Measuring and Interpreting the Economic Impact of Tourism: 20/20 Hindsight and Foresight

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Measuring the economic consequences of tourism activities on national and sub-national (regional) areas provides valuable input for critically addressing issues of importance to at least four key stakeholder groups in the geographic area of interest. These groups are public officials, business owners and managers, employees of tourism establishments and other residents of the host communities.

Before we address our topic, it is essential to define it. We had thought that standard English usage over the last three decades was pretty well established. As Reece (2010) recently affirmed, the economic impact of tourism is comprised of “changes in regional employment, incomes, tax payments, and other measures of economic activity . . . that result from a region’s tourism development” (p. 50), except that we understand this to apply to nations as well as regions. Reece follows a long train of authors who have defined “tourism economic impact” broadly (e.g., Goeldner and Ritchie 2003, Mason 2003, Smith 2000, Frechtling 1994). Some now claim that “tourism economic impact” measures only result from complex economic equilibrium models (Dwyer, et al., 2008), a clear break with tradition and the ways the term is commonly used in tourism research today.

According to the tradition of tourism economic studies, “the economic impact of tourism” is a term that covers one, some or all of the following economic changes resulting from the presence of visitors in an area, their activities or their expenditures:

- Business receipts
- Value added contribution to gross domestic or regional product
- Employment (jobs, persons employed)
- Labor earnings
- Other factor earnings (dividends, interest, rent, profits)
- Government tax revenue
- Other government revenue (e.g., user fees, fines, receipts of government enterprises)
- Distribution of income
- Government spending
- Externalities and public goods
- Multiplier effects on transactions, output, income, employment or government revenue
- New business formation
- Real property and other asset values
- Business investment in plant and equipment
• Price levels
• Interest rates on borrowed funds or return on capital
• Foreign exchange rates
• Imports and exports
• International Balance of Payments

The Way We Were - 1988

Serious research interest in measuring aspects of the economic impact of tourism dates back more than 75 years (Mathieson and Wall 1982, p. 35). Initially, interest was limited to volumes and expenditures of international visitors. In 1969, an official of the U.S. Bureau of the Census proposed a model to estimate domestic tourism expenditures, and this model was implemented within five years (Frechtling 1974). A year later, the World Tourism Organization held its first conference on measuring domestic tourism and its economic effects (Frechtling and Muha 1975). That same year, the first economic model designed to estimate the value of visitor spending and its impact on employment, labor income and tax revenue at the sub-national level across a country was published (Frechtling and Muha, 1975).

The first book-length treatment of the economic consequences of tourism in the English language was Mathieson and Wall’s (1982) Tourism: Economic, Physical and Social Impacts. In addressing the economic side, the authors used the term, “economic impact” broadly to indicate the primary and secondary impacts, costs and benefits of tourists on destination areas (pp. 6, 12). They defined “impact” as “the form of altered human behavior that stems from interactions between agents of change and sub-systems on which they impinge” (p. 14). The authors identified the economic benefits documented in the literature as (p. 52):

1. Foreign exchange earnings and balance of payments
2. Generation of income
3. Generation of employment
4. Improvement of economic structures
5. Encouragement of entrepreneurship

By 1988, the research on measuring and interpreting the economic effects of tourism activities had blossomed. Most of this research was focused on measuring the economic benefits of tourism to a national or regional (i.e., sub-national) area (Frechtling 1987). Studies published measuring the economic impact of special events were relatively few (Frechtling 1987, Getz 1994).

Most economic impact studies concentrated on measuring the gross benefits of visitors to an area, driven by their expenditures while in the area (Frechtling 1987). Most attention was focused on who derived economic benefits from visitors to the area, and who bore the costs (Frechtling 1987). Models were developed and applied that simulated domestic visitor expenditures and their direct effects on business receipts, employment, labor earnings and tax revenue (Frechtling 1987, Rovelstad 1987).
These efforts were driven by various techniques of estimating visitor spending in a country or region (Frechtling 2005). Surveying probability sample surveys of visitors onsite was the most popular technique, but data from households surveys were also employed to estimate spending at the state or provincial level.

