, Song and Witt (2004) and Song, Romilly and Liu (2000). As Li *et al.* (2004) remarked, tourists are more flexible in response to price changes in the long term whereas in the short run, because of information asymmetry and bounded rationality among other reasons, tourists cannot fully adjust their behaviours when the price change occurs.

Table 1: **Previous studies findings on UK outbound expenditure elasticities.**

Origin	Destination			Short-run	Long-run	(1)	(2)	Short-Run	Long-run
		Syriopoulos and Sinclair (1993)	Papatheo-dorou (1999)	Song, Romilly and Liu (2000)		De Mello, Pack and Sinclair (2002)		Li, Song and Witt (2004)	
	Period	1985-1995	1957-1990	1965-1994		1969-1979	1980-1997	1972-1996	1997-2000
UK	France	-	-	1.67	2.12	0.63	0.81	1.12	1.09
	Greece	1.05	0.80	-	-	-	-	1.20	1.20
	Italy	0.88	1.05	-	-	-	-	1.00	0.90
	Portugal	1.58	0.04	-	-	0.82	0.95	1.05	1.24
	Spain	0.90	1.15	2.77	2.20	1.20	1.15	1.04	1.06
	Germany	-	-	2.30	2.26	-	-	-	-

Note: De Mello, Pack and Sinclair (2002) separated the whole sample into two periods, denoted as (1) and (2), respectively.

Table 2: Previous studies findings on UK outbound price elasticities.

Origin	Destination			Short-run	Long-run	(1)	(2)	Short-Run	Long-run
		Syriopoulos and Sinclair (1993)	Papatheo-dorou (1999)	Song, Romilly and Liu (2000)		De Mello, Pack and Sinclair (2002)		Li, Song and Witt (2004)	
	Period	1985-1995	1957-1990	1965-1994		1969-1979	1980-1997	1972-1996	1997-2000
UK	France	-	-	-0.78	-1.08	-1.76	-1.54	-0.53	-1.17
	Greece	-2.54	-0.93	-	-	-	-	-1.91	-2.75
	Italy	-1.24	-0.77	-	-	-	-	-0.65	-0.93
	Portugal	-2.69	-2.85	-	-	-2.16	-1.71	-1.05	-1.16
	Spain	-0.72	-0.65	-0.49	0.50	-1.26	-1.40	-1.32	-1.52
	Germany	-	-	-0.69	-1.25	-	-	-	-

Note: De Mello, Pack and Sinclair (2002) separated the whole sample into two periods, denoted as (1) and (2), respectively.

Inbound tourism demand studies for the UK

A large body of literature focuses on the analysis of inbound tourism demand to different destinations. For instance, Garín Muñoz and Pérez Amaral (2000) for Spain, Shan and Kulendran (2002) for China, Louvieris (2002) for Greece, Song, Witt and Jensen (2003) for Denmark, Vanegas and Croes (2004) for Aruba, Kim and Moosa (2005) to Australia, Kim and Wong (2006) for Hong Kong.

However, few empirical studies have been conducted for inbound tourism to the UK to date. To that respect, Frewin (1998) declared that very few studies had been conducted to estimate how tourists

in the UK react to changes in prices and taxes, despite the fact that many parties had expressed views about the likely effects of price increases. More recently, Durbarry and Sinclair (2000) report on "Tourism taxation in the UK" and the British Tourist Authority (BTA) (2001) study of "The Price Sensitivity of Tourism to Britain" as the most known investigations focused on the UK's inbound tourism.

Durbarry and Sinclair (2000) measure the sensitivity of tourism demand in the UK to changes in prices, exchange rates and expenditure. These authors use an econometric model, specifically a gravity model. This model is particularly relevant as it considers tourist expenditure from different origins since it is a data panel[1]. These authors estimate two models including the price of tourism and the exchange rate separately in the first model and the effective price of tourism (resulted by the combination of the previous two prices) is included in the second model.

Considering both price of tourism and exchange rate as separated variables, they suggest that an increase in the relative price level or an appreciation of the sterling by 1% decreases tourists' expenditure by 0.6% and 0.5% respectively. Durbarry and Sinclair (2000) argue that because tourists are more concerned with the effective price of tourism, which takes into account the price level and the purchasing power of the tourist, the effective price of tourism is only considered in a second model. The effective price variable appears to have a value of around unity, suggesting that tourism expenditure has unitary price elasticity and is sensitive to price changes. In fact, any increase in the effective price will result to a significant loss in terms of revenue from tourism. The price elasticity of tourism demand in the UK due to price changes in competing destinations is positive and has a value around unity in both models. This report suggested that international visitors to the UK are sensitive to changes in the price of tourism in the UK, in competing destinations and to exchange rate movements. Therefore, the UK's inbound tourism demand is sensitive to changes in prices. Additionally, the income elasticity appears to be around 0.6 in both models. Meaning that for every 1% increase in visitors' incomes, the UK's international tourism earnings will increase by 0.6%.

The BTA produced a study on 2001 on "The Price Sensitivity of Tourism to Britain", which examined the relationship between price and generation of tourism revenue undertaken in any country throughout an econometric modelling.

The overall findings showed that overseas visitors are highly sensitive to changes in the cost of staying in Britain. BTA found that the exchange rate elasticity of tourism to the UK is -1.3, that means for every 1% movement in the exchange rate which increases the cost of staying in Britain, the UK's international tourism earnings will decrease by 1.3%. Moreover, the income elasticity to tourism to the UK appeared to be 0.6, meaning for every 1% change in visitors' incomes, the UK's international tourism earnings will change by 0.6% in the same direction.

According to BTA (2001), the implication of the elasticity findings was that while both cost and income levels affect overseas visitors' decisions on whether to visit the UK, changes in exchange rate cost have the greatest impact. The BTA argued that normally, increasing the price of products does not proportionally depress the sales volume and, as such, results in an increase in total sales value. However, this is not so for international tourism to the UK which is highly competitive, highly price sensitive and, it would appear, has many 'close substitutes'.

[1] The panel comprised eleven countries of origin and the time period is from 1968 to 1998.

Additionally, BTA also conducted the analysis for the UK's four main tourism markets: France, Ireland, Germany and the USA. Two common relationships were found in all markets: (1) the UK's tourism earnings decrease as the cost of visiting the UK increases, with American visitor expenditure decreasing by 1.4% for every 1% increase in the exchange rate; (2) the UK's tourism earnings increase as income increase, with French visitor expenditure increasingly by 1.57% for every 1% increase in GDP.

Lastly, the same analysis was also conducted according to the three main segments of the UK inbound tourism: Holiday, Business and Visiting Friends and Relatives (VFR). The BTA findings revealed that Business and VFR segments had been the fastest growing segments over the last five years (+23%) and for 2001 accounted for 50% of the UK's total tourism revenue. Modelling of the sensitivity of each segment to changes in income levels and the cost of visiting the UK allowed to compare sensitiveness of the different segments could be determined, being the Holiday visitors the most sensitive to changes in the cost of the visit, while Business visitors and VFR visitors appeared to be the most sensitive to changes in income levels. The BTA declared that the implication of these results is that the UK's tourism earnings from Business and VFR visitors strongly influenced by economic growth in their home countries, whereas the UK's exchange rate is of greater significance to Holiday visitors.

2. Modelling Inbound Tourism Demand for the UK

This section describes the modelling approach adopted in the present study to estimate the drivers of tourism demand in the UK.

2.1 UK Tourism Demand: A Structural Time- Series Model (STSM)

The STSM incorporates stochastic and seasonal components into the classical econometric model. The stochastic and seasonal components in the STSM are specified in the state space form and estimated by the Kalman filter algorithms. However, the coefficients of the explanatory variables are still treated as fixed parameters in the STSM. Song and Turner (2006) point out that although the trend, seasonal and cyclical components in the STSM are allowed to vary over time, the parameters of the explanatory variables are still fixed over time and this can be a drawback, as these parameters may also change over time due to changing tourist preferences. It is worth remarking that Li, Song and Witt (2005) in their tourism demand econometrics forecasting survey, find STSM as one of the best forecasting methods, pointing out it performs especially well for short-run forecasting and its suitability when seasonal tourism demand is taken into account.

Moreover, we can find numerous empirical forecasting studies that use such econometrics model. For example, González and Moral (1995, 1996) analyse inbound tourism demand in Spain, Kulendran and Witt (2001, 2003) investigate outbound UK tourism demand, Turner and Witt (2001) the inbound tourism demand of New Zealand, Greenidge (2001) studies the inbound tourism demand for Barbados, Papatheodorou and Song (2003) analyse the international tourism in six major regions and the world, Blake *et al.* (2006) investigate the inbound tourism in Scotland, Kim and Moosa (2005) analyse the international tourist flows to Australia. All these papers have shown that the STSM can successfully capture the time varying properties of the time series and reflect the seasonal characteristics of tourism demand.

Specification of the model

The model used for UK inbound tourism demand is specified as follows:

$$TD_t = \alpha + \beta\, RGDP_t + \phi\, RER_t + \delta\, RERC_t + \theta\, D1 + \varphi\, D2 + \gamma\, D3 + \lambda_t + \xi_t$$

where:

- *TD* is the tourism demand from the country of origin to UK, it is measured by real tourism expenditure adjusted by Consumer Price Index (base 2000) and tourist arrivals;
- *RGDP* is the income variable measured by real Gross Domestic Product (base 2000);
- *RER* is the UK tourism price variable measured by real exchange rate of the pound sterling against the currency of the country of origin, constructed as the exchange rate adjusted by the relative prices (relative CPI; base 2000);
- *RERC* is UK competitor's price variable measured by the real effective exchange rate for the alternative destination to UK. France is taken as the alternative destination for all the

markets analysed excepting for France, for which Spain is used as competitor destination. It is important to point out that the RER was constructed using the RPI for Holidays in UK.

- *D1, D2* and *D3* are the dummy variables that are included in the model to capture the significance of one-off events: Foot and Mouth Disease (FMD), September 11th in New York and June 7th in London. In order to capture the instantaneous or delayed effect on the UK inbound tourism demand two quarters by events have been examined, specifically the quarter when the event occurred and the following one. Hence, for FMD it has been analysed 2001:Q1 and 2001:Q2; for September 11th, 2001:Q4 and 2002:Q1 and for June 7th, 2005:Q3 and 2005:Q4.

t denotes time; β, ϕ and δ are the coefficients that accompany the income variable, price variable and competitor price, respectively. The variables are expressed in natural logarithms so we can directly interpret β, ϕ and δ as the income elasticity, the price elasticity and the competitors' price elasticity, respectively. θ, φ, γ are the parameters that goes with the dummy variables; λ denotes the (stochastic) seasonal factor and ξ the disturbance.

The variables are quarterly (Q) and the period under analysis is from the first quarter of 1994 (1994:Q1) until the third quarter of 2006 (2006:Q3), which is the most updated available data. Due to lack of availability of some series, Ireland is analysed from 1997Q1 to 2006Q3 whilst The Netherlands is examined from 1995Q1 to 2006Q3.

Regarding the source of the data, tourism expenditure and tourist arrivals by the seven countries analysed and the four tourist segments were obtained from the International Passenger Survey (IPS), conducted by the National Statistics Office, UK; GDP is obtained from OECD via DataStream; CPI and exchange rates were taken from IMF Statistics via DataStream, RPI UK Holidays was obtained from the ONS.

The UK inbound tourism demand is estimated for both tourism expenditure and tourist arrivals as independent variable for seven markets. The countries examined are France, Germany, Spain, the Netherlands, Ireland, Italy and the United States. Moreover, the estimates and forecasting are carried out by tourists' purpose of visit. In fact, four different tourist segments are examined: Holidays, Business, VFR and Study. Only for Ireland the Study segment is not analysed due to lack of data[2]. Hence, results for UK inbound tourism demand for twenty-seven specific cases are provided.

Harvey (1989) remarked that STSM is well suited to forecasting based on time-series data involving both trend and seasonality. It takes into account the effects of tourism demand of the key economic drivers of demand, seasonal changes in demand and intervention variables for one-off events such as major unanticipated changes in exchange rates, political changes or sporting events. It allows for fixed and stochastic components for seasonality and also permits alternative error specifications to be tested. The model allows for decomposition of the trend into level and slope components, which can be fixed or stochastic. Such wide range of possibilities permits to select the most suitable model for each case. And the selection of this model is also supported by the conclusion of Li, Song and Witt (2005)'s survey which is that STSM is one of the best forecasting methods. Moreover it provides us estimates for the elasticities. The STSM is estimated using STAMP 7 software.

[2] The data for Netherlands according to Study purpose of visit has missings on 1997:Q2, 1999:Q2, 2000:Q1, 2004:Q1 and 2006:Q3; nevertheless this segment is also examined until 2006:Q2.

The Effects of one-off events

In order to capture the effects on UK tourism demand of FMD, September 11th and June 7th, two steps are followed. First we estimate the specified tourism demand model including dummy variables. Specifically, the quarter when the event occurred and the following one are included for each event, so we can capture whether there was an instantaneous or delayed effect. Hence, for FMD it has been analysed 2001:Q1 and 2001:Q2; for September 11th, 2001:Q4 and 2002:Q1 and for June 7th, 2005:Q3 and 2005:Q4. Once we have the estimates we examine whether the dummies under consideration are significant, the ones that are not significant are dropped from the specification. For the ones that appear as significant we can observe the analyse the sign of the parameter to know if there was a positive or a negative effect that quarter into de UK tourism demand.

The second step is the estimation of the economic effect of such events. This second analysis consists of carrying out firstly the forecasting with a constrained dataset covering the time series until the occurrence of the event. The estimated equation is then used to predict the tourism expenditure until the period when the event occurred. The difference between the forecasts of tourism expenditure and the real figures provide quantitative estimates of the effects of the one-off events[3]. For instance, we find that either the dummy 2001:Q4 and 2002:Q1 corresponding to September 11th event is significant. We estimate the model until 2001:Q3, after that we predict the tourism expenditure for two periods, which is for 2001:Q4 and 2002:Q1. Finally we calculate the difference between the predicted values and the actual figures for the period where the dummy was significant.

Marketing Expenditures

It would be possible to insert a term for marketing expenditure (*MARK*) into this equation:

$$TD_t = \alpha + \beta RGDP_t + \phi RER_t + \delta RERC_t + \mu MARK_t + \theta D1 + \varphi D2 + \gamma D3 + \lambda_t + \xi_t$$

The resulting estimate of μ could then be used to show the effect of marketing expenditure on tourism demand. The only practical problem with this approach is the lack of suitable data to use. While a limited amount of marketing expenditure data is available from VisitBritain for a limited number of years, econometric modelling would require that data is available for each time period that the model is constructed for. In this case, this means that quarterly data from 1994 onwards would be needed. Such data does not in itself exist, but the model constructed here is also applied to individual markets defined by nationality and purpose of visit, so estimating the effects of marketing expenditure on these markets would require even more detailed data. It might be possible to include marketing expenditure by country, e.g. marketing expenditure by VisitBritain on campaigns to attract U.S. tourists could be used for all U.S. markets by purpose of visit, but this data does not exist and could not be constructed on a quarterly basis back to 1994. While some of VisitBritain's marketing expenditure is spent in a particular country, much of it is spent in the UK constructing campaigns, and would be impossible to fully appropriate to source markets.

