RECREATIONAL TRIP GENERATION

A Cross Section Analysis of Weekend Pleasure Trips to the Lake District National Park

By N. W. Mansfield

This paper attempts to analyse the demand for day and half-day pleasure trips to a holiday area, by means of a model describing the generation of trips to alternative recreation facilities and holiday resorts.

The main purpose is to make a cross-section analysis of a single year's traffic data in order to determine how much of the observed variations in trip demand during a single year can be attributed to a few simple factors affecting relative journey costs. The study makes no pretence at statistical rigour, since the small sample size of the original data meant that only 15 separate observations of trip volumes were available. The quantitative results should therefore be interpreted as only general indications of the responsiveness of demand to changes in the variables considered, *not* as precise estimates of what has happened or may happen in the future.

THE DERIVATION OF THE MODEL

The first assumption made is that, where no charge is made for the use of a recreation site or beauty spot, the demand for its services (and hence trip generation to it) is a function of its attractiveness (in terms of its facilities, etc.) and the relative cost of reaching it. A similar assumption is made about the demand for long-period holidays at resorts, since average hotel and other holiday costs do not differ much between the major holiday areas of the country.

Thus the most important factors influencing the number of trips to a beauty spot or holiday area made from particular towns are:

(a) the relative attractiveness of the resort compared with other resorts accessible from the same town;

(b) the money cost of travel to it and other resorts;

(c) the journey time expended in reaching it and other resorts;

(d) the population of the town; and

(e) the level of car ownership in the town.

Facts (a), (b) and (c) are interrelated, since the value placed by the consumer on his use of the resort must equal or exceed the cost of the journey to and from it, on the usual assumption that travelling is a disutility. For recreational trips, this

assumption may be unjustified; people may enjoy their drive to a resort. However, if the amount of enjoyment motorists gain from their journey is proportionate to the length of the journey, irrespective of the destination, the falseness of this assumption will not affect the validity of the model.

The General Model

Symbolically, one can set up a system of simultaneous equations describing the demand for trips from any of K zones to N possible resorts in terms of the five factors listed above; each equation will be of the following form:

$$Y_{kn} = f(C_{kl} \ldots C_{kN}, t_{kl} \ldots t_{kN}, r_l \ldots r_N, W_k, P_k) \qquad [k = 1, 2 \ldots K, n = 1, 2 \ldots N]$$

where Y_{kn} = number of visitors to the nth resort from the kth zone,
C_k = money cost of travel from the kth zone,
t_k = journey time from the kth zone,
r_n = the relative attractiveness (in terms of facilities, natural characteristics, etc.) of the nth resort,
W_k = the level of car ownership in the kth zone,
P_k = the population of the kth zone.

(We assume that the N simultaneous equations for each zone are independent of each other. This is equivalent to saying that the demand for trips from any one zone is not great enough to affect traffic congestion significantly on any road which its inhabitants share with those from other zones. When considering trips from any one zone, the variables c, t, r, W and P can then be regarded as exogenous or "predetermined". We thus have a model containing K separate systems of N equations, each of which has N dependent variables for which solutions may be obtained.)

