VARIATIONS IN ECONOMIC MULTIPLIERS OF THE TOURISM SECTOR IN NEW HAMPSHIRE

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Abstract

The New Hampshire Fiscal Year 2002 Tourism Satellite Account, prepared for the Division of Travel and Tourism by the INHS, reports a state tourism output multiplier of 2.61. Tourism output multipliers for other New England states are generally around 1.60. The state-level output multiplier estimated in this study was 1.51 (using the economic modeling software IMPLAN and 1999 New Hampshire County Data). The variations in this multiplier across the seven regions in New Hampshire varied from 1.32 to 1.48. Further, output multipliers have a positive relationship to the natural log of population, and job multipliers have an inverse relationship to the natural log of population.

1.0 Introduction

The state of New Hampshire keeps data on tourism statistics through the Department of Resource & Economic Development. The Tourism Satellite Account for New Hampshire (INHS 2002) highlights tourist data on spending in seven regions of the state and across the four seasons of the year. Along with this data, the report also includes state level multipliers for the tourism sector on total value, income, and jobs.

Few tourism analysts and recreation managers have formal training in regional economic methods and most are not familiar with input-output models or multipliers. One of the most common errors in tourism impact studies is the application of state level multipliers to sub-state regions. Multipliers indicate the interdependence of industry sectors within a regions economy and are influenced by the size of the region and population (Tooman 1997; Baaijens et. al. 1998; Propst and Gavrillis 1987; Chang et al. 1999).

The purpose of this study is to determine regional tourism multipliers for the state of New Hampshire, and to explain why these multipliers vary across different regions of the state. Above all, this study will serve as an extension to the state's data on regional tourist spending and provide a tool for New Hampshire's regional planners and policy makers. Regional tourism multipliers should be used to refine procedures for estimating the economic impact of recreation and tourism demand within the state.

2.0 Literature Review

Chang (2000) established that variations in tourism multipliers do exist, and that these variations have a significant relationship to the natural log of population. Chang found that employment multipliers have an inverse relationship to population size, and output (sales) multipliers have a positive correlation with population size. His study compared 114 different size regions throughout the United States, and the Type II sales multiplier varied from 1.32 for Modoc County in California to 1.67 for the State of Florida. Baaijens et al. took income multipliers from 11 studies and estimated regression models by using population, area, number of tourist arrivals, and other regional characteristics to predict income multipliers (Baaijens et. al., 1998).

Fletcher compiled income multipliers estimated from I-O models for 30 countries, cities, and regions around the world. The ranges of these multipliers varied from 1.19 for the City of Winchester, UK to 1.96 for Turkey. When he ranked these multipliers in order he found that the multipliers are larger for regions with larger and more developed economies (Fletcher 1989).

Based on a review of previous recreation and tourism studies, the type II sales multiplier is the most frequently reported multiplier and IMPLAN is the most widely used system. Studies that have used IMPLAN generally report a state tourism multiplier between 1.5 and 1.8, and an employment multiplier around 30. Some studies used borrowed multipliers or professional judgment, and

others tried to adjust state level RIMS II multipliers to regional levels (Mak 1989).

Tyrell (1999) looked at tourism multipliers in Rhode Island. His study compared tourism multipliers from each season, and separated visitors into day-trippers and overnight visitors. The tourism output multiplier for overnight visitors and day-visitors was almost identical at 1.53 and 1.54, respectively. Further, seasonal residents had a lower multiplier of 1.30 because large portions of their overall purchases are out of state. Wood & Liang (2001) used IMPLAN to estimate the economic impact of tourism to the Vermont economy. They reported a tourism multiplier of 1.61, and an employment multiplier of 29.

3.0 Methodology

3.1 The Tourism Sector

Recreation and tourism involves a number of different industries. There is no single "tourism" sector in the Standard Industrial Classification (SIC) system (Johnson et al. 1989). The U.S. Travel and Tourism Satellite Accounts have identified 15 tourism-related industries for the U.S. economy. Sales to tourists account for more than 20 percent of the total sales for eight of these 15 industries (Okubo and Planting 1998).

