Extending the Measurement of the Economic Impact of Tourism Beyond a Regional Tourism Satellite Account

A paper delivered to the INRouTE 1st Seminar on Regional Tourism: Setting the Focus, Venice, Italy,

By Dr. Douglas C. Frechtling
Professor of Tourism Studies,
International Institute of Tourism Studies,
The George Washington University
Washington, DC, USA
July 5, 2012

Executive Summary

The Tourism Satellite Account (TSA) is a unique tool now available to policymakers in many countries to document the direct GDP and employment contributions of tourism to national economies. Policymakers are also interested in estimating other elements of the Economic Benefits of Tourism, such as labor compensation, government receipts and the indirect and induced impacts of Tourism Expenditure. This paper examines three macroeconomic analysis tools proposed for extending the measures of Economic Benefits from Tourism Expenditure: the Input-Output Model, the Social Accounting Matrix and the Computable General Equilibrium Model. After distinguishing two time contexts in which such analysis takes place, it is argued that the Input-Output Tables are superior to the modeling approaches. Ways of generating these tables for subnational regions are explored and a call for case studies of these methods at future INRouTe conferences is made.

I. Introduction

The purpose of this paper is to discuss three macroeconomic analysis tools that appear to be available for extending the impact estimates of the Tourism Satellite Account (TSA) in a subnational region of a country to inform public policy officials of the economic implications of tourism demand for their residents, businesses and government units. It is designed to address “Topic 12. Overview of the main instruments for its measurement” in the “List of 20 Topics for which General Guidelines will be designed over 2012-2015” in the paper for the UNWTO/INRouTe 1st Seminar on Regional Tourism: Setting the Focus” in Venice, Italy, July 2012.

The tools to be examined are the Input-Output Model, the Social Accounting Matrix, and the Computable General Equilibrium Model. The paper identifies two contexts in which these tools might be used, summarizes the conceptual framework of each, discusses requirements for employing the tools at the regional level and concludes with a call for case studies to investigate their validity and usefulness for understanding Tourism Economic Impact. The following discussion assumes that a Tourism Satellite Account exists for a subnational region of a country, such as a state, province, department, metropolitan area or some contiguous aggregation of these.
II. Basic Terms

It is important here to establish basic terminology covering various elements of “the economic impact of tourism”. Unfortunately, there is no global consensus on the terms used to describe these elements. So the following terms and definitions, proposed in an earlier paper (Frechtling, 2011), are suggested to encourage a consensus on terms, to facilitate discussion of measuring the impact of Tourism Demand on the economy of country or a subnational region.

A. Tourism Economic Contribution: the direct, positive effects of Tourism Consumption, Tourism Gross Fixed Capital Investment and Tourism Collective Consumption on a national or regional economy. This includes the TSA measures of Tourism Direct Gross Value Added, Tourism Direct Gross Domestic Product (GDP), and Employment in the Tourism Industries consistent with the System of National Accounts. Other measures of direct contributions to a national or regional economy provided by the TSA include compensation of employees, gross operating surplus of business firms, and government revenue.

B. Tourism Economic Benefits: Tourism Economic Contribution plus the secondary effects (including both “indirect effects” and “induced effects”) on the economy.

C. Tourism Expenditure: as defined in the TSA, the amount paid by visitors in an economy for the acquisition of consumption goods and services, and valuables, for visitors’ own use or to give away. It includes monetary expenditure by visitors themselves, as well as by others on behalf of visitors. The latter include monetary expenditures by employers for business travel, and by governments and Non-profit Institutions Serving Households on subsidizing costs to visitors; this item is synonymous with “visitor spending” in this paper.

A national TSA effectively measures a major part of Tourism Economic Contribution for the country. But there are other ways visitor spending can contribute to an economy:

1. Government revenue – in addition to tax revenue, these include licenses and other fees, enterprise receipts, and other other charges

2. Indirect impact – business receipts, income, jobs, etc., generated as a nation’s productive units buy and sell from one another (“interindustry transactions”) in the economy under study in response to Tourism Expenditure.