[3] Such quantitative analysis of one-off events is also performed in Eugenio-Martin, Sinclair and Yeoman (2005) for the case of tourism demand for Scotland from France, Germany and United States.

The only other option for estimating marketing expenditures would be to restrict the markets and time periods modelled to those for which marketing expenditure is available. This would mean using annual data only for a period from around 2000-2006 at the aggregate (total arrivals, total receipts) level, not broken down into markets. Econometrically this data would be insufficient to model any of the determinants of tourism demand, as with seven time periods and (if dummy variables are not used) four explanatory variables, it would not have sufficient degrees of freedom (observations, or time periods minus explanatory variables, in this case 7-4=3, whereas the quarterly models estimated have around 52 time periods and 6 explanatory variables, including dummy variables).

2.2 Results of Drivers of Inbound Tourism Demand

Although the results are generated by different models classified by purpose of visit and nationality, Table 3 shows weighted averages of the elasticities obtained and described in more detail in Section 2.3.

The overall average elasticities (the last row in Table 3) show that there is an income elasticity of 1.65, a price elasticity of -0.61 and a competitors' price elasticity of 0.04. Thus the UK tourism benefits well from increases in incomes in source countries, is relatively price inelastic.

Some purposes of visit are more price elastic (holidays -1.23; VFR -0.93) than others. Business visits have a positive price elasticity, a result that will be discussed in the following section.

Average elasticities by nationality of tourist have relatively similar income elasticities, lying in a range from 1.35 (Germany) to 2.01 (United States). Price elasticities vary much wider, however. While some of this variation is due to the composition of tourism from different countries, variations in measured elasticities by detailed market are more important. Spain and Ireland are found to be the most price sensitive markets, while Germany and the United States are the least price sensitive. Italy has a positive value, due to finding a positive elasticity for the Italian business and VFR markets, as will be discussed in the following section.

Table 3: Weighted average elasticities.

	Income Elasticity	Price Elasticity	Competitors' Price Elasticity
France	1.37	-0.53	3.61
Germany	1.35	-0.33	0.00
Spain	1.43	-1.38	-5.97
The Netherlands	1.48	-0.61	0.00
Ireland	1.72	-1.86	1.79
Italy	1.37	0.49	-1.17
United States	2.01	-0.42	0.36
Holidays	1.70	-1.23	-0.20
Business	1.70	0.18	0.74
VFR	1.58	-0.93	-0.62
Study	1.40	-0.12	0.00
Overall Average	1.65	-0.61	0.04

2.3 Results by purpose of visit

The elasticity results from twenty seven different econometric models are summarised in Table 4. This gives, for each of the seven market countries, results for the estimate of income elasticity of demand, (own) price elasticity and competitors' price elasticity for the four purposes of visit that have been estimated. In all cases the results that are shown are statistically significant, and a dash is shown where no significance has been found. In general throughout the results the significance of income is strong, and the results for income elasticities sometimes have similar values across some purposes of visit. Price elasticities have less significance, particularly in business and study markets competitors' price elasticity.

Income elasticity results lie broadly within a range between 1.28 and 2.10. Generally the income elasticity estimates are higher business and holiday markets and lowest in study markets, although for some countries (for example Ireland, France and Italy) there is less difference between purpose of visit than in others (for example, the United States and the Netherlands).

Own-price elasticity estimates show a much greater disparity. The holiday market shows estimates between -0.48 and -2.48, with no significant price relationship found for the Italian holiday market. The most price sensitive country markets are Spain and Ireland, with Germany the least price sensitive. Business price elasticities are found to not only have low levels of significance for most countries but to have positive values for Germany and Italy. These values are difficult to interpret – perhaps it is true that business visitors are attracted to a destination where prices are higher because they are better able to sell products on their trip, or for some other business-related reason that they are undertaking the trip. The VFR market has significant results for price elasticity for Germany, Spain and Ireland with results that show differences when comparing with the respective holidays market from those countries, for example the German VFR market is more price sensitive than the German holiday market while the Spanish VFR market is less price sensitive than the Spanish holiday market. In one case, Italy, there is a positive price elasticity for VFR tourism. Only one study market, Germany, has a significant price elasticity.

Competitors' price elasticity results show a mixed picture. Some countries have positive elasticities (meaning that more expensive competition attracts tourism spending in the UK). Here France has a particular set of elasticities that show that what happens to prices elsewhere does affect tourism in the UK; in other countries such as Spain and Italy there are negative elasticities, which as for the positive price elasticities found in the own-price elasticity results, are difficult to interpret. It is possible that the competitor's price has tended to move in the same way as a variable not included in the model that actually has a significant effect, and it is this effect that is being picked up with these results. Another possibility is that rather than being a substitute, the competitor (in both these cases, France) is complementary to the UK, for example, for visitors from Spain and Italy making a combined trip to both France and the UK. While this may be the case for a small number of tourists, it is difficult to see how this would explain the statistical significance attributed in these results. One result that is quite clear from the competitors' price elasticity is the absence of any significance in results for study visitors; these do not appear to take other countries' prices into account when visiting the UK.

Table 4: Significant elasticity results.

	Income Elasticity				Price Elasticity				Competitors' Price Elasticity			
	Holidays	**Business**	**VFR**	**Study**	**Holidays**	**Business**	**VFR**	**Study**	**Holidays**	**Business**	**VFR**	**Study**
France	1.39	1.39	1.35	1.31	-1.75	–	–	–	4.15	2.56	5.82	–
Germany	1.37	1.37	1.28	1.28	-0.48	0.51	-1.22	-1.15	–	–	–	–
Spain	1.43	1.44	1.42	1.38	-2.48	–	-1.77	–	-7.01	-3.02	-9.07	–
Netherlands	1.50	1.52	1.43	1.26	-1.48	–	–	–	–	–	-	–
Ireland	1.71	1.73	1.71	*	-2.37	–	-2.67	*	2.70	5.10	-1.08	*
Italy	1.38	1.39	1.31	1.32	–	1.14	0.85	–	-2.19	–	-2.48	–
United States	2.10	2.08	1.92	1.52	-1.09	–	–	–	–	0.66	0.75	–

Note: "-" indicates no statistically significant relationship can be found at the 90% confidence level. For all other results we can be at least 90% confident that the elasticity is different from zero and has the correct sign.

* lack of data prevented estimation of an equation for study visits from Ireland.

The Impact of Selected Events

Table 5 shows the overall impact, in millions of pounds, of the impact of the foot and mouth disease (FMD) impact in 2001, September 11th and July 7th. Later sections will discuss the statistical significance of these results, and their detail by purpose of visit. Each of these events has been modelled by introducing two dummy variables into the model, firstly in the quarter that the event had its immediate impact (2001Q1, 2001Q4 and 2005Q3) (where note that because of the proximity of September 11th to the end of the third quarter, when no significant effects were found, 2001Q4 was used as the period of initial impact) and the following quarter, and the significance of these dummy variables was assessed. Dummy variables with no significance were removed before the full estimation of the model.

Notably some markets show no significant effect at all – such as the United States during the FMD outbreak, Ireland after September 11th, and Spain and Italy following July 7th. The result for the United States shows that when exchange rate changes and the economic slowdown at the time are taken into account, there is no significant effect of FMD itself on this market.

Table 5: The Effects on Spending in the UK of selected events (£million).

	FMD	**Sept 11th**	**July 7th**	**Total**
France	£13.50	£22.05	£23.49	£59.04
Germany	£33.07	£30.98	£12.04	£76.09
Spain	£17.93	£25.60	-	£43.53
The Netherlands	£34.78	£23.67	£1.20	£59.65
Ireland	£47.55	-	£15.43	£62.98
Italy	£10.30	£57.57	-	£67.87
United States	-	£120.64	£33.17	£153.81
TOTAL	£157.13	£280.51	£85.33	£522.97

2.4 Results by Nationality

The present section contains the results of the estimation of inbound UK tourism demand by nationality. The results are presented for France, Germany, Spain, the Netherlands, Ireland, Italy and the United States.

Estimates for France

The details of the estimates for France are presented here, along with indications of the statistical significance of the results. Table 6 shows that the main elasticity values for France are either highly significant or not significant at all. Income elasticities are similar across purposes of visit, but are slightly higher for holidays and business purposes of visit than for VFR and study. Only holiday tourism is price sensitive.

Table 6: Elasticity Values for France.

	Income Elasticity	Price Elasticity	Competitors' Price Elasticity
Holidays	1.39***	-1.75***	4.15***
Business	1.39***	-	2.56**
VFR	1.35***	-	5.82***
Study	1.31***	-	-

***: significant at the 99% confidence level; **: significant at 95% confidence level; *: significant at 90% confidence level, -: not significant at the 90% confidence level.

The effects of shocks for the French market follow a pattern (see Table 7 for levels of significance, Table 8 for results in values) whereby holiday and VFR spending were effected by these events, with a high level of significance being attributed to the effects of September 11th on the French holiday market in 2002Q1. Business and study purposes of visit are found to have had no significant impacts from any of these events. Overall, the foot and mouth disease (FMD) outbreak in 2001 had a total impact of reducing spending by French tourists by £13.55 million, although the impact on holiday spending was more immediate (occurring in the first quarter of 2001) than the impact on VFR spending. July 7th is found to have only effected holiday spending, although the value of this effect (£23.49 million) is higher than for either of the other two shocks.

Figure 1 shows indicative graphs of forecasting using this model. Four quadrants of this figure show spending data (see Annex 2 for the equivalent graphs for arrivals) for holidays, business, VFR and study tourism expenditure from France. In each of these graphs, and in the others that follow, a forecasted section is presented showing 5 periods of forecasts. These demonstrate the predicted seasonal patterns from the model as well as showing the breadth of the spread between a 68% confidence interval around the mean expectation. These graphs show the forecasts with no changes in the explanatory variables, while the forecasting model provided as part of this project will include expectations of GDP growth, inflation and exchange rate changes.

These graphs show that for the French market, there is a relatively narrow band in which holiday tourism would be forecasted, with a significant degree of seasonality. Business, VFR and study markets have somewhat wider confidence bands with less seasonality.

Table 7: Effects of Shocks on the French Market.

	FMD		September 11th		July 7th	
	2001Q1	2001Q2	2001Q4	2002Q1	2005Q3	2005Q4
Holidays	[0.06]*	-	-	[0.00]***	[0.05]**	-
Business	-	-	-	-	-	-
VFR	-	[0.02]**	[0.06]*	-	-	-
Study	-	-	-	-	-	-

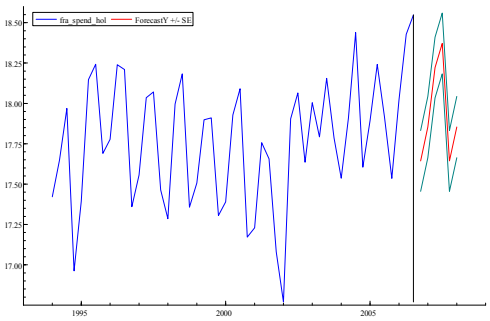
Note: (1) p-values in brackets.

Table 8: Economic Quantification of Shocks on the French Market.

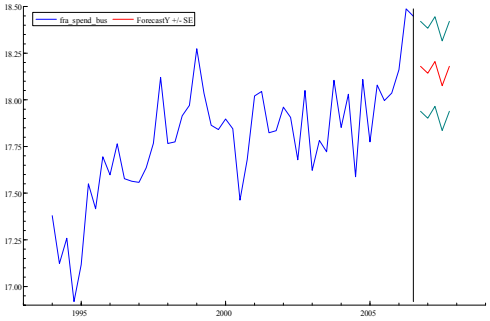
	FMD		September 11th		July 7th	
	2001Q1	2001Q2	2001Q4	2002Q1	2005Q3	2005Q4
Holidays	£6.77	-	-	£17.85	£23.49	-
Business	-	-	-	-	-	-
VFR	-	£6.78	£4.20	-	-	-
Study	-	-	-	-	-	-
Total	£13.55		£22.05		£23.49	

Figure 1: Forecasting French market spending in the UK.

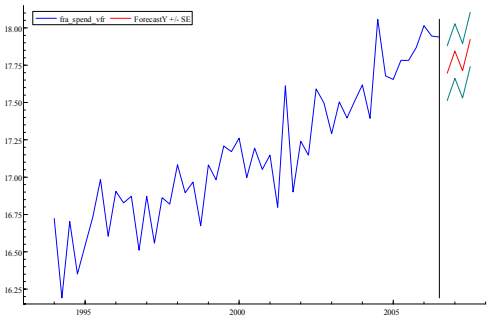
(a) Holidays



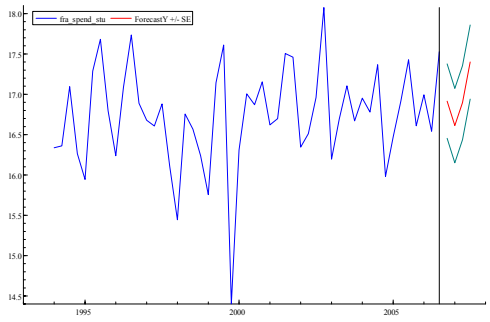
(b) Business



(c) VFR



(d) Study



Estimates for Germany

The details of the estimates for Germany are presented in Table 9. It can be observed that the main elasticity values for Germany are significant for income elasticity and price elasticity, with more significance on the income elasticity results, but that competitors' price elasticity is not significant in any case.

The effects of shocks for the German market show (see Table 10 for levels of significance, Table 11 for results in values) that German tourism expenditure by holidays was negatively affected by FMD in 2001Q1 and by September 11th in 2002Q1. The business segment shows a positive effect in 2002Q1 which can be attributed to other issues different from FMD. The VFR segment was affected only by FMD in 2001Q1. While the study segment appears to be the most sensitive since it is affected by FMD in 2001Q1, by September 11th in 2002Q1 and by July 7th in 2005Q4. Overall, the foot and mouth disease (FMD) outbreak in 2001 had a total impact of reducing spending by German tourists by £33.07 million, being an immediate impact in all cases (occurring in the first quarter of 2001). September 11th is found to have an impact of £30.98 of tourism spending reduction (2002Q1) and July 7th is found to have had a £12.04 spending reduction effect.

Figure 2 shows indicative graphs of forecasting the German market. These graphs show that for there is a relatively narrow band in which holiday tourism would be forecasted. Holidays and VFR segments have a significant degree of seasonality. Business and study markets have somewhat wider confidence bands with less seasonality.

Table 9: Elasticity Values for Germany.

	Income Elasticity	Price Elasticity	Competitors' Price Elasticity
Holidays	1.37***	-0.48**	-
Business	1.37***	0.51**	-
VFR	1.28***	-1.22*	-
Study	1.28***	-1.15***	-

Table 10: Significance of Shocks on the German Market.

	FMD		September 11th		July 7th	
	2001Q1	2001Q2	2001Q4	2002Q1	2005Q3	2005Q4
Holidays	[0.05]**	-	-	[0.00]***	-	-
Business	[0.07]*	-	-	-	-	-
VFR	[0.04]**	-	-	-	-	-
Study	[0.07]**	-	-	[0.01]**	-	[0.00]***

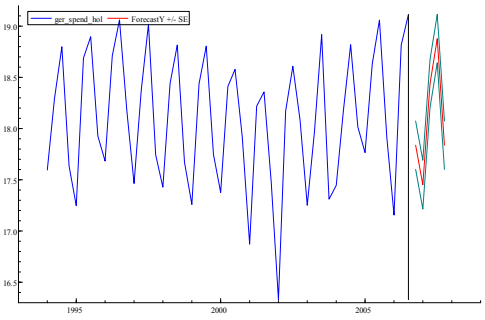
Notes: (1) p-values in brackets; (2) red figures denote that the shock effect is positive instead of negative.