IMPLAN does not define a specific "tourism sector", and it is therefore necessary to decide which individual sectors to aggregate in order to build this new sector. Chang (2001) defined the tourism sector as a weighted average of the top four tourism-related sectors, which included hotels & lodging, eating & drinking, recreation & amusement, and retail trade (retail trade is an aggregate of seven retail trade sectors). These four sectors account for almost 80 percent of the sales to a typical visitor (Chang 2001). Tyrell (1999) identified 38 different economic sectors that cater to tourists. However, he calculated the tourism multiplier as a weighted average of only the top five tourism related sectors. These sectors were the same four sectors as in Chang's study, with the addition of the "auto dealers & service station" sector.

For this study, the tourism sector is an aggregation of the seven "sectors" of the economy that the INHS maintains sales data. The Tourism Satellite Account highlights sales information to seven economic "sectors". These sectors are shown in the left-hand column in Table 1. These seven sectors aggregate to five major tourism sectors in IMPLAN, where two of these five sectors are a compilation of seven or more different IMPLAN equivalent sectors. The five IMPLAN tourism sectors are on the right hand column in Table 1 along with the complete list of aggregated sectors.

Travel surveys (administered by the Institute for New Hampshire Studies in 1994 and 2001) were modified by state sales and employment data for FY2002 to estimate total purchases by tourists and travelers. The distribution of these purchases across the seven economic sectors and seven regions of the state were also estimated (Goss 2003). Table 2 shows the state-level distribution of traveler spending across the different economic sectors.

3.2 Defining Regions

It is necessary to define the regions in IMPLAN as close as possible to the regions used to report data in the INHS study. There are ten counties and seven travel regions in New Hampshire. Economic information published by the state and federal governments is available only at county and statewide levels. However, each travel region contains a portion of at least one county. The 2000 report from the New Hampshire Department of Employment Security gave covered employment for the lodging and travel establishments for the seven travel regions (Goss 2003).

Since IMPLAN can only segregate data to the county level, any regional economic zone that is larger than one particular county must be aggregated to include two or more counties. Table 3 shows the "regional economic zones" used by the INHS as well as the IMPLAN equivalent regions.

A separate IMPLAN model is built for each one of these regions to analyze the relationship between the new "tourism sector" and the local regional economies. Impact analysis used the data collected by the INHS to account for changes in final demand of tourism sales and to assign regional budget shares. Table 4 shows the regional budget shares of the seven tourism related sectors across the different regions of the state.

Output and employment multipliers were estimated for each region in New Hampshire using IMPLAN, and tourism multipliers were calculated based on a region's tourist budget distribution.

Table 1.—The seven sectors of INHS tourism sector

INHS Tourism Sectors	IMPLAN Equivalent Tourism Sectors
1. Eating & Drinking	1. Eating & Drinking (454)
2. Retail Stores	2. Retail Stores - (Retail Stores and Food Stores) a. Building Materials & Gardening 448 b. General Merchandise Stores 449 c. Food Stores 450 d. Auto Dealers & Services 451 e. Apparel & Accessory Stores 452 f. Furniture & Home Furnishings 453 g. Misc. Retail 455
3. Food Stores	3. Hotel & Accommodations (463)
4. Lodging Accommodations	4. Transportation & Services - (Ground Transportation and Services & Other Transportation) a. Local Inter-urban transportation 434 b. Water Transportation 436 c. Air Transportation 437 d. Arrangement of Passenger Transportation 439 e. Transportation Services 440 f. Gas Production & Distribution 444 g.Automobile Rental & Leasing 477 h. Automobile Repair & Services 479
5. Services & Other Transportation	5. Recreation & Amusement (488)
6. Ground Transportation	
7. Recreation	

*Source-New Hampshire Fiscal Year 2002 Tourism Satellite Account; IMPLAN 1999

Table 2.—The state-level distribution of traveler spending across the different economic sectors

Tourism Sectors	FY2002	Budget Weight
Eating & Drinking	$1,063	0.28
Accommodations	$520	0.15
Recreation	$665	0.18
Retail	$932	0.25
Transportation Services	$554	0.14
Total	$3,733	1

*Dollar amounts in millions. Source -New Hampshire Fiscal Year 2002 Tourism Satellite Account

3.3 Regional Purchase Coefficients & Margins

Application of IMPLAN models to impact prediction requires appropriate allocation of direct impacts and customization of the way impacts are calculated. In particular, the percent of local demand met by local purchasers might need to be adjusted. Regional Purchase Coefficients (RPCs) estimate these percentages, and IMPLAN has built-in RPCs that attempt to estimate reasonable local values. However, for predicting the impact of tourist visits we should use RPCs of 1.00. This ensures that the local demand for goods and services is completely met by local businesses.

