An Alternative to Conversion Studies For Measuring the Impact of Travel Ads

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Research on the effectiveness of tourism advertising has relied on conversion studies, an attempt to ascertain how many inquirers from travel ads are converted into visitors. In spite of the methodological improvements in conversion research, only descriptive statements can be made. Severe conceptual problems remain when using conversion research. The approach presented here develops a behavioral model of tourism visitation with advertising as an independent variable. The approach is equivalent to estimating how aggregate advertising affects aggregate sales by estimating parameters of a general demand function.

Research on the effectiveness of tourism advertising has been based on conversion studies (Woodside and Ronkainen 1984; Ballman et al. 1984; Gray 1982; Woodside 1981; Ellerbrock 1981; Hunt and Dalton 1983). Advertising conversion research measures the number of inquiries from travel ads that are converted into visitors. Numerous methodological problems with conversion research have been documented (Woodside 1981; Woodside and Ronkainen 1984; Ellerbrock 1981; Ballman et al. 1984). Among the problems are improper sampling techniques; the failure to correct for nonresponse bias; failure to consider sampling precision; and failure to factor out of conversion estimates those respondents who had decided to visit a destination before being exposed to the advertising.

Recent attempts to identify and correct for the methodological problems in conversion research have not resolved conceptual difficulties. The crucial conceptual problem is lack of a causal model. Ballman et al. (1984) state,

> Most conversion studies naively use the term in a causal rather than a descriptive context . . . . Most studies fail to recognize that only descriptive statements regarding conversion estimates can legitimately be made . . . . Just exactly what caused these decisions to be made and how much can be credited to the advertising campaign are separate and highly complex issues.

Additional conceptual difficulties not addressed in the conversion literature are the two-way causality between advertising and visitation; the fact that conversion research samples only inquiries rather than the entire population subject to the travel ads; and that different media vehicles will have a reinforcement effect, making it impossible to evaluate each separately as suggested in conversion studies. Conversion research relies on the recall of the respondent. Recall is subjective, and it may be especially misleading when attempting to distinguish between inquirers who decided to visit a given destination area before requesting information from those who decided after requesting the information. No follow-up statistical testing has been performed to validate the accuracy of responses.

The objective for this article is to present an alternative to conversion research for measuring the impact of travel advertising. A method that evaluates travel advertising within the context of a causal model of tourism visitation is developed. The conceptual problems inherent in conversion research are avoided. The analysis evaluates the advertising expenditures for the City of Virginia Beach during the spring of 1981.

A MODEL OF TOURISM VISITATION

The model of tourism visitation is based on a technique developed for valuing non-market goods, the "travel cost method" (Clawson 1959; Clawson and Knetsch 1966; Dwyer, Kelly, and Bowes 1977). The travel cost method allows construction of a demand function for visits to a site (summer vacation trips to Virginia Beach, Virginia) by viewing trip costs per visit as the price variable and the visitation rate as the quantity variable. It is assumed that individuals react to changes in travel costs in the same manner that they would respond to changes in overt prices such as entry fees. The result is a negative relationship between distance and visitation.

In the basic version of the travel cost model, per capita visitation is a function of travel costs or distance alone. The basic model may be extended by adding explanatory variables, including travel advertising. One extended model is given by the following expression:

(1) $V_{ij}/P_i = F(C_{ij}, Y_{ij}, S_{ij}, A_{ij})$; where

V_{ij} = the number of individuals from the ith origin zone visiting the jth recreation area;

P_i = population of the ith origin zone;

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C_{ij} = travel cost per party of visitors from the ith origin zone to the jth recreation area;

Y_{ij} = median income level of visitors from the ith origin zone to the jth recreation area;

S_{ij} = an index of the degree of substitutability of alternative recreation sites to an individual from origin i visiting site j.

A_{ij} = a measure of the advertising for recreation area j in origin zone i.

The above model explicitly recognizes that advertising is only one of multiple factors that influence visitation to a recreation site. Multiple regression is employed to estimate the model.

