This paper attempts to test conventionally believed hypotheses on a body of relevant data. The study is primarily based on examining the nature of Irish export tourism demand from four of its main generating countries: Britain, the USA, France and Germany. The work of various authors is drawn upon in an attempt to give an overview of the use of economic theory in analysing tourism demand. The study centers on the use of regression analysis using time series data (1968-1992) to estimate the quantitative relationship between the level of visitor arrivals to Ireland and those variables expected to influence the former. The main tenets of the theory of demand has provided a basis for the regression model. While the relevance of the exogenous variables presented seems clear, in effect, they should be accompanied by some carefully organised quantitative evidence in order to present a more precise indication of which factors are likely to be operative for a particular origin-destination visit data set. Much attention is focused on the actual construction of each of the variables for the regression models as this can obviously have significant implications for the interpretation of parameter estimates. Overall, the results suggest that price and income factors were among the most important explanatory variables determining tourism demand levels to Ireland. An analysis of the subsequent elasticity values has important significance particularly, in light of past and present tourism policy initiatives.

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1. INTRODUCTION

The travel and tourism industry has emerged as one of the fastest growing industries in the world generating more than US$3.0 trillion per year. The World Travel and Tourism Council (WTTC, 1994) has estimated that tourism is the world’s largest industry, responsible for 10 per cent of world GDP and representing approximately 10 per cent of global wages and 11 percent of world-wide consumer spending. Consequently, sustaining this industry has become an integral part of government policies in countries world-wide, not least in Ireland.

Ireland itself has a comparatively small but distinctive tourism industry, approximately receiving over 0.8 per cent of all world tourism arrivals. In terms of Ireland’s GNP, the contribution of tourism is estimated at 6.4 per cent in 1995. The number of total out-of-state visits to Ireland reached 4.8 million in 1995 of which, over 4.2 million constituted overseas arrivals. Revenue from tourism is now in excess of IR£2.3 billion of which almost IR£1.7 billion was generated in the form of foreign exchange earnings. Ireland’s four major origin markets constituted over 83 per cent of all out-of-state arrivals in 1995; Britain contributes over 47 per cent of total out-of-state arrivals into Ireland while mainland Europe and North America account for approximately 23 per cent and 13 per cent respectively.

Real revenue earned from tourism showed a slowdown in growth up to the mid-eighties and subsequently, some major reviews pointed to the poor performance of Irish tourism and more specifically, to the loss of market share in the UK and US. External factors were often cited as reasons for Ireland’s poor tourism performance, for example, the escalation of violence in Northern Ireland during the early 1970s, the sun destinations’ rapidly increasing share of the total UK outbound market and uncompetitive high rates of inflation in the 1970s compared to rival destinations. It was not until 1984 that the 1969 level of British arrivals to Ireland was surpassed. Actual budgetary allocations to the tourism industry in Ireland had fallen in real terms between the years 1982-1987, reflecting a real decline of 18 per cent in the combined budget of the main tourism organisations. The situation up to the mid-eighties was such that the tourism industry in Ireland did not enjoy the same credibility as other sectors of the economy (NESC, 1980).

However in the 1990s, there was a substantial improvement in the Irish tourism product primarily brought about as a result of the availability of EU Structural Funds and tourism being recognised as an appropriate recipient of this assistance. The Operational Programme for Tourism 1989-1993 represented the most systematic approach Ireland has seen to planning and resourcing the tourism industry. As part of this new tourism strategy, targets to double overseas tourist arrivals over the five year period 1987-1992 were broadly on target for the first three years but fell short of the 1992 target by 26 per cent (equivalent to over 1 million tourists). Mainland European arrivals to Ireland had increased their market share from almost 14 per cent in 1988 to almost 16 per cent in 1989, thus displacing North America as
Ireland’s second most important origin market in terms of numbers and by 1990, in terms of revenue receipts. During the six year period to 1992, the percentage increase in visitors from Britain reached 62 per cent. However, there was an even more dramatic growth in mainland European arrivals of 162 per cent, surpassing all other origins during this period. The rate of visitor growth was strongest up to 1990. In fact, in 1991 total overseas visitors fell by 2.3 per cent.1 The effect of a sharp 20 per cent fall in North American tourists was to some extent cushioned by an increase of 13 per cent in visitors from mainland Europe. There was a recovery of growth in 1992, albeit at a slower pace than that of the preceding years. The period 1993-1995 has seen a huge increase of 52 per cent in arrivals from North America, a trend greatly shaped by the announcement of the ‘Peace Process’ related to Northern Ireland and the subsequent media publicity that ensued. The Operational Programme for Tourism 1994-1999 outlines Ireland’s planned expenditure of nearly £700 million on the tourism sector over the 1994-99 period. Numbers from Europe grew by 16.5 per cent during this period but revenue only increased by 3 per cent (countries such as Germany, France and Italy showed marked declines in both numbers and revenue during 1993-1994).

To what should one attribute Ireland’s exceptional performance? While the growth rates of European tourism are evident for most years, not all countries benefited equally from this process.

“Ireland achieved the fastest growth in earnings from international tourism amongst fifteen prime European destinations in the period 1980-1992.”

(Tansey, Webster and Associates, 1995:2)

Therefore, Ireland’s relative performance cannot be attributed solely to external factors, but probably to a combination of factors; including the expansion of the Irish tourist product base, more effective marketing, improved access transport and an international trend to move away from sun holidays coinciding with the image of Ireland as a ‘green’ holiday destination. Ireland had by 1987 already established itself as a stable low-inflation economy and a greater co-ordination of government efforts existed within the industry. In any discussion of the reasons for the rapid growth of tourism since the late 1980s, it is useful to distinguish between the relative influence of demand and supply. That is, to what extent has Ireland been merely the passive beneficiary of the expanding travel market in the US etc., and to what extent alternatively, can the growth of tourism be attributed to increased efficiency in production (i.e. to supply factors). Ireland is frequently associated with the so-called ‘green’ destinations. Therefore it has attempted to exploit specific major niches, notably the German market which grew by nearly 182 per cent in 1988-1995 (in terms of visitor numbers). However, on balance, it would seem more legitimate to suggest that the surge of growth from Britain and mainland Europe was maintained by an interplay of both supply and demand side factors. From the viewpoint that tourism is influenced by business cycles in national economies rather than
determining them, tourism demand is primarily private consumption of services and investment is both capital intensive and long-term.

As with the examination of changes in demand for any goods and services, analysis of tourism demand is hindered by the fact that in practice, we normally only see, via empirical data, a Walrasian equilibrium of supply and demand in tourism markets, and change represents a shift from one equilibrium position to another. Thus, in effect, one is examining tourism consumption rather than tourism demand. Nevertheless, sufficient market research and time series or comparative studies exist to build reasonably accurate analyses of the effects on tourism demand of independent variables. Tourism’s growing contribution to national economies has subsequently been accompanied by a need to understand the major factors which can determine demand levels. Tourism spending, like any other form of discretionary spending is regarded as being particularly sensitive to general economic conditions. The world’s leading tourism generating countries are also associated with high per capita incomes. Generally, annual fluctuations in the total number of outbound tourists from a country vary much less than the proportional distribution by country of destination.

2. SPECIFICATION OF THE MODEL

Classical economic theory implies that the major determinants of the demand for foreign tourism should include: the price of tourist goods and services relative to the price of relevant substitutes, the incomes of tourists and any other specific factors which may alter the tastes of travellers for tourism.

The primary objective of this study has been to make a contribution to the exercise of ‘best’ explaining the most significant determinants of tourism flows to Ireland based on a systematic quantitative analysis. There is undoubtedly a growing awareness of the importance of tourism. However, assumptions which may once have been valid must either be challenged or substantiated. Previous tourism demand studies will be drawn upon throughout. However, they vary not only in terms of technique but also in the construction of the variables under consideration. The period of estimation is 1968-1992. After estimation some variables will be dropped if the empirical results indicate that this is necessary. The final models will vary in form between origin and destination pairs. It is clear that no single form of model has been found to be superior in the literature.