Another important specification is whether the purchase will be accounted for at the production level with relevant margins assigned to other industries. Since tourist purchases are made at the retail level, and specific commodities are not usually identified in tourist expenditure surveys, we will generally make

Table 3.—The regional economic zones

INHS Economic Regions	IMPLAN County Regions
1. Merrimack Valley	1. Merrimack, Hillsborough
2. Seacoast	2. Strafford, Rockingham
3. Lakes	3. Belknap, Carol
4. White Mountains	4. Grafton, Carol
5. Monadnock	5. Cheschire
6. Dartmouth-Lake Sunapee	6. Grafton, Sullivan
7. Great North Woods	7. Coos

Table 4.—Regional budget shares of the seven tourism related sectors

Region	Lodging	Eating & Drinking	Recreation	Retail	Transportation & Services	Total
New Hampshire	0.15	0.28	0.18	0.25	0.14	1.0
Grt. North Woods	0.26	0.22	0.22	0.15	0.15	1.0
Seacoast	0.1	0.3	0.2	0.25	0.15	1.0
Monadnock	0.12	0.29	0.22	0.22	0.15	1.0
Merrimack	0.12	0.3	0.18	0.25	0.15	1.0
Lakes	0.15	0.28	0.2	0.22	0.15	1.0
Dartmouth	0.13	0.28	0.22	0.22	0.15	1.0
White Mountains	0.19	0.26	0.22	0.18	0.15	1.0

*Source-New Hampshire Fiscal Year 2002 Tourism Satellite Account

impact predictions at the retail and service industry level through sectors such as those listed in Table 1. If specific commodities are identified in expenditure surveys, we have the option of identifying a producing sector and indicating that a retail margin needs to be allocated to the appropriate storage, transportation and retail sectors (Tyrell 1999). This study only used the five aggregated sectors listed in Table 1 to characterize tourists because expenditure survey data did not permit detailed industry identification. We have not tried to identify individual commodities associated with these expenditures, so margins are included in direct effects.

4.0 Results & Analysis

4.1 Tourism Multipliers

The regional budget shares in Table 4 were used to estimate tourism multipliers for each region of the state. Tourism multipliers were computed as weighted averages of the multipliers for the five primary tourism sectors (Chang 2001; Tyrell 1999). For example, the state-level tourism multiplier is defined as:

Tourism Multiplier = .15 * Lodging Multiplier +
.28 * Eating & Drinking +
.18 * Recreation & Amusement +
.25 * Retail Trade +
.14 * Transportation & Services

A separate IMPLAN model was built for each region of the state to illustrate how tourism multipliers vary across the different regions. The results show that output multipliers are higher for regions of the state with a higher population and a greater number of industries. Further, employment multipliers are higher for regions of the state with low populations and a lower number of industries.

Table 5.—Tourism output and employment multipliers

Region	Type II Output Multiplier	Type II Jobs/M$	Population	No. of Industries
New Hampshire	1.51	30.07	1,220,033	373
Merrimack valley	1.45	28.59	504,986	292
Lakes	1.44	31.82	95,341	205
Seacoast	1.43	31.8	392,231	272
Dartmouth	1.42	31.16	120,694	214
White Mountains	1.42	31.4	120,622	204
Monadnock	1.4	30.32	73,540	179
Great North Woods	1.33	32.19	33,240	120

*Source-IMPLAN Pro 2.0, 1999 New Hampshire County Data

The tourism output multipliers at the state-level are the highest reported output multipliers in this study. This makes sense when one considers that the state also has the highest population of any region in this study and the most number of industries, 1.2 million and 373 respectively. The Type II employment multiplier is the second lowest reported employment multiplier in this study. Only Merrimack valley, with its large industrial belt and high population has a lower employment multiplier.