3. Induced impact – business receipts, income, jobs, etc., generated as the employees of tourism businesses spend their income in the economy under study.
III. Two Time Contexts

It is critical to achieving the purpose of this paper to recognize two contexts where macroeconomic analysis of Tourism Expenditure can occur. One is the past, when Tourism Expenditure has occurred and policy makers and others are interested in measuring the resulting Tourism Economic Contribution or other aggregates indicated above. In this context, the Tourism Expenditure has occurred and we are interested in its broad economic effects. As a philosopher might say, we apply a posteriori analysis of an event that has occurred to measure its economic effects.

The other context is the future, where an event or events is/are assumed to occur. A number of studies have applied a priori analysis of what is likely to result from events such as visitor consumption generated by expanding a conference center, building a new sports stadium, hosting a festival, mounting a new advertising campaign and the like. A popular type of speculative analysis here is the policy simulation, where the potential impacts of new public policies, such as tax increases, public expenditures on tourism development and subsidizing air transport, are projected and examined. Since the event has not occurred its impact cannot be measured, only projected by some estimation procedure. Such an exercise necessarily involves employing a model that seeks to simulate how the economy is likely to change in response to such shocks as expanding visitor supply elements, rising prices of visitor services, and the aforementioned policy changes.

IV. The Tourism Satellite Account

The single most important new macroeconomic policy analysis tool developed in the last several decades to measure tourism demand and its implications for a national economy is the Tourism Satellite Account.

The Tourism Satellite Account, or TSA, is a distinctive method of measuring the direct economic contributions of Tourism Expenditure to a national economy. Its unique approach derives from employing the principles and structure of the internationally-adopted System of National Accounts (SNA) to measuring the direct economic impact of tourism. The TSA comprises a set of inter-related tables that show the size and distribution of the different forms of Tourism Expenditure in a country and direct contributions to GDP, employment and other macroeconomic measures of a national economy (see Frechtling 2010a for a summary of these).

UNWTO and other key stakeholders in the accurate measurement of visitor consumption on an economy have not agreed on the conceptual framework for the Regional Tourism Satellite Account (R-TSA). It is crucial that such a consensus be achieved to forestall the spread of “simulated regional TSAs” as has occurred in the United States (Frechtling, 2010b). These have been elaborated by different organizations, do not follow the definitions and principles of the TSA and have little in common with one another. The proliferation of idiosyncratic R-TSAs seems extensive in Europe, as well. Having such
variability in the conceptual frameworks of such exercises prohibits, of course, fair comparisons among them or with the internationally-accepted Tourism Satellite Account. I have recommended for consideration a set of standards to guide development and assessment of R-TSAs in another paper for this conference (Frechtling 2012).

Assuming such consensus is achieved on the conceptual framework of the R-TSA, the balance of this paper explores the intentional limitations of the TSA conceptual framework and how the analytical value of the R-TSA can be extended through three other existing tools for macroeconomic policy analysis.

**Context and the Tourism Satellite Account**

The TSA is the most valid method of measuring the size of the Tourism Economic Contribution to a country. It is based on observed values of visitor consumption of specific products produced by specified tourism industries, producing contributions to a nation’s Gross Domestic Product and employment. The context of the TSA is the past and the analysis it provides is *a posteriori*. It does not simulate anything about the future but rather accounts for visitor consumption effects on Gross Domestic Product and employment.

These are among the so-called “direct” or “primary” effects of tourism demand on the national economy. Other measures of tourism’s direct contributions to a national economy include labor compensation, gross operating surplus of business and tax revenue directly generated by Tourism Expenditure. All of these are presented by the TSA.

As indicated in the definition of “Tourism Benefits”, there are other economic consequences of the interactions between Tourism Demand and tourism supply beyond the direct effects. One set of these is called the “secondary impact of tourism demand”. This includes the “indirect effects” of Tourism Expenditures, recognizing that as a nation’s productive units buy and sell from one another (“interindustry transactions”) in response to Tourism Consumption, they produce additional business receipts, jobs and income. And there are also the “induced effects” of the original visitor expenditures that result as employees of tourism businesses spend their incomes in the economy under study. These impacts are in addition to the amount produced directly by tourism demand and captured so well in the TSA.

By design, neither of these is captured in the Tourism Satellite Account. Estimating secondary effects requires moving from defining and populating accounts to designing and implementing economic models. A “macroeconomic model” is a simplified representation of an economy that attempts to identify the major variables and relationships among them, array them in equations and use them to estimate macroeconomic variables that cannot be observed directly. It is the product of assumptions held by the model builders about the important relationships in the world that produce salient results and of related data collection projects. We now examine the three popular types of macroeconomic models that have been used to explore the secondary effects of shocks to national economies (such
as increased visitor spending or new government policies): the Input-Output Model, the Social Accounting Matrix and the Computable General Equilibrium Model.