The four countries chosen for the study are: Britain, USA, France and the Federal Republic of Germany. These countries have traditionally been Ireland’s biggest source markets. Indeed, they have provided the reliable mainstay for the Irish tourism economy.
Construction of variables

The majority of studies on international tourism demand have used the number of tourist visits as a measure of demand: Barry and O’Hagan (1972), Kliman (1981), Martin and Witt (1988), Summary (1987), and Uysal and Crompton (1984). Nevertheless, a substantial proportion of studies also measured tourism demand in terms of tourism receipts and/or expenditure: Artus (1972), Kwack (1972) and Little (1980). In any case, those factors affecting tourism expenditure also generally explain the number of visits. In this particular study, it was decided that demand would be measured from each country in terms of the number of tourist visits expressed in annual terms. The reason for this choice stems from statistical concerns, i.e. a general consensus exists about the greater reliability of Irish data on numbers. Ideally, a dependent variable should represent total tourism expenditure resulting from a holiday in Ireland (i.e. expenditure in the destination and transport payments to origin and destination carriers).

However, Irish tourism statistics derive expenditure data based on sampling those who travel via a particular origin rather than by country of permanent residence. Only business travellers have been excluded from the dependent variable on the basis that business travel is more likely to be motivated by very different considerations from those which motivate travel for pleasure. In any case, pleasure travel constitutes the bulk of inbound tourism flows to Ireland. Business travellers are also more likely to be less income and price-elastic, arising from the obligatory nature of one against the discretion of the other. No effort is made to exclude any other category, nor in fact, is there any attempt to include in the list of explanatory variables any special factors that apply expressly to these latter categories.

The extent of demand for tourism services from any origin is obviously related to the actual size of the population, i.e. the amount of potential customers in a market to buy that good. In general, demand for foreign tourism from a country with a relatively small population would rarely approximate to that of a country with a large population even if the propensity to travel abroad of a small country is higher. Bond and Ladman (1972) allow for the impact of population by using it as a separate explanatory variable. Their study confirmed that population proved to be a significant variable in a number of cases. Laber (1969) estimates a demand model using three variables and then, multiplies each of them by the population figures. Thus, population doesn’t actually appear as a separate explanatory variable in his econometric model. However, for the purposes of this study, all appropriate variables are expressed in per capita form for each origin. In effect, by doing this, the population coefficient is constrained to unity.

Conceptually, the larger the real per capita income of a country, the more likely its citizens can afford to purchase travel services abroad, ceteris paribus. Growth in real incomes provides consumers with increased spending power. Consideration of income distribution is central to any estimates of national income elasticity with
regard to tourism demand. The more skewed is a country’s income distribution, the
greater is the tendency to place a limit on the percentage of its population, whose
income levels indicate that foreign travel is financially possible. Decisions on
holidays are generally taken early in the year, if not before. Therefore, one may
reasonably expect a larger than usual increase in incomes in one year to be followed
in the next, by a remarkably rapid increase in demand for tourism, *ceteris paribus*.

In examining the relationship between income and tourism demand, it seems
reasonable to suggest, that once one achieves a certain level of income, the income
estasticity will increase initially but then, it will remain approximately constant for a
range of per capita income. Ultimately, it will decrease as it is unlikely that tourism’s
share of expenditure out of GNP would grow indefinitely. In tandem with this, Barry
and O’Hagan (1972) have addressed the concept of a “saturation effect”. They base
it on the hypothesis that, after a certain point, the amount of utility accruing to an
individual from a holiday may decline as the number of tourists enjoying utility from
the same holiday increases. The vast majority of studies have included income as an
explanatory variable in tourism demand models. Some studies have used total
national disposable income: Bond and Ladman (1972) and Oliver (1971). Artus
(1970) derived an index from real disposable income whereas, Uysal and Crompton
(1984) used GNP per capita data. While it is interesting to examine the differing
representations of the income variable, ideally, data representing *discretionary*
income per capita would be the most appropriate form. However, since discretionary
income is very subjective and thus not measurable, origin disposable income data is
employed as a proxy for the purposes of this study. The disposable income figures
are divided by the origin population and also, by the consumer price index (the base
year is 1985). Therefore, the income variable in this study enters the model as real
personal disposable income per capita for each country.  

The effect of *price* changes is far more complex in tourism than are the effects of
changes in income. It is not just destination holiday prices which are important but
also, relative price differences between the destination and the generating country. If
prices in destination countries increase by more than those of the generating country
and, this is not (fully) compensated for by changes in exchange rates then, the
relative cost of travel abroad has clearly risen. Basically, relative prices result from
factors which tend to operate in opposite directions: if prices increase faster than
average in a particular destination, then its currency tends to depreciate. However,
when the two influences *exactly* counterbalance one another, then relative prices
remain unchanged. Therefore, it is implied that changes in relative prices reflect
either a short term or a long term imbalance between relative rates of inflation and
exchange rates.
Basically, there are three elements constituting the price of tourism:

1. the cost of travel to the destination,
2. the exchange rate between the tourist’s country of origin and that of the destination country,
3. the cost of goods and services incurred after arrival, e.g., information on prices of accommodation and sustenance is generally available in advance but information on entertainment and inland travel may not be widely available in advance.

Gerakis (1966) suggests that the effects of these price changes are short term whereas Barry and O’Hagan (1972) view the effects to be more long term, on the basis that, reputations for expensiveness or cheapness passed on by word-of-mouth are developed over a number of years, for example, the reputed cheapness of Greece and expensiveness of Paris. Edwards (1976) justifies his suggestion that price changes anticipate travel by approximately twelve months on the basis that countries tend to get a reputation for being expensive after the event, not while it is happening. Defining tourism prices is very difficult in that, the cost of tourism is a function of the total mix of goods and services consumed by each tourist. However, price indices for tourists simply do not exist (Witt and Witt 1992). Edwards (1988) emphasises the point that no country has an adequate price series representing costs to tourists. Most authors have used the consumer price index or the retail price index to act as a proxy for the cost of tourism: Little (1980), Loeb (1982), Witt and Martin (1987). Nonetheless, these authors complain about the fact that there is no better measure. However, most authors who have used the CPI as a proxy would accept the argument that the mix of goods and services consumed by tourists is not very different from the mix constituting the CPI and that, the changes in the CPI reasonably reflect the changes in the prices of goods and services consumed by tourists.

Some countries have attempted to build a price series of hotel charges. However, such price series are limited in that they relate to nominal rates and not to the discounted rates which tour operators negotiate. Such discounts vary from year to year usually in accordance with the expected demand-supply balances. A weighted average one-directional airfare has been used as a proxy for price by Bond and Ladman (1972) but the authors do not actually give their reasoning as to why the cost of travel would be appropriate to reflect the cost of tourism. Martin and Witt (1987) have shown that the CPI is a reasonable proxy for the cost of tourism within the context of international tourism demand models. Therefore, the use of the CPI in this study was necessitated by the absence of an alternative and consistent measure. Indeed, the data available indicated little improvement could be expected over the CPI. Thus, while recognising that the use of the CPI may not adequately reflect the actual price of tourism services, it appears as the best alternative.

There is no consensus regarding the construction of the price variable in tourism demand models. In general, it can be assumed that travellers will consider the total
cost of a holiday, i.e. the cost of transportation to the destination and the cost of living upon arrival. The difficulty of representing total cost stems from the fact that the ratio of the two elements is not fixed. Therefore, it is not feasible to embody a single price variable into a model and consequently, both elements should be represented separately. Indeed, little consensus exists on the question of modelling substitutability. With regard to the treatment of price data, it must be stated that no superior method was found in the review of literature. The empirical results using various cost of tourism variables have been mixed.

Essentially, price may be represented in either absolute and/or relative terms. The manner in which the cost of tourism variable enters a demand model differs quite markedly between studies. Most authors acknowledge the point that, tourists who reflect on price do not just consider price in isolation but relative to prices in substitute destinations. In cases where price is to be represented in relative terms, the question arises as to what should it be related, for example, prices in the generating country and/or prices in alternative destinations. A number of studies include a price variable in the form of cost of tourism in the destination relative to the cost of tourism in the origin; Artus (1970), Barry and O’Hagan (1972), Kliman (1981), Uysal and Crompton (1984) and Witt (1980a, 1980b). The consequent implication/assumption from this approach is that the substitute for a particular foreign holiday is domestic tourism. To consider only the destination-origin cost is not adequate. In reality of course, there is much wider substitutability. Demand for goods and services is dependent upon the price of substitute goods, amongst other things.