Some Simplifying Assumptions

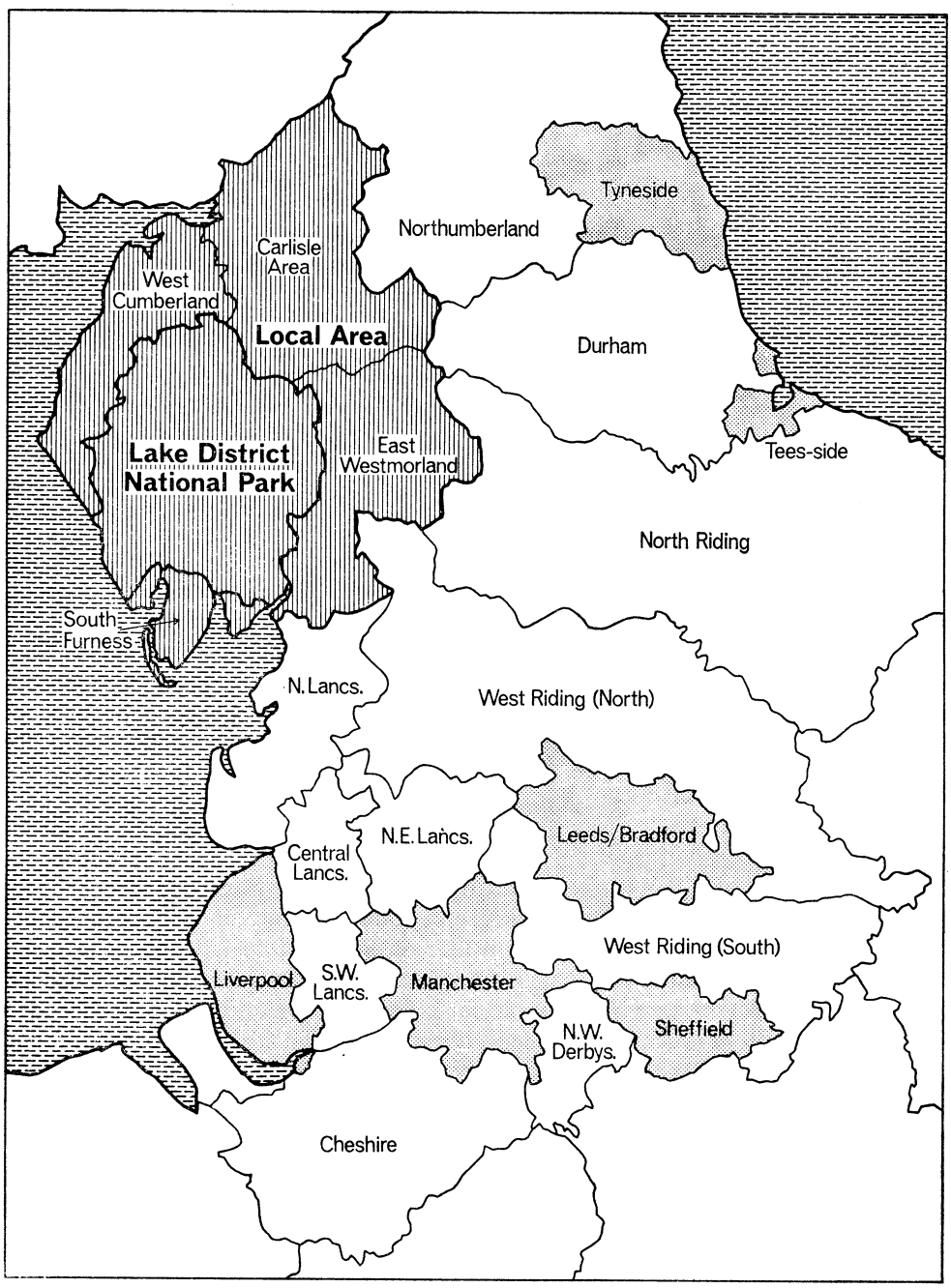
For trip generation to only one area, the general model described above is too cumbersome, since it requires more data than could possibly be obtained. Whilst it would be wrong to ignore entirely the influence of travel costs to and the relative attractiveness of other areas on trip generation to the area studied, our principal purpose is to investigate how the demand for pleasure journeys is affected by changes such as a reduction in journey times consequent on the opening of a new motorway. In these circumstances it seems reasonable to assume that the "unobserved" variables, $C_2 \ldots C_N, t_2 \ldots t_N$ and $r_2 \ldots r_N$, remain constant and do not affect the analysis. These latter variables can then all be expressed in terms of a single variable (R_{kl}) which measures the "overall" competitiveness of the Lake District when compared with alternative recreation facilities available to the population of the kth zone – *i.e.*,

$$R_{kl} = f(C_{k2} \ldots C_{kN}, t_{k2} \ldots t_{kN}, r_2 \ldots r_N)$$

The general model thus reduces to the following simple form for each of the K zones considered in the analysis:

$$Y_{kl} = f(C_{kl}, t_{kl}, W_k, R_{kl}, P_k) \qquad [K = 1, 2 \ldots 15]$$

A linearisation of this equation is employed in the subsequent analysis.


Tyneside
Northumberland
Carlisle Area
West Cumberland
Local Area
Durham
Lake District National Park
East Westmorland
Tees-side
North Riding
South Furness
N. Lancs.
West Riding (North)
N.E. Lancs.
Leeds/Bradford
Central Lancs.
West Riding (South)
Liverpool
S.W. Lancs.
Manchester
Sheffield
N.W. Derbys.
Cheshire

THE DATA

In 1966 a survey of weekend motorists in the Lake District was commissioned by the National Parks Commission and the British Travel Association (with assistance from the Ministry of Transport)[1]. Although the survey was not designed to yield detailed origin and destination information, it produced a breakdown of origins and journey purpose in sufficient detail for our analysis.