IV. The Input-Output (I-O) Model

The first model developed years ago to assess the secondary impact of shocks to a national economy, tourism or otherwise, is the Input-Output (I-O) Model.

The I-O Model is based upon an Input-Output Table constructed from the supply and use tables from a country’s System of National Accounts (Table 15.1 in SNA 1993; Table 14.12 in SNA 2008). As SNA 2008 explains (chapter 28), we can substitute industries for the rows of the use table to produce an Input-Output Table. This table presents every industry in the country in the rows supplying output to every industry in the columns. Consequently, it has been called the “interindustry matrix” because it shows the flows of output from each industry to each industry in the country. Figure 1 displays the flows among producers, Households, Government and other elements embodied in the I-O Table.

So far, we have utilized the Input-Output Table as an account. With some transformations, this account can be turned into a very useful model: the Input-Output Model. We begin the modeling exercise by computing another account from the Input-Output Table, sometimes called the “Direct Requirements Table,” by simply substituting for each cell in the Use Table the ratio of the value in the cell in the input-output table to the total for the entire column (i.e., industry). The Direct Requirements table, then, shows for
each purchasing industry (in the column) the inputs directly required from different supplier industries (in the rows) to produce one unit of output. Through matrix algebra manipulation (called “matrix inversion”) of this Direct Requirements Table, we derive the “Total Requirements Table”. At this point, we have moved from an account to a model, the Input-Output (I-O) Model. This model computes, for any increase in consumption of a given industry’s output, the total amount of intermediate output required. And this model can be used to compute the secondary effects of visitor spending in the economy described above. These are often summarized in the “multiplier concept,” covering ratios of the total effects of visitor spending (primary plus secondary impacts) to the initial visitor spending.

**Contributions to the Macroeconomic Analysis of Tourism**

A country’s I-O Model can produce estimates of the output, income and employment multipliers for Tourism Expenditure for the relevant year. Such multipliers can be compared to other types of consumer expenditure, such as on automobiles and other consumer products, government expenditures on military bases and other facilities, and investment in infrastructure construction and maintenance. This assists policymakers in determining the total effects of public policies to expand Tourism Expenditure compared to alternative economic development programs.

In addition, the Input-Output Tables display linkages between tourism industries producing for Tourism Demand and the industries supplying intermediate goods and services to those industries. If a country finds, for example, that the accommodations industry is purchasing a great deal of its intermediate products from abroad (say, furniture and equipment), it can increase the macroeconomic contribution of serving accommodations demand by encouraging domestic enterprises to produce these items. This will reduce the leakages of demand to industries in other countries and increase the multiplier impact of Tourism Expenditure.

Finally, it is important to note that I-O models continue to be popular today, seventy years after they were first developed. The structure of, and data required for, I-O models are well-understood and widely accepted. There is no question about how an I-O model must be constructed: it is specified in SNA 2008. Indeed, Archer (1982) marks the first comprehensive exposition of I-O multipliers for tourism analysis, and studies continue to be published using these techniques 30 years later (See Hara 2008 for a current discussion). Consequently, we can be quite confident that the results of I-O models are comparable across nations.

It is important to note that we are applying *a posteriori* analysis here: examining what the Input-output Model based on an Input-Output Table for a past year tells us about what actually occurred for the year. We are interested in distinguishing the portion of GDP, labor compensation, employment, and taxes that are associated with the size and distribution of Tourism Expenditure among Tourism Characteristic Products for that year. There is no intention here to *simulate* the effects of some shock to the tourism economy. So the so-called limitations of I-O modeling liberally referenced in academic research (e.g., Dwyer, Forsyth and Spurr, 2005) do not apply.
This discussion has focused solely on the I-O Model at the national level. I-O models have been developed for a number of subnational regions, as well. However, the data requirements are daunting and regional authorities may not have the leverage with business operators and other sources of input data that the national government has. Section VI below discusses alternatives.

