

A Gravity Model Analysis of The Effect of Regional Policies to Attract Foreign Tourists

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Abstract

One of the cornerstones of the USTTA's attempt to attract foreign tourists to the U.S. has been the initiation of regional cooperative market ventures. The USTTA has focused on this type of promotion because of evidence that foreign tourists typically visit more than one state and because of the perceived advantage of cost sharing and volume discounts inherent in the regional approach. This study utilizes the gravity model to empirically estimate the effectiveness of the regional promotion approach. The empirical results suggest that while regional marketing is somewhat effective, it may not be as effective as devoting resources to upgrading tourist attractions and their surrounding amenities.

Introduction

Foreign tourism has become one of the fastest growing segments of the U.S. travel industry. In recent years growing affluence in foreign countries, a cheaper dollar and aggressive promotional campaigns through the foreign travel vendor network have contributed to this growth.

States attracted by the potential economic contribution of foreign tourists, have participated in a program initiated in 1985 by the U.S. Travel and Tourism Administration (USTTA) which utilizes regional (multistate) promotional organizations to capture the foreign tourist market. Such a program is based on the rationale that foreign visitors take extended journeys through several states on a typical excursion. Regional promotions tend to be cost-effective because of cost sharing and volume discounts.

This study presents one possible approach to analyze the economic impact of this program at the state level. The model is a modified gravity equation and is tested for its explanatory power. The results bring into question the potential value of this approach.

The Special Qualities of Foreign Tourists

Table 1 displays the purpose of travel to the United States from several key foreign origins for 1986. While not all foreign travel is tourist related, the data clearly shows that the majority of foreign travelers do arrive for "pleasurable purposes".

In his classic study H. Peter Gray (1970) identified some of the special qualities of international tourists as opposed to domestic tourists. We distinguished two basic travel motives for the foreign tourist. "Wanderlust" denotes the desire to experience other cultures and climes first hand. The other, "Sunlust", connotes the desire to consume travel amenities superior than those available within one's region. These motives are especially critical in explaining travel from small homogeneous nations to large diverse nations such as the U.S. These motives are related to key elements in the travel decision. A "Wanderlust" tourist would be most sensitive to cultural and geographic amenities and the overall quality of the transportation network. A "Sunlust" traveler is relatively sedentary and would be most concerned with the amenities and the climate at a particular site. Lundberg and Lundberg (1985) make a similar distinction, separating tourists into "Quiet Lake persons" (similar to Sunlust) and Overseas Travellers (similar to Wanderlust).

In analyzing more specific factors of demand, Gray focused on income and foreign exchange rates. Gray hypothesized that foreign travel is a normal good with a high income elasticity, i.e., it is perceived as a luxury item. Along with travel services, prices, and transportation fares, the exchange rate determines the final cost of travel and the purchasing power of one's money abroad. Not only is foreign travel relatively expensive, foreign tourists tend to purchase a wide range of goods and services. Relative exchange rates are critical in choosing

Table 1
Purpose of Travel to U.S. (%)

<u>Purpose</u>	<u>France</u>	<u>Germany</u>	<u>U.K.</u>	<u>Japan</u>	<u>Overseas</u>	<u>Canada</u>
Business	44.1	35.3	34.6	30.5	35.8	
Conventions	11.8	9.8	7.6	8.9	9.9	10.8
Vacation	37.3	40.6	46.6	54.2	46.1	56.6
Family	30.5	42.4	50.6	12.9	20.8	22.8
Other	8.3	9.4	4.2	12.3	7.6	9.7

Source: USTTA, 1987

a final destination, since the foreign traveler may have several potential destinations in mind before settling on a final location. Empirically estimating demand for foreign travel in Canada, Great Britain, West Germany and the United States, Gray determined that demand is elastic with respect to income in all four countries and elastic with respect to exchange rates in Canada and the United States (1970, p. 86).

U.S. Public Policy Toward Foreign Tourism

Since succeeding the US Travel Service in 1981 the USTTA has been charged with promoting foreign tourism to the United States. Operating under severe budget constraints, the USTTA has emphasized the formulation of marketing plans which utilize the resources of state and local TPAs (Travel or Tourism Promotion Agencies) and the private sector. Included in its activities are: 1) sponsoring regional marketing seminars throughout the U.S. and an annual tourism conference; 2) conducting market research aimed at identifying high potential foreign markets; 3) staffing 10 foreign field offices; 4) sponsoring cooperative promotional ventures; and 5) evaluating cooperative efforts. (Seely, 1987, pp. 11-12).

The USTTA interest in cooperative marketing ventures is based on a general objective of optimizing scarce funds and is based upon the following considerations: 1) most tourism enterprises lack the knowledge and the resources to develop effective foreign tourist campaigns; 2) the large chain operations promote only their destinations and operations leaving many good locations unpromoted; 3) studies indicate that foreign tourists visit at least two states when they make extended visits; and 4) there are economies of scale in regional promotional campaigns.