Table 11: Economic Quantification of Shocks on the German Market.

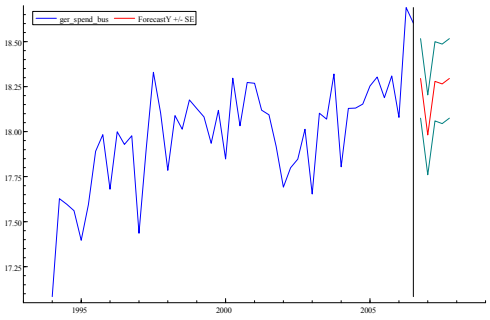
	FMD		September 11th		July 7th	
	2001Q1	2001Q2	2001Q4	2002Q1	2005Q3	2005Q4
Holidays	£11.71	-	-	£22.92	-	-
Business	•	-	-	-	-	-
VFR	£15.05	-	-	-	-	-
Study	£6.27	-	-	£8.06	-	£12.04
Total	£33.07		£30.98		£12.04	

Figure 2: Forecasting of German market spending in UK.

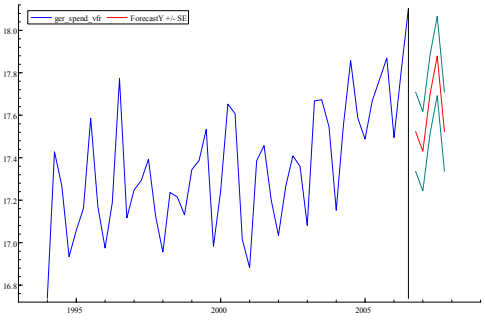
(a) Holidays



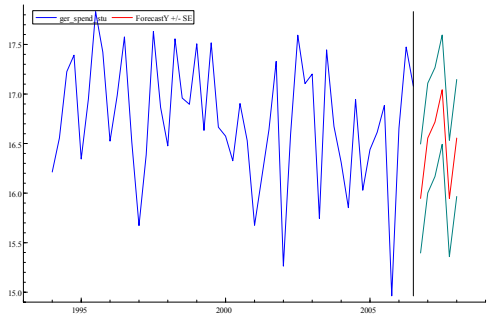
(b) Business



(c) VFR



(d) Study



Estimates for Spain

Table 12 contains the main elasticity values for Spain. The results show that the income elasticity is significant in all cases while the price elasticity is significant only for holidays and VFR segments. The competitors' price elasticity is significant for holidays, business and VFR with high values.

Table 12: Elasticity Values for Spain.

	Income Elasticity	Price Elasticity	Competitors' Price Elasticity
Holidays	1.43***	-2.48***	-7.01***
Business	1.44***	-	-3.02***
VFR	1.42***	-1.77***	-9.07***
Study	1.38***	-	-

The effects of shocks for the Spanish market follow a pattern (see Table 13 for levels of significance, Table 14 for results in values) whereby holidays, business and VFR spending were affected by FMD and September 11th. Holidays and VFR had an immediate effect in 2001Q1 and 2001Q4, respectively. While the business purpose of visit is found to be affected in 2001Q2 and 2002Q1. The study Spanish segment was not affected by any event. Overall, the FMD outbreak in 2001 had a total impact of reducing spending by Spanish tourists by £17.93 million, while September 11th had a total impact of £25.60, higher than FMD effect. July 7th is not found to have affected the Spanish tourism spending in UK.

Figure 3 contains indicative graphs of forecasting the Spanish market. These graphs show that there is a relatively narrow band in which holiday tourism would be forecasted. Holidays, business and study purposes of visit have a significant degree of seasonality, while for VFR is not so evident.

Table 13: Effects of Shocks on the Spanish Market.

	FMD		September 11th		July 7th	
	2001Q1	2001Q2	2001Q4	2002Q1	2005Q3	2005Q4
Holidays	[0.06]*	-	[0.10]*	-	-	-
Business	-	[0.04]**	-	[0.10]*	-	-
VFR	[0.05]**	-	[0.00]***	-	-	-
Study	-	-	-	-	-	-

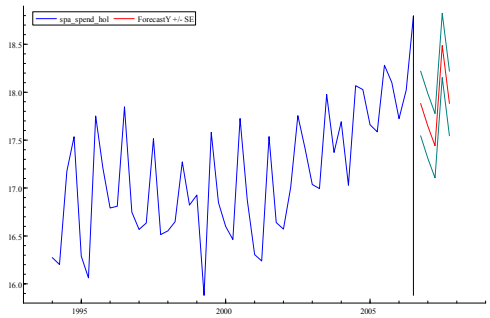
Note: p-values in brackets.

Table 14: Economic Quantification of Shocks on the Spanish Market.

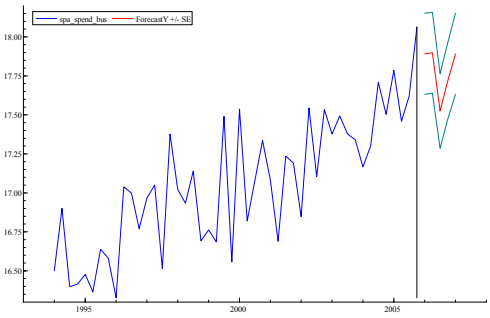
	FMD		September 11th		July 7th	
	2001Q1	2001Q2	2001Q4	2002Q1	2005Q3	2005Q4
Holidays	£2.25	-	£7.68	-	-	-
Business	-	£8.88	-	£11.10	-	-
VFR	£6.79	-	£6.82	-	-	-
Study	-	-	-	-	-	-
Total	£17.93		£25.60		-	

Figure 3: Forecasting of Spanish market spending in UK.

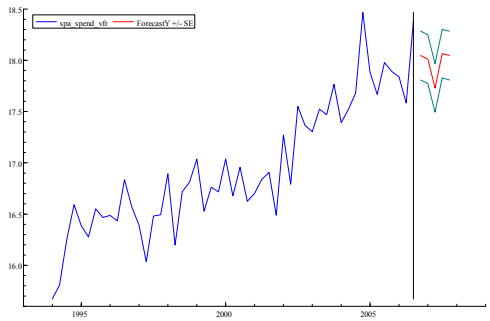
(a) Holidays



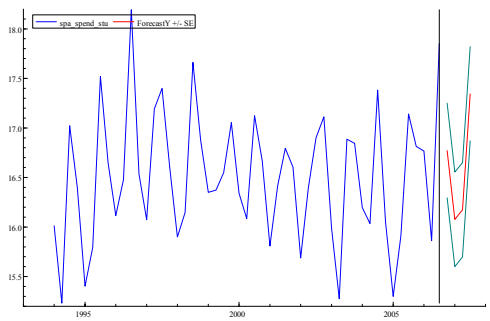
(b) Business



(c) VFR



(d) Study



Estimates for the Netherlands

The details of the estimates for the Netherlands are presented here. Table 15 contains the main elasticity values for the Netherlands. These results show how that income elasticity is significant in all cases with a high significance while the price elasticity is significant only for the Holidays segments. Competitors' price elasticity is not significant in any case

The effects of shocks for the Dutch market follow a pattern (see Table 16 for levels of significance, Table 17 for results in values) whereby holidays and business were affected by FMD and September 11th, but in different periods. Holidays were affected in 2001Q2 by FMD and in two consecutive quarters (2001Q4 and 2002Q1) by September 11th, while business tourism was affected in 2001Q3 and in 2001Q4. VFR was not affected by any event, while study was affected by September 11th in 2002Q1 and by July 7th in 2005Q4 (there is a positive effect in 2005Q3). Overall, the FMD outbreak in 2001 had a total impact of reducing spending by Dutch tourists by £34.78 million. September 11th had a total expenditure impact of £23.67, lower than FMD effect. July 7th had a much smaller effect, of £1.22.

Figure 4 contains indicative graphs of forecasting the Netherlands market. These graphs show that there is a relatively narrow band in which holiday tourism would be forecasted with a high degree of seasonality although from 2002 onwards the evolution seems to change from the previous path. Business, VFR and study purposes of visit have significant degrees of seasonality, with wider bands.

Table 15: Elasticity Values for the Netherlands.

	Income Elasticity	Price Elasticity	Competitors' Price Elasticity
Holidays	1.50***	-1.48**	-
Business	1.52***	-	-
VFR	1.43***	-	-
Study	1.26***	-	-

Table 16: Effects of Shocks on the Dutch Market.

	FMD		September 11th		July 7th	
	2001Q1	2001Q2	2001Q4	2002Q1	2005Q3	2005Q4
Holidays	-	[0.06]*	[0.07]*	[0.05]**	-	-
Business	-	[0.00]*** †	[0.11]*	-	-	-
VFR	-	-	-	-	-	-
Study	-	-	-	[0.02]**	[0.04]**	[0.03]** ‡

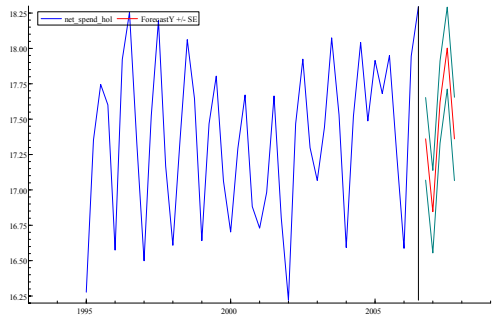
Note: p-values in brackets; † 2001Q3; ‡2006Q1.

Table 17: Economic Quantification of Shocks on the Netherlands Market.

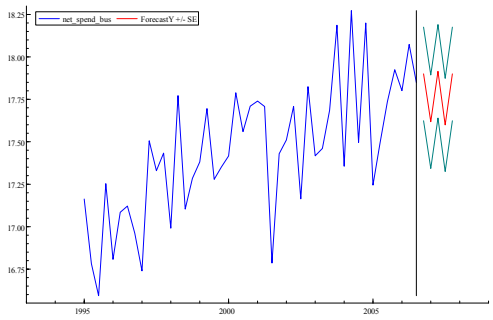
	FMD		September 11th		July 7th	
	2001Q1	2001Q2	2001Q4	2002Q1	2005Q3	2005Q4
Holidays	-	£13.39	£10.34	£4.14	-	-
Business	-	£21.39†	£8.34	-	-	-
VFR	-	-	-	-	-	-
Study				£0.85	•	£1.22
Total	£34.78		£23.67		£1.22	

Figure 4: Forecasting of Dutch market spending in UK.

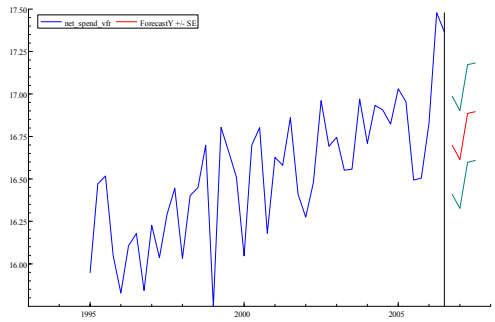
(a) Holidays



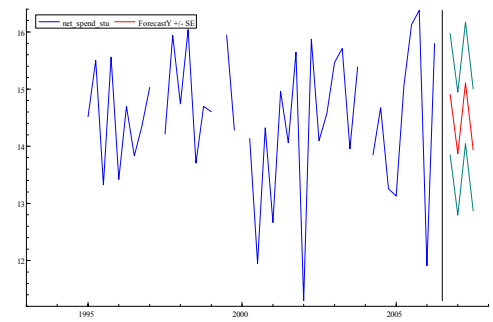
(b) Business



(c) VFR



(d) Study



Estimates for Ireland

The details of the estimates for Ireland are presented here, along with indications of the statistical significance of the results. Table 18 shows that the main elasticity values for Ireland are either significant or not significant. Income elasticity and competitors' price elasticity appears as significant in all cases while price elasticity is significant for Holidays and VFR only and with a high value.

Table 18: Elasticity Values for Ireland.

	Income Elasticity	Price Elasticity	Competitors' Price Elasticity
Holidays	1.71***	-2.37***	2.70***
Business	1.73***	-	5.10***
VFR	1.71***	-2.67***	-1.08**

The effects of shocks for the Irish market follow a pattern (see Table 19 for levels of significance, Table 20 for results in values) whereby holidays and business were affected by FMD but holidays were affected during two periods (2001Q1 and 2001Q2) and VFR was affected in 2001Q2. The business segment was also affected by July 7th in 2005Q3. VFR had a positive effect in 2005Q4. The Irish market was not affected by September 11th in any case. Overall, the FMD outbreak had a total impact of reducing spending by Irish tourists by £47.55 million. July 7th had a reducing effect of £15.43 in tourism expenditure.

Figure 5 shows indicative graphs of forecasting the Ireland market using this model. These graphs show that for the Irish market, there is a relatively narrow band similar in all purposes of visit and there is a significant degree of seasonality.

Table 19: Effects of Shocks on the Irish Market.

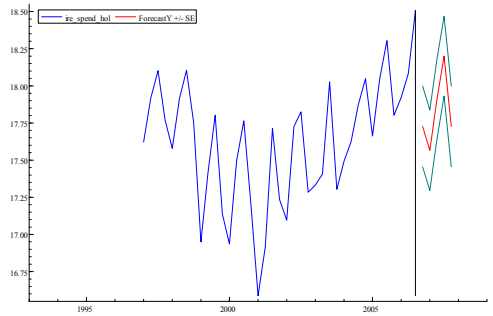
	FMD		September 11th		July 7th	
	2001Q1	2001Q2	2001Q4	2002Q1	2005Q3	2005Q4
Holidays	[0.02]**	[0.01]***	-	-	-	-
Business	-	[0.01]***	-	-	[0.03]**	-
VFR	-	-	-	-	-	[0.04]**

Table 20: Economic Quantification of Shocks on the Irish Market.

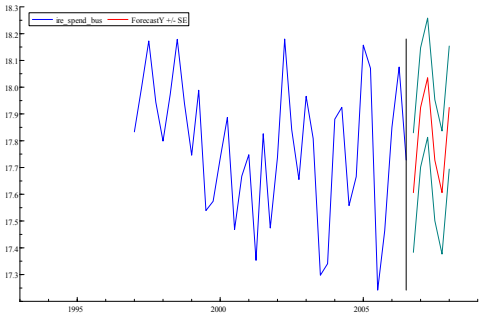
	FMD		September 11th		July 7th	
	2001Q1	2001Q2	2001Q4	2002Q1	2005Q3	2005Q4
Holidays	£7.51	£15.23	-	-	-	-
Business	-	£24.80	-	-	£15.43	-
VFR	-	-	-	-	-	
Total	£47.55		-		£15.43	

Figure 5: Forecasting of Irish market spending in UK.