Therefore, the price of tourism in this study will enter the model as cost of tourism in the destination relative to a weighted average cost of tourism in substitute destinations. Basically, a composite index of the price of destinations must be derived. This is done by allocating weights to competing destinations for each of the four origin countries and then, adding the CPIs of each country multiplied by their respective weights. However, firstly, it is necessary to decide what countries constitute Ireland’s competitors in each of its four main export markets, since one is concerned with the cost of a holiday in Ireland. In some studies, the substitute destinations and their corresponding weights were selected on a somewhat ad hoc basis, for example, Loeb (1982) and Uysal and Crompton (1984). This can have varying implications for the interpretation of data and provides leeway for biased results. In this study, the weights were derived for each origin based on the relative market shares of that origin’s demand while excluding totally from the calculation the estimated demand to Ireland.

The selection of substitute destinations was limited to five major competitors. The demand to each competing destination was divided by the total demand and the weights derived were then applied to the CPIs of the selected competing destinations. In some studies that do allow for substitute prices, the weights applied have been constant throughout the entire period under consideration, that is, they
were calculated based on market shares of a particular base year. For example, Jud and Joseph (1974) used 1960 market shares as weights in their study which examined the period 1958-1968. However, for the purposes of this study, the weights calculated are based on an average of the previous three years demand. Thus, the weights are changing throughout the estimation period and should prove to be more representative. These weights when totalled equal one. The CPIs were further adjusted to account for prices in the origin. This is based on the premise that domestic tourism is a major competitor for holiday trips abroad. However, there is no evidence of any data available which facilitates the construction of a comparable weight to represent domestic tourism prices. The procedure followed here is that the substitute cost derived from the substitute foreign destinations is multiplied by 0.5 and to this is added 0.5 times the cost of living in the origin country. The CPI data was collected for each of Ireland’s four main source markets and the competing destinations within those markets. The CPI must be adjusted for changes in the exchange rate between each origin and destination and then, divided by the CPI of the origin country for each year. The series is calculated by using the 1985 CPI value as the base year for each destination. All prices are in real terms. Prior to the weights being applied to the CPIs in the substitute cost variable, the CPI should be first converted into real terms.

So far, representation of the price variable has been expressed in relative terms. However, the absolute level of the cost of tourism in the destination (Ireland) is also clearly relevant. Witt and Witt (1992) illustrate this point using the following example: if all holidays trebled in price in real terms, then the ratio of prices would remain the same but compared with other types of goods, the situation would definitely change. The real price of holidaying abroad has fallen over the last twenty years (Edwards 1988), mainly due to the development of the industry to economies of scale. It seems reasonable to expect this to have an impact on demand and it was therefore decided that an ‘own price’ variable should enter the model also. The price of tourism in Ireland is represented by its CPI, adjusted by exchange rates so that the variable is presented in the currency of the origin and converted into real terms with 1985 as the base year. The addition of this price variable has meant that it is not necessary to make the cost of substitutes relative to destination prices in cases where a log-linear functional model is used.

Travellers are concerned with the price of foreign currency. It is expected that, if the price of foreign currency declines then, travellers will demand more foreign travel services, ceteris paribus, i.e. both present and future expected exchange rates are important. However, it is the actual process by which exchange rate movements influence peoples’ choice of holiday destination that is of relevance here. Studies which have provided evidence of the significance of exchange rates include: Loeb (1982) and Quayson and Var (1982). Nominal exchange rate changes can have predictable effects on tourism demand patterns, i.e. the rate of exchange is regarded as a prime indicator of expected prices. A study in The Economist (1978) highlights the fact that, countries with a depreciating exchange rate had generally shown a
larger growth in tourism receipts than in expenditure and that the opposite (with exceptions) was true for countries with an appreciating currency. It appears, however from the study, that these exchange rate changes did little more than offset differing rates of inflation. The market exchange rates are normally a poor guide to the real purchasing power of currencies. It is the actual movements in real exchange rates which provide a more reliable estimate, i.e. market rates adjusted for movements in price levels in the home country compared to destination countries.

In general, justification for the inclusion of exchange rates to explain tourism demand usually stems from either its influence on price or the proposition that ‘in practice’, people use the exchange rate as a proxy for destination prices. The impact of exchange rates have been largely embodied in the price variables and economic theory does not suggest the incorporation of a separate exchange rate variable per se. Relative exchange rates do not reflect relative prices because relative inflation rates are not taken fully into consideration. However, exchange rates tend to fluctuate more frequently than relative prices.

“In the short run .... buyers of foreign travel services will be informed faster and more precisely of exchange rate changes than of changes in local currency prices in foreign countries.”

(Artus, 1972:588)

Gerakis’s (1966) results illustrate a shift in demand to the more price competitive destinations. However, he later revisits his findings and stresses the point that, he is not suggesting that all devaluations or revaluations have strong stimulating or retarding effects on tourism receipts but rather that the countries he has examined, form part of closely knit and very active tourism markets within which, the possibilities of substitution are considerable.

In a later study, Artus (1972) argues for the inclusion of an exchange rate variable:

“For purposes of statistical analysis, it is preferable to separate as much as possible the exchange rate variables from the other price factors included .... The reason is that exchange rates are known precisely, while the data on local currency prices of travel services and costs of transportation may contain large errors of measurement”.

(Artus, 1972:588)

For the purposes of this study, the rate of exchange between the origin and destination (Ireland) is measured as the mean of 12 monthly averages for each year and for each of the four markets under consideration.
It is frequently posited that poor weather conditions is a major factor in influencing one’s decision to return to the same holiday location in the following year and/or in influencing friends to visit here in both years. In Ireland, wet weather conditions, particularly in the summer months are frequently blamed when the industry performs worse than expected. This study tests this theory in the case of Ireland’s four main markets. Indeed, relative weather conditions do not vary much but there could be short-term effects. The Poulter index is used as a measure of weather conditions. This index represents mean temperature, rainfall and sunshine during the popular summer months of June, July and August. Thus, the index should prove to be very representative. A two-year average of the index was calculated and included in the model.

**Dummy variables** have been included in the model to take account of once-off events which are non-quantitative in nature. It is hypothesised that such factors can have a very significant impact on the level of tourism demand to a particular destination. In regression models, a dummy variable takes the value ‘1’ in the year of the event and ‘0’ otherwise. It is not practical to try and include dummy variables to capture the effect of every special event and, particularly from a statistical point of view where each additional variable results in the loss of a degree of freedom from the regression. For the purposes of this study, five dummy variables were selected:

- British Travel Credit Restrictions 1968;
- Northern Ireland Troubles 1972;
- Oil crisis 1973;
- Oil Crisis 1979;

Travel credit restrictions were in operation in Britain (1966-1968), which prohibited nationals from spending more than fifty pounds in non-sterling area countries. Eight percent more visitors went to sterling areas (including Ireland) in 1967 than in 1966, compared with a two per cent increase in non-sterling areas. While the price increases resulting from the oil crisis of 1973 and 1979 have already been incorporated in price variables, the variable is included here on grounds of an hypothesised psychological impact on travellers. Justification for the inclusion of the Gulf War stems from the fact that the total number of overseas arrivals to Ireland from January to June 1991 decreased by four per cent compared with the first half of 1990.

Essentially, the inclusion of a lagged dependent variable implies that the number of visitors in the current year is a function of the number in a previous year. The theoretical argument for the inclusion of a lagged dependent variable is that it represents evidence of:
1. habit/persistence: it can be argued that once people have visited a particular country and liked it, there can be a tendency to reduce risk by returning to this known destination (Witt and Martin, 1985). Reports about holiday destinations often spread via ‘word-of-mouth’. Thus, in situations where people do not have first-hand knowledge about a particular resort, recommendations by previous visitors who have visited there, can influence prospective travellers even more than advertising efforts in brochures.

2. rigidity of supply of tourism services: this can be experienced in terms of the development of tourist facilities. The theory stems from the belief that the existence of a partial adjustment process imposes supply side constraints which affect tourism demand levels. Some studies, for example, Martin and Witt (1988) and Uysal and Crompton (1985) have assumed a perfectly elastic supply of tourism products and services; availability of transportation, infrastructure and hospitality resources.

