UK and US Visitor Expenditure in Ireland: Some Econometric Findings

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Abstract: This paper analyses trends in the Irish shares of UK and US visitor expenditures in Europe over the period 1964 to 1981. This is done in the context of two larger studies by the authors, the theoretical framework of which is the Almost Ideal Demand System of Deaton and Muellbauer (1980b). Estimates of price and expenditure elasticities of demand for UK and US visits to Ireland are provided.

I INTRODUCTION

Expenditure by visitors from the UK and US combined accounted for over 90 per cent of total foreign visitor expenditure in Ireland in the mid-1960s; by the early 1980s this figure had fallen to 75 per cent. This decline reflects a very slow rise in the volume of visitor expenditure in Ireland by UK and US residents, particularly in the 1970s, rather than an exceptionally rapid rise in the volume of visitor expenditure in Ireland by residents of other countries. As a result, the percentage increase in total expenditure in Ireland by foreign visitors was only 0.83 times the percentage increase in GDP for the period 1970-72 to 1979-81, compared to a European Community average of 1.23 and figures of 1.71 and 1.53 for Greece and the UK, respectively (see O'Hagan and Minnock, 1983).

The purpose of this paper is to analyse the trends in Ireland's shares of

visitor expenditure in Western Europe by UK and US residents. This analysis should also provide some insight into the reasons for the slow growth in absolute expenditure in Ireland. A related objective is to provide estimates of price and expenditure elasticities of demand for UK and US visits to Ireland. The results are based on largely unreported work arising out of two previous studies by the authors (see Harrison and O'Hagan, 1983 and O'Hagan and Harrison, 1984). This work involved a system-wide analysis of the market shares of UK and US visitor expenditure in two respective groups of European countries, each of which included Ireland. Section II provides a summary of the theoretical background to these studies. The data and econometric results of relevance to Ireland are presented in Section III. Section IV contains the conclusions.

II THEORETICAL BACKGROUND

The general approach in economic theory is to view the consumer as allocating a given income over a number of goods, with no limitation placed on the substitution possibilities between commodities or groups of commodities. Each good in this system is characterised by a particular own-price elasticity of demand, cross-price elasticities with respect to the prices of all other commodities in the system and an income elasticity. Clearly, estimation of the magnitude of some of the elasticities will usually require considerable simplification of these possible substitution relationships. Specifically, certain restrictions on behaviour may be imposed that greatly limit the number of possible substitution effects. These restrictions on behaviour can be severe, but they do admit the existence of subgroup demand functions and they may be considered acceptable if commodities which bear special relationships to one another are always kept in the same subgroup (Deaton and Muellbauer, 1980a, Ch. 5). In the case of expenditures by UK and US residents on visits abroad, the important question then is what type of behavioural restrictions are acceptable?

For UK visitor expenditure, the most fundamental distinction, perhaps, is that between expenditure on visits within the UK and expenditure on visits abroad. A starting point is to assume that the choice between the two is taken *prior* to the choice of which country or area of the UK to visit, although even this is debatable. For example, holidays in Scotland and Norway or holidays in Cornwall and France may be substitutes. However, lack of data precludes the inclusion of expenditure on visits to regions of the UK, since the UK International Passenger Survey only provides data on international visitor expenditure.

The next question is whether or not the UK resident, having decided on a visit abroad, first chooses between broad groups of countries before choosing

any individual country? For the purely pragmatic reasons of lack of data and loss of degrees of freedom it has to be assumed that he/she does. The question then is what choice of subgroup demand functions is most plausible, given that for the period 1964 to 1981 suitable data exist for only 15 countries.

It seems reasonable to assume that there is a clear distinction between a "sun" visit (e.g., a visit to Majorca), a business/cultural/educational visit (e.g., a visit to Paris) and a visit to relatives, and that the choice between these generally takes place prior to the decision about which country to visit. All countries have business/cultural/educational attractions, but for Austria, Belgium, France, Germany, Ireland, Netherlands, Scandinavia and Switzerland these are likely to be the dominant motivations for the visit. "Sun" is almost certainly the main factor for most UK visitors to Greece, Portugal and Spain, and for visits to many of the major countries in the "other" group (e.g., Commonwealth Caribbean, Malta, Yugoslavia). A visit to relatives is likely to be the main factor for trips to Australia, New Zealand and Canada (see *British Business*, December 15, 1978); it is an important, albeit not the main, reason for visits to Ireland. This leaves, of the 15 countries for which there are data, Italy and the US for consideration. All three factors are important for Italy. However, the apparent decline of Italy as a "sun" holiday destination in the last decade or so probably justifies its inclusion in the business/cultural/educational grouping. The US probably belongs to the "sun" category or else constitutes a special category in its own right. If so, this leaves 9 countries in the subgroup business/cultural/educational, of which one is Ireland.