An implicit assumption of multiple regression is that the cause-and-effect relationship between visitation and the independent variables is unidirectional: that is, the explanatory variables are the cause and visitation is the effect. However, in the present case there may be a two-way flow of influence. Advertising affects visitation, but advertising is also influenced by visitation. Visits tend to result in advertising because travel ads are generally targeted to areas with relatively high visitation rates, so that when an area increases in its visitation rate advertising is then also increased in that area. The result of the two-way flow of influence between visitation and advertising is that the ordinary least-squares estimates may be biased and inconsistent. The appropriate statistical method is two stage least-squares (2SLS).

Advertising expenditures in equation 1 are evaluated within the context of a behavioral model of visitation. In contrast to the descriptive statements from a conversion study, inferential conclusions can be drawn regarding how many individuals vacation in a destination area because of exposure to the ad campaign. All individuals exposed to the ad campaign are included rather than only those inquiring about information, and any feedback effect of visitation on advertising is controlled for statistically using 2SLS. The conversion method does not recognize the possibility of a two-way causality between visitation and advertising.

DERIVING A TRAVEL COST MODEL

To illustrate the method we present a sample travel cost model for overnight trips to the Virginia Beach, Virginia Shoreline. Estimation of the model developed above requires sample data on the following: (1) the number of visits from a set of adjacent visitor origin zones; (2) an independent estimate of correct visitation; (3) the total population and mean family income of each origin zone; (4) distance or travel cost from each origin; and (5) a standardized measure of advertising in each origin zone. The data sources and the generation of the required variables for the present example are detailed below.

Per Capita Visitation

Data on visitation per origin zone and the estimate of total visitation were obtained from the city of Virginia Beach. The city commissioned a survey in 1981 of all overnight visitors registering at nine hotels located in the prime area of the resort strip. Approximately 25,000 individuals from 450 different city-county origin points were interviewed during the peak use period of the summer season, Memorial Day through Labor Day. Complete data on 300 origin zones were available for this study. The fact that the sample was drawn from registries of nine hotels introduces a sampling bias since these hotels were not drawn at random from the "universe" of hotels. While the approach presented here avoids the conceptual problems inherent in conversion research, it is just as susceptible to the methodological difficulties of sampling and nonresponse bias.

The independent estimate of total overnight visitation for 1981, 1 million, was obtained from the Virginia Beach Tourist Development Bureau. The estimate is based on the total number of accommodations, average length of stay, and occupancy rates. Given the estimate of total visitation, the origin sample was then used to generate the per capita visitation variable by origin. This was done by assuming that the percentage of the visitor sample from a given origin was equal to the percentage of the total visitation from that origin. For example, if 5% of the visitor sample was from the city of Richmond then this implies that total overnight visitation from Richmond would equal 50,000 (.05 X 1.0 million). To create the per capita visitation variable, estimated visitation from each origin zone is divided by the population of that zone. The procedure is generalized by the following expression, $[(X_{ij}/N_j)*Y_j]/P_i]$, where: X_{ij} is the number of respondents in the origin survey from origin zone i to recreation site j; N_j is the total number of respondents in the survey; Y_j is the total visitation to recreation site j; and P_i is the total population of origin i.

Population and Income

Population and median income data from each origin point were furnished by the Reuben H. Donnelley Advertising Service. If such a data source is not available, the required information may be obtained from census data or other sources. The coefficient of the income variable is hypothesized to be positive: recreation service provided by the site is a normal good.

Travel Costs

Economic theory suggests that travel cost be treated as a combination of direct (the variable cost of travel) and indirect (the opportunity cost of time) outlays. This version of the travel cost variable is appealing on theoretical grounds. However, if complete data on travel cost are not available, distance from the site is an acceptable proxy. The direct costs of travel by private automobile are easily calculated. The indirect cost, however, will differ according to the individual's valuation of time. Resolution of this problem is therefore arbitrary to some extent. Most researchers have opted for valuing travel time at some fraction of the average wage rate for the visitor's origin zone. This is based upon the presumption that recreation travel provides some satisfaction or utility apart from its objective of arrival at the site.