“The significance of demand in providing an engine of growth for the tourism industry should not be taken to imply that supply elements have not also contributed to this growth. ... It would therefore be misleading to suppose that demand and supply can sensibly be separated.”

(Johnson and Thomas, 1993:2)

However, in a destination such as Ireland whose tourist industry is noted for being highly seasonal, the validity of this assumption is questionable where problems (short-term) of deficiencies in specific types of accommodation and access transport have characterised the industry in the past. This variable should reflect any hypothesised interdependence between demand and supply.

An annual time trend variable is included in the model as a proxy for tastes, i.e. it reflects a steady change in the popularity of the holiday over the estimation period as a result of changing tastes and preferences. This process is usually slow. The approach taken in many similar studies is to ignore changes in tastes and/or assume tastes to be both exogenous and fixed. However, the trend variable also picks up the time effects of all other explanatory variables not explicitly included in the equation, such as, air service frequencies and demographic changes in the origin countries, (i.e. some non-price factors). Some countries spend vast amounts of money developing and promoting their tourist resources and therefore, should be more attractive to more people. In the case of Ireland, the increased growth rate in arrivals from Continental Europe has been attributed to the wider product base being developed and promoted. In 1992 alone, new investment of £200 million was committed to tourism projects compared with £25 million in 1987.
There are other factors hypothesised to affect tourism demand levels but which have been omitted from estimation in this study. The inclusion or exclusion of certain other variables from the study means that the subsequent results are subject to biases entailed in mis-specification and omitted variables, particularly, if the variable excluded is correlated with the dependent variable. Essentially, it would prove impractical to attempt to include all possible variables in a regression model. Nonetheless, certain variables are excluded purely on grounds of inadequate data. Indeed, loss of degrees of freedom means that only the most important variables remain. Some of the most obvious omissions in addition to reasons for their omission are as follows; access transport costs, marketing expenditure abroad and sociological factors.

The cost of transportation can logically be expected to influence the total volume of imports. Thus, theoretical justification for its inclusion should not be in dispute. Within international travel, a change in the price of transportation can result in different substitution effects often depending upon the distance of competing destinations. Frequently, the choice between domestic and foreign holidays emanates from the cost of transportation. Therefore, with the decline in travel prices, one may anticipate substitution between the two. As the price of transportation increases, for instance, for US travel to Canada, the price of foreign travel will increase relative to the cost of domestic holidays. Thus, a decline in foreign travel may be anticipated. However, at the same time, the cost of transportation, for example, from the US to Canada relative to other (more distant) countries will decline, so one may anticipate some substitution of Canada for other (overseas) travel. This would cause an increase in demand for travel to Canada, all else being equal. In Gray’s (1970) reference to transportation costs, he suggests that, while the number of travellers is likely to go up with a fall in air fares, expenditure abroad may not. The marginal propensity to spend the windfall gain (i.e. savings in airfare) is less than one and any new travellers (i.e. low income groups), attracted for the first time by lower fares are likely to be low spenders. The actual implication of this theory is that a reduction in travel fares may have a greater impact on the volume of tourists to a destination than on tourism expenditure per capita. There are various classes of air travel and surface travel and each have distinct demand functions. The several classes of transport are substitutes. A rise in air fares may induce substitution from air to surface travel or more importantly in terms of tourism demand, a substitution between near and far destinations.

Inadequate data has prevented the inclusion of a consistent series which could sufficiently represent the cost of transport to Ireland. “There exists no completely satisfactory price index for foreign transportation,” according to Stronge and Redman, (1982:24). The transport cost variable is omitted from this study on grounds of technical difficulties in the form of data collection problems. These include, for example, difficulty in selecting an appropriate mode of transport cost.
especially as the variety and quantity of flights change every year, and problems in
deciding how to accommodate for substitution between a) air and surface b) near and
far destinations c) airlines and charters, all in just one variable. Just as the price of
tourism in substitute destinations is expected to influence the demand for travel, so
also are transport costs to substitute destinations (Witt and Witt 1992). A rise in
transport costs may lead to a substitution of a near or far destination. Actual fares do
not represent relative expensiveness. For example, if air fares are increasing but the
price of surface travel is increasing at a faster rate, one may find that travel demand
is growing which can result in a positive air fare coefficient. If total demand is to be
explained, the air fare coefficient could be biased by the omission of the cost of
surface travel depending upon the amount of substitution. Barry and O’Hagan (1972)
have summarised the sentiments expressed by many authors in subsequent studies
which also excluded the transport cost variable from their model due to:

“.... lack of meaningful and worthwhile data. Even if such data existed, one
would need a highly sophisticated weighting system to account both for charges
on different modes of travel and different charges on similar modes. The
exclusion of the travel variable is unfortunate, although the inclusion of one,
from the evidence of other research, would probably lead to such high
correlation between it and the income variable that the results would be
meaningless.”

(Barry and O’Hagan, 1972:150)

Jud and Joseph (1974) stress the point that previous research data have shown a
strong negative correlation between the level of income and the cost of travel. As a
result, such studies have been unable to separate the independent effects of both
income and travel costs upon the demand for travel. Gray (1966) found the
transportation cost variable to be statistically insignificant in explaining the travel
spending abroad and fare payments to foreign flag carriers by Canadian and US
residents. Other studies which include insignificant transportation cost variables
include; Little (1980), Stronge and Redman (1982) and Quayson and Var (1982).
Most authors make reference to the cost of transport as an important determinant of
tourism flows but have typically excluded the travel cost variable from the model. In
1984, Uysal and Crompton summarised the usual explanations for transportation
costs being omitted from tourism demand models as follows:

- insufficient data available;
- anticipated problems with multicollinearity;
- difficulty in identifying the appropriate mode of transport cost;
- lack of statistically significant results in studies where it is included;
- the reluctance to lose another degree of freedom in estimation.
The problem of measuring transport costs is not unique to Ireland. Indeed, the difficulty in presenting a travel cost variable becomes very apparent simply by observing the variety of proxies used. Jud (1974) used distance as a proxy for the cost of travel. However, this approach is questionable on the basis that only in cross-sectional models where prices are held constant at a given moment can distance serve as an index of cost and even then, fares and distance do not move exactly in step. Therefore, the coefficient of the distance variable cannot sufficiently represent a measure of responsiveness to the cost of transport. Bond and Ladman (1972) used a weighted average one-directional air fare cost as a proxy of how the cost of a whole trip might vary through time. Witt (1980a, 1980b) includes travel time in his model.

The exclusion of transport costs from a demand study on Ireland is unfortunately a serious limitation since access transport costs have probably been the most mobile element of total costs, particularly in the 1980s. It is commonly suggested that the reduction in air fares in conjunction with the rapid increase in charter services (carrier capacity) stimulated the phenomenal growth of European visitors to Ireland in the mid-late 1980s. This begs the question again as to whether the growth in tourism is more demand-driven or supply-driven. The liberalisation of airfares on Irish-UK routes combined with the market entry of Ryanair in 1986 sparked competition on all routes on the Irish Sea. Prior to the advent of Ryanair, prices on the Dublin-London route were at a level which made it one of Europe’s most expensive routes on a rate per mile basis. During the months that followed, a wave of low fare pricing tactics ensued, Aer Lingus and British Airways made considerable reductions in their Apex and Super-Apex fares. In 1986, there was a significant shift from sea routes to air routes when the number of air passengers increased by 12.4 per cent. Sea fares fell dramatically between 1987 and 1988 in response to the 1986 fall in air fares. Yet, the share of cross channel traffic by sea carriers fell steadily in the period 1985-1990.

Most national tourist organisations maintain that marketing and promotional activities are key factors in determining international tourism flows. The effectiveness of marketing efforts is difficult to measure. Firstly, the actual impact of promotion can be distributed over time, i.e. the impact of promotional activity will influence not only demand in the current period but also in subsequent periods, however, this impact should decline with the passage of time. Secondly, the impact will vary across media, and thirdly, a certain percentage of marketing will go towards averting the loss of tourists that would otherwise occur as a result of competitive marketing campaigns by alternative destinations. Only a few studies have included marketing as an explanatory variable: Barry and O’Hagan (1972), Uysal and Crompton (1984) and Papadopoulos and Witt (1985). In general, their results are mixed. Barry and O’Hagan try to estimate the significance of marketing
expenditure by Bord Fáilte in the British market. The authors examine absolute marketing expenditure although, they agree that it is relative marketing expenditure figures that would be most appropriate in this situation. This does limit their analysis on the impact of marketing.