In addition the USTTA works with destinations in upgrading their amenities to meet the standards required by the foreign tourist, including the training of multilingual personnel, the placement of universal signage at strategic locations, the promotion of currency exchange services, the development of special cuisines to meet the religious or dietary needs of international travelers, and the marketing of medical insurance programs aimed at the international visitor.

The lack of funding has hindered the USTTA in its ability to adequately promote all of its programs and therefore has limited the agency's ability to realize its potential. Despite the fact that foreign tourism is by definition an export industry and therefore could significantly improve our sagging balance of payments, the fiscal crisis of the federal government has kept tourism a low priority industry. States have displayed different attitudes towards co-operative promotional ventures as well. States with already active foreign tourist markets consider co-operative ventures of marginal benefit, and consider such programs harmful since they enhance the visibility of neighboring states, potential direct competitors.

Theoretical Model

The effectiveness of the USTTA's marketing approach will be analyzed through the theoretical construct of the gravity model. The gravity model is a common feature of regional economic analysis. Briefly, the model is a mathematical formulation designed to predict the level of interaction between two populations or geographic points. In terms of tourism, the model would predict the flow of tourists from origin j to destination i as a direct function of each point's population and as an inverse function of the distance between the two points. Population serves as a proxy for the forces of propulsion

and attraction. Distance serves as a source of friction which would inhibit interaction. Other variables can easily be incorporated into this basic formulation as will be demonstrated shortly.

The gravity model has generally performed well in empirical studies on economic interaction. However, the model lacks a firm theoretical base in economics, and only a resort to restrictive assumptions has been able to strengthen the model's underpinnings (see Anderson, (1979) and Bergstrand (1985)). Because of the fundamental nature of tourism, which weighs the attractiveness of a location against the difficulty of travelling there, we believe the model presents appeal for this particular analysis.

The interaction variable to be analyzed is the flow of tourism from foreign sources to the United States. Because our intent is to analyze economic impacts, we have chosen to utilize the level of tourism related expenditures generated from origin country to the several U.S. destinations soon to be delineated.

We also modify the population variables. While we still employ the population of the source country we replace the population of the destination region with a measure designed to capture the presence of tourism in the destination region. To that end we utilize the level of tourism related employment in the host region. This was measured by taking the 30 SIC 4-digit code industries that the USTTA recognize as elements of the U.S. tourism industry, and selecting those that the authors view as relating directly to foreign tourism. These are listed in Table 2.

Table 2
Foreign Tourist SIC Codes

4119	Sightseeing Buses
4121	Taxicabs
4459	Sightseeing Boats
4511	Commercial Air Transportation
4581	Sightseeing Airplane Service
4722	Travel Agencies and Tour Operators
6052	Foreign Exchange Establishments
7011	Hotels, Motels, and Tourist Courts
7512	Passenger Car Rental and Leasing

To provide a more accurate model we add several pertinent economic variables. We include a measure of income of each source country, based on the income elasticity associated with tourism. We also include a variable known as competing destinations and one called intervening opportunities.

The former concept signifies the fact that each U.S. destination is in effect competing with all other possible destinations. This competition exists on the basis of: a) the forces of agglomeration which render some destinations more efficient than others in serving tourists; b) the hierarchical nature of foreign tourists' decisions regarding destinations which initially places each region on an equal footing with each other and c) the factor of isolation which results in some destinations being perceived more distinctly than others because they are easily identified.

The impact of competing destinations on the decision of an individual in origin country *j* considering travelling to destination *i* is directly related to the tourist attractions and amenities at the other *k* possible destinations (provided by tourist-related employment) and inversely related to the distance. This is measured by:

$$C_{ij} = \sum_{k=1}^n E_k/D_{kj}, \quad k = i$$

where *C* is the measure of the impact of the competing destinations, *E* is the tourist-related employment in each region, and *D* is the distance from the origin country to each competing destination. Any increase in the attractiveness of other destinations, caused perhaps by an increase in tourist amenities or accessibility, will decrease the number of tourists to destination *i*.

The notion of intervening destinations differs from that of competing destinations. Given two destinations, *i* and *i'*, which are of equal distance from origin *j* and identical in every way, it would be expected that the trips between *i* and *j* and *i'* and *j* would be equal (i.e., $T_{ij} = T_{i'j}$). However, if there exists an intervening opportunity, *r*, directly between *j* and *i*, it would be expected that this would have a negative impact on trips to *i*, and therefore $T_{ij} < T_{i'j}$. This intervening effect is in addition to, not in place of, the fact that *r*, *i*, and *i'* are also competing destinations. If a measure of intervening opportunities was left out of the model the number of tourists to destination *i* would be overpredicted (Baxter and Ewing (1979), p. 326). This variable is specified as

$$I_{ij} = \sum_{k=1}^n E_k/D_{kj} \quad \text{for all intervening destinations}$$

As with competing destinations, an increase in the attractiveness or accessibility of an intervening destination will reduce the flow of tourists from origin *j* to destination *i*.