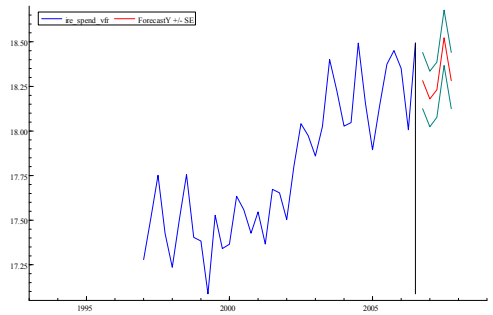
(a) Holidays



(b) Business



(c) VFR



Estimates for Italy

The details of the estimates for Italy are presented below, along with indications of the statistical significance of the results. Table 21 shows that the main elasticity values for Italy are either significant or not significant. Income elasticity is significant in all cases while price elasticity is significant only for Business and VFR with positive sign while competitors' price elasticity is significant for Holidays and VFR segments.

Table 21: Elasticity Values for Italy.

	Income Elasticity	Price Elasticity	Competitors' Price Elasticity
Holidays	1.38***	-	-2.19**
Business	1.39***	1.14***	-
VFR	1.31***	0.85**	-2.48**
Study	1.32***	-	-

The effects of shocks for the Italian market follow a pattern (see Table 22 for levels of significance, Table 23 for results in values) whereby all the purposes of visit were affected only by September 11th and not by FMD or July 7th, except business which was affected in 2001Q1 by FMD. Holidays and business are affected in two periods, 2001Q4 and 2002Q1 whilst VFR and study are affected only in the immediate period (2001Q4). Overall, the FMD outbreak had a total impact of reducing spending by Italian tourists by £10.30 million. The relevant effect in the Italian market is September 11th with a reduction on tourism expenditure of £57.57 million.

Figure 6 shows indicative graphs of forecasting Italian tourism expenditure using this model. These graphs show that for the Italian market, there is a relatively narrow band for holiday tourism. In general, the Italian market shows a significant degree of seasonality, especially for holidays and study.

Table 22: Effects of Shocks on the Italian Market.

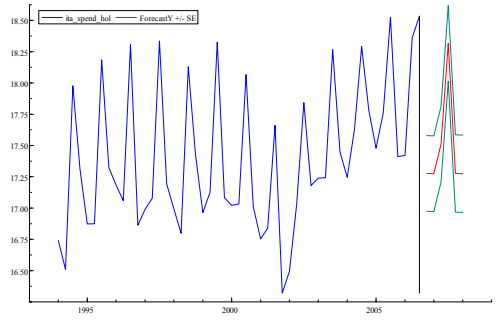
	FMD		September 11th		July 7th	
	2001Q1	2001Q2	2001Q4	2002Q1	2005Q3	2005Q4
Holidays	-	-	[0.00]***	[0.02]**	-	-
Business	[0.09]*	-	[0.04]**	[0.00]***	-	-
VFR	-	-	[0.00]***	-	-	-
Study	-	-	[0.01]***	-	-	-

Table 23: Economic Quantification of Shocks on the Italian Market.

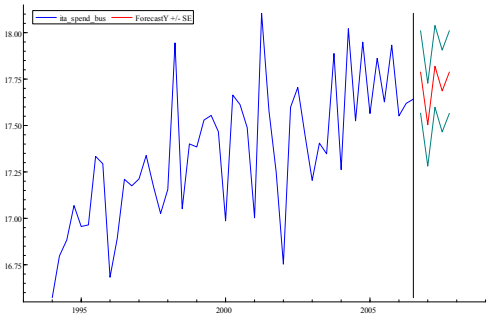
	FMD		September 11th		July 7th	
	2001Q1	2001Q2	2001Q4	2002Q1	2005Q3	2005Q4
Holidays	-	-	£15.88	£7.96	-	-
Business	£10.30	-	£8.57	£17.57	-	-
VFR	-	-	£1.89	-	-	-
Study	-	-	£5.69	-	-	-
Total	£10.30		£57.57		-	

Figure 6: Forecasting of Italian market spending in UK.

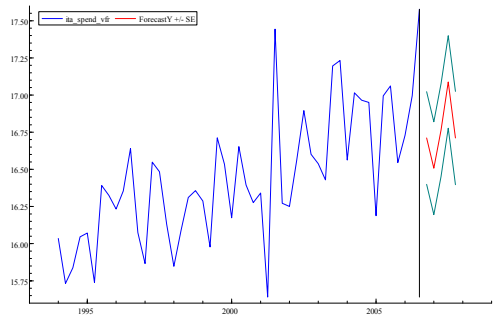
(a) Holidays



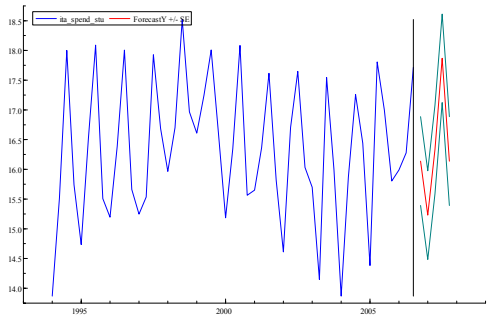
(b) Business



(c) VFR



(d) Study



Estimates for United States

The details of the estimates for United States are presented below, along with indications of the statistical significance of the results. Table 24 shows that the main elasticity values for the United States are either significant or not significant. Income elasticity is significant in all cases while price elasticity is significant only for holidays. Competitors' price elasticity is significant for business and VFR purposes of visit.

Table 24: Elasticity Values for the United States.

	Income Elasticity	Price Elasticity	Competitors' Price Elasticity
Holidays	2.10***	-1.09***	-
Business	2.08***	-	0.66***
VFR	1.92***	-	0.75***
Study	1.52***	-	-

The effects of shocks for the United States market follow a pattern (see Table 25 for levels of significance, Table 26 for results in values) whereby holidays were affected by September 11th in 2001Q4 and July 7th in 2005Q4 and business was affected by September 11th in 2001Q4. VFR had a positive effect in 2002Q1 while study was not affected by any event. Overall, the September 11th outbreak had a total impact of reducing spending by tourists from the United States by £120.64 million, while the reduction of tourism expenditure following July 7th was £33.17.

Figure 7 shows indicative graphs of forecasting expenditure by tourists from the United States using this model. These graphs show that for the U.S. market, there is a relatively narrow band for expenditure by holidays and VFR tourists. Holidays and VFR show a significant degree of seasonality while business and study tourism are less seasonal but with wider confidence bands.

Table 25: Effects of Shocks on the United States Market.

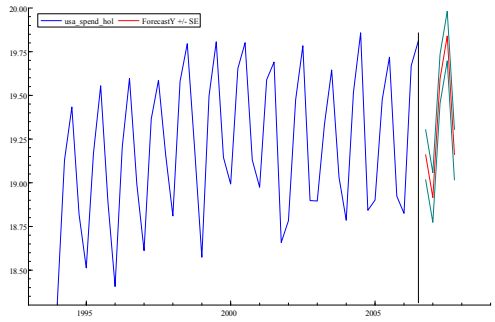
	FMD		September 11th		July 7th	
	2001Q1	2001Q2	2001Q4	2002Q1	2005Q3	2005Q4
Holidays	-	-	[0.00]***	-	-	[0.09]*
Business	-	-	[0.09]*	-	-	-
VFR				[0.09]*		
Study	-	-	-	-	-	-

Table 26: Economic Quantification of Shocks on the United States Market.

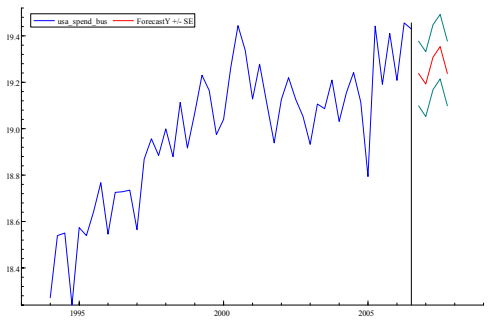
	FMD		September 11th		July 7th	
	2001Q1	2001Q2	2001Q4	2002Q1	2005Q3	2005Q4
Holidays	-	-	£79.22	-	-	£33.17
Business	-	-	£41.42	-	-	-
VFR	-	-	-	•	-	-
Study	-	-	-	-	-	-
Total			£120.64		£33.17	

Figure 7: Forecasting of United States market spending in UK.

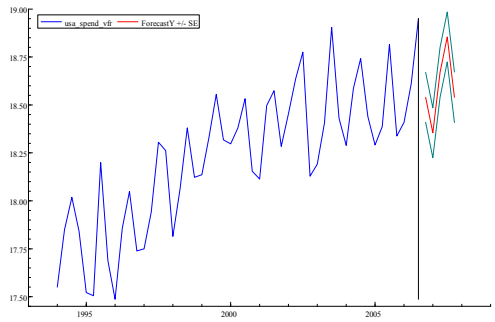
(a) Holidays



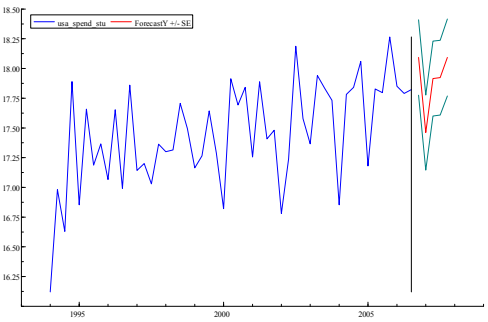
(b) Business



(c) VFR



(d) Study

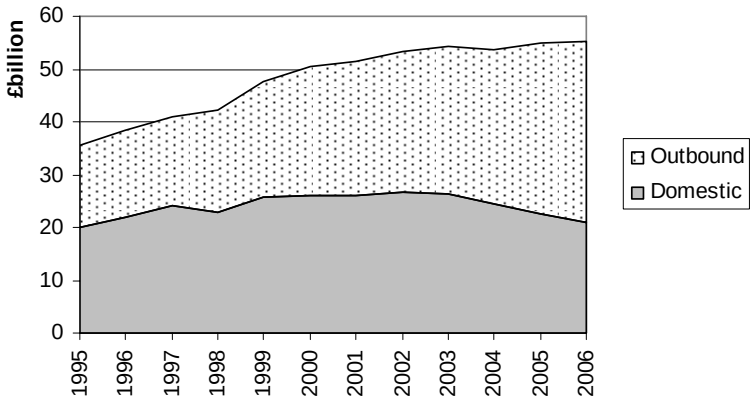


3. Modelling Domestic Tourism Demand for the UK

Domestic tourism demand in the UK has seen increases in total visits and expenditure in the late 1990s, followed by a period of levelling off and, since 2003, decline (Figure 8), while total tourism spending by UK residents, the sum of outbound and domestic expenditure, has risen at a much more constant rate. Tourism day visits have also shown reductions in expenditure in recent years, although the data on these visits is not available on a time series basis. Total expenditure on tourism day visits rose from £25.9bn in 1996 to £34.1bn in 1998, but fell to £29.8bn in 2002-3 (GBDVS 2004 p.48; note that these figures are all in 2002 prices).

This section is centred on the study of the domestic tourism demand for the UK that seeks to identify the drivers behind the movement in domestic tourism demand, and quantify their effects through econometric analysis. Prior to this, more detailed data on domestic tourism demand is examined.

Figure 8 Outbound and Domestic Tourism Spending (£bn)



3.1 Domestic Tourism Demand in the UK: Facts and figures

Values for domestic tourism demand in the UK can be obtained from the United Kingdom Tourism Survey (UKTS), a national consumer survey measuring the volume and value of domestic tourism trips jointly sponsored by VisitBritain, VisitScotland, Visit Wales and the Northern Ireland Tourist Board. The UKTS survey covers trips away from home lasting one night or more taken by UK residents for the purpose of holidays, business, visits to friends and relatives or any other purpose. Tourism is measured in terms of volume (i.e. trips taken and nights away) and value (i.e. expenditure).

The survey underwent two significant methodology changes in the last ten years. In 2000, the survey moved from a face-to-face survey to a telephone survey while in May 2005 the change was reversed. Data from 1995 to 1999 was reworked by VisitBritain to allow comparisons to be made with 2000 and later data, but no such reworking has been performed after May 2005. There are therefore difficulties inherent in comparing 2005 and 2006 data with previous years. Although this period has seen falling domestic tourism expenditure, this is a continuation of a trend that existed prior to the change in methodology.

While for inbound tourism demand there are available data for quarterly arrivals and spending from 1994 to 2006 disaggregated by purpose of visit, detailed time series data for domestic tourism demand data are comparatively limited. The available domestic tourism data which is useful for the

present study covers annual data with breakdown for four purposes of visit ('holidays', 'business', 'VFR' and 'other') for the period 1995-2006. This data comprises figures on trips, nights and spending.

Quarterly data is available from 2000 onwards, but without a breakdown by purpose of visit. The available period is shorter than the annual data since it covers from the first quarter of 2000 (expressed by 2000Q1) until the last quarter of 2006 (expressed by 2006Q4). In addition, only the number of trips is available, rather than expenditure, and in some cases this figure is derived from publications giving each quarter's value as a percentage of the annual total, leading to a degree of numerical inaccuracy – as the percentage has been rounded to the nearest one percent prior to publication.

Annual domestic tourism in the UK by purposes of visit

The largest portion of domestic tourism spending is on holiday trips (Table 27). In 2006 holidays made up 65% of total domestic tourism spending, while business tourism and VFR were 22% and 10% respectively. These proportions are fairly constant throughout the period under consideration.

Table 27 UK Domestic Tourism Spending (£ millions).

	HOLIDAYS	BUSINESS	VFR	All purposes of visit
1995	13,164	3,928	2,376	20,072
1996	13,897	4,912	2,338	22,041
1997	15,602	5,006	2,663	24,137
1998	14,978	4,498	2,755	22,814
1999	16,475	5,312	3,033	25,635
2000	16,494	5,641	3,179	26,133
2001	17,016	5,670	2,999	26,094
2002	17,352	5,552	3,428	26,699
2003	16,174	6,142	3,444	26,482
2004	15,351	4,840	3,092	24,357
2005	14,462	5,251	2,386	22,667
2006	13,592	4,643	2,133	20,965

Source: http://www.staruk.org.uk/

While the overall pattern of growth and decline in total expenditure, leading to total spending in 2006 only slightly higher than in 1995, is repeated in each purpose of visit category, these categories have experienced different paths (Figure 9) and growth rates (Figure 10). For instance, all purposes of visit have experienced overall declines over the period 2004-2006 although at different growth rates, and in 2005 spending by business tourists increased. A slight drop in overall spending in 2003 was due to a combination of a fall in holiday spending and an increase in business spending. High growth rates of total domestic tourism in 1996 and 1999 were led by high growth in business tourism; while in 1997 a high overall growth rate was due to growth in holiday and VFR markets while business tourism was relatively stagnant.