The effects of an increase in marketing expenditure abroad by any one country is likely to be counterbalanced or partially offset, if a competing country (or countries) increase their marketing efforts in the same market by an equivalent or greater value. Indeed, their work was further limited by the fact that marketing of Irish tourist destinations is conducted by several interests (as in most countries), a fact which adds further to the complexity of trying to quantify the impact of marketing on tourism demand levels. For example, airlines and tour operators do as much advertising if not more than national tourist boards. However, it is difficult to assess the percentage of such advertising that is focused on promoting Ireland as a holiday destination as opposed to promoting the particular airline (company) involved. Thus, many of the studies focusing on the impact of marketing are inconclusive. No marketing/promotional expenditure data is included for the purposes of this study. It proved impossible to obtain sufficient data to adequately represent Ireland’s total marketing efforts (i.e. private and state sectors) in the four origin countries being examined. Even efforts to present the marketing expenditure of Ireland’s national tourist organisation proved in vain. The data published by Bord Fáilte with regard to their own marketing efforts do not breakdown the marketing expenditure on a country by country basis for Continental/Mainland Europe. For the purposes of this study, it is unfortunate that adequate marketing data is not widely available. This limits the scope for testing the hypothesis that marketing is an important determinant of Ireland’s tourism exports. This type of analysis would be of interest to those investing in the industry. Bord Fáilte allocated £16 million to marketing activities in 1992. However, systematic analysis into Ireland’s marketing abroad is being prevented due to the unavailability of such data.

It can be suggested that sociological variables characteristic of the origin country, such as; age distribution, occupations, urbanisation and educational levels play an important role in influencing tourism demand. However, for the purposes of this study, these variables are excluded, it was felt that these sociological variables may be more significant in determining the decision to travel than in determining the holiday destination. Also, these variables are not subject to short-run changes or control. In any case, it is likely that the effect of some of these types of variables would be captured in the trend variable.

**Econometric modelling**

The econometric approach involves the use of regression analysis to estimate the quantitative relationship between the dependent variable and those variables which appear likely to influence it.
“...the purpose of econometric models is not purely forecasting. Instead, they attempt to explain economic or business phenomena and increase our understanding of relationships between and among variables. To this direction, econometric models provide unique information not available by time series methods.”

(Makridakis, 1986:17)

This study will employ multiple regression techniques to try and estimate a relationship between the dependent variable and various independent variables. The estimation is carried out using historic data. The objective econometrically is to calculate values for each of the coefficients which give the lowest possible values for the residual (unaccounted error). The disturbance term $u$ in a regression equation picks up the influence of those variables affecting the dependent variable that have not been included in the regression equation. A priori knowledge is therefore required of the selected factors which theoretically may affect the dependent variable. Since the variables are predetermined, a single statistical equation is justified, i.e. a simultaneous system is not necessary. Conceptually, any number of variables can be used to explain the dependent variable. The coefficients are parameters providing evidence of the effect of the regressors on the dependent variable. Many models are estimated to test and see whether the hypothesised relationship does exist in practice.

Ordinary Least Squares regression (OLS) and regression using the Cochrane-Orcutt (C-O) technique have been the most frequently used methods to estimate the parameters of models in the literature. This method minimises

$$\sum_{i=1}^{n} e_i^2$$

(the sum of squared residuals) and provides estimates of which are best, linear and unbiased provided that a given set of assumptions underlying the classical linear regression model holds. All equations in this study are (initially) estimated using the OLS procedure. The variables enter the equation in a logarithmic linear form:

$$\log D = \log a + b \log Y + c \log C + d \log P + e \log E + \log u$$

This type of equation has an added advantage in that the resultant coefficients are parameters which express the elasticities of the variables included. The model adopted in this study was also expected to be multiplicative. However, initial experimentation with linear models was necessary in order to justify its specification. The majority of studies in the literature adopt either a log-linear (multiplicative) or a linear (additive) functional form. The data analysed is in the form of time series. The original specification was expanded to include the lagged values as additional explanatory variables.
The Basic Model

The initial specification of the model is therefore as follows:

\[
\ln V_{tod} / P_{to} = \alpha \beta + \beta_1 \ln I_{to} / P_{to} + \beta_2 \ln C_{td} + \beta_3 \ln S_{to} + \beta_4 \ln E_{tod} + \beta_5 \ln W_{td} \\
+ \beta_{6} D_{t1} + \beta_{7} D_{t2} + \beta_{8} D_{t3} + \beta_{9} D_{t4} + \beta_{10} D_{t5} \\
+ \beta_{11} \ln T_{t} + \beta_{12} \ln V_{t} - 1_{od} / P_{t} - 1_{o} + U_{tod} 
\]

\( \alpha \) = The estimated intercept term  
\( \beta \) = Parameters to be estimated

\( V_{tod} \) = Visits from the origin \( o \) to the destination \( d \) during the time period \( t \)  
\( P_{to} \) = The population of the origin \( o \) during the period \( t \)  
\( I_{to} \) = Real disposable income in the origin \( o \) in period \( t \)  
\( C_{td} \) = Real cost of living in the destination \( d \) in period \( t \)  
\( S_{to} \) = Real cost of living in weighted substitute destinations in the period \( t \)  
\( E_{tod} \) = The exchange rate between the origin \( o \) and the destination \( d \) in the period \( t \)  
\( W_{td} \) = Poulter index to represent weather in the destination in the period \( t \)  
\( D_{t1} \) = Dummy variable: the effects of Currency Restrictions (British origin model only)  
\( D_{t2} \) = Dummy variable: the effects of the impact of Northern Ireland disturbances  
\( D_{t3} \) = Dummy variable: the effects of the Oil Crisis (1974)  
\( D_{t4} \) = Dummy variable: the effects of the Oil Crisis (1979)  
\( D_{t5} \) = Dummy variable: the effects of the Gulf War (USA origin model only)  
\( T_{t} \) = Trend variable to pick up the effects of any changes in taste  
\( U_{tod} \) = Stochastic disturbance term.
3. THE MODELLING PROCESS

An important characteristic of the raw data being used for the regression is stationarity. When using time series modelling, various diagnostic tests and checks are employed as part of the estimation procedure. These tests are used to identify the most acceptable model and validate the data results.

Stationarity

Many economic time series are clearly non-stationary in that, both the mean and variance depend on time and they tend to depart ever further from any given value with time. A simple non-stationary time series model is \( X_t = \mu_t + e_t \), whereby the mean \( \mu_t \) is a function of time and \( e_t \) is a weakly stationary series. If the movement is predominantly in one direction, this series exhibits a trend. Non-stationary time series variables containing trend deterministic components are de-trended before further analysis is attempted. A regression of \( X_t \) on its own past values is termed an autoregressive process and is denoted (ARp). This process is given by:

\[
X_t = \alpha_1 X_{t-1} + \alpha_2 X_{t-2} + \ldots + \alpha_p X_{t-p} + e_t
\]

where \( e_t \) is white noise and \( \alpha \) is the parameter.

A variable can be determined by:

\[
Y_t = \alpha + \beta t + \delta Y_{t-1} + U_t
\]

Two types of trend are examined:

1.) Deterministic Trend: The time series is a trend stationary process (TSP) if \( \beta \neq 0, \delta < 1 \). However, this TSP can be de-trended by estimating regressions on time, i.e. regressing the variable on time as follows:

\[
Y_t = \alpha + \beta t + U_t
\]

2.) Stochastic Trend: The time series is a difference stationary process (DSP), if \( \beta = 0, \delta = 1 \). The DSP can be de-trended by successive differencing until the series is stationary. The series becomes:

\[
\Delta Y_t = \delta + U_t
\]

(Maddala, 1992)
Three methods are chosen by way of determining the order of differencing a time series:

1. Examination of the Autocorrelation Function of the data series:
2. Identify the minimum variance:
3. Test for a unit root using either the Dickey-Fuller (DF) or Augmented Dicky-Fuller (ADF) tests. Serial correlation was tested using Box-Pierce and Ljung-Box.

It appears that with most economic time series, it is best to use differenced data as opposed to data in the levels. The reason stems from the fact that if indeed, the data series are of the DSP type, the errors in the levels equation will have increasing variances over time.