V. Two Macroeconomic Models for Ex Ante Analysis

The Social Accounting Matrix (SAM) is an extension of I-O modeling (SNA 2008). It adds to the I-O structure by presenting more transactions in the national economy in greater detail. However, unlike the I-O model, there is no single structure or presentation universally recognized. Rather, SAMs are constructed for individual purposes to disaggregate relationships among suppliers, purchasers, and factors of production. Specifically, a SAM can elaborate the institutions purchasing or supplying goods and services: business firms, households and governments. For example, the Household sector might be disaggregated to distinguish households by race, income, and whether male or female headed. Sources of household income can be distinguished: labor earnings, property income, transfer payments. The business sector might be broken down in size categories (e.g., small, medium and large sized enterprises). The markets for factors of production might distinguish labor by occupations and capital by sources. Finally, the actual consumption patterns of households can be modeled for these different groups.

In economic theory, general equilibrium analysis addresses how households, firms and markets interact to determine what is produced in a national economy, how it is produced and for whom. This analysis assumes markets are competitive, that prices for inputs and products move freely to equilibrate supply and demand, firms maximize profits, consumers (i.e., households) consume their preferred collection of products, each product is produced under constant or decreasing returns to scale and government does not interfere to restrict these conditions.

In such a competitive general equilibrium world, the economy is at or moving toward the following states of equilibrium –

- Ratios of marginal utilities of products for all consumers equal to the relative prices of these products
- Ratios of marginal costs of firms to produce goods and services equal to the relative prices of these products
- The revenues produced by one additional unit of input for all inputs equal for all firms and all products and equal to those inputs’ relative prices.

The Computable General Equilibrium (CGE) models extend the SAM structure to address how a national economy adjusts to a shock, such as increased Tourism Expenditure or higher tax rates, and reaches a new general equilibrium with the above
features. A CGE is “an economy-wide model that includes the feedback between demand, income and production structures and where all prices adjust until decisions made in production are consistent with decisions made in demand.” (Rossouw and Saayman 2011, p. 757) It expands a SAM through linking industries as producers, other institutions, purchasers and markets together by the concept of general equilibrium.

VI. The Superior Choice – Input-Output Tables

Both of these models can be useful in a priori analysis of possible shocks to an economy (see Frechtling 2011 for a detailed explanation). However, they provide no additional value for a posteriori analysis of the results of past shocks or estimation of any of the various multipliers discussed above developed through Input-Output analysis. This is because there is no advantage to be gained by modeling past economies and economic shocks to understand the past. The results of increased visitor spending or increased government spending on tourism development for a given year in the past has already occurred and is embodied in the Input-Output Table for that year. The only challenge is to accurately identify these shocks and their results in the account. An R-TSA will present the direct effects of such changes on the regional economy. And the Input-output model, representing the actual interindustry relationships with households included, is more than adequate for examining the indirect and induced effects of past visitor spending.

Despite its superiority in representing past economic relationships, regional Input-Output tables are not available for many subnational areas of the world today. There appear to be three methods for producing such tables for individual regions:

a. Develop the Supply and Use Tables from scratch (Lubson and Jang, 2012; Jones and Munday, 2004; Research and Economic Analysis Division, 2011)

b. Estimate regional indirect and induced impacts through applying “location quotients” to the national Input-Output Tables (Bakhtiari and Dehganizadeh, 2012; Yang, et. al., 2007)

c. Demand-driven quantity model (Oosterhaven and Stelder, 2007)

If the first is chosen, then it is unlikely a region can have Supply and Use Tables generated annually. Fortunately, Hara (2008) notes the RAS method has been used to update such tables annually.

VI. Summary and Conclusion

This paper has discussed how the results of a regional TSA can be extended to produce measures of following economic consequences of Tourism Expenditure on a subnational region:
1. Total government revenue  
2. Indirect impact  
3. Induced impact  

Three macroeconomic tools for producing such extensions have been examined: the Input-Output Model, the Social Accounting Matrix and the Computable General Equilibrium Model. For measuring the extent of the Economic Benefits of Tourism, the Input-Output Model is superior. Ways of generating such models for subnational regions and keeping them up to date were suggested.

In conclusion, I end with a call to INRouTE professionals and others interested in the health and development of regional tourism to conduct studies employing these techniques for extending the TSA. And I encourage them to present their findings to future INRouTE seminars and conferences to increase the body of applied knowledge available on this important topic.

References