Multiplier Effects

The approaches discussed so far estimated the direct or primary effects of visitor spending on business receipts, employment, labor earnings and tax revenue in an area. In addition, there are secondary effects as other businesses buy and sell from one another to supply the visitor, and as the employees of these establishments spend their earnings in the area (Frechtling 1987). The sum of these secondary effects gave rise to various multipliers or ratios of the ultimate (i.e., sum of primary plus secondary effect) measures of sales, output, earnings, employment or government revenue to the initial injection of visitor expenditures into the area. There were three methods employed in published studies to estimate such multiplier effects: the economic base model, the ad hoc model and the Input-output model (Frechtling 1987).

As applied to visitor impact, economic base models required dividing the productive activities of each industry located in the study area into the proportion of total sales to visitors, constituting export revenue. Summed across all industries, these constituted the denominator of the sales, output, earnings or employment multipliers. The numerator was the total sales, labor earnings or employment for the area. Then, all one needed to do was to estimate visitor spending for the period and multiply it by the base multipliers to get total (primary plus secondary) sales, earnings or employment generated by visitors. While simple and somewhat elegant, the approach assumed all economic growth in an area was export-driven, and the distribution of the visitor spending (percentage for foodservice, accommodations, local transportation, shopping, etc.) did not change over time.

Archer (1977) developed an ad hoc multiplier model that applied the principles of the Keynesian multiplier to regional tourism analysis. This model consisted of a multiplicand of visitor spending that remains in the study area after first round leakages and the direct and indirect income this generates, and a multiplier that represented the induced effects of visitor spending on the economy.

Input-Output Analysis

The most prevalent approach to estimating the direct and secondary effects of visitor spending in the 1980s and 90s was the Input-Output model, and this method is still popular today (Reece 2010). The use of Input-Output analysis in the classical sense allows calculating the direct, indirect and induced value-added effects resulting from visitor spending (Fletcher 1989). Direct value added is value added that can be attributed to the productive activities directly serving visitors. Indirect value added is value created in the goods and services industries that supply the industries that directly serve visitors. In other words, indirect value added is generated in industries that supply goods and services to businesses that produce the final goods and services purchased before, during and after a visit.
Finally, the induced effect is value added generated by industries providing goods and services to consumers who gain income from the direct and indirect processes noted above. Direct, indirect and induced effects are summed for a destination to produce total economic impact. Multipliers can be derived by dividing the total impact measure for a variable (e.g., business receipts, income, employment) by the initial visitor spending.

Input-Output analysis is a general equilibrium approach to determining the results of a change imposed on an economic system, such as visitor spending, new investment in plant and equipment, withdrawal of a productive establishment or a catastrophic shock.

The technique of Input-Output analysis comprises two stages (Fletcher, 1989, Fletcher 2000). First there is the construction of an inter-industry transactions, or supply and use, table. This table details the transactions that take place between industries within the economy as they buy and sell from one another. The inter-industry transactions table provides information to planners, managers and policy-makers in pointing out the economic structure of the destination and demonstrates the direct economic effects associated with any change in final demand.

The second stage of the analysis involves the conversion of the table into an input-output model (Fletcher, 1989 and 2000). This requires dividing the value contained in each cell by the corresponding column total. This process results in a table of coefficients where the vertical columns show the production functions of each industry, and where the sum of each column is one. This coefficient table is then subjected to the Leontief inversion routine, which produces the total effects table calculating indirect economic impacts associated with any change in final demand.

Input-Output analysis produces estimates of economic multiplier values relating to transactions, output, income, employment and government revenues as well as an estimate of the import requirements as a consequence of any change in final demand.