**Estimation procedure**

The model adopted in this study was expected to be multiplicative. In any case, it was felt that some test runs with linear models should be made to confirm the findings of previous studies. Initial experimentation showed that those regressions run in linear form yielded inferior empirical results compared with the corresponding log-linear functional form in terms of expected coefficient signs and statistically significant coefficients. Hence, the latter form of equation is chosen for this study.

Ordinary least squares (OLS) estimates were obtained for each model. In cases, where the models estimated suffer from autocorrelation, the Cochrane-Orcutt (C-O) iterative procedure was used in an attempt to reduce the likelihood of autocorrelation. This technique estimates an autocorrelation parameter in order to convert the regression equation to a generalised differences specification of the relationship thus, providing a new error term that is not autocorrelated.

**Diagnostic tests**

There are a number of diagnostic tests/checks which must be implemented in order to evaluate the estimated model and to identify the most ‘satisfactory’ or ‘acceptable’ estimation. If any of the assumptions are violated, problems can arise with regard to the validity and reliability of the estimated parameters and models.

In order to assess whether the coefficients estimated are theoretically meaningful, they must first be examined in terms of both sign and magnitude. Economic theory imposes certain constraints on the signs of the coefficients in demand functions. For the purposes of this study, parameters with ‘incorrect’ signs are rejected on the grounds of being theoretically implausible. A priori expectations exist with regard to the signs of coefficients. In general, an unexpected parameter sign or size arises as a result of deficiencies in the model itself, for example;
The presence of multicollinearity;
the omission of a relevant variable;
the inclusion of an unimportant variable.

The *t*-test can be used to test the hypothesis that a particular coefficient is significantly different from zero or whether the estimated coefficient value occurred by chance.\(^7\)

The *F*-statistic is important to test the hypothesis that the whole relationship provided by the equation is significantly different from zero, i.e. whether the model explains the variation in demand.

The *R*-squared (*R*\(^2\)) value ranging from '0' to '1' or the 'corrected R-squared' (\(\overline{R}^2\)) which is adjusted for degrees of freedom indicates the explanatory power (goodness of fit) of the model.

**Autocorrelation** occurs when the values of the error term are not drawn independently of that particular error term. Parameter estimates become inefficient and the usual hypothesis-testing procedures are not valid. The standard errors would also be estimated incorrectly, probably being underestimated which can mean that the variances of the coefficients may also be seriously underestimated. The *t* and *F* tests are no longer strictly valid and the *R*\(^2\) value will probably be overestimated. Equations which indicate the presence of autocorrelation are re-estimated using the Cochrane-Orcutt iterative procedure. The Box-Pierce (B-P) test and the Ljung-Box (L-B) are used to indicate the presence of autocorrelation.\(^9\)

**Multicollinearity** is characteristic of models containing highly correlated independent variables and large standard deviations of their respective regression coefficients, thus making it very difficult to assess the separate effects of such variables. Large errors can cause ‘incorrect’ signs. Multicollinearity can be detected by examining the correlation matrix of the independent variables. The presence of multicollinearity was evident in a few cases in this study but was not deemed to have any overall critical distortion on the results. Indeed, evidence of multicollinearity was substantially reduced once the data was made stationary. Differencing removes trend elements which diminishes multicollinearity due to common trend components in the independent variables, (Peek 1982).

The presence of *heteroscedasticity* indicates that there is a systematic relationship between the magnitude of the error term and the magnitude of one or more of the independent variables.\(^10\)

Another important consideration is the *standard error* of the coefficients. The standard error gives a general guide to the likely accuracy of a regression parameter.\(^11\)
4. INTERPRETATION OF RESULTS

The coefficients of those explanatory variables specified in logarithmic form may be interpreted as elasticities. The results table across contains the selection of estimated regression models for export tourism demand in Ireland. The most reliable equations are shown in this table and as can be seen, some variables which were included in the hypothesis as outlined above have not been included at this stage. Refinement and re-estimation of the demand functions is essential before sound conclusions can be reached, as otherwise, implications are drawn on the basis of poor empirical results. Models were estimated using all possible combinations of variables and subsets of explanatory variables. In effect, the results presented measure association rather than causation, although the causal effects are usually inferred on the basis of theory.

Real income growth in France, Britain and the US can be assumed to be positively related to real per capita demand for Irish tourism. The empirical findings also imply that the Americans and the French regard a foreign holiday as a luxury whereas, the Germans view them somewhat more as necessities, i.e. an established part of household income. Hence, holidays abroad account for 67.6 per cent of total German holiday trips (i.e. four nights or longer). The US travellers appear much more sensitive to changes in their real income levels (i.e. with an elasticity value of 12.19 which is significant at the 5 per cent confidence levels) than to exchange rate movements in the long run. In tandem with this result, it should be noted that the US income coefficient may possibly be somewhat biased upwards due to the omission of the transport variable. The effect of the omission of a variable that is negatively correlated with an included variable is to bias upward the coefficient of the included variable.

Nonetheless, real income levels in the US are clearly very important. Income growth is also a major determinant of French arrivals to Ireland with a 1 per cent increase in real income resulting in more than a 2.1 per cent increase in per capita demand for Irish tourism, \textit{ceteris paribus}. The corresponding \textit{t}-value for the income coefficient is only marginally less then the critical \textit{t}-value at the 10 per cent confidence level. The elasticity of demand with respect to British real income was less than unity (0.1898) and insignificant at the 10 per cent level of probability. Hence, the hypothesis that British per capita income has a significant influence on demand for Irish tourism in the long-term cannot be accepted. This result could stem from the fact that Ireland may have been affected by being perceived as a quasi-domestic destination by British travellers. A visit to Ireland may have been perceived as relatively mundane when compared with a trip to the popular sun destinations, particularly for a large part of the period under estimation, i.e. 1970s and 1980s. In effect, this implies that only with substantial falls in British real income levels would demand for foreign holidays to Ireland be significantly eroded.
Statistical Analysis of the Determinants of Tourism Visits to Ireland from Selected Countries (1968-1991)

<table>
<thead>
<tr>
<th>Country</th>
<th>INFY</th>
<th>INCOME</th>
<th>CPI</th>
<th>SUBSTIT.</th>
<th>EACH</th>
<th>POULTER</th>
<th>DUMMY</th>
<th>DUMMY</th>
<th>DUMMY</th>
<th>DUMMY</th>
<th>DUMMY</th>
<th>TREND</th>
<th>LAG OF</th>
<th>$R^2$</th>
<th>$R^2$</th>
<th>SD</th>
<th>METHOD</th>
</tr>
</thead>
<tbody>
<tr>
<td>BRITAIN</td>
<td>0.0317</td>
<td>0.0053</td>
<td>2.3740</td>
<td>2.0060</td>
<td>0.0228</td>
<td>-0.3200</td>
<td>-0.2193</td>
<td>-0.2940</td>
<td>.82</td>
<td>.72</td>
<td>.58</td>
<td>C.O.</td>
<td></td>
<td></td>
<td></td>
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<td></td>
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<tr>
<td>(0.582)</td>
<td>(0.8086)</td>
<td>(0.4447)</td>
<td>(0.0132)</td>
<td>(0.3073)</td>
<td>(3.4176)</td>
<td>(-3.0712)</td>
<td>(-3.1017)</td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>FRANCE</td>
<td>-2.7116</td>
<td>2.1520</td>
<td>-1.3048**</td>
<td>0.1233**</td>
<td>0.1266</td>
<td>0.0818</td>
<td>-0.2011</td>
<td>-0.11324</td>
<td>.66</td>
<td>.51</td>
<td>.49</td>
<td>OLS</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(-1.939)</td>
<td>(1.3121)</td>
<td>(2.0371)</td>
<td>(0.1205)</td>
<td>(1.1557)</td>
<td>(2.0062)</td>
<td>(-2.7315)</td>
<td>(-1.0118)</td>
<td></td>
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<tr>
<td>USA</td>
<td>-1.1666</td>
<td>12.1909**</td>
<td>1.0126</td>
<td>.01903</td>
<td>0.5903</td>
<td>2.2904</td>
<td>57.43</td>
<td>.45</td>
<td>OLS</td>
<td></td>
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<tr>
<td>(-5.077)</td>
<td>(2.1474)</td>
<td>(1.0827)</td>
<td>(-1.1022)</td>
<td>(-4.0681)</td>
<td></td>
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</tr>
<tr>
<td>GERMANY</td>
<td>-1.5101</td>
<td>-0.0570**</td>
<td>1.0447**</td>
<td>0.2714</td>
<td>0.0916</td>
<td>0.2396</td>
<td>23.60</td>
<td>.49</td>
<td>OLS</td>
<td></td>
<td></td>
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<td></td>
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<td></td>
</tr>
<tr>
<td>(-1.820)</td>
<td>(-0.2187)</td>
<td>(1.1229)</td>
<td>(1.1234)</td>
<td>(-0.8733)</td>
<td></td>
<td></td>
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</table>

Note: Numbers in parentheses are t-values associated with the estimated coefficients.