Figure 9 Annual growth of domestic tourism spending by purpose of visit, 1996-2006

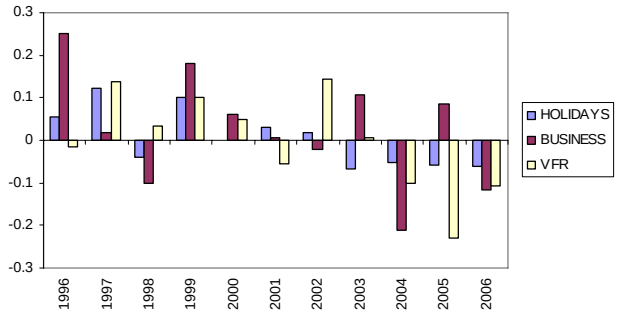
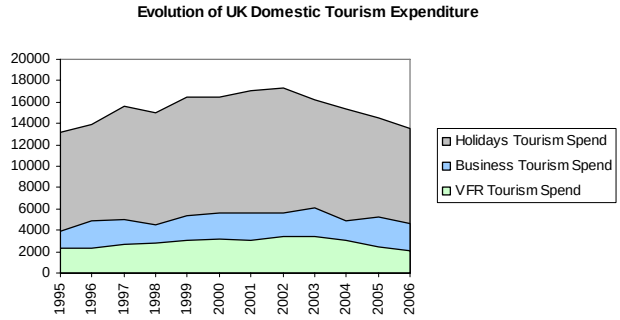


Figure 10 Evolution of UK domestic tourism expenditure by purpose of visit (£ millions)



Seasonal behaviour of total domestic tourism demand in the UK

Tourism demand is characterised by a seasonal pattern (Figure 11), with peaks occurring in the third quarter of every year, corresponding to the summer months of July, August and September while the lowest levels are in the first quarter corresponding to the winter season. This seems to follow a relatively stable pattern until 2004. After 2005, a similar seasonal pattern is evident in the data to that which existed before the methodology change. The same overall patterns of growth depicted in the annual data are also evident in the quarterly data, except that prior to 2004 where there was growth in the annual data (such as in 2002), the peak summer season demonstrated declining figures, with increases in off-peak periods. This might be evidence that the summer holiday market has been under increasing pressure from overseas destinations while other domestic markets have been growing.

The annual growth rates of these domestic quarterly data (Figure 12) can provide further information about these seasonal data. These figures can be interpreted in the following way: domestic trips made during the first quarter of 2001 (2001Q1) experienced a drop (of the 7%) with respect to the first quarter of 2000, and there were further declines in the second and the third quarters of 2001, followed by an increase in the fourth quarter of 2001 that continued through the first two quarters of 2002. These events might be readily explained by the impact of foot and mouth disease reducing

Figure 11. Domestic trips, quarterly data, 2000-2006

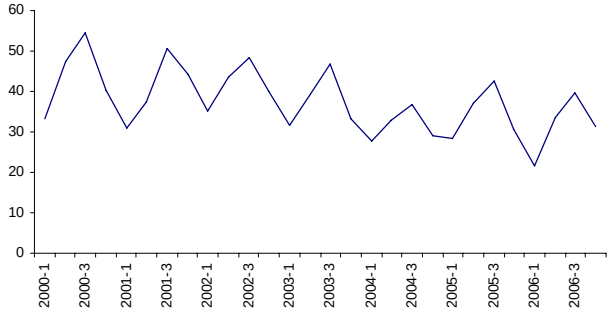
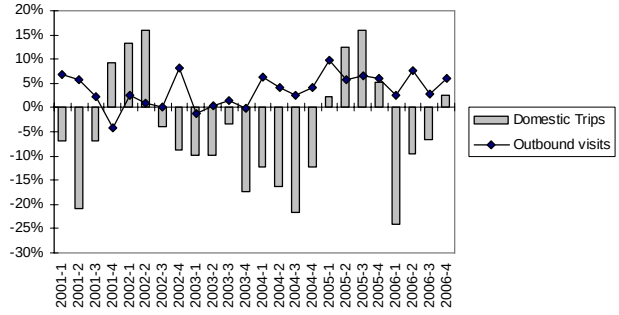


Figure 12 Annual growth rates of domestic UK trips and outbound UK visits



domestic tourism trips from February 2001 onwards, followed by a recovery into 2002, perhaps aided by the fall in outbound trips in the last quarter of 2001 after September 11th, which may have deterred some UK residents from outbound air travel and lead to increased domestic tourism visits.

From the third quarter of 2002, there were ten consecutive quarters of negative growth, followed by a brief period of growth in 2005, and negative growth from the beginning of 2006. Outbound visits have increased continuously from the second quarter of 2003. The positive growth of outbound tourism contrasts with the decreasing path of domestic tourism for some, but by no means all, of the period shown.

The same pattern of outbound growth and a recent drop in domestic tourism is demonstrated in annual figures for tourism spending (Figure 13 and Figure 14).

Figure 13 The evolution of UK domestic tourism spending and outbound tourism spending

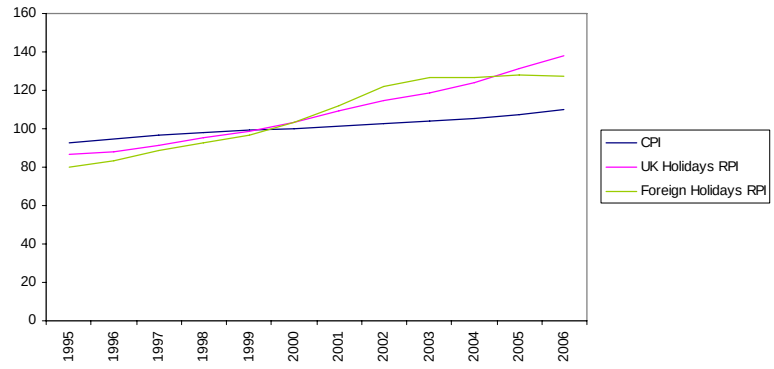
Figure 14 Annual growth rates of domestic and outbound tourism spending

3.2 Possible Drivers of UK Domestic Tourism

Domestic Tourism can be influenced by several factors, the most obvious ones are the prices of the goods and services purchased by domestic tourists, the price of foreign holidays, and spending power or income. Weather is also often seen as being an important factor.

Prices are important drivers both in terms of the prices paid for domestic tourism trips and for one of the main alternatives, the average price of a foreign holiday. Since 1995 both of domestic and foreign holiday prices have risen faster than the consumer price index (Figure 15) and from 2000 foreign holiday prices have increased as a higher rate than domestic tourism. From 2004 onwards not only do foreign holiday prices grow at a lower rate than both domestic holidays and the CPI, but foreign holiday prices have also been decreasing in absolute terms.

Figure 15 UK Holidays Prices, Foreign Holidays Prices and CPI (base 2000)



Given this picture, it seems appropriate to observe not only the evolution of the relative prices of holidays in UK and prices holidays abroad during the period under analysis but also the evolution of outbound UK tourism demand (Figure 16). Both of these relative prices series grew at similar rates until 2003, since when there is a divergence evolution between both relative price series. The ratio of prices of domestic tourism to the CPI has continued to grow, showing that consuming domestic tourism has continued to become more expensive than consuming other goods within the economy. At the same time, from 2003 the ratio of prices of foreign tourism with respect to domestic tourism has fallen; consuming holidays abroad has become relatively cheaper than consuming holidays within the UK. The growth rates of the relative prices (Figure 17) also demonstrate this pattern.

A pattern therefore exists from 2003 onwards of (a) foreign holidays becoming cheaper than domestic holidays; (b) increased expenditure on foreign holidays; and (c) reduced spending on domestic holidays. Care must be taken in direct interpretation from the data however, as this striking pattern is not evident prior to 2003, when, for example, between 2000 and 2003 the ratio of foreign to domestic holiday prices increased rapidly, but without any reduction in outbound tourism spending or increase in domestic spending. Only an econometric model that takes other factors into account will be able to determine the extent to which foreign prices influence domestic tourism demand.

Figure 16 Evolution of relative prices of domestic and outbound tourism

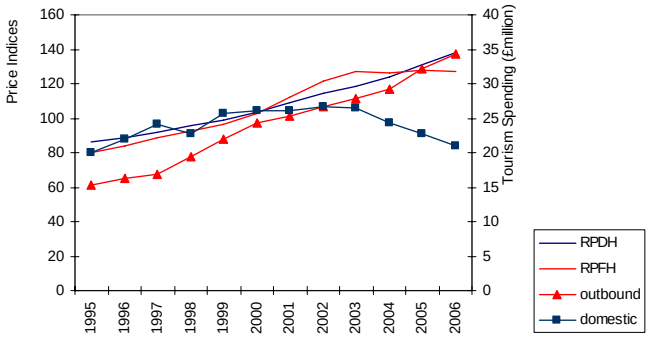


Figure 17 Rate of Growth of relative prices

RPDH: relative price of domestic holidays to CPI
RPFH: relative price of foreign holidays to domestic holidays

Climate is often seen as being a driver of tourism, and it is clear that quarterly variations in domestic tourism are significantly related to temperature and rainfall (Figure 18). While this partly explains seasonality in tourism demand, the influence of climate on the levels of domestic tourism is less clear. At the annual level (Figure 19) there is no clearly observable relationship between temperatures and domestic holiday spending. A hot summer does not, according to the data, necessarily imply a good year for domestic tourism; this may be because other drivers such as prices are more important, or that temperatures may affect the timing of domestic holidays or the type of domestic holiday taken rather than the overall value of holiday spending.

Figure 18 UK domestic trips (millions), temperature and rainfall (°C), quarterly data

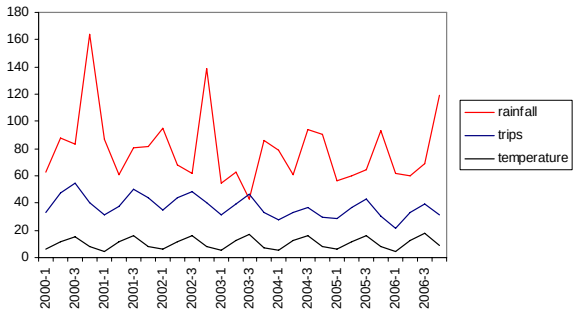


Figure 19 domestic tourism expenditure (£billion) and average temperatures (°C), annual data

3.3 Modelling the Determinants of the UK Domestic Tourism Demand

This section describes the specification of the model to estimate the drivers of domestic tourism demand in the UK as well as the modelling approach.

Specification of the model

The model used for UK inbound tourism demand is specified as follows:

$$\ln DTD_{uk,t} = \alpha + \beta_1 \ln RGDP_{uk,t} + \beta_2 \ln RPDH_{uk,t} + \beta_3 \ln RPFH_{uk,t} +$$

$$+ \beta_4 \ln CLIMATE_{uk,t} + \delta_i D_i + \lambda_t + \varepsilon_t$$

Where:

DTD is the domestic tourism demand in the UK. This will be measured in two different ways: first, as quarterly domestic trips for the period 2000Q1-2006Q4 and it includes all tourism trips; and, as annual domestic tourism spending, adjusted by Consumer Price Index (base 2000) for the period 1995-2006 and it is broken down by purposes of visit, it includes holidays, business, VFR and total tourism. The source of these data is: UKTS.

RGDP is the income variable measured by real Gross Domestic Product of (base 2000), measured in sterling pounds (£). This data has been obtained from DataStream, which in turn is derived from Office for National Statistics data.

RPDH is a ratio of relative prices defined as $\frac{DH}{CPI} * 100$, being *DH* measured by "RPI: UK Holidays" and CPI in UK, base year is 2000. This ratio measures the relative prices of holidays in UK and other goods and services. The source of these price indexes is the Office for National Statistics.

RPFH is a ratio of relative prices defined as $\frac{FH}{DH} * 100$, being *FH* measured by "RPI: Foreign Holidays, both indices have base year 2000. This ratio measures the relative prices between foreign holidays and domestic holidays. Both price indexes have been obtained from the Office for National Statistics.

CLIMATE is measured by temperature and rainfall. For the annual analysis, the average winter temperature and the average summer temperature in England and Wales measured in Degrees Celsius (°C) and the average rainfall in winter and summer in England and Wales measured in millimetres (mm) are used. For the quarterly analysis, the average quarterly temperature and the average quarterly rainfall are employed. The source of this data is the Meteorological Office.

Dummy variables are also included in the estimated models. Several dummy variables in order to check their significance towards the UK domestic tourism demand are used. These dummies refer to the foot and mouth disease (FMD), the September 11th terrorism attack in New York, and the July 7th 2005 terrorism attack in London. A dummy variable is also included in 2004 because of the different behaviour of the tourism demand in that period. More details about the dummy variables can be found in the explanation of the results.

In this study two time periods are analysed: t_1 = 1995…2006 (annual data) and t_2=2000Q1…2006Q3 (quarterly data); λ denotes the seasonal factor, which appears only in the estimate using quarterly data; ε = error term

ln indicates that the variables are expressed in natural logarithms. This transformation is done to permit the interpretation of the coefficients (β_1, β_2, β_3) as demand elasticities; $\boldsymbol{\beta_1}$ denotes income elasticity; $\boldsymbol{\beta_2}$ denotes price elasticity of domestic holidays in front of consuming other goods and services; $\boldsymbol{\beta_3}$ denotes price elasticity of holidays abroad *versus* domestic holidays.

The model allows the identification of two different price effects: 1) domestic tourism versus consuming other goods and services; 2) foreign tourism versus domestic tourism. The estimation of this model using the quarterly data is performed using a structural time series (STSM) model; the estimation of the model using the annual data is performed using a simple linear regression estimated by ordinary least squares (OLS).

3.4 Results for Domestic Tourism modelling for the UK

Table 28 contains the results for the annual domestic tourism demand model. For all purposes of visit, and for total domestic tourism, income elasticities are positive, own-price elasticities are negative and substitute price elasticities are positive, all conforming to their expected signs. Only for business tourism are there estimates that lack significance at the 95% level.

Key results are that while total domestic tourism has an income elasticity of less than one, the income elasticity for the holiday segment is greater than one, which is usually associated with luxury goods. In this case, an increase of 1% in income would make the domestic tourism spending rise by 1.15%. Holidays experience a higher own-price elasticity than other purposes of visit with an increase of 1% in relative prices (domestic tourism becoming more expensive than other goods and services in the economy) would lead to a decrease of a 2.62% in UK domestic holiday spending. Hence, domestic tourism by "holidays" is highly responsive to changes in prices (price-elastic). Holiday tourism is responsive to foreign prices, with an elasticity of 0.84 indicating that if foreign tourism becomes 1% more expensive than domestic tourism, domestic tourism spending will increase by 0.84%; but is less responsive to foreign prices than either business or VFR tourism. This might indicate that domestic holiday trips are seen more as a substitute for other goods and services, while VFR tourism in particular has a higher element of substitutability with foreign holidays.

While mean winter temperatures do have a significant effect on VFR tourism (with higher temperatures increasing tourism spending), no other climate variables (summer and winter temperatures and rainfall) have any significant effect on any of the purposes of visit modelled.

Two dummy variables (for 2001 and 2002) are significant in explaining domestic holiday tourism, but with positive values. Domestic holiday spending was 11% higher in 2001 than would otherwise be explained by the drivers of demand included in the model *ceteris paribus*, and 10% higher in 2002 (see Table A8 in Annex 2). These positive effects might be induced by the effects of September 11th (2001) in deterring tourists from taking foreign holidays and taking holidays in the UK instead. Other purposes of visit, and total tourism spending, are not affected by events in 2001 and 2002; and none of these series show significant effects in 2004 or 2005. It appears that any negative effects from Foot and Mouth disease or the July 7th terrorist attacks in London have been either countered by other events that occurred in the same year, or have lead to tourists taking different types of domestic tourism trips (or at different times of the year) rather than effecting the

Table 28 Estimates for domestic tourism expenditure by purposes of visit

	Holidays	Business	VFR	Total
Income Elasticity	**1.15**	0.95	**0.75**	**0.89**
Own-price elasticity (domestic holidays/other goods)	**-2.62**	-1.84	**-1.84**	**-1.95**
Substitute price elasticity (foreign holidays/domestic holidays)	**0.84**	**1.54**	**2.83**	**1.52**
Climate	x	x	√	x
Dummy	√	x	x	x

Notes: (1) Bold figures indicate that they are significant; (2) 'Total' includes holidays, business, VFR and other; (3) The period under study in this case is t_1=1995…2006 (annual data); (4) The UK domestic tourism demand is measured in this case by domestic tourism spending.

total level of spending.