The original data consisted of 5,891 postal questionnaires returned out of nearly 10,000 issued at roadside survey points over five weekend days (spread over 5 weeks) at the height of the 1966 holiday season. From this was obtained a weighted sample, relating to 2,284 day visitors and 1,301 half-day trippers, which is thought to be reasonably representative of the true spread of visitors from the various areas surrounding the National Park. The origins of visitors in the sample were classed in 15 geographical zones, one consisting of the counties of Westmorland and Cumberland, the others based on the Ministry of Transport standard 2-digit classification up to a distance of 100 miles from the National Park. The small size of the sample made it unwise to break the information down into a finer grid, since this might have introduced serious distortions into the data. (As it was, the smallest numbers of observations from any zone were 18 for day visitors and 2 for half-day trippers).

The sample information was then converted into estimates of the number of cars leaving the Lake District per 1,000 resident population for each of the 15 zones. This information, given in Table 1, was subsequently converted into an index form, taking as the base the number of vehicles with an observed origin within 25 miles of the Lake District.

TABLE I

Estimated Number of Cars Leaving the Lake District per 1,000 Resident Population in Each Zone

No.	*Zone Description*	*On Day Trips (Daily Average)*	*On Half-Day Trips (Daily Average)*
1	North Lancashire	1.1640	0.5317
2	Central Lancashire	0.7111	0.2315
3	N.E. Lancashire	0.2530	0.0887
4	West Riding North	0.2346	0.0487
5	S.W. Lancashire	0.1810	0.0494
6	Durham	0.2120	0.0247
7	Tyneside Conurbation	0.1407	0.0137
8	Manchester Conurbation	0.1060	0.0250
9	Northumberland	0.2460	0.0123
10	Tees-side Conurbation	0.1039	0.0104
11	Leeds/Bradford Area	0.1039	0.0091
12	North Riding	0.1008	0.0112
13	Liverpool Conurbation	0.0919	0.0175
14	Cheshire	0.1057	0.0000
15	West Riding South	0.0222	0.0021

Sources: Traffic Data – *Pleasure Traffic and Recreation in the Lake District,* Appendix C, Table 5 (to be published by the National Parks Commission). Population – *Census of Popupulation, England and Wales, 1961.*

[Since the best measurement of journey numbers was believed to be the individual sample observation, *not* the zonal totals, the indices were weighted according to the strength of the sample obtained from each zone. This procedure corrected a distortion which would otherwise have affected the quality of the regression results obtained. Since the unweighted zonal observations were heavily concentrated into the upper end of the distance range, with relatively low absolute values, an apparently high level of efficiency in prediction (in terms of R^2) could have been obtained despite failure to obtain a good explanation of trip numbers from longer distances. Weighting the zonal totals prevents this.]

THE EMPIRICAL FINDINGS

In order to employ multiple regression on the model, using the traffic data described above, it was necessary to make some further assumptions about the nature of the elements in the demand function. Firstly, the effect of the variable R_k had to be considered, since it did not seem possible to establish objectively the "relative attractiveness" of the Lake District as compared with other National Parks in the area such as the Yorkshire dales, the Peak district and the North Yorkshire moors, or with the many seaside resorts on the north-east and north-west coasts. In the short run (given the existing road pattern) R_k might be considered independent of the two cost variables C_k, t_k, so that its exclusion from the fitted regression equations would not bias the least-squares estimates of the parameters of those variables. This assumption of independence, however, might not survive a change in the road pattern radically affecting the values of C_k or t_k. Indeed, a road improvement might so increase the accessibility of the National Park as to make the parameters of the simple model completely unstable. Even in this case, a fitted regression equation which excluded R_k could be used to predict a *minimum* increase in traffic resulting from reductions in journey costs, since it is most unlikely that $dyk/dR_k < 0$.