* All variables rather than the dummy variables and the Trend term entered the equation in logarithmic form.
* **SE refers to the standard error of the regression.
* The method of estimation was either the Cochrane-Orcutt (CO) iterative procedure or the Ordinary Least Squares (OLS) method.
* ** indicates that the variable has been lagged by one year, i.e., $X_{t-1}$.
Demand is price sensitive from all the European origins studied. Increases in Irish domestic prices have had a negative impact on travel from Europe. The empirical results indicated that price changes anticipate travel changes by about twelve months. This gives credence to the theory that countries tend to get a reputation for being expensive after the event, not while it is happening. Almost all of the price variables have illustrated a lagged effect. Basically, the timing of the pricing of inclusive tours and of decisions on when to take these, plus lack of knowledge among potential travellers of changes in costs in different destinations (until they, or their friends, have experienced them) are among the main reasons for lagged effects. These lagged effects are clearest for French and German travel. All other factors being equal, favourable movements of prices should stimulate a proportionate increase in per capita demand for Irish tourism from France. In terms of the German model, the magnitude of the first (absolute) price variable is very close to zero. This suggests that movements in the cost of living in the destination (Ireland) has only a negligible impact on demand, ceteris paribus. Nonetheless, the Germans do respond to the price levels in substitute destinations.

With regard to substitution effects, the empirical results accept the hypothesis that increases in Irish price levels relative to those of competing destinations exert their effects through an extensive type of substitution at the expense of the Irish tourism industry. However, the importance varies considerably, depending on the origin under consideration. For Britain, as relative prices in the exporting country (Ireland) increase by 1 per cent vis-à-vis prices in the home country and alternative travel locations, there is a large reduction (2.574 per cent) in demand for travel services from the exporting country, ceteris paribus. Substitute prices in competing destinations are also taken into consideration by the French when choosing their holiday, i.e. substitution is likely, although the magnitude of this coefficient suggests a less than proportionate response in absolute terms. A possible reason for the poor performance of the price variables in the USA model arises from the possibility that the most important price element, that of transport, was excluded (by necessity) from the price indices.

Changes in exchange rates can alter the cost differential between domestic and foreign holidays, so that despite relatively stagnant economies, increases in holidays abroad may be experienced. Fluctuations in exchange rates are a prime influence on travel growth to Ireland. Travellers to Ireland have concerned themselves with the price of foreign currency with corresponding elasticities ranging from 0.5 to 2.6. Both the US and the British examples indicate sensitivity to exchange rate movements. However, when an exchange rate variable appears in the model, the interpretation is not quite so straightforward. Usually, when interpreting one variable, the remaining variables are assumed to remain unchanged. However, if the exchange rate changes and the origin country’s currency becomes stronger, it is unlikely that all other variables will remain constant (the CPI is adjusted by the exchange rate before being put into real terms) unless price levels exactly offset the effect of the change in the exchange rate. Thus, for interpretation purposes, one
calculates the net effect on per capita demand by adding the effect of a 1 per cent upward movement of the relative exchange rate to the effect of a 0.99 per cent fall in price etc. To take the French results as an example, a 1 per cent improvement in exchange rate results in an increase in per capita tourism demand of 1.58 per cent (0.5066 + 1.0685). While the French do cut back on the levels of holiday-taking when exchange rates are unfavourable and disposable income growth is low, the extent of their retrenchment is not nearly as marked as in the case of American residents.

The evidence suggests that the weakness of the dollar through the mid- and late-1970s had held back the development of US trips to Western Europe. In the past, a fall in the value of the dollar has undoubtedly been accompanied by a drop in the number of US holidaymakers. US inflation rates in the 1980s have been broadly similar to the average in major Western European countries, however, only up to 1980 was this reflected by exchange rate movements. The strength of the dollar up to 1986, followed by a sharp fall in 1986-1987 has had a marked effect on European and world travel patterns. The sharp appreciation of the US dollar against most European currencies reduced the relative cost of travel for the US. This undoubtedly influenced the relatively rapid growth in US travel abroad. The results support the conventional hypothesis regarding the role of real income and exchange rate factors in US imports of tourism. In the case of the German model, it must be stated that there is evidence of some multicollinearity between the exchange rate variable and the CPI. This could mean that although the former does not appear in the model, the CPI may be biased upwards when the CPI and the exchange rate are negatively correlated.

While the weather variable appears in both the French and the German models, the level of its impact is extremely small, i.e. a 1 per cent improvement in the poulter index would lead to an approximate increase in arrivals of less than 0.5 per cent from France and Germany, i.e. only a minimal impact. In effect, despite the fact that poor weather conditions are frequently cited as a major deterrent to large numbers of tourists to Ireland, the results do not give credence to this theory. Basically, it seems that most travellers to Ireland would not have any expectations of a sunny climate on arrival. Barry and O’Hagan (1972) incorporated a weather variable and it proved insignificant at the 5 per cent level in all cases where it was included. In the UK, up-to-date information on Irish weather conditions is widely broadcasted. The results confirm the sensitivity of the tourism industry to social and/or political disturbances as expected. Non-price factors have a very pronounced short term impact. The British Currency restrictions did have a positive effect on the number of holidays taken in Ireland by British residents, however, in terms of numbers, the impact was less than sometimes hypothesised, i.e. 1 per cent (i.e. $0.0258$) growth in the level of demand than might otherwise have been achieved. Nonetheless, British travel is volatile and susceptible to a variety of external factors, including the outbreak of unrest in Northern Ireland in the early 1970s, (i.e. a reduction of 27 per
cent \(e^{-0.32}\) than what otherwise might have occurred during this period. However, this result merely confirms prior expectations. These latter dummy variables are highly significant at the 1 per cent confidence level. The psychological impact of the oil crises in the 1970s was also very marked, particularly in the case of US outbound travel. The uncertainty surrounding future developments of Irish export tourism makes predictive exercises more dependent on qualitative assumptions. Dummy variables have been found to improve the empirical results in several cases in this study.

The lagged dependent variable was tested in various equations for each of the four models but it did not improve the empirical results of any of them i.e. in terms of expected signs or magnitudes of the coefficients of other variables, statistical significance of coefficients or higher explanatory power of the model. Therefore, this variable was not retained in any of the final models. This suggests that for example, constraints on supply of the tourism product have not played a significant role in deterring the level of foreign holiday arrivals.

Similar to the conditions applying to the lagged dependent variable, the trend variable would only be retained where obvious improvement resulted. However, its incorporation often caused multicollinearity. In cases where the trend term was tested, it had a positive coefficient for the European countries, which suggests a steady increase in the popularity of these holidays over the period as a result of changing tastes. The trend coefficient was not significantly different from zero in various equations tested. In summary, regressions with time trends included gave unsatisfactory results.