The tourism output multipliers for the Great North Woods region are the lowest output multipliers reported in this study. This region has the lowest population (33,200) and the least amount of industry (120). Inversely, the Type II employment multiplier is the highest reported employment multiplier for any region in this study. Table 5 shows how the tourism output and employment multipliers vary across different regions of the state with different populations and economic bases.

For the most part, tourism output multipliers seem to be positively correlated with population and the number of industries in a given region, and employment multipliers appear to be negatively correlated to population size and the strength of economic bases.

4.2 Regression Analysis

Separate regression models for aggregate tourism output and employment multipliers were estimated using Eviews statistical software program. Since one of the research objectives is to develop a tool to simplify the selection of multipliers for New Hampshire recreation and tourism applications, only regional characteristics that are readily available to recreation and tourism managers were selected as independent variables. Two independent variables were selected, the natural log of population and the number of industries. However, due to the small sample size, we are limited to running the regressions with only one independent variable at a time.

Model 1: Tourism Output Multipliers

Using Eviews regression output data and the natural logs of population as the independent variable, the best prediction equation for the Type II tourism output multiplier was identified as:

Tourism Sales Multiplier = .967 + .038*ln (POP)
Std. Error- (.092) (.007)

Only one predictor ln (POP), the natural logs of population, was identified for this model and was found to be significant at a 95% confidence level. The model explains about 80 percent of the variation in the Type II output multiplier. Model 2 shows the best prediction equation for Type II tourism output multipliers using the number of industries (IND) as the independent variable.

Model 2: Tourism Output Multipliers

Tourism Sales Multiplier = 1.2889 + .000591*(IND)
Std. Error- (.0242) (.000099)

The independent variable, (IND), was also found to be significant at a 95 % confidence level. Model 2 explains about 85 percent of the variation in tourism output multipliers.

Model 3 shows the best prediction equation for Type II tourism employment multipliers in New Hampshire using the natural logs of population as the independent variable.

Model 3: Type II Tourism Employment Multipliers
Tourism Employment Multiplier =
38.146 - .599452 *ln(POP)
Std. Error- (4.053) (.3346)

The independent variable, ln(POP), was found to be significant at a 90 % confidence level. Model 3 explains about 45 percent of the variation in tourism employment multipliers. Model 4 shows the best prediction equation for Type II tourism employment multipliers using the number of industries (IND) as the independent variable.

Model 4: Type II Tourism Employment Multipliers
Tourism Employment Multiplier = 32.99 - .008968 *(IND)
Std. Error- (1.233) (.0050)

The independent variable, (IND), was also found to be significant at a 90 % confidence level. Model 4 explains about 45 percent of the variation in tourism multipliers. The Type II Tourism Employment models each had a low R-squared value and a higher p-value than the Type II Tourism Output models. However, the signs on both models are heading in the right direction. This signifies a positive relationship between the independent variables and the output multipliers, and a negative relationship between the independent variables and the employment multipliers. These results are consistent with Chang's (2001) study, which used a sample size of 114. A larger sample size in this case would increase R-square values and lower p-values for employment and output.

5.0 Conclusion

Economic multipliers of tourism do vary from region to region. In addition, the tourism output (sales) multipliers are higher for regions of the state with a larger population and the employment (jobs) multiplier are generally higher for regions of the state with low populations. A uniform, state-level tourism multiplier should not be applied to sub-state level regions. Also, the tourism output multiplier of 2.61, which was reported in the New Hampshire Fiscal Year 2002 Tourism Satellite Account, is misleading and is generally too high to be considered an appropriate tourism multiplier. For a more accurate representation of industrial linkages and re-spending in New Hampshire, state planners and recreation managers would be better served to use a state-level tourism output multiplier of around 1.5 and an employment multiplier of about 30. Further, regional output multipliers should be employed when looking at sub-state level regions.

Misapplication of tourism multipliers may lead to an inefficient distribution of state resources such as funding, protection, or advertising; and could ultimately result in incompatible business developments, unsustainable natural resource use, loss of jobs, and loss of local identity. Better defining the economic base of a given region using the reported multipliers will provide a greater understanding of the unique character of each of these regions. Multipliers can help recreation managers, town planners, and politicians to target investment in tourism in order to develop this industry in a more sustainable and compatible manner with a local community.

6.0 Citations

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