The application of Input-Output analysis produces useful estimates for measuring the multiplier effects of visitors to an area. However, in interpreting these results, the restrictive assumptions of the Input-Output model must be considered (Fletcher and Archer, 1991). These restrictive assumptions have generated interest in Computable General Equilibrium (CGE) models as discussed below.

Current State of Affairs in Measuring Tourism’s Economic Impact

Computable General Equilibrium (CGE) Models

In reaction to the limiting assumptions of Input-Output analysis, it has become a fashion in recent years to use computable general equilibrium models for measuring the economic impact of a change in tourism demand or an event (Dwyer and Forsyth, 1997; Dwyer, et al., 2003; Dwyer, Forsyth and Spurr, 2004 and 2005; Narayan, 2004). After early CGE modelling performed in the 1970s, the first impact analysis of tourism was carried out in the late 1980s. CGE models have three general characteristics (Adams and Parmenter, 1995; Dixon and Parmenter, 1996):
The assumption of competitiveness in CGE models. This describes a competitive world that includes utility maximization in consumption, cost minimization in production, zero pure profits, and market clearing (Zhou, et al., 1997). CGE models simulate an economy with efficient markets. In the CGE world, each market has an equilibrium solution for a set of prices and levels of production.

The core database of a CGE model is usually a set of Input-Output accounts showing the flows of commodities and factors between industries, households, governments, importers and exporters. These tables are normally supplemented by numerical estimates of various elasticity parameters.

CGE models go beyond Input-Output models by linking industries via economy-wide constraints. With these constraints in place, the economy-wide implications of stimulating one industry can be negative and a positive impact for some industries may be generated at the expense of others. For example, contrary to Input-Output analysis, CGE models do not assume that resources, such as labour, land and capital, flow freely to tourism-related industries, and they generally do consider feedback effects from other markets.

CGE models are sometimes criticised as being too time-consuming to build and too complicated to use (Dwyer, Forsyth and Spurr 2004). It is also argued that CGE analyses are very expensive compared to simpler techniques such as Input-Output analysis.

It is also questionable whether CGE models can describe economic reality. As one observer has pointed out, “most empirical exercises confront theory with numbers . . . . CGE models, by contrast, put numbers to theory” (The Economist 2006, P. 69). In many cases the parameters of CGE models are calibrated by values based on experience. Moreover, in contrast to Input-Output modelling, the equations representing the structure of the CGE model are not revealed, even in lengthy technical reports on specific elaborations of the CGE approach (e.g., Dwyer, et al. 2004). This prevents scholars from examining the assumptions, relationships and data vintage of the models, preventing the peer review, testing and reproducibility that is the hallmark of the scientific method (Godfrey-Smith 2003). Moreover, such opacity “risks bringing a useful analytical tool into disrepute” (The Economist 2006, p. 69).

Several studies are available on the assessment of the economic impact of a demand shock that compare the results of CGE and Input-Output analysis (Dwyer and Forsyth, 1997; Dwyer, Forsyth and Spurr, 2005; Zhou, et al. 1997). All these studies found that Input-Output results are greater than CGE results, but failed to evaluate these results in a more general economic context that considers factor availability and the degree of market efficiency. In other words, the finding that Input-Output analysis overestimates the impacts is based on the lower CGE results as benchmarks, but no evidence is presented on how the CGE results represent reality.

The Tourism Satellite Account

Over much of the last two decades, the World Tourism Organization (UNWTO) and other international economic organizations have developed the Tourism Satellite Account (TSA) to
measure the impact of visitor consumption expenditures on Gross Domestic Product and employment in a country. In 2008, two key documents defining the structure and elaborating the data sources for the TSA were accepted by the United Nations Statistical Commission (United Nations Statistics Division, et al. 2008; World Tourism Organization 2008). Seventy countries have been found to have elaborated at least one annual TSA in the last 15 years (Libreros, Massieu and Meis 2006).