The only variable that appears as significant for business tourism expenditure is the relative price of foreign tourism. The value of the elasticity is positive and higher than the unity, which shows the high sensitivity of domestic tourism demand to changes in prices of tourism abroad. The value can be interpreted as follows. A decrease of the ratio of prices in 1% (meaning that foreign tourism becomes cheaper compared to domestic tourism) would lead to a 1.54% fall in domestic business tourism. The income elasticity and own price variables are not significant although have the correct sign. For business tourism, neither the climate variables nor the dummy variables are significant.

The income elasticity for domestic VFR tourism is significant and has a positive sign although it is less than the unity. In response to a 1% increase in income, VFR spending would increase by 0.75%. The relative price of domestic tourism is significant and has a negative sign, although not as high as in the case of holiday tourism. Therefore, this result can be interpreted as an increase of the

Table 29 Detailed results for domestic tourism expenditure (annual).

	Holidays	**Business**	**VFR**	**Total**
constant	2.15 (0.15)	-3.06 (0.22)	**-7.12** (0.00)	-0.15 (0.90)
ln RGDP	**1.15** (0.09)	0.95 (0.13)	**0.75** (0.06)	**0.89** (0.01)
ln RPDH	**-2.62** (0.01)	-1.84 (0.24)	**-1.84** (0.07)	**-1.95** (0.03)
ln RPFH	**0.84** (0.04)	**1.54** (0.02)	**2.83** (0.00)	**1.52** (0.00)
ln Climate	-	-	-	-
- Temperature Summer	-	-	-	-
- Temperature Winter	-	-	**0.16** (0.06)	-
- Rainfall Summer	-	-	-	-
- Rainfall Winter	-	-	-	-
Dummies				
- 2001	**0.11** (0.05)	-	-	-
- 2002	**0.10** (0.09)	-	-	-
- 2004	-	-	-	-
- 2005	-	-	-	-
R2-adj	0.88	0.70	0.92	0.88
F	17.9 (0.00)	9.74 (0.00)	33.4 (0.00)	26.16 (0.00)

Note: Bold figures indicate that the coefficient is significant; p-values in parenthesis.

price of domestic tourism with respect to the rest of goods in a 1% would mean a drop of the domestic tourism spending in 1.84%. The foreign price variable is significant with a positive sign and a high value (the highest value in this context) meaning that if foreign tourism became more expensive than domestic holidays by 1%, domestic tourism spending would increase by 2.83%. Finally, it is found that the climate has some effect on this segment. In particular, the average temperature in winter has a positive effect.

Total domestic tourism demand has a positive income elasticity, which is less than unity (0.89) and shows sensitivity to both foreign (-1.95) and foreign (1.52) holiday prices. No climate or dummy variables are significant. While these can be compared with the results from the quarterly model (Table 30), caution must be used in doing so for three reasons. Firstly, the annual and quarterly models use data from different time periods (the quarterly model is restricted to data from 2000 onwards); secondly, the quarterly model uses data on trips rather than expenditure – this means that elasticity estimates will be lower if the driver of demand will also increase spend per visitor; thirdly, the quarterly model is better at taking account of dummy variables where an event effects tourism demand for only part of a year. Neither model can thus be considered as superior to the other – while the quarterly model is better at taking the effects of events into account, it is lacking in only having data for trips, and in terms of not having data by purpose of visit.

The quarterly model has results that show (as expected) smaller elasticities than the annual model, but with each variable having the same direction of effect. The interpretation of the combined elasticities from the annual and quarterly models is that 1% higher incomes will lead to 0.45% more trips and a 0.89% increase in spending, so that spend per visitor increases by 0.3%[4]. A 1% increase in domestic holiday prices will lead to a 1.46% fall in trips and a 1.95% fall in expenditure, implying a 0.2% fall in spend per trip. A 1% increase in foreign holiday prices will lead to a 0.79%

Table 30 Estimates of total domestic tourism trips (quarterly).

Income elasticity	**0.45**
Own price elasticity (domestic holidays/other goods)	**-1.46**
Substitute price elasticity (foreign holidays/domestic holidays)	**0.79**
Climate	
- Temperature	**0.27**
- Rainfall	**0.15**
Dummy	
- D2001Q2	**-0.11**
- D2001Q4	**0.18**
- D2004Q2	**-0.18**
- D2004Q3	**-0.27**
- D2004Q4	**-0.13**

Notes: (1) Bold numbers indicate estimates that are significant at the 95% level; (2) The period under study in this case is t_2=2000Q1…2006Q4 (quarterly data); (3) UK domestic tourism demand is measured in this case by domestic trips.

increase in domestic tourism trips and a 1.52% increase in domestic tourism expenditure, with a 0.41% increase in spend per visit.

The results for climate variables demonstrate that climatic variables do affect tourism trips at the quarterly level. This, with the lack of such findings for expenditure at the annual level, implies that either there is an opposite effect on spend per visit, or (as seems more likely) that temperature and rainfall affect the timing of tourism trips, but not their annual level. A particularly hot second quarter (April-June), for example, might entice domestic tourists to make their trip then rather than wait until later in the summer.

Finally, dummy variables are significant at the quarterly level, showing that the events included did have effects on domestic tourism despite the lack of effects from them in the annual model. Domestic tourism trips were 11% lower in the second quarter of 2001 than would otherwise have been expected, which might be attributed to the effects of foot and mouth disease (although there were no significant effects in the third quarter of 2001). September 11th appears to have increased domestic tourism trips by 18% in the fourth quarter of 2001 as tourists took domestic trips rather than fly abroad. The changes to the UKTS data series is captured in quarterly dummies in 2004. No significant effects were found for the summer of 2005 following the July 7th terrorist attacks in London.

[4] Note that the percentage change in spend per visit is not the percentage change in spending (s) minus the percentage change in visits (v), but rather is (1+s) / (1+v) – 1.

4. Conclusions

This report has described the model used in, and presented results from, a project examining the drivers of tourism demand in the UK. The model used has been discussed with reference to a large literature on tourism demand modelling and forecasting, where there has been little previous work conducted on inbound tourism to the UK. Only two recent studies - Durbarry and Sinclair (2001) and BTA (2001) have estimated these elasticities, and each have used more aggregate classifications than used in this study.

Durbarry and Sinclair and the BTA both estimated income elasticity 0.6, while the results of this study indicate an average income elasticity of 1.65. Whether or not this is due to a more recent period of data being used, a different methodology, or more detailed treatment of different markets in this study, the income elasticity above unity does correspond well with estimates for other countries, and is consistent with predictions based on tourism being a luxury good compared with other products.

On price elasticities, Durbarry and Sinclair (-0.5 and -0.6) and the BTA (-1.3) estimated substantially different estimates. This report estimates an average price elasticity of -0.61 that is very similar to the Durbarry and Sinclair estimates, but has also shown that a wide variation exists for price elasticities in different markets and for tourism classified by purpose of visit. Some markets are more price sensitive than the BTA average.

For domestic tourism, this report has shown that while domestic tourism has an income elasticity of less than unity (0.89), domestic holiday tourism is still a luxury good with an income elasticity greater than unity (1.15). The Domestic holiday market is more responsive to domestic prices than other purposes of visit, but less responsive to foreign prices. Weather has been shown to affect the timing of domestic tourism visits rather than the level of expenditure. Foot and mouth disease has been shown to have had a negative effect on domestic tourism, while September 11th lead to more domestic trips, although both of these effects were fairly short-lived and did not affect annual domestic tourism expenditure.

This report has also demonstrated the usefulness of the model used to provide forecasts and to show confidence bands around these forecasts. A spreadsheet model using this modelling methodology will enable forecasts to be generated as new data becomes available.

This report has also discussed that there are other influences on tourism demand that have not been included in the model, either because there is no way of providing data, such as trends in fashion and tastes, or because adequate data is not available, such as marketing expenditure. Inclusion of these variables as and when data permits would increase the estimates gained from this form of modelling methodology. This report does demonstrate that data on marketing expenditure could be included if it were available and not only improve model estimates but provide useful indications of the usefulness of marketing expenditure.

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Annex 1: Detailed Results by Country

This annex contains the detailed results of the UK inbound tourism demand by country and by purpose of visit. The estimates for both tourism expenditure and tourist arrivals to UK as tourism demand variable are provided for each case. The estimated coefficients and the p-value are provided. In order to ease the interpretation of the results an extra column has been added indicating the level of significance of the parameters through asterisks. Specifically, *, ** and *** denote 90%, 95% and 99% of significance of the estimated coefficient. Additionally, the goodness of fit (R^2) is provided, as the closer the R^2 is to unity indicates that the variables better capture the changes in the dependant variable. In the seven countries examined, the R^2 shows lower values for certain segments, especially VFR and study.

Table A1: Detailed results for France by purpose of visit

	Expenditure			Arrivals		
	Coefficient	**P-value**		**Coefficient**	**P-value**	
FRANCE						
Holidays						
Income elasticity	1.38875	[0.00000]	***	0.98945	[0.00000]	***
Price elasticity	-1.75472	[0.00000]	***	-1.38518	[0.00019]	***
Competitors' price elasticity	4.14608	[0.00003]	***	0.25281	[0.79218]	-
Interventions:						
FMD 2001:Q1	-0.36525	[0.05643]	*	–		
Sept 11th 2002:Q1	-0.73622	[0.00034]	***	-0.77334	[0.00045]	***
June 7th 2005:Q3	-0.37122	[0.05341]	*	–		
R^2	0.806			0.724		
Business						
Income elasticity	1.39470	[0.00000]	***	0.97216	[0.00000]	***
Price elasticity	-0.26928	[0.49934]	-	0.24990	[0.17345]	-
Competitors' price elasticity	2.55969	[0.02655]	**	-0.28367	[0.58082]	-
Interventions	–			–		
R^2	0.467			0.572		
VFR						
Income elasticity	1.34823	[0.00000]	***	0.94218	[0.00000]	***
Price elasticity	-0.44623	[0.15525]	-	-0.45039	[0.02455]	**
Competitors' price elasticity	5.82380	[0.00000]	***	3.29167	[0.00000]	***
Interventions						
FMD 2001:Q2	-0.44545	[0.01850]	**	–		
Sept 11th 2001:Q4	-0.35490	[0.05829]	*	–		
June 7th	–			–		
R^2	0.861			0.791		
Study						
Income elasticity	1.30677	[0.00000]	***	0.76727	[0.00000]	***
Price elasticity	-1.50192	[0.11321]	-	-1.53243	[0.07842]	*
Competitors' price elasticity	3.44246	[0.19644]	-	2.36360	[0.33035]	-
Interventions	–			–		
R^2	0.256			0.469		

Table A2: Detailed results for Germany by purpose of visit

		Expenditure			Arrivals		
		Coefficient	**P-value**		**Coefficient**	**P-value**	
GERMANY							
Holidays							
Income elasticity		1.37476	[0.00000]	***	0.94249	[0.00000]	***
Price elasticity		-0.48503	[0.02307]	**	-0.81051	[0.00003]	**
Competitors' price elasticity		3.53016	[0.27097]	-	-1.78212	[0.50821]	-
Interventions:							
FMD	2001:Q1	-0.48388	[0.04747]	**	-0.52921	[0.01137]	**
Sept 11th	2002:Q1	-0.99778	[0.00012]	***	-0.71299	[0.00088]	***
June 7th	2005:Q3	–			–		
R^2		0.885			0.881		
Business							
Income elasticity		1.37178	[0.00000]	***	0.93188	[0.00000]	***
Price elasticity		0.51545	[0.01033]	**	0.81000	[0.00000]	***
Competitors' price elasticity		0.63962	[0.82887]	-	4.29598	[0.00977]	***
Interventions							
FMD	2001:Q1	0.40887	[0.07026]	*	–		
Sept 11th; June 7th		–			–		
R^2		0.508			0.756		
VFR							
Income elasticity		1.27732	[0.00000]	***	0.90422	[0.00000]	***
Price elasticity		-1.22211	[0.10713]	*	0.42435	[0.00101]	***
Competitors' price elasticity		-2.44326	[0.64840]	-	7.00262	[0.00037]	***
Interventions							
FMD	2001:Q1	-0.49223	[0.03870]	**	–		
Sept 11th; June 7th		–			–		
R^2		0.413			0.687		
Study							
Income elasticity		1.28011	[0.00000]	***	0.73859	[0.00000]	***
Price elasticity		-1.15271	[0.01083]	***	-0.95975	[0.02028]	**
Competitors' price elasticity		-5.34429	[0.41528]	-	-4.56038	[0.45399]	-
Interventions							
FMD	2001:Q1	-0.91489	[0.06610]	**	-1.14642	[0.01646]	**
Sept 11th	2002:Q1	-1.24431	[0.01370]	**	–		
June 7th	2005:Q4	-1.71154	[0.00109]	***			
R^2		0.362			0.783		

Table A3: Detailed results for Spain by purpose of visit

	Expenditure			Arrivals		
	Coefficient	**P-value**		**Coefficient**	**P-value**	
SPAIN						
Holidays						
Income elasticity	1.43054	[0.00000]	***	0.93197	[0.00000]	***
Price elasticity	-2.48284	[0.00003]	***	-1.49268	[0.00328]	***
Competitors' price elasticity	-7.01251	[0.00000]	***	-4.50013	[0.00017]	***
Interventions:						
FMD 2001:Q1	-0.63325	[0.05711]	**	-0.51210	[0.08802]	*
Sept 11th 2001:Q4	-0.54328	[0.10488]	*	-0.49675	[0.10206]	*
June 7th						
R^2	0.783			0.680		
Business						
Income elasticity	1.43642	[0.00000]	***	0.93564	[0.00000]	***
Price elasticity	-0.09135	[0.84252]	-	0.31675	[0.13961]	-
Competitors' price elasticity	-3.02008	[0.00565]	***	-1.58113	[0.00221]	***
Interventions						
FMD 2001:Q2	-0.58980	[0.03883]	**	–		
Sept 11th 2002:Q1	-0.46610	[0.09998]	*	–		
June 7th	–			–		
R^2	0.677			0.835		
VFR						
Income elasticity	1.42180	[0.00000]	***	0.93262	[0.00000]	***
Price elasticity	-1.76655	[0.00004]	***	-1.97425	[0.00000]	***
Competitors' price elasticity	-9.07121	[0.00000]	***	-8.65725	[0.00000]	***
Interventions						
FMD 2001:Q1	-0.47063	[0.04919]	**	-0.36933	[0.09783]	*
Sept 11th 2001:Q4	-0.72889	[0.00344]	***	–		
June 7th	–			–		
R^2	0.879			0.841		
Study						
Income elasticity	1.37758	[0.00000]	***	0.76423	[0.00000]	***
Price elasticity	-0.44150	[0.56342]	-	-0.90420	[0.10643]	*
Competitors' price elasticity	1.88605	[0.28781]	-	1.35357	[0.29260]	-
Interventions	–			–		
R^2	0.530			0.782		