In the case of the US, it is assumed that the decision by a US resident between, for example, staying at home and visiting Canada, Europe, Latin America or Mexico is taken *prior* to the decision as to what European country to visit. From an American perspective, the countries comprising Europe have common attributes specific to the group, so there is a limited possibility for substitution between a holiday in one country in this group and a holiday in an individual country in, say, the Latin American group. This is especially true given that business travel accounts for such a very small proportion of US travel to Europe. However, substitution is likely between holidays by US citizens in individual European countries given that most of them share many common characteristics. It seems reasonable, then, to assume subgroup demand functions for holidays in Europe by US residents. (Adequate data only exist for expenditure in 15 European countries, including Ireland, but these 15 countries account for 95 per cent of total US visitor expenditure in Europe.)

Given the above, the subgroup demand functions for visits by UK residents to each of the 9 countries (referred to as Europe (9) hereafter), and by US residents to each of 15 countries (Europe (15)), can be treated as two

systems. These systems may be estimated separately from each other and
without reference to any other commodity group, and in particular to any
country not included in the group. Since a demand function for visits to
Ireland is in both systems, estimation of each system clearly provides estimated
equations for Ireland and it is with these that Section III of this paper is
concerned.

A number of models can be used for a system of demand equations. The
Almost Ideal Demand System (AIDS) of Deaton and Muellbauer (1980b) is,
however, arguably the most suitable — given its simplicity of structure,
generality and conformity with economic theory. In its most general form, it
yields a system of non-linear equations, but in the case of this study this
can be satisfactorily approximated by the linear system of equations:

$$s_i = \alpha_i + \sum_{j=1}^{n} \gamma_{ij} \log p_j + \beta_i \log (x/NP^*) + u_i, \quad i=1 \ldots n \qquad (1)$$

where s_i is the share of country i in UK/US visitor expenditure in Europe
(9)/Europe (15), p_j is the price facing UK/US visitors in country j, x is
UK/US visitor expenditure in Europe (9)/Europe (15), N is UK/US popula-
tion, $P^* = \Pi p_j^{s_j}$, n is the number of countries, α_i, γ_{ij} and β_i are parameters
and u_i is a disturbance term assumed to be normally distributed with zero
mean and constant variance.

The adding up restriction implied by consumer demand theory (i.e.,
$\sum_{i=1}^{n} \alpha_i = 1$, $\sum_{i=1}^{n} \gamma_{ij} = 0$ and $\sum_{i=1}^{n} \beta_i = 0$) automatically holds for shares data
as they sum to unity. This restriction will also apply to coefficients of any
other variables included; in the case of dummy or time trend variables, for
example, there must be a corresponding variable in the equation for at least
one other country. Homogeneity implies $\sum_{j=1}^{n} \gamma_{ij} = 0$ for all i; symmetry
implies $\gamma_{ij} = \gamma_{ij}$ for all i and j; and both restrictions can be tested against the
data.

Because only 18 observations existed on the variables in (1) and this data
set was likely to be highly collinear, an alternative functional form is also
considered. One obvious method of reducing the twin problems of lack of
degrees of freedom and multicollinearity is to use a single relative price
variable. Similar variables have been used extensively in previous studies of
export demand. The relative price variable used here is $p_i^* = p_i/(\prod_{j \neq i} p_j^{s_j})^{1/\Sigma s_j}$.
The implications of using such a variable, however, have rarely been made
explicit. In the AIDS framework, it can be shown that the use of p_i^* auto-
matically imposes homogeneity and the restrictions

$$\gamma_{ij} = -\gamma_{ii} s_j / \sum_{j=1}^{n} s_j, \quad j \neq 1. \qquad (2)$$

Thus the use of p_i^* involves some strong assumptions about cross-price effects. Unlike homogeneity, symmetry remains testable, the condition $\gamma_{ij} = \gamma_{ji}$ reducing to $\gamma_{ii}/\gamma_{jj} = s_i (1 - s_i)/s_j(1 - s_j)$.[1] Whether restrictions (2) are acceptable in the interests of estimability is debatable, but it is arguable that the restrictions imposed here are less strict than those either explicit or implicit in previous studies (see Artus, 1972, Barry and O'Hagan, 1972, Bond, 1979, Gray, 1966 and White, 1982).