The TSA is limited to dealing with “tourism,” defined by UNWTO as “specific types of trips: those that take a traveler outside his/her usual environment for less than a year and for a main purpose other than to be employed by a resident entity in the place visited.” (United Nations Statistics Division, et al., 2008, p. 12) “Usual environment” is defined as “the geographical area (though not necessarily a contiguous one) within which an individual conducts his/her regular life routines” (United Nations Statistics Division, et al., 2008, p. 13). So the TSA deals strictly with the activities of “visitors” in a country, including both residents of the country and non-residents, who leave their usual environment for any purpose but to be employed by an organization in the places visited.

The TSA is a “satellite” to a larger body, in this case the System of National Accounts (hereafter “SNA 1993”). It is subordinate to and dependent upon the concepts, definitions, structure and compilation rules of SNA 1993.

Finally, at its core, the TSA is an “account”, that is, a table or set of tables “which records, for a given aspect of economic life, the uses and resources or the changes in assets and the changes in liabilities and/or stock of assets and liabilities existing at a certain time” (SNA 1993 ¶2.85). This recording is based on observations or counts of economic variables. This is in contrast to the economic impact measurement methods described above, which are “models”, that is, “simplified description[s] of a system, process, etc., put forward as a basis for theoretical or empirical understanding” (Trumble and Stevenson 2002, p. 1805).

When a country undertakes developing a TSA, it necessarily defines tourism characteristic products: those that are sold directly to visitors. It also designates a set of industries conventionally defined as “tourism industries”. The results are estimates of tourism’s direct contribution to Gross Domestic Product for the country that are directly comparable to any other industry or sector (Dwyer, Forsyth and Spurr 2007).

There is considerable interest in extending the TSA to subnational levels, such as states, provinces and major metropolitan areas. UNWTO is considering approving such extensions (Frechtling 2009).

Tourism Economic Impact Studies for the Next Decade.

Contrary to the main research thrust of the last two decades, focusing on the general impact of tourism and later on the impact of small events, future research on tourism economic impact should concentrate on the impact of large-scale, mega events since their importance for regional development has become of considerable political interest. A steady supply of festivals and similar small events in many destinations over the years has turned such marketing tools into
standard features of many destination products, so that they no longer offer competitive advantages.

The economic significance of mega events and their impact on tourism need to be seen from several angles. Planned events typically provide sufficient motivation for people to travel to a given destination country or subnational area. Further, the construction of event facilities and the related infrastructure (e.g., Olympic Games) often has a considerable economic impact, since such direct investments create income and employment in the short-run and improves a destination's long-term competitiveness.

There can also be negative economic impacts. Planned mega events can produce environmental degradation, overcrowding and traffic congestion that impose significant economic costs on the local residents. In contrast to such events, unscheduled events such as manmade disruptions and natural catastrophes typically have negative economic impacts, requiring crisis management. It appears that the negative economic impacts of unscheduled events such as financial and economic crises, terrorist attacks, violent demonstrations, earthquakes, and the row over Russian gas supply to Europe, will need to come under more careful scrutiny for evidence of adding to economic instabilities (Bram, Haughwout and Orr, 2004; Enders, 2004)

For measuring event impacts, future research will concentrate first on capturing the size of the events with the help of modern time series econometrics (Smeral and Wüger 2000 and 2008; Song and Witt 2000). It is essential to identify the size of an event – i.e., in expenditure terms – before impact measurement methods can be applied, because it is only by having unbiased measures of the event shock that we can produce unbiased impact estimates.

Identifying the magnitude of an event was formerly done mostly through heuristic methods. These approaches begin by assessing the number of attendees, the duration of their stay and their average expenditure per day in order to arrive at a measure of expenditure to calculate the direct, indirect and induced impacts (Hultkrantz, 2000). It can be argued that heuristic approaches are unreliable tools for isolating pure event-related factors from other factors such as business cycles, trends, prices, influences of seasonal and calendar effects or unknown outliers. Nor do they allow statistical inference, making it impossible to be statistically confident of their results, i.e. to ascertain whether or not they exceed normal levels of random variation.