Table A4: Detailed results for The Netherlands by purpose of visit

	Expenditure			Arrivals		
	Coefficient	**P-value**		**Coefficient**	**P-value**	
THE NETHERLANDS						
Holidays						
Income elasticity	1.50492	[0.00000]	***	1.01789	[0.00000]	***
Price elasticity	-1.48132	[0.01892]	**	-0.59389	[0.28070]	-
Competitors' price elasticity	-3.17092	[0.17209]	-	2.71154	[0.19231]	-
Interventions:						
FMD 2001:Q2	-0.54043	[0.06506]	*	–		
Sept 11th 2001:Q4	-0.52587	[0.07335]	*	-0.40620	[0.11977]	
2002:Q1	-0.57215	[0.05275]	*	–		
R^2	0.769			0.709		
Business						
Income elasticity	1.52007	[0.00000]	***	1.02947	[0.00000]	***
Price elasticity	0.76317	[0.15371]	-	0.61441	[0.03937]	**
Competitors' price elasticity	-0.79451	[0.68950]	-	1.78946	[0.10688]	*
Interventions						
FMD 2001:Q3	-0.76146	[0.00353]	***	-0.34941	[0.01328]	**
Sept 11th 2001:Q4	-0.39780	[0.11488]	* 11%			
R^2	0.564			0.553		
VFR						
Income elasticity	1.43463	[0.00000]	***	0.98082	[0.00000]	***
Price elasticity	-0.12972	[0.83263]	-	0.21003	[0.57336]	-
Competitors' price elasticity	-3.27788	[0.16088]	-	-1.24586	[0.37610]	-
Interventions	–			–		
R^2	0.499			0.556		
Study						
Income elasticity	1.25990	[0.00000]	***	0.64448	[0.00000]	***
Price elasticity	-1.11054	[0.62909]	-	-1.29206	[0.32962]	-
Competitors' price elasticity	-1.10504	[0.89795]	-	-2.35635	[0.63308]	-
Interventions						
Sept 11th 2002:Q1	-2.85223	[0.00893]	**	–		
June 7th 2005:Q3	2.13613	[0.04089]	**	1.12543	[0.05880]	*
2006.Q1	-2.29100	[0.03236]	**	1.31146	[0.03091]	**
R^2	0.348			0.094		

Table A5: Detailed results for Ireland by purpose of visit

	Expenditure			Arrivals		
	Coefficient	**P-value**	**Sign.**	**Coefficient**	**P-value**	**Sign.**
IRELAND						
Holidays						
Income elasticity	1.70737	[0.00000]	***	1.14828	[0.00000]	***
Price elasticity	-2.37439	[0.00356]	***	-0.44455	[0.30019]	-
Competitors' price elasticity	2.69694	[0.00064]	***	2.49850	[0.00000]	***
Interventions						
FMD 2001:Q1	-0.70508	[0.01149]	**	-0.42085	[0.00868]	***
2001:Q2	-0.61006	[0.02885]	**	–		
Sept 11th; June 7th	–			–		
R^2	0.649			0.800		
Business						
Income elasticity	1.72590	[0.00000]	***	1.14858	[0.00000]	***
Price elasticity	-0.35766	[0.54261]	-	-0.66016	[0.25099]	-
Competitors' price elasticity	5.10110	[0.00000]	***	11.68204	[0.00000]	***
Interventions						
FMD 2001:Q2	-0.56767	[0.01179]	**	–		
Sept 11th	-	-		–		
June 7th 2005:Q3	-0.47644	[0.03336]		–		
R^2	0.273			0.379		
VFR						
Income elasticity	1.71328	[0.00000]	***	1.18417	[0.00000]	***
Price elasticity	-2.67394	[0.00000]	***	-1.09022	[0.00096]	***
Competitors' price elasticity	-1.08247	[0.01422]	**	0.80352	[0.35756]	-
Interventions						
FMD 2001:Q2	–			-0.35815	[0.00177]	***
Sept 11th	–			–		
June 7th 2005:Q4	0.32318	[0.04562]		0.17436	[0.10761]	*
R^2	0.860			0.839		

Table A6: Detailed results for Italy by purpose of visit

	Expenditure			Arrivals		
	Coefficient	**P-value**		**Coefficient**	**P-value**	
ITALY						
Holidays						
Income elasticity	1.38592	[0.00000]	***	0.90812	[0.00000]	***
Price elasticity	-0.13580	[0.68628]	-	0.15674	[0.52230]	-
Competitors' price elasticity	-2.18938	[0.05064]	**	-0.55878	[0.48380]	-
Interventions						
FMD 2001:Q1	—			-0.48685	[0.03085]	**
Sept 11th 2001:Q4	-1.01989	[0.00114]	***	-1.13383	[0.00000]	***
2002:Q1	-0.71917	[0.01812]	**	-0.97940	[0.00006]	***
June 7th	—			—		
R^2	0.769			0.795		
Business						
Income elasticity	1.38715	[0.00000]	***	0.89878	[0.00000]	***
Price elasticity	1.13855	[0.00007]	***	0.52591	[0.00501]	***
Competitors' price elasticity	-1.31697	[0.12212]	-	-1.54003	[0.01170]	**
Interventions						
FMD 2001:Q1	-0.37675	[0.09419]	*	—		
Sept 11th 2001:Q4	-0.46344	[0.04204]	**	-0.47296	[0.00379]	***
2002:Q1	-0.69120	[0.00333]	***	—		
June 7th	—			—		
R^2	0.691			0.681		
VFR						
Income elasticity	1.31285	[0.00000]	***	0.85501	[0.00000]	***
Price elasticity	0.84840	[0.02051]	**	1.25502	[0.00003]	***
Competitors' price elasticity	-2.47748	[0.03870]	**	-1.39128	[0.12263]	-
Interventions						
FMD 2001:Q2	—			-0.52903	[0.02796]	**
Sept 11th 2001:Q4	-1.00680	[0.00207]	***	—		
2002:Q1				-0.38690	[0.10448]	*
June 7th	—			—		
R^2	0.569			0.632		
Study						
Income elasticity	1.32250	[0.00000]	***	0.74700	[0.00000]	***
Price elasticity	0.77201	[0.40122]	-	-0.58016	[0.38875]	-
Competitors' price elasticity	-3.10296	[0.26979]	-	-0.61123	[0.77962]	-
Interventions						
Sept 11th 2001:Q4	-0.69236	[0.00891]	***	-1.07471	[0.07107]	*
2002:Q1	—			-0.98166	[0.09840]	*
FMD; June 7th	—			—		
R^2	0.686			0.776		

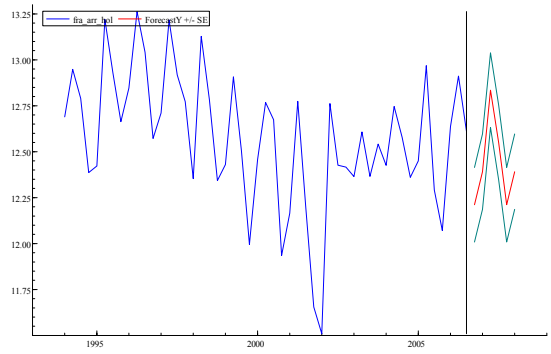
Table A7: Detailed results for United States by purpose of visit

	Expenditure			Arrivals		
	Coefficient	**P-value**		**Coefficient**	**P-value**	
UNITED STATES						
Holidays						
Income elasticity	2.10499	[0.00000]	***	1.40881	[0.00000]	***
Price elasticity	-1.08593	[0.00000]	***	-1.37669	[0.00000]	***
Competitors' price elasticity	-0.13617	[0.45502]	-	-0.20085	[0.35541]	-
Interventions:						
FMD	–					
Sept 11th 2001:Q4	-0.51029	[0.00063]	***	-0.55248	[0.00155]	***
June 7th 2005:Q4	-0.23812	[0.09552]	*	-0.28266	[0.08854]	*
R^2	0.90			0.84		
Business						
Income elasticity	2.08045	[0.00000]	***	1.33458	[0.00000]	***
Price elasticity	0.08311	[0.63269]	-	-0.71576	[0.00001]	***
Competitors' price elasticity	0.66182	[0.00076]	***	0.19912	[0.18497]	-
Interventions						
Sept 11th 2001:Q4	-0.23515	[0.09801]	*	-0.37564	[0.00168]	***
FMD; June 7th	–			–		
R^2	0.802			0.47		
VFR						
Income elasticity	1.92520	[0.00000]	***	1.06091	[0.00000]	***
Price elasticity	0.63365	[0.17033]	-	0.45482	[0.00085]	***
Competitors' price elasticity	0.74634	[0.00807]	***	0.47826	[0.00000]	***
Interventions						
Sept 11th 2002:Q1	0.21018	[0.09439]	*	–		
R^2	0.894			0.894		
Study						
Income elasticity	1.51964	[0.00000]	***	0.83753	[0.00000]	***
Price elasticity	0.14855	[0.68410]	-	0.77353	[0.02581]	**
Competitors' price elasticity	-0.34629	[0.36062]	-	0.31358	[0.37098]	-
Interventions	–			–		
R^2	2.54			2.27		

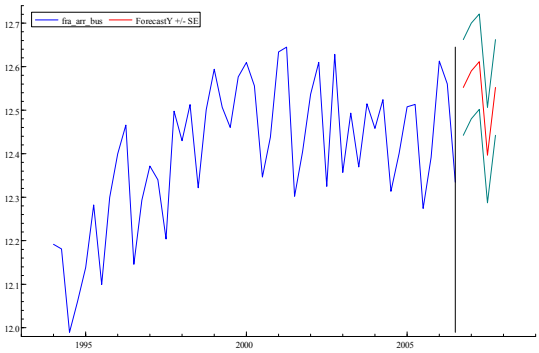
Annex 2: Forecasting for Tourist Arrivals by Country

Figure A1: Forecasting of French tourists arrivals to UK.

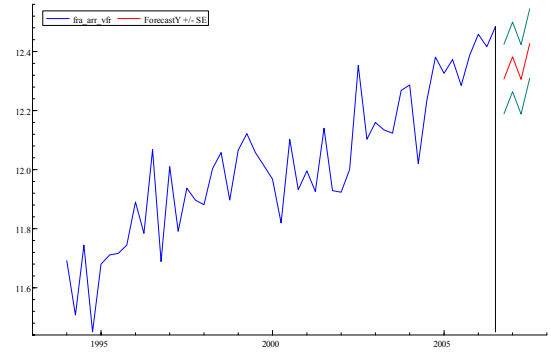
(a) Holidays



(b) Business



(c) VFR



(d) Study

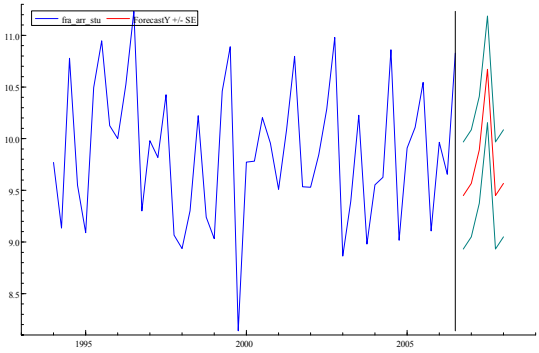
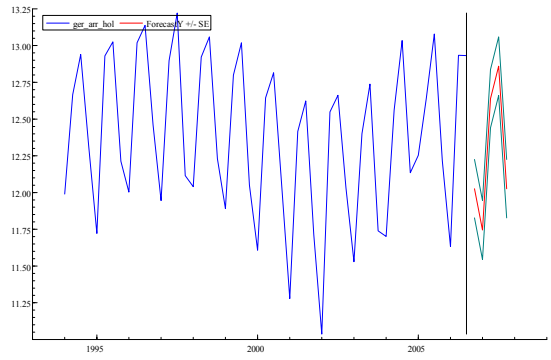
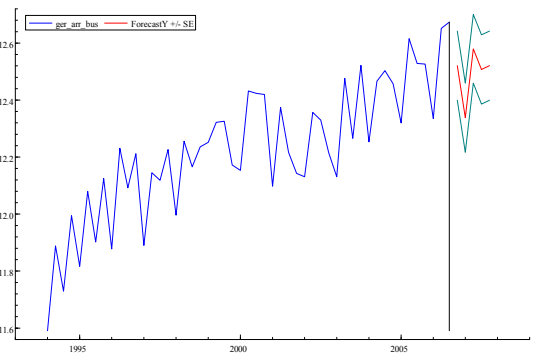


Figure A1: Forecasting of German tourists arrivals to UK.

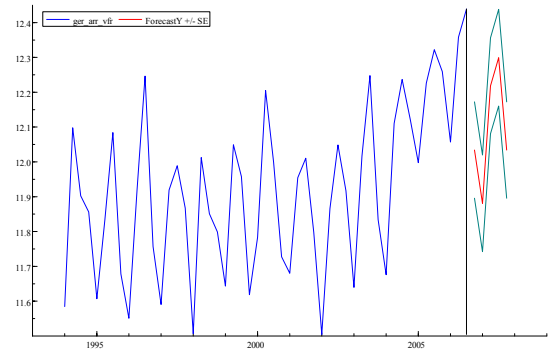
(a) Holidays



(b) Business



(c) VFR



(d) Study

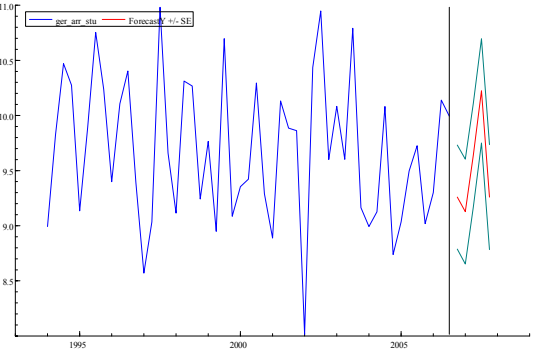
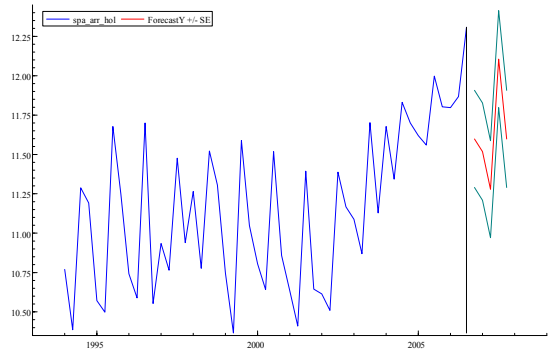
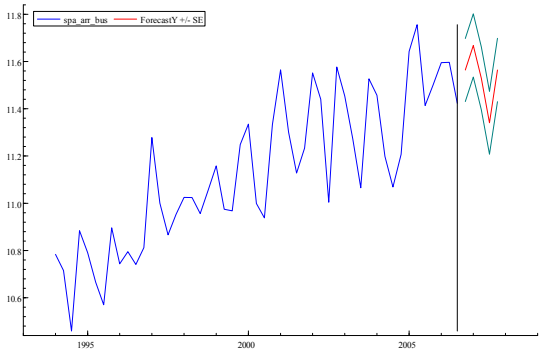


Figure A3: Forecasting of Spanish tourists arrivals to UK.