The money cost per mile of a recreation journey might vary slightly according to the type of road and the degree of congestion. But these variations were ignored and journey costs related simply to distance, partly for simplicity and partly because the variations between different routes were believed to be small. Journey times from each zone were also assumed to vary proportionately with distance, except that some account was taken of the faster speeds possible on motorways by including a variable to denote the possibility of using a motorway for part of the journey. Thus $t_k = tX_k - tM_k$, where M_k is either a dummy variable (taking the value 1 when motorway access is available and 0 when not) or the distance a motorist from zone k could travel along M6 on his journey to the Lake District. The final form of the equation is therefore:

$$\frac{Y}{P} = a + [c + t]f(X) + tM + gW.$$

The Regression Results

Y/P was plotted and observed to have an exponential relationship with distance (X). Two forms of regression equation were employed, each being used on data for day and half-day trips taken separately:

(a) $Y/P = \alpha 0 + \alpha_1 M + \alpha_2 W + \alpha_3 e^{-x} \quad (M = 0, 1)$

(b) $Y/P = \beta 0 + \beta_1 M + \beta_2 W + \beta_3 X_{-2} \quad (M = 0, 1)$

The results of these regressions are presented in Tables 2 and 3 (the data being given in the Appendix).

TABLE 2

Trip Generation Regression Results – Equation Type (a)

Regression variable	*Day visitors*			*Half-day visitors*		
	Coefficient	*Standard error*	*T-Value*	*Coefficient*	*Standard error*	*T-Value*
Constant	−12.464	13.297	0.937	−4.944	4.653	−1.063
M	3.214	3.716	0.865	1.929	1.300	1.484
W	0.427	0.305	1.400	0.135	0.107	1.267
$[10^{15}]e^{-x}$	2.417	0.370	6.531	1.289	0.129	9.956
R^2		0.889			0.944	

TABLE 3

Trip Generation Regression Results – Equation Type (b)

Regression variable	*Day visitors*			*Half-day visitors*		
	Coefficient	*Standard error*	*T-Value*	*Coefficient*	*Standard error*	*T-Value*
Constant	−11.951	4.201	2.844	−5.570	1.590	3.504
M	−0.593	1.050	0.565	−0.388	0.397	0.976
W	0.214	0.097	2.203	0.058	0.037	1.570
X^{-2}	41779.43	1794.35	23.28	21034.28	678.91	30.983
R^2		0.989			0.994	

The coefficients of the distance variable all have the right sign and are significant at the 1 per cent level or better. Differences in distance alone explain 85.6 per cent of the variation in day-trip numbers (92 per cent for half-day trips) when equation (a) is used and almost all of the variation when equation (b) is used. It is evident, therefore, that inclusion of the other variables increases the predictive power of the

equations very little. The influence of the motorway variable is at best significant at the 15 per cent level, and car ownership at the 5 per cent level; but these results may be due partly to the small sample size.

Elasticities of Demand

The demand for recreation trips appears highly elastic with respect to changes in total travel costs. From the results presented in Table 3 it is estimated that, at the average distance day visitors are prepared to travel (44.5 miles), the "price elasticity" of demand is between 2.28 and 2.38, using a 95 per cent confidence interval. This "price" includes money costs and the value of journey time. People from the main conurbations travel between 60 and 70 miles to reach the National Park; at this distance the price elasticity is slightly higher, at between 2.89 and 3.13. Thus, if a road improvement resulted in a 10 per cent reduction in travel costs from every zone, there would be an increase of more than 20 per cent in trips from zones up to 50 miles away and about a 30 per cent increase in trips from zones 70 or more miles from the National Park. Similar, but slightly higher, price elasticities of demand can be obtained from the results of equation (a) presented in Table 2. As might be expected, the elasticity of demand for half-day trips is greater than that for day trips over the same distance – it is between 2.75 and 2.88 at 44.5 miles, falling to about 1.21 at 20 miles. The predicted elasticities become greater the further one goes from the Lake District, thus conforming with the typical textbook demand curve, on which elasticities are usually greater at high than at low prices.

THE EFFECT OF THE MOTORWAY ON TRIP GENERATION

Although the coefficients of the motorway variable were only significant at the 15 per cent level or worse, it is possible to make some estimate of the effect of the M6 motorway on the number of trips made from the 6 zones it serves. For this purpose regression equation (a) can be used to calculate a value of time, since the coefficient of M represents the effect of the motorway on trip generation from points about the mean distance of all zones from the Lake District (57.5 miles).