Using the relative price variable suggested above, the alternative functional form to be estimated is

$$s_i = \alpha_i + \gamma_{ii} \log p_i^* + \beta_i \log (x/NP^*) + u_i, \quad i = 1 \ldots n. \tag{3}$$

Uncompensated and compensated own-price and cross-price elasticities (ϵ_i, ϵ_i^* and ϵ_{ij}, ϵ_{ij}^*, respectively) and expenditure elasticities, η_i, can be calculated from the estimates of the parameters in (3) using the formulae:

$$
\begin{aligned}
\eta_i &= \left(\beta_i/s_i\right) + 1 \\
\epsilon_i &= \left(\gamma_{ii}/s_i\right) - \beta_i - 1 \\
\epsilon_i^* &= \epsilon_i + s_i\eta_i \\
\epsilon_{ij} &= \left(\gamma_{ij}/s_i\right) - \left(\beta_i\, s_j/s_i\right) \\
\epsilon_{ij}^* &= \epsilon_{ij} + s_j\eta_i .
\end{aligned}
\tag{4}
$$

Apart from the price and expenditure variables above, several other qualitative variables were included in the specification. The nature of, and reasons for, these variables in the Irish equations are discussed in the next section.

III DATA AND RESULTS

A full discussion of the data used for both studies is contained elsewhere (Harrison and O'Hagan, 1983 and O'Hagan and Harrison, 1984) and only a brief listing of the main points in these discussions is provided here.

First, the data on s_i for the US equations are derived from one common source — the US Department of Commerce — and there is reason to believe that, at least compared to most other tourist expenditure figures, these data are very reliable (Gray, 1966). The same applies to the International Passenger Survey data on the s_i for the UK. Second, due to lack of data, travel prices

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1 For both the UK and US systems, symmetry, *given* the restrictions implicit in the use of p_i^*, was tested by means of t tests using the Seemingly Unrelated Regression (SUR) estimates of γ_{ij} in (2); it was rejected, a finding not uncommon in empirical demand studies. Homogeneity, and homogeneity together with restrictions (2), were also rejected using standard likelihood ratio tests.

are not included as independent variables in the equations. In the case of the US equations, it could be argued with some validity that little variability in *relative* costs of travelling between the US and each country would be expected, given that the distance from any one European country to the US is not significantly different from that from any other European country to the US, and given that air is the predominant mode of travel to each. Likewise, in the case of the UK equations, no obvious factor suggests itself as having had a marked impact on the cost of travel to some of the 9 and not to the others. Therefore, although the absence of suitable data on transport costs is unfortunate, the view is taken that it may not constitute a significant lacuna in the study. Third, sterling/dollar adjusted consumer price indices had to be used as proxies for tourist price indices. Finally, dummy variables were used to model qualitative factors, and these are discussed below.

Table 1 provides the key data series used in the econometric analysis.[2] As they are also of interest in themselves, they will be described in some detail.

As may be seen, the Irish share of the Europe (9) market increased from around 21.5 per cent in the mid-1960s to about 27.0 per cent in the late 1960s, dropping back to 20.2 per cent in 1970 and to 12.8 per cent by 1972. These extraordinary shifts in market share, however, must be seen in the context of two major special developments during this period: the operation of travel allowance restrictions on UK visits outside the sterling area between end-1966 and early 1970 (see Oliver, 1971) and the outbreak and intensification of violence in Northern Ireland between 1969 and 1972, with little abatement since. The former would be expected to have lead to a substantial decrease in x/P^* between the mid- and late-1960s, but to a substantial increase in s_i for Ireland, which was still in the sterling area in the late 1960s. The data in Table 1 amply bear this out and to test formally for the latter effect a dummy variable, with a value of 1 for the years 1967 to 1969 and 0 for all other years, is included in the Irish equation. The troubles in Northern Ireland would be expected to have led to a permanent decline in s_i between 1969 and 1972, but particularly in 1972 when a major escalation in the violence took place. A dummy variable again is used to model this effect, with a value of 0 for the years 1964 to 1971 and 1 for the years 1972 to 1981.[3]

