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Résumé : Measuring the economic consequences of national or regional tourism activities provides valuable information for economic policy. The economic methods are used in order to analysed the economic benefits on generation of income or employment, foreign exchange earnings and balance of payments or improvement on entrepreneurship. Multiplier effects, econometric simulation models, the Computable General Equilibrium (CGE), the tourism satellite Accounts are mainly used.

Résumé : La mesure des conséquences économiques des activités touristiques nationales ou régionales fournit des informations précieuses pour la politique économique. Les méthodes statistiques et mathématiques sont utilisées afin d'analyser les avantages économiques sur le revenu ou l'emploi, les revenus en devises, la balance des paiements ou l'amélioration de l'esprit d'entreprise. Les effets multiplicateurs, les modèles de simulation économétrique, l'équilibre général calculable (EGC), les comptes satellites du tourisme sont principalement utilisés.

Mots clés : Tourism economy