Calculation of a Value of Time on Recreation Trips

We assume that there is a straight trade-off between time costs and car operating costs (*i.e.*, a given reduction in time costs, holding car operating costs constant, would have the same effect on demand as an equal money reduction in operating costs).

Hence $\dfrac{\Delta Y}{(\Delta M)} \simeq \dfrac{\Delta Y}{\Delta \bar{X}}$; so, as $\dfrac{\Delta Y}{(\Delta M)} = \alpha_1$ and $\dfrac{\Delta Y}{(\Delta \bar{X})} = \dfrac{\alpha_3}{e^{\bar{x}}} - \dfrac{\alpha_3}{e^{\bar{x}+\Delta x}}$,

we may assume $\alpha_1 \simeq \dfrac{\alpha_3}{e^{57.5}} - \dfrac{\alpha_3}{e^{57.5+\Delta x}}$ as $\bar{x} = 57.5$

Using the coefficients $\alpha 1$, $\alpha 3$ from the fitted regression equation for day trips as set out in Table 2 above, we have: $\Delta x \doteq 34.8$ (or between 32.2 and 35.7 using 95 per cent confidence limits).

As Δx represents changes in total journey cost, $\Delta (c + t)$, where c and t represent respectively operating and time costs per mile, then Δ (cost) $= -34.8 (c + t)$ about the calculated value for ΔX. If the average speed on ordinary roads is about 30 to 35 miles per hour, then 34.8 equals the value of about one hour of travelling time (T). If the 6 zones served by the motorway are taken together, the mean length of motorway mileage travelled by visitors from these zones is 41 miles. At the mean journey distance from the Lake District the effect of motorway access is to reduce total travel time by 30 minutes (assuming speeds of 50 m.p.h. or more on the motorway). Hence Δ (cost) $= 0.5T$, so $0.5T = -(34.8c + T)$, and $T = 23.2c$. If a modified version of the Road Research Laboratory estimate of direct car operating costs (4d. per mile) is used [2], then $T = 93$d. or approximately 7s. 9d. per car party. Expressed in terms of a 95 per cent confidence interval, the derived time value lies between 7s. 7d. and 7s. 10d. per hour for day visitors; a similar calculation from the fitted regression equation for half-day trips gives a derived time value of identical size and range. On average, each car party consisted of 3.1 people, while about half the vehicles observed during the Survey of Weekend Motorists contained children under 16 years of age. If the children are assumed to have zero values for journey time, the average value of time per person is about 3s. 2d. per hour, which is about the same as the value for leisure time currently in use at the Ministry of Transport; otherwise the average value is just over 2s. 7d.

Effect of Journey Time Changes

The time value can now be used to calculate a "time-cost" elasticity of demand for vehicle pleasure trips, assuming that operating costs are held constant. This assumption is reasonable, since extra fuel used through the higher cruising speeds on a motorway is probably counterbalanced by savings on fuel and maintenance through not having to slow down or change gears so often. Equation (a) above gives the number of day trips made from the mean distance (57.5 miles) as 6.401 if a zone has no motorway access but 9.615 if it has motorway access (but the possible range is between 6.4 and 17.1, given the high standard error of the coefficient of M). The percentage difference is 40.3 per cent (or between 0 and 90.8 per cent if we use the same confidence limits as previously). The time the journey would take without motorway access (assuming an average speed of 30 m.p.h.[3]) is about $1\frac{2}{3}$ to 2 hours; this is reduced by about 25 or 30 minutes if a motorway can be used. Thus demand increases by 40 per cent for a reduction in journey time of some 25 per cent. Thus the "time-cost" elasticity of demand, as revealed by differences in the number of trips from zones with and without motorway access to the Lake District, is about 1.6, with a lower limit of zero and an upper limit of 3.6. For half-day trips the apparent elasticity is greater, the increase in the number of trips being about 75 per cent; this gives a "time-cost" elasticity of demand of 3.0, with a range between zero and 4.8.

Although the poor statistical quality of the regression results means that the

precise magnitude of the "time-cost" elasticities quoted is subject to a wide range of variation, they may give some indication of the effect of the M6 on the number of pleasure trips made to the Lake District. Journey times from the Manchester and Liverpool conurbations have been reduced by about one-fifth to one-quarter, so that there may have been an increase in trips of the order of magnitude of 30 to 40 per cent. Closer to the Lake District, journey times from the Preston area may also have been reduced by up to a fifth, resulting in an increase in trips of perhaps about 30 per cent. For half-day trips the percentage increase may well have been up to twice as great. In view of the high preponderance of pleasure traffic in the area, these results appear to conform quite well with the usual observed effect of a 30 per cent increase in traffic resulting from the opening of a motorway.