It is of interest to note that travel restrictions were not the only factor explaining the downward pressure on x/P^* for Europe (9). Between the mid-1960s and mid-1970s, the sun destinations dramatically increased their share of the total UK market, at the expense of the Europe (9) countries

2 $\frac{X}{P*}$, however, rather than $\frac{X}{NP}*$, is looked at as it is of most relevance to the discussion that follows.

3 Some experimentation with this dummy was undertaken, but the specification above proved most satisfactory.

Table 1: *Basic data series for equations for Ireland*

	UK Europe (9)[1] market			US Europe (15)[2] market		
	s_i	x/P*	p_i*	s_i	x/P*	p_i*
1964	21.0	95.8	98.4	2.7	82.5	101.4
1965	22.2	100.0	100.0	2.5	100.0	100.0
1966	21.3	97.1	99.5	2.8	100.9	101.2
1967	25.9	73.0	85.4	3.0	115.4	104.3
1968	29.7	66.6	86.6	3.5	109.9	101.6
1969	26.1	73.0	91.5	3.3	123.6	100.7
1970	20.2	84.1	93.9	3.2	145.4	98.0
1971	18.5	84.5	96.1	3.8	135.8	88.4
1972	12.8	86.7	89.1	2.2	153.4	86.2
1973	13.9	92.1	83.8	2.5	142.6	86.2
1974	16.1	77.5	81.4	2.9	107.1	91.0
1975	14.9	77.3	80.7	3.2	108.9	82.3
1976	14.3	69.3	76.0	4.4	116.0	88.3
1977	17.8	74.5	84.4	4.6	108.2	87.0
1978	16.5	90.1	80.6	4.2	117.4	81.5
1979	14.9	111.1	85.9	4.0	107.3	78.1
1980	13.6	163.8	90.0	3.4	107.4	76.0
1981	11.5	162.0	98.2	2.7	131.2	82.0

Sources: Department of Trade (UK), *British Business;* Department of Commerce (US), *Survey of Current Business;* and International Monetary Fund, *International Financial Statistics*, various issues.

Notes:
1   Austria, Belgium/Luxembourg, France, Germany, Ireland, Italy, Netherlands, Scandinavia (Denmark, Finland, Norway, Sweden) and Switzerland.
2   Austria, Belgium, Denmark, France, Germany, Greece, Ireland, Italy, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and UK.

and, by the mid-1970s, x/P* for Europe (9) was 25 per cent below its level in the mid-1960s. However, between the mid-1970s and early 1980s, the swing to the sun destinations ceased and total UK visitor expenditure burgeoned, bringing about a more than doubling of x/P* for Europe (9). Ironically, s_i for Ireland increased after 1972, when x/P* was falling, but fell between the mid-1970s and 1981, when x/P* was rising rapidly. By 1981, s_i for Ireland reached its lowest level since 1966 and, perhaps, in the whole post-war period.

No long-term trend in the Irish share of the Europe (15) market is discernible from the data in Table 1: if anything, s_i for Ireland increased

somewhat over the period. However, it dipped dramatically in 1972 and 1973, and it would appear that the troubles in Northern Ireland were the major causal factor (see *Tourism Policy*, NESC Report No. 52). Because of this, a dummy variable, with a value of 1 in 1972 and 1973 and 0 in all other years, is included in the Irish equation. The trends in x/P^* for Europe (15) are of some interest. Between the mid-1960s and the early 1970s, x/P^* grew substantially, but declined in the mid-1970s, and remained at that level until 1980. Thus, although s_i for Ireland held up over the period, it simply represented a steady share of a stagnant market.