This study only considers competing and intervening destinations within the United States.

In addition a foreign exchange variable is utilized. The measure used is the ratio of the exchange rate of each foreign origin currency with respect to the dollar for the year 1986 divided by the rate for 1985. This measure allows for changes in the exchange rate which could affect the level of tourism from each foreign country to the U.S.

Table 3
State Comprising
Tourist Census Divisions

<u>New England</u>	<u>Southeast</u>
Connecticut	Alabama
Maine	Delaware
Massachusetts	Florida
New Hampshire	Washington, DC
Rhode Island	Georgia
Vermont	Kentucky
	Maryland
<u>East North Central</u>	Mississippi
	North Carolina
Indiana	South Carolina
Illinois	Tennessee
Michigan	Virginia
Ohio	West Virginia
Wisconsin	
<u>West North Central</u>	<u>West South Central</u>
Iowa	Arkansas
Kansas	Louisiana
Minnesota	Oklahoma
Missouri	Texas
Nebraska	
North Dakota	
<u>Middle Atlantic</u>	<u>Mountain</u>
New Jersey	Arizona
New York	Colorado
Pennsylvania	Idaho
	New Mexico
	Utah
<u>Pacific</u>	Wyoming
Alaska	
California	
Hawaii	
Oregon	
Washington	

Finally the model includes a public policy variable, the sum of the foreign advertising budgets for each state in each of the USTTA tourist census regions (Table 3). Therefore, the actions of each state within each region are assumed to benefit the region as a whole.

The final form of the model is as follows:

$$T_{ij} = a E_i^b P_j^c Y_j^d C_{ij}^e I_{ij}^f D_{ij}^g X_j^h A_j^i$$

Where

- T_{ij} = expenditures of tourists from origin j in region i
 E_i = tourist related employment in region i
 P_j = population in origin country j
 Y_j = per capita income in origin country j in dollars
 C_{ij} = competing destinations for trips from j to i
 I_{ij} = intervening opportunities between j and i
 D_{ij} = distance between major airport in country j and airport in region i
 X_j = exchange rate ratio
 A_j = sum of states' foreign advertising budgets in region j

It is expected that:

$$b, c, d, i > 0$$

$$e, f, g, h < 0$$

Empirical Results

The model is tested for 12 origin countries and the eight tourist destination regions delineated by the USTTA (Table 3), yielding a total of 96 interactions. The twelve origin countries are Canada, Mexico, Brazil, Venezuela, Japan, Australia, Great Britain, West Germany, France, Switzerland, Italy and the Netherlands. Data for tourist expenditures were utilized for the year 1986 as estimated by the USTTA (1988) and reflect the expenditures in each regional destination by tourists from each origin. All other variables were measured for 1986 as well. The equation was estimated in log-linear form, transforming the variables' exponents into coefficients of elasticity. The equation was adjusted for heteroskedasticity by use of White's correction (White 1980).

The results are presented in Table 4. All the variables were significant at the .99 level except distance and competing destinations. All variables show the correct signs and there was no multicollinearity detected.

The lack of significance displayed by the distance variable was unexpected given the fact that distance is a key element of the gravity model. However, in international travel, time may be a superior specification for distance than miles.¹ For example, a trip by automobile from Montreal to New York City consumes as much time as a flight from Paris to New York, although Paris

is considerably more distant from New York. The lack of significance displayed by the competing destination variable may be explained by the fact that in international travel competing destinations are nations rather than regions.

Table 4
Regression Results

<u>Variable</u>	<u>Coefficient</u>	<u>T-Statistic</u>
Constant	-39.53	7.23**
Employment	1.46	9.06**
Population	.87	7.62**
Income	1.53	5.93**
Competing Destinations	.31	1.26
Intervening Opportunities	-.14	4.37**
Distance	.98	.39
Exchange Rate	-1.80	3.36**
Advertising	.61	2.67**

F = 25.87** R² (Adj.) = .70

* - significant at .95 level
** - significant at .99 level

As noted above, exponents for each variable are transformed into coefficients of elasticity when a log-linear form is utilized. The most elastic variable was found to be exchange rates, a result consistent with Gray's findings. The most inelastic variable was found to be regional advertising expenditures, a finding which suggests that the USTTA's regional approach to tourism promotion may not be cost effective.