The travel cost variable equals the sum of the round-trip cost of automobile operation and the opportunity cost of travel time. According to the American Automobile Association, the variable cost of operating an automobile in 1981 was $.07 a mile. This figure was multiplied by the round-trip mileage from all origin points to Virginia Beach. To calculate the opportunity cost of travel time, the duration of a trip in hours was computed by assuming a 50-mile-per-hour rate of speed (the AAA standard per hour). Valuation of travel time for each origin was set equal to ⅓ of the wage rate for adults and 1/12 of the wage rate for each child. The wage rate for each origin was calculated by dividing median family income of that origin by the number of working hours in a year (2,080). The number of adults and children was determined by assuming that the first two individuals in a party were adults and the remaining persons were children.

The travel cost coefficient is hypothesized to have a negative sign: as travel cost (price) increases via the effect of distance, per capita visitation will decline.

Substitute Recreation Areas

The effect of substitute recreation areas on visitation to Virginia Beach is analyzed by means of dummy variables in the travel cost equation. Interviews with Virginia Beach tourism officials revealed that Ocean City, Maryland and Myrtle Beach, South Carolina are considered to be the alternative recreation sites for visitors to Virginia Beach. Dummy variables rather than distance were created for each of those sites owing to the multicollinearity between distance to Virginia Beach with distance to the alternative sites. Alternative measures such as the relative attractiveness of the beach and differences in the cost of accommodations were also rejected because of statistical insignificance or lack of variation among the beaches.

The Ocean City dummy variable takes on the value 1 if the ith origin is closer to Ocean City than Virginia Beach and 0 otherwise; likewise, the Myrtle Beach dummy variable takes on the value of 1 if the ith origin is closer to Myrtle Beach than Virginia Beach and 0 otherwise. The coefficients of the two dummy variables are hypothesized to be negative. The closer an origin zone is to an alternative recreation site, the lower will be visitation to Virginia Beach from that origin.

Advertising

A media schedule for the spring of 1981 was provided by the city of Virginia Beach. Advertising took place in 77% of the origin zones used in the travel cost model. The breakdown by media was TV, 3.8%; radio, 53.8%; and newspaper, 68.9%. The media mix was television, radio and newspaper, 3.8%; newspaper and radio, 37.5%; newspaper only, 27.7%; and radio only, 5.3%. The number of gross rating points (GRP) per week per market for TV was included with the media schedule. Radio and newspaper GRP were not included. Information on radio were a list of markets, stations selected in each market, the number of spots per week aired, the number of weeks the spot was aired, and the target audience. Included for newspapers were a list of the newspapers bought and the total number of times ads of a given size were run.

Gross rating points, adjusted for exposure, were generated for each origin zone. The crucial issue was determining the market for each media buy and matching that market to the origin zones in the Virginia Beach travel cost model. Information on reach, frequency and exposure is required for a buy in each origin zone. The advertising agency for the city of Virginia Beach assisted in delivering the advertising measure. Data sources included the Newspaper Circulation Analysis published by SRDS, Inc.; Arbitron ratings; and information supplied directly by individual radio and TV stations.

RESULTS

The Virginia Beach travel cost model was estimated using the semilog functional form (Ziener 1980; Strong 1980). The sample size was truncated to exclude city- county origin points which were extreme outlyers (Smith and Kopp 1980). The final origin sample was 264. Results of the OLS and 2SLS equations are presented in Table 1.

TABLE 1
TRAVEL COST MODEL FOR OVERNIGHT VISITATION TO VIRGINIA BEACH

Independent Variable	Mean Value [a]	OLS	2SLS
Travel cost	$122.22	−0.00207* (0.001149)[b]	−0.002895* (0.001467)[b]
Median family income	$15,378	0.000011 (.000015)	0.000023 (.000020)
Ocean City	.5038	−1.10136* −(0.148605)	−1.01706* (0.179245)
Myrtle Beach	.0795	−1.605523* (0.212792)	−1.65422* (0.234811)
Advertising	1.01482	0.413575* (0.058013)	0.298919* (0.124662)
Constant		−3.58888* (0.221616)	−3.60211* (0.240128)
R^2		0.525	0.518
F-value		57.05*	55.43*

[a] Mean value of per capita visitation, the dependent variable before conversion to logarithm, is .544.
[b] Standard errors are presented in parentheses below the estimated regression coefficient.
* Statistically significant at the .05 level or less.