The Future

There is some tentative evidence that the income elasticity of demand for pleasure trips is higher than 1. Let us assume that, if a growth rate in the Gross National Product of some 3 per cent per annum is sustained, a minimum 4 per cent per annum increase in the demand for pleasure trips per head will result. Therefore, while the 1965 predictions of the county surveyors and planning officers in the *Report on Traffic in the Lake District National Park* of a doubling of traffic by 1974 might be considered high, this level will most certainly be reached by 1980 unless there is a drastic change in tastes, even without any further extension of M6. (This, of course, assumes there is sufficient capacity on the access routes to accommodate a doubling of traffic. If there is not, journey times will increase, and this will have the effect of damping down demand below the level predicted by the model.)

When the section of M6 between Carnforth and Kendal is opened, motorists from the south may be able to save about 15 minutes' journey time (and possibly more at weekends when traffic congestion in Kendal is heavy). If we continue to assume a speed of 30 to 35 m.p.h. on ordinary roads and 50 m.p.h. on the motorway, the average journey time from the zones served by M6 is at present approximately as shown in Table 4. The Table also shows the percentage reduction in travelling time which would follow the opening of the northern extension of M6. Since the time-cost elasticity of demand has been shown to be about 1.6, the expected increase in the number of pleasure trips from each zone is equal to 1.6 times the percentage reduction in journey time. The predicted percentage growth in traffic is shown in column 3 of Table 4.

But the zones served directly by the M6 account for only a proportion of all pleasure trips to the Lake District (see column 4 of Table 4). The effect of the Carnforth to Penrith extension on journey times from other zones will be much less – its main impact on these will be felt through the reduction of traffic congestion in and on the approaches to Kendal and Penrith. A saving of 5 minutes in a 2 to 2½ hour journey would perhaps lead to a 5 per cent growth in traffic; since this is the average order of time-saving which will accrue to zones not served by the M6 (which account for 66 per cent of the total number of pleasure trips), we may perhaps assume that the number of trips from them will increase by 5 per cent when M6 is open to Penrith. We arrive at the conclusion that the number of day and half-day

TABLE 4

Journey Times from Areas served by the M6

Area	*Average present journey time*	*Reduction with northern extension*	*Predicted growth in traffic*	*Proportion of total pleasure trips to the Lake District 1966*
	Mins.	%	%	%
North Lancashire	55	27.3	44	13.2
Central Lancashire	65	21.8	35	4.5
South West Lancashire	90	16.7	27	2.3
Manchester	110	13.6	22	6.1
Liverpool	110	13.6	22	3.2
Cheshire	130	11.5	18	0.7
North East Lancashire	90	16.7	27	3.7

Source (column 4): *Pleasure Traffic and Recreation in the Lake District*, Appendix C, Tables 5 and 6.

trips made to all parts of the Lake District might increase by 12 to 13 per cent; this is about the equivalent of two years' natural increase in the number of trips resulting from increasing incomes and wider car ownership.

CONCLUSIONS

The simple generation model considered here is an efficient predictor of the number of weekend pleasure trips from the north of England to the Lake District. The model included the assumption, however, that the attraction of a National Park would vary according to the strength of competing opportunities for recreation and relative travel costs to other areas. These might be expected to differ substantially between origin zones. The most striking result from the present analysis is that this expectation is not fulfilled. Less than 1 per cent of the variation in individual journeys from the catchment areas considered is "unexplained" by variations in cost or car ownership levels. Even if one regards variations in the *unweighted* zonal totals as a more reliable indication of differences in attraction, the results are not strikingly different. Only 6 per cent of the variation in day trips, and 3 per cent in half-day trips, is then unexplained by the simple model. (To some extent this may be a slightly false picture, since a high R^2 could occur despite large *proportionate* residuals from zones at a great distance from the National Park.)