The tourism employment variable displays an elastic coefficient. This variable can be viewed as a proxy for the availability of tourist attractions and amenities. When compared to the highly inelastic coefficient for advertising expenditures, the result obtained for tourism employment suggests that the quality of the tourism product in a given location is of greater importance than the level of promotional expenditures. Therefore, a state with scarce tourist promotion funds would be well advised to place its priority on enhancing the quality of its tourist attractions and amenities, rather than on foreign advertising. Similarly, the USTTA's approach of coordinating regional advertising is seemingly a less effective use of its resources than its other programs aimed at improving local foreign tourist amenities.

Conclusion

This study is only a first step. Because only a cross-sectional sample was utilized it is premature to judge the impact of the USTTA program. As more data becomes available we hope to develop a clearer picture of the relationships developed in this study. However, the gravity model did perform well in terms of its explanatory power and with more data and some modifications to the distance variable we hope to improve the power of this model.

The results do point to one principle of tourism policy which is often ignored. No matter how intense a promotional campaign for tourism is, there is no substitute for a quality product. This point is especially true with respect to foreign tourists who generally tend to be more sophisticated and more affluent than the domestic tourist. The USTTA has emphasized the need to develop the product as well as the promotional program. Our model suggests that existing promotional programs could be more effective if emphasis is placed upon improving the quality of tourist services.

Suggestions for Future Research

As more data becomes available researchers studying foreign tourism need to perform cost-benefit calculations of spending resources on foreign tourism development as opposed to other regional economic development initiatives. Among the information that must be flushed out to conduct this cost-benefit analysis is the value of the employment multiplier for each type of regional economic development program (including foreign tourism). Different types of regional economic development stimulate different types of jobs, some high-paying and some low-paying, and with varying degrees of regional linkages. It is also necessary, in order to tackle this cost-benefits problem, to deal with the age-old problem of identifying the amount of regional economic activity that would have taken place even in the absence of specialized programs such as foreign tourism development. This is no easy task. However, the cost-benefit calculations must be performed in order to provide policy makers with the information needed to best utilize scarce economic development resources.

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Endnote

1. It was suggested that the distance variable be measured by the cost of travel (e.g., air fare). The authors agree that this is an excellent suggestion. However, it proved to be impractical given the myriad of commercial airline fares and the varying

discount policies, as well as the variety of charter air fares.

*****References*****

1. Anderson, J. E. "A Theoretical Foundation for the Gravity Equation", *American Economic Review*, Vol. 69, No. 1, pp. 106-116, 1979.
2. Baxter, M. J. and G. O. Ewing, "Calibration of Production-Constrained Trip Distribution Models and the Effect of Intervening Opportunities," *Journal of Regional Science*, Vol. 19, No. 3, pp. 319-330, 1979.
3. Bergstrand, Jeffrey H., "The Gravity Equation in International Trade: Some Microeconomic Foundations and Empirical Evidence." *Review of Economics and Statistics*, Vol. 67, No. 3, pp. 474-81, 1985.
4. Bikker, Jacob A., "An International Trade Flow Model with Substitution: An Extension of the Gravity Model", *Kyklos*, Vol. 40, No. 3, pp. 315-337, 1987.
5. Gray, H. Peter, *International Travel - International Trade*, Lexington Books, Lexington, MA, 1970.
6. Haynes, Kingsley E. and A. Stuart Fotheringham, *Gravity and Spatial Interaction Models*. Sage, Beverly Hills, 1984.
7. Hua, Chang-i and Frank Porrell, "A Critical Review of the Development of the Gravity Model", *International Regional Science Review*, Vol. 4, No. 2, pp. 97-126, 1979.
8. Lundberg, Donald E. and Carolyn B. Lundberg, *International Travel and Tourism*, Wiley, New York, 1985.
9. Seely, Richard. "USTTA's Cooperative Marketing Program Stimulates New Business", *Business America*, Vol. 10, No. 4, pp. 11-12, 1987.
10. Tuttle, Donna F., "Whether Your Business is Tourism or Not, Tourism is Your Business", *Business America*, Vol. 10, No. 4, pp. 3-8, 1987.
11. United States Travel and Tourism Administration. *Impact of Foreign Visitors' Spending on State Economies*, 1985-86, Washington, DC, 1988.
12. _____, *The Impact of Foreign Tourism on the United States Lodging Industry*, Washington, DC, 1987.
13. _____, *Marketing U.S. Tourism Abroad: A Manual of Cooperative Marketing Programs in USTTA Markets*, Washington, DC, 1988.
14. White, Halbert, "A Heteroskedasticity - Consistent Covariance Matrix: Estimation and Direct Test for Heteroskedasticity", *Econometrica*, Vol. 48, No. 4, pp. 817-38, 1980.