The signs of all explanatory variables in the OLS model conform to expectations. With the exception of median family income all variables are statistically significant at the 95% level of confidence. The insignificant income variable is not due to multicollinearity between income and travel costs. A model estimated excluding advertising yields a statistically significant income coefficient. Rather, advertising expenditures and income appear to be related, although no pairwise multicollinearity was detected. The adjusted R_2 value reveals that 52% of the variation in visitation rates is explained by the model.

Direct application of OLS will result in biased and inconsistent estimates of the coefficients owing to the simultaneity between per capita visitation and advertising. The simple correlation between these variables is .41 and per capita visitation is statistically significant in an advertising OLS equation. The correction for simultaneous equation bias is to estimate the model using two-stage least squares (2SLS).

The factors influencing advertising are population, median family income, log of per capita visitation, and a dummy variable for origin zones that receive Pittsburgh TV stations. Television advertising was undertaken in 1981 on an experimental basis only in the Pittsburgh market. Application of 2SLS involves first regressing advertising on all exogenous variables in the two-equation model (DISTANCE, OCEAN, MYRTLE, INC, POP, TV and the constant term) and then using the resulting predicted values as an instrument for advertising in the travel cost model.The estimates will be unbiased and consistent.

Given that the correlation between advertising and per capita visitation is positive, we expect the unbiased 2SLS estimate of advertising to be less than the biased OLS estimate. The 2SLS results are consistent with our expectation. The advertising coefficient is less using 2SLS. All variables have the expected sign and are statistically significant with the exception of income. The elasticity coefficient for advertising in the 2SLS estimation is 0.49, indicating decreasing returns to advertising. The advertising elasticity of visitation was calculated by increasing all values of advertising by 1% and calculating the estimated percentage change in visitation.

The models in Table 1 can be used to estimate the number of visitors who went to Virginia Beach because of advertising. The procedure is to calculate the estimated visitation from the models in Table 1 and then compare the results to the estimated visitation, setting advertising equal to zero. Estimated visitation is calculated by taking the antilog of the expected Y-value (dependent variable) and multiplying the result by population. The visitation estimate for each origin is summed to arrive at total visitation. The visitation estimate including advertising (779,346 in the OLS equation) implies that the origins used account for approximately 75% of the total visitation to Virginia Beach during 1981.

The findings, reported in Table 2, suggest the impact of advertising. Specification bias exists since it is anticipated that current and past advertising are positively correlated. The carryover effect of past advertising is not taken into account owing to the unavailability of data. The models in Table 1 result in an upward bias on the effect of current advertising on current visitation.

TABLE 2
IMPACT OF ADVERTISING ON VISITATION

	Estimated No. of Visitors	
	OLS	2SLS
Including advertising	779,346	723,790
Without advertising	392,346	456,142
Net impact of advertising	387,000	267,648
Impact of advertising as a % of visitation	50%	37%

The impact of advertising on visitation in the OLS equation is 387,000 visits. This may be considered an upward bound on the effectiveness of advertising. The positive two-way flow of influence between advertising and visitation is not taken into account and the carryover effect of past advertising overstates the impact of current advertising. The 2SLS estimates indicate that the effectiveness of advertising is 267,648 visits. Not controlling for the two-way flow of influences between advertising and visitation overstates the impact of advertising by 44%.

The impact of media mix on visitation can be ascertained by creating interaction terms, the multiplication of dummy variables for the different media combinations, and advertising. The OLS results of this estimation are presented in Table 3. All variables have the expected sign and are statistically significant at the 5% level with the exception of median family income and advertising by radio only. The results are consistent with those reported in Table 1. A 2SLS estimation for media mix was not feasible. The 2SLS model was under- identified; thus, no solution to the system of equations was possible.