Turning now to the econometric analysis, it may be noted that in the absence of cross-equation restrictions, maximum likelihood estimation of the parameters of (1) can be effected using ordinary least squares (OLS) on individual equations. However, estimation of (1) encountered, as expected, very serious multicollinearity problems, evidenced by the presence of very low t values for the parameter estimates and large R^2 values for the equations. Moreover, most of the values for the normalised determinants of the observations on the regressors, $|X'X|$, were zero to 3 or more places of decimals. None the less, parameter estimates for the Ireland equation in system (1) were calculated and these are available from the authors on request.

In (3) the price variable differs, and the disturbances may well be correlated, across equations. To account for this possibility, (3) was estimated as a system using Zellner's generalised least squares method for seemingly unrelated regressions (SUR). The SUR estimates of the parameters of the Ireland equations, together with t-values computed using estimated asymptotic standard errors, are given in Table 2. Since OLS estimation of these equations is required in applying Zellner's estimator, single equation coefficient estimates and the usual diagnostic statistics were also obtained. An analysis of these statistics was considered worthwhile — given that specification testing at the system level is more problematical than that for individual OLS regressions — and their values are also included in Table 2.

The values of $|X'X|$ suggest that in circumventing multicollinearity use of p_i^* proved decidedly successful. The R^2 values are reasonably high, but the Durbin-Watson d statistics are low, particularly that for the US equation, and this may be associated with the imposition of homogeneity.[4] Szroeter's

4 The introduction of serial correlation through the imposition of homogeneity was observed by Deaton and Muellbauer (1980b). They also noted that the Durbin-Watson d statistics showed the sharpest fall for the equations which, in the unrestricted form, had homogeneity rejected. The only restriction imposed in the Deaton and Muellbauer study, however, was that of homogeneity. In the case above, homogeneity *and* restrictions (2) were imposed and, as such, direct comparison is not strictly valid.

Low Durbin-Watson d statistic values were a feature in only a few equations in both systems. Given this, and as there was no *a priori* reason in this case to suggest the use of a dynamic version of AIDS (see Harrison and O'Hagan, 1983), this avenue of inquiry was not explored. Generalised Least

(1978) bounds (h) test and the McCabe-Harrison (1980) cusum of squares procedure indicated that heteroscedasticity and instability, respectively, are of little consequence.

With regard to the actual SUR parameter estimates, and associated asymptotic t-values in Table 2, some interesting findings emerge. For the UK equation, the dummy variable parameter estimates have the expected sign and are highly significant, while the price and real expenditure parameter estimates are insignificant. For the US equation, the price and dummy variable parameter estimates have the expected sign and are highly significant, real expenditure again not being a significant explanatory factor. As Deaton and Muellbauer point out, in a different context, "these results suggest that influences other than prices and current total expenditure must be systematically modelled if even the broad pattern of demand is to be explained in a theoretically coherent and empirically robust way" (1980b, p. 323).

Price and total expenditure elasticities were computed using the SUR results. The own-price and total expenditure elasticity estimates — together with the sample mean values of the budget shares, $\bar{s}_i$, at which they were calculated, and associated standard errors — appear in Table 2; the cross-price elasticity estimates are given in Table A.1. The own-price elasticity estimates are negative, as would be expected, with a very large value for US visitors. The total expenditure elasticity estimates are not significantly different from unity, reflecting the insignificance of the β_i estimates and indicating that a given increase in total expenditure on visits to Europe (9)/Europe (15) is matched by an approximately equi-proportional increase in demand for visits to Ireland, as might have been expected.

IV CONCLUSION

If the theoretical framework of the study is accepted as satisfactory, a number of important conclusions can be arrived at on the basis of the results presented above. First, it is evident from the equations for Ireland, and the larger studies on which they were based, that non-economic factors are of crucial importance in explaining movements in market shares of visitor expenditures: most of the variation in Ireland's share of UK visitor expenditure in Europe (9) between 1964 and 1981 was accounted for by the UK travel restrictions to non-sterling areas in the late 1960s and the troubles in Northern Ireland since then. Second, the relative price indices generally

Squares (GLS) was applied to the Irish equations, though, and three of the four statistically significant parameter estimates displayed almost no change. The parameter estimate for the price variable in the US equation was significantly reduced, however, and lowered the price elasticity estimate from -3.102 to -2.584. The value of the Durbin-Watson d statistic for the UK equation was increased to 1.93, but that for the US to only 1.62.