Given these limitations of the heuristic approaches, we expect economists in the future to make more use of applied times series intervention models to accurately measure impacts of mega events.

Intervention Models

In the 1970s, Box and Jenkins (1976) developed so-called auto-regressive, integrated moving average or “ARIMA” models to analyse time series, where they attempted to explain time series movements based on their intrinsic dynamics (autoregressive terms and moving averages). Since economic time series are usually influenced by events, such additional information must be accounted for in modelling a time series. This can be done through intervention models, which are extensions of the ARIMA models (Box and Tiao, 1975; Box and Jenkins, 1976).
Since data in economic time series frequently are impaired by changes in recording methods and faulty reporting, and since the process to generate data for tourism time series can be affected quite substantially by factors such as exchange rate fluctuations, disasters, media reports and unknown events, it is advisable to make use of outlier detection methods when estimating the model, especially since often no information is available on the timing of such events. Such methods use an iterative approach to test whether any of the observed values of a time series are unknown outliers within the data generation process (Smeral and Wüger, 2005 and 2006).

Categories of outliers are defined in advance: additive outlier (events that influence a time series at a single point in time), level shifts (permanent changes in the data generation process), innovational outliers (innovations in the data generation process) and temporary changes (effects of an event decaying in accordance with a damping factor). The model parameters of the data generation process and the outlier effects are estimated simultaneously and the three steps: identifying outliers, adjusting outliers and estimating parameters based on the corrected series, repeated until outliers are no longer found.

By accounting for such unknown outliers, it is possible to quantify their effects and thereby improve the parameter estimates of the overall model, since outliers may distort estimates of the model parameters through their impact. In this way it is also ensured that the effect of an event and an assessment of its significance are given a more solid foundation than when an intervention model is estimated without outlier adjustment (Liu, 2005).

The technical aspects of intervention models can be summarized as follows (Smeral and Wüger 2008). These models distinguish three components in a time series of visits, expenditures, employment or other economic impact measure: (1) the intervention variables that represent the effects of the event; (2) outlier adjustments to filter out the effects of other unknown special influences, and (3) the standard ARIMA elements capturing the other factors in the time series (trend, business cycles, season, etc.) influencing the data generation process for the tourism variables being analyzed.

Future Research Directions

Accurate measurement of the effects of planned and unplanned events on economic activity is complicated by:

- Delays in obtaining data measuring the activities
- Need to apply ex ante and ex post perspectives to discern the additions or subtractions due to the event
- Markets reacting inefficiently to unexpected shocks
- Human behaviour failing to follow the maximization principles of neoclassical economic theory

In addition, assessment of the impacts of unplanned events face the constraints of:

- Lack of detailed ex ante assessments of the activities affected
• The results of these complications may be unacceptably long intervals between the event and accurate measurement of its effects.
• Probabilities of structural changes in national or regional economies.
• Asymmetric behaviour of price and income elasticities in unexpected downturns versus periods of uninterrupted growth.

These concerns may be dealt with in the future through:

• Systems instituted to provide forecasts of relevant economic activities over three to five year periods for nations and regions to define normal trends and levels.
• Meta-analysis of event impact studies to identify ranges of impact to be expected from events (e.g., Smeral and Wüger, 2000 and 2008; Teigland, 1996).
• Research distinguishing short-lived impacts on economic activities (Spilling, 2000) from long-term or structural changes in an economy due to the event.

We recommend the development of an accessible database of studies of the impact of planned and unplanned events on various national and regional tourism activities, organized by type of impact, duration of the event, type of event (its planned or unplanned nature), and scope of impact (direct or secondary impacts). Researchers and policy officials could access these studies to better simulate the potential effects of events and their measureable effects after they occur.

REFERENCES


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