Building models from the German data proved difficult. This difficulty is reflected in the \(R^2\) values. One possible reason for this could be the omission of a significant variable or mis-specification of the model. This conclusion seems reasonable in that the variables are neither highly intercorrelated nor do they suffer from autocorrelation, in addition to the fact that a common cause of ‘incorrect’ signs is as a result of picking up the effect of an important excluded independent variable. The exclusion of theoretically/potentially important variables in this study, such as, marketing expenditure may have led to an over-estimation of the income elasticity, while the exclusion of the price of travel may result in an underestimation of the price elasticity. There is not much doubt that over the past thirty years, the influence of long-run factors such as the improvement in transport facilities, have facilitated the growth of tourism demand. Such factors are picked up by the remaining variables and this may cause some bias in the estimates of coefficients. One source of bias is the use of consumer price indices as proxies for local currency prices of tourism services. Such proxy variables are certainly imperfect. However, on balance, this is not likely to be an important source of error because the averaging procedure employed to derive the relevant index of local currency prices in foreign countries should reduce the importance of these random errors.
A more obvious source of error could stem from the derivation of the domestic price variable. Any measurement errors may cause some bias in the estimates of the coefficients of the other variables present in the equation. However, this should not result in serious bias for the exchange rate elasticities (which have been converted into real terms using the CPI) because there is little reason, at least in the short run, to expect a high correlation between either the errors of measurement or the true local currency prices and the variations in the exchange rates. The fact that data do not exist to construct a totally satisfactory price variable for tourist flows to Ireland in no way diminishes the importance to be attached both to the proper specification of such a variable and to the limitation of proxies for it. Indeed, due to the complex nature of tourism, a study of economic factors alone can limit the potential of the final results. Such omitted factors include the following:

“.... such relevant issues as sociodemographic and sociopsychological factors, the impact of personal values and lifestyles, the continuing development of technology and transportation, urbanisation, the growth in leisure time, and so on.

(Witt and Moutinho, 1989:113)

The challenge for the future remains the unresolved question of how to go beyond the purely economic factors in model development.
5. CONCLUSIONS

The results selected from the estimated regression models for each of the four origins show that conventional arguments regarding the influence of economic variables on tourism flows can be formalised in a way that is supported by an extensive body of data. It has become commonplace to attribute changes in revenue receipts and visitor numbers to changes in economic variables. However, since the hypothesis is not supported uniformly, the analysis makes it clear that the explanation for tourism flows is not as straightforward as is often suggested. For instance, relative price movements influence the choice of Ireland as a holiday destination, but not in every case, and certainly not with uniform intensity.

Considerable support for the postulated model is provided by the data studied. The results suggest that for travel trade between Ireland and those countries examined, relative prices and exchange rate movements are often as important as origin income growth in determining changes in the level of demand. Ireland’s main source countries are clearly price sensitive. Indeed, the importance of both price and income has been theoretically and empirically established. However, price considerations appear to be the over-riding factor for all four origins, i.e. the CPI variable(s) and/or the exchange rate variable appear in all of the models. In the case of French and German outbound travellers, it appears from the results that holiday trips to Ireland are also subject to inertia and travellers from these markets are slow in adjusting to changes in prices. The hypothesis that the exchange rate has been used as an indicator of tourism prices in Ireland has been accepted. In summary, it is clear that no single model applies to all origin pairs. It is therefore not possible to present a general ‘package’ of variables which would produce satisfactory models.

The need for meaningful estimates of tourism demand functions stems from two principal sources: first, public planning and the budgetary allocation process and secondly, to effectively manipulate the tourism export component in the area of economic growth. For those who view tourism as a catalyst to growth, the value of variable elasticities of export tourism provides a useful means of determining the relative merits of tourism as an avenue for product diversification. To the extent that much of the recent growth in Irish export tourism has coincided with favourable economic conditions in its major source countries, this study would counsel caution to the proponents of accelerated tourism development, that is to those who base their expectations on an assumed high elasticity of demand for the new Irish tourism product base. In fact, it is probably too early to assess the real impact of recent accelerated investment in the tourism product. It can generally be concluded that much of the late 1980s growth which occurred in Irish export tourism can be attributed to favourable externally driven demand factors, such as, reduced inflation rates in tandem with improved economic factors in the main generating countries.

Despite some data limitations encountered, reported results allow for some tentative policy suggestions. In Ireland, the varying trends within export tourism reinforce the
necessity for examination and co-ordination of policy initiatives which control or determine the important tourism variables already specified. The erosion of favourable price differentials has a substantial impact on tourism flows from Europe. The implications of such evidence should be central to any future government efforts in influencing inflation rates particularly, if travel from Europe is to be stimulated at the levels currently being targeted. The importance of such policy considerations is evident from past experience of periods with high inflation (notably the 1970s and the early 1980s) coinciding with periods of slow or declining rates of tourism growth.

All policy initiatives must be directed to stimulating total foreign exchange earnings from tourists and more specifically, to attempt to boost average expenditure per capita rather than an emphasis on volume of inbound traffic. Indeed, in the latest publication of *The Operational Programme for Tourism 1994-1999*, the emphasis has shifted from accelerating overseas visitor numbers to overseas revenue particularly in origins such as the UK which contribute much more to numbers than to revenue.

Undoubtedly, it is clear that the tourism industry is much more subject than other sectors to external instabilities outside of its control. Until recently, efforts to establish a long-term strategic plan for the industry had frequently been met with complacency. Hence, the number of short-term ad hoc initiatives which had characterised Irish tourism policy. In the past, non-economic factors have also been of central importance in explaining tourism flows to Ireland. Thus efforts to make dramatic increases in market shares during periods of adverse conditions may meet with limited success.

There has been much discussion recently on the importance of marketing expenditure to stimulate particular markets. However, the real impact of extensive marketing, for example, in the US is at best uncertain. Numbers have grown at reasonably fast rates in times of relatively low levels of marketing expenditure. Ireland will have to fight hard for its share of the US outbound market. The impact of marketing for example, in the US can at best only be marginal. The combined advertising for Ireland (Bord Fáilte and Aer Lingus) accounted for only 2.1 per cent of the total spending in the US on promoting foreign destinations and by 1989, Ireland’s share was only 1.3 per cent. In terms of the focus of marketing expenditure, emphasis should remain on *niche* marketing so that Ireland can continue to benefit from changing trends in the nature of international tourism demand as already outlined (a growing preference for activity-based holidays, increased environmental awareness and the less favoured sun holidays) and the higher spending market segments. Active government support is vital for the industry. It incites a new confidence in the industry which can attract private sector investment. In effect, the extensive growth of tourism revenue in the late 1980s-early 1990s was undoubtedly driven by an improved and better co-ordinated organisational effort as well as the financial commitment to the industry. Estimates of price elasticities are meaningful.
in the determination of future foreign exchange policies. It is envisaged that with increased information on tourism demand that the various levels of government can appropriately manipulate the tourism export component in the area of economic growth. It would appear that after examination of the factors outlined above, that the most reliable understanding of tourism demand draws on both economic and non-economic factors. However, it seems reasonable to view the post 1999 period with guarded optimism in view of uncertain international economic factors and the fact that Europe’s share of global arrivals seem to be in long term decline.
Footnotes

1. The impact of the Gulf War in 1991 was undoubtedly underlying this decrease.
2. Travel and tourism markets tend to exhibit conditions leading to Walrasian stability in the short-run, that is, adjustments are made through the price system rather than by suppliers attempting to change quantities supplied, (Paraskevopoulos, 1977).
3. Data refers to Germany before unification.
4. In the case of Britain, all statistics referring to the CPI and disposable income relate to those of the UK.
5. White noise refers to a purely random process consisting of a sequence of mutually independent, and identically distributed random variables with zero mean and identical finite variances.
6. A statistical software package called Data-Fit was used to run the regressions, (Pesaran, M.H. and Pesaran, B., 1987)
7. For the purposes of this study, the term ‘significant’ means significantly different from zero at either the 1%, 5% or 10% confidence level, i.e. using the two-tailed tests of significance.
8. In cases where there is strong theoretical grounds for expecting a particular explanatory variable to influence the dependent variable and a ‘correct’ coefficient sign is estimated, the explanatory variable is not necessarily eliminated from the equation even if the corresponding parameter is not significant, as weak support has been obtained for the hypothesis. The insignificance of the parameter may be a result of statistical problems.
9. The B-P method uses $Q$-statistics. The $Q$-statistics are designed to test correlations of higher orders, i.e. not just to look for first-order autocorrelation but autocorrelations of all orders of the residuals. The L-B method involves a modification of the $Q$-statistic.
10. It causes the estimate of the variance of the error term to be dependent on the values of the selected independent variables. However, the presence of heteroscedasticity did not present any problems in any of the estimated equations.
11. The large variance of the disturbance term contributes to high standard errors of the coefficients indicating a risk that the coefficients are inaccurate. In all of the final models presented, the standard errors were minimal.
References