More reliable information on differences in attraction might be obtained by comparing actual and predicted zonal trip indices (Table 5). There is a general tendency to over-prediction, but the percentage residuals vary greatly between zones, particularly in the case of full-day trips. As the *t*-values of the distance regression coefficients are 13.0 for day trips and 17.9 for half-day trips, this reflects more than chance errors of prediction. One might conclude, therefore, that there is some

TABLE 5

Predicted Numbers and the Actual Trip Index

Zone	Day trips		Half-day trips	
	Trip index	*Predicted trip numbers*	*Trip index*	*Predicted trip numbers*
1	38.98	38.79	17.98	17.03
2	23.81	21.23	7.83	8.58
3	8.47	10.13	3.00	3.24
4	7.86	2.73	1.65	—
5	6.06	6.77	1.67	1.63
6	7.10	9.00	0.83	0.87
7	4.71	6.48	0.46	1.49
8	3.55	5.20	0.85	0.87
9	8.24	3.98	0.42	0.28
10	3.48	2.80	0.35	0.37
11	3.48	5.44	0.31	0.99
12	3.38	8.08	0.38	2.26
13	3.08	5.20	0.59	0.81
14	3.54	1.40	0.00	—
15	0.74	1.68	0.07	—

evidence of differences between areas in the attraction of the Lake District, but they are not large enough to affect the overall trip generation pattern very much.

A further important revelation of the present study is the high "price" elasticity of demand for weekend pleasure trips. Millward, in a recent cost-benefit analysis of the Barrow Link Road (in the same general area as the Lake District National Park), implied that the elasticity of demand for all car journeys was as low as 0.19, as compared with 2 or more for pleasure trips suggested here. Although the responsiveness of all car journeys to price changes is probably less than that of pleasure trips alone, these findings suggest that present assumptions about trip demand warrant further investigations. [*Editor's note:* Millward's figure is also discussed by Higgie elsewhere in this issue].

The general model is also suitable for analysing the generation of main holiday trips, the principal limitation at the moment being lack of data. Few of the holiday surveys, such as those commissioned by the British Travel Association, are on a sufficiently large scale to be of use in the present context, while transportation studies are rarely carried out in holiday resorts. If the data problem were surmounted, analyses of recreation trip generation could usefully be mounted on a wider scale, and would provide much useful material for the planning of recreation as well as traffic.

ACKNOWLEDGEMENTS

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APPENDIX – THE DATA EMPLOYED

TABLE A1

Index of Trip Volumes

Area	*Full-day outings*	*Half-day trips*	*Observation weights*
Within 25 miles of National Park	100.00	100.00	—
North Lancashire	38.98	17.98	4.123
Central Lancashire	23.81	7.83	1.494
North East Lancashire	8.47	3.00	1.144
West Riding North	7.86	1.65	1.559
South West Lancashire	6.06	1.67	0.734
Durham	7.10	0.83	0.839
Tyneside conurbation	4.71	0.46	0.987
Manchester conurbation	3.55	0.85	1.922
Northumberland	8.24	0.42	0.183
Tees-side conurbation	3.48	0.35	0.288
Leeds/Bradford area	3.48	0.31	1.083
North Riding	3.38	0.38	0.174
Liverpool conurbation	3.08	0.59	1.039
Cheshire	3.54	0.00	0.227
West Riding South/Sheffield	0.74	0.07	0.201

Source: These indices were derived from the traffic data set out in Table 1 above, by taking as the base Zone 0 (not shown in Table 1) equal to 100.

TABLE A2

Distance, Car Ownership Levels

	Distance from the National Park	*Cars owned per 100 population*	*Distance travelled on M6*
Variable	*X*	*W*	*M*
Area	*Miles*		*Miles*
North Lancashire	32	48.78	—
Central Lancashire	42	48.51	27
North East Lancashire	57	40.41	27
West Riding North	86	54.35	—
South West Lancashire	66	39.82	44
Durham	72	38.82	—
Tyneside conurbation	67	34.89	—
Manchester conurbation	72	40.95	44
Northumberland	78	47.41	—
Tees-side conurbation	77	37.41	—
Leeds/Bradford area	71	38.70	—
North Riding	62	59.75	—
Liverpool conurbation	72	41.41	27
Cheshire	98	62.35	72
West Riding South	95	41.23	—

Sources: Distance from the National Park – a combination of distances between points, given in the A.A. *Members' Handbook.*

Zonal Car Ownership – *Sample Census of Population 1966.*

Ministry of Transport