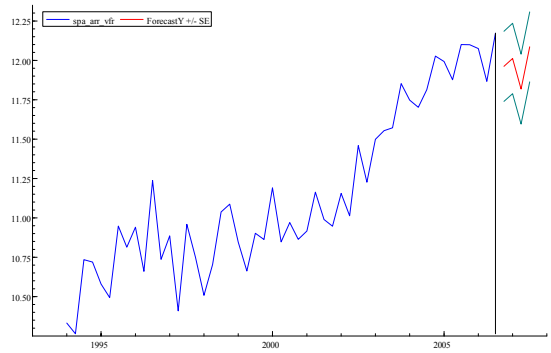
(a) Holidays



(b) Business



(c) VFR



(d) Study

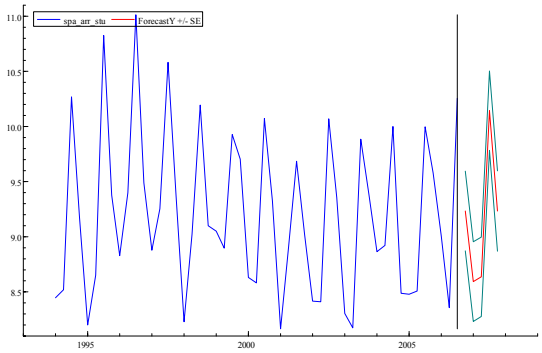
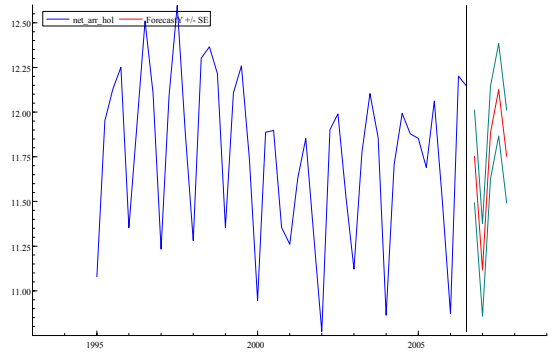
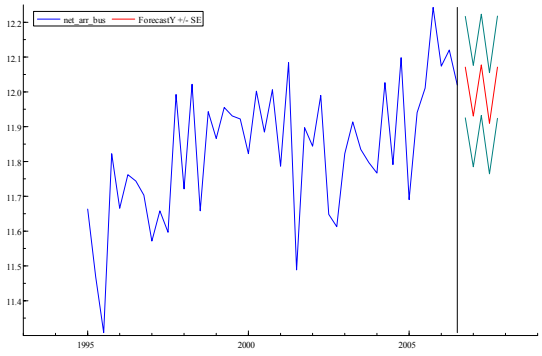


Figure A4: Forecasting of Dutch tourists arrivals to UK.

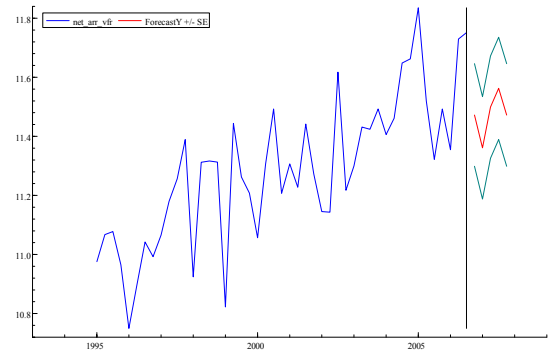
(a) Holidays



(b) Business



(c) VFR



(d) Study

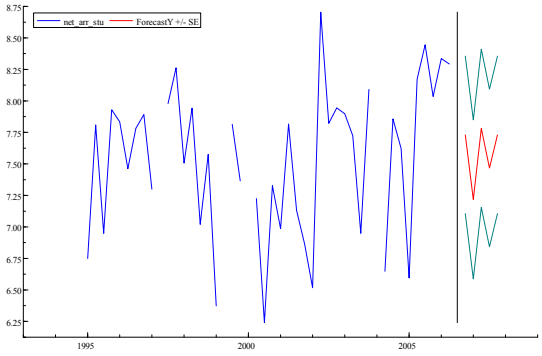
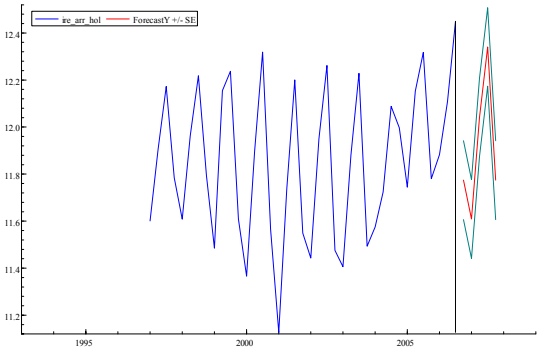
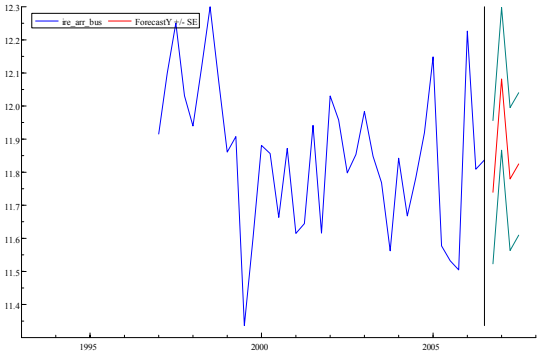


Figure A5: Forecasting of Irish tourists arrivals to UK.

(a) Holidays



(b) Business



(c) VFR

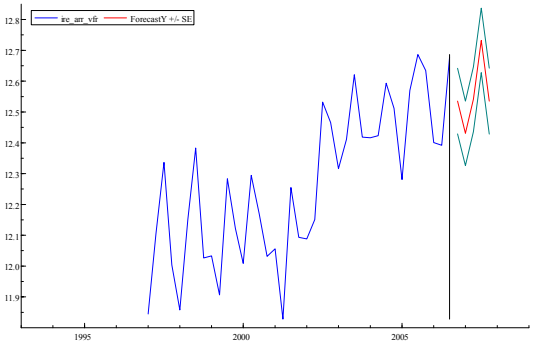
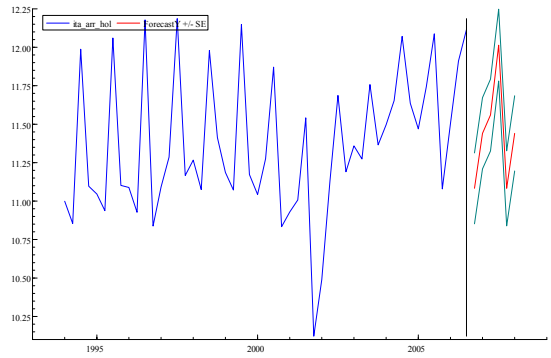
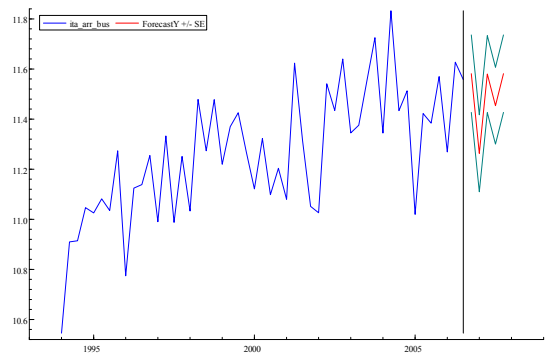


Figure A6: Forecasting of Italian tourists arrivals to UK.

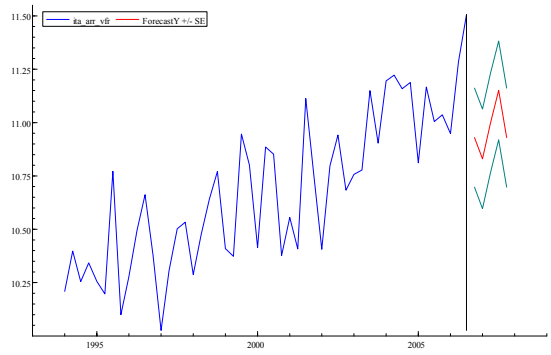
(a) Holidays



(b) Business



(c) VFR



(d) Study

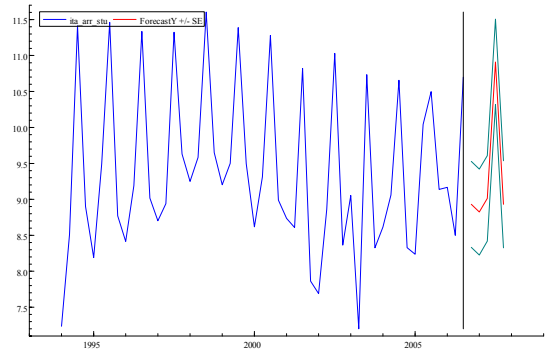
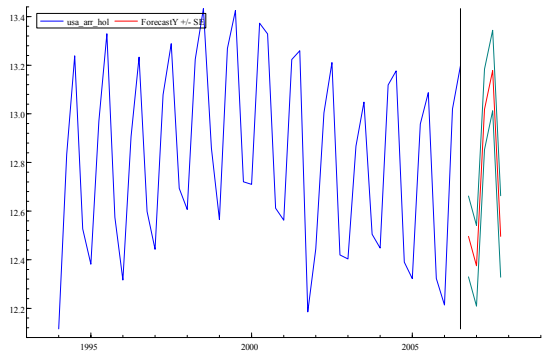
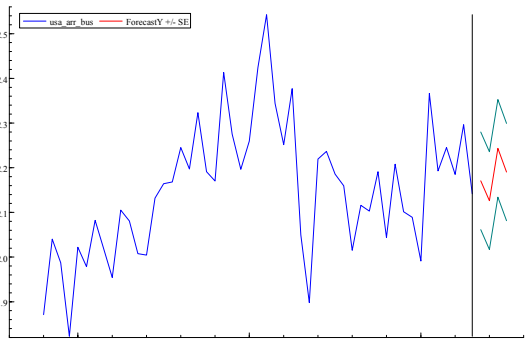


Figure A7: Forecasting of United States tourists arrivals to UK.

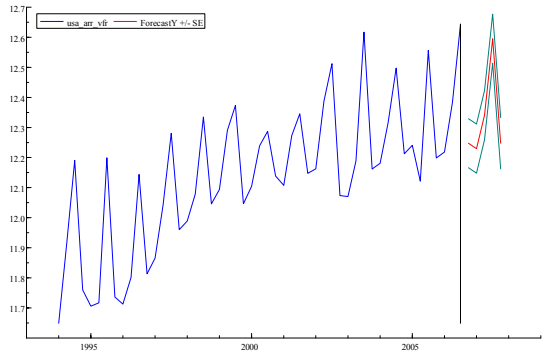
(a) Holidays



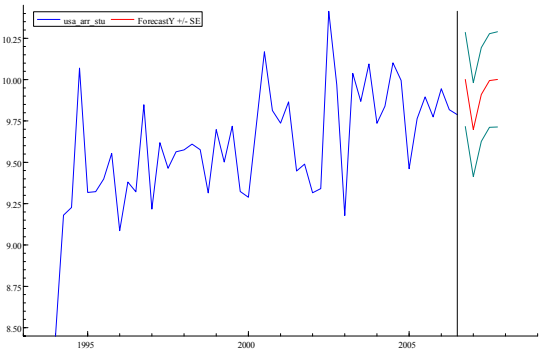
(b) Business



(c) VFR



(d) Study



Annex 3: Detailed Results for Domestic Demand

Table A8 shows the full results for the annual model of domestic demand. Figures in parentheses are standard errors. '-' indicates variables that have such low levels of significance that they have been removed from the model. Table A9 shows detailed results for the quarterly demand model, with different treatments of climate and dummy variables (column IV is the one used in the main report).

Table A8: Detailed results of the estimates of the UK domestic tourism demand (annual).

	Holidays	**Business**	**VFR**	**Total**
constant	2.15	-3.06	**-7.12**	-0.15
	(0.15)	(0.22)	(0.00)	(0.90)
ln RGDP	**1.15**	0.95	**0.75**	**0.89**
	(0.09)	(0.13)	(0.06)	(0.01)
ln RPDH	**-2.62**	-1.84	**-1.84**	**-1.95**
	(0.01)	(0.24)	(0.07)	(0.03)
ln RPFH	**0.84**	**1.54**	**2.83**	**1.52**
	(0.04)	(0.02)	(0.00)	(0.00)
ln Climate	-	-	-	-
- Temperature Summer	-	-	-	-
- Temperature Winter	-	-	**0.16**	-
			(0.06)	
- Rainfall Summer	-	-	-	-
- Rainfall Winter	-	-	-	-
Dummies				
- 2001	**0.11**	-	-	-
	(0.05)			
- 2002	**0.10**	-	-	-
	(0.09)			
- 2004	-	-	-	-
- 2005	-	-	-	-
R2-adj	0.88	0.70	0.92	0.88
F	17.9	9.74	33.4	26.16
	(0.00)	(0.00)	(0.00)	(0.00)

Table A9: Results for quarterly domestic tourism demand

	(I)	(II)	(III)	(IV)	(V)
Income elasticity	**0.72** (0.01)	**0.78** (0.00)	**0.50** (0.04)	**0.45** (0.04)	**0.81** (0.00)
Own-price elasticity (domestic holidays/other goods)	**-1.92** (0.00)	**-1.99** (0.00)	**-1.49** (0.05)	**-1.46** (0.00)	**-2.02** (0.00)
Substitute Price elasticity (foreign holidays/domestic holidays)	**0.65** (0.02)	**0.61** (0.01)	**0.81** (0.00)	**0.79** (0.00)	**0.64** (0.02)
Climate					
- Temperature	0.27 (0.13)	0.18 (0.17)		**0.27** (0.01)	-
- Rainfall	-	-	**0.15** (0.03)	**0.15** (0.01)	-
Dummy variables					
- D2001Q1	0.05 (0.48)	-	-	-	-
- D2001Q2	**-0.13** (0.06)	**-0.14** (0.03)	**-0.12** (0.07)	**-0.11** (0.06)	**-0.15** (0.04)
- D2001Q4	0.11 (0.11)	**0.11** (0.06)	**0.18** (0.01)	**0.18** (0.01)	**0.12** (0.10)
- D2002Q1	0.069 (0.38)	0.09 (0.19)	-	-	-
- D2005Q3	0.04 (0.56)	-	-	-	-
- D2005Q4	-0.01 (0.89)	-	-	-	-
- D2004Q1	-0.04 (0.50)	-	-	-	-
- D2004Q2	**-0.19** (0.01)	**-0.19** (0.00)	**-0.17** (0.01)	**-0.18** (0.00)	**-0.19** (0.01)
- D2004Q3	**-0.20** (0.01)	**-0.21** (0.00)	**-0.28** (0.00)	**-0.27** (0.00)	**-0.21** (0.00)
- D2004Q4	**-0.16** (0.03)	**-0.16** (0.01)	**-0.13** (0.04)	**-0.13** (0.03)	**-0.16** (0.02)
R^2_s	0.60	0.67	0.67	0.75	0.56
R^2	0.92	0.94	0.94	0.95	0.92