Table 2: *SUR coefficient estimates, test statistics, and estimated price and expenditure elasticities*

Market	Parameter estimates						Test statistics				Elasticities		
	α	γ	β	δ_1^1	δ_2^1	δ_3^1	R^2	F	DW	h	ϵ	ϵ^*	η
United Kingdom	0.069 (0.77)	0.032 (0.36)	−0.039 (−1.52)	0.059 (4.04)	−0.055 (−3.39)	*	0.91	31.54	1.49	1.72	−0.787 (−1.57)	−0.642 (−1.33)	0.788 (5.70)
United States	0.012 (0.77)	−0.069 (−7.51)	0.011 (1.04)	*	*	−0.014 (−7.71)	0.51	5.01	1.28	2.28	−3.102 (−11.98)	−3.058 (−11.09)	1.333 (4.19)

Note: The numbers in parentheses are t-values computed using estimated asymptotic standard errors and testing for statistical significance of the parameter estimate from zero.

1 Parameters for the dummy variables — for the UK travel restrictions, 1967-1969, (δ_1) and for the effects of the troubles in Northern Ireland on UK (δ_2) and US (δ_3) visitor expenditure in Ireland.

moved in Ireland's favour over the period, but only for the US was this a statistically significant factor in explaining movements in market share. United States visitor expenditure, in fact, appears to be highly responsive to price. Third, as the size of the UK and US markets grow, it does not appear to have any significant effect on Ireland's share of these markets.

Trends in the size of the UK/US markets do, however, throw light on the growth in the *level* of visitor expenditure in Ireland. Specifically, it was seen that the size of the relevant UK market declined at first and then increased dramatically, a boom that Ireland was not able to benefit from, largely because of the troubles in Northern Ireland. In contrast, the Irish share of the US market, if anything, increased – largely because of the relatively favourable movements in price – but the absolute size of the market showed little increase over the period. Thus, it could be argued that the slow growth in visitor receipts in Ireland since the late 1960s can be largely explained by two factors: the marked reduction – resulting from the effects of troubles in Northern Ireland – in Ireland's share of its largest market at the time, UK tourism in Europe (9), and the decline and stagnation in its second largest market, namely, US tourism in Europe (15).

A number of possible policy implications follow from the findings above. First, it is evident that any increase in the volume of expenditure by US visitors to Ireland will have to be achieved by an increase in Ireland's market share, if total US visitor expenditure in Europe remains static. Second, the responsiveness of US visitors' demand to price suggests that price competitiveness should be the major factor in any campaign to increase Ireland's share of total US visitor expenditure in Europe (15). Last, it would appear that as long as the troubles in Northern Ireland persist at their recent level, any attempt to increase Ireland's share of total UK expenditure in Europe (9), either through price reductions or other means will meet with limited success.

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Table A1: *Estimated cross-elasticities*

		Austria	Belgium	France	Germany	Italy	Netherlands	Scandinavia	Switzerland
	$\bar{s}_j$	0.069	0.048	0.234	0.097	0.182	0.053	0.061	0.073
United Kingdom (Irish share $s_i = 0.184$)	Uncompensated ϵ_{ij}	0.011	0.008	0.031	0.015	0.026	0.008	0.010	0.011
	Compensated ϵ_{ij}^{*}	0.061	0.042	0.202	0.085	0.159	0.047	0.054	0.064

		Austria	Belgium	Denmark	France	Germany	Greece	Italy	Netherlands	Norway	Portugal	Spain	Sweden	Switzerland	United Kingdom
	$\bar{s}_j$	0.038	0.017	0.026	0.129	0.104	0.045	0.135	0.032	0.021	0.020	0.074	0.018	0.069	0.239
United States (Irish share $s_i=0.033$)	Uncompensated ϵ_{ij}	-0.098	-0.042	-0.065	-0.322	-0.260	-0.112	-0.337	-0.080	-0.052	-0.050	-0.185	-0.045	-0.172	-0.597
	Compensated ϵ_{ij}^{*}	-0.047	-0.019	-0.030	-0.150	-0.121	-0.052	-0.157	-0.037	-0.024	-0.023	-0.086	-0.021	-0.080	-0.278