TABLE 3
TRAVEL COST MODEL FOR OVERNIGHT VISITATION TO VIRGINIA TYPE OF MEDIA EXPOSURE

Independent Variable	Mean Value	Estimated Coefficient
Travel cost	$122.22	−0.002077** (0.001262)[a]
Median family income	$15,378	0.000012 (0.000017)
Ocean City	.5038	−1.10456* (0.150839)
Myrtle Beach	.0795	−1.5789* (0.216088)
Advertising by TV, radio & newspaper	0.111049	0.421344* (0.091726)
Advertising by newspaper & radio only	0.711644	0.41596* (0.068465)
Advertising by newspaper only	0.166182	0.522933* (0.158526)
Advertising by radio only	0.025947	0.596625 (0.409045)
Constant		−3.63681* (0.231214)
R^2		0.526
F-value		35.43

[a] Standard errors are presented in parentheses below the estimated regression coefficient.
* Statistically significant at the .05 level or less.
** Statistically significant at the .10 level.

The total and average impact of media mix on visitation to Virginia Beach is displayed in Table 4. The combined impact of advertising (392,158) is consistent with the OLS results reported in Table 2. Exposure to the combination of radio and newspaper advertising had the largest total impact, 292, 491 visitors. The total impact of advertising, however, is influenced by the number of gross rating points and the number of origins experiencing a specific media combination. A standardized measure of advertising effectiveness for each media combination is the average gain in visitation per unit of advertising. This figure clearly demonstrates that combinations of media vehicles will have a reinforcement effect. The average impact of radio and newspaper is substantially larger than radio or newspaper separately. The average impact of TV radio, and newspaper is substantially larger than radio and newspaper combined.

TABLE 4
IMPACT OF ADVERTISING BY MEDIA MIX ON VISITATION

Media Mix	Estimated No.of Visitors: Total Impact	Estimated No.of Visitors: Average Per Adv. Unit
Exposure to TV, radio and newspaper	66,993	2,285
Exposure to radio and newspaper	292,491	1,557
Exposure to newspaper only	28,172	642
Exposure to radio only	4,502	657
Total	392,158	

CONCLUSIONS

Limitations of Our Approach

The 2SLS estimation presented allows classical statistical inferential statements to be made. Such inferential statements are conditional on proper specification of the model. One should be aware that omitted variables and linear specification of a nonlinear relationship create biases which place a caveat on inferential statements. This caveat clearly applies to our example since past advertising was omitted from the model.

There are additional limitations with our approach. Conversion research uses individual data while the travel cost model has origin zones as observations. The travel cost model is subject to the problem of aggregation bias, which does not occur in conversion research. Our data, moreover, contain a sampling bias since the sample was not selected from the entire universe of visitors to Virginia Beach.

In summary, the approach presented here is suggested as an alternative to conversion research. It can serve as a check on the results of conversion research and will enable research on tourism advertising to move into the mainstream of research on the impact of advertising (see Assmus et al. 1984). Both approaches, however, suffer from methodological difficulties. As Woodside (1981) argues, to really ascertain the influence of advertising on visiting would require a true experiment using treatment and control groups with random assignment of subjects to groups.

Suggestions for Future Research

The data requirements of our approach are not restrictive. Improvement in model specification of both the visitation and advertising equations, especially a measure of past advertising, will yield more reliable and precise estimates of the impact of travel advertisements on tourism. These refinements require richer data than those at our disposal, which should not prove difficult to obtain if the evaluation of advertising is planned at the same time as the media campaign. The approach presented is also flexible enough to address issues such as the impact of media types and combinations of media.

Finally, we have a suggestion on how the data used in conversion research may be adapted to multivariate statistical techniques. A model can be specified with the probability of visiting a destination (1 if visited; 0 if not) as the dependent variable. The independent variables might be the demographic characteristics and past vacation behavior of respondents, the level of advertising in the origin of the respondent, and distance from origin to the destination site. If advertising varies by origin, then the model can determine the impact of advertising on the probability of visiting after controlling for other factors expected to influence the visit decision. A conversion rate can readily be generated. The above approach will be more representative if the respondent data are a random sample of households in various markets rather than a random sample of those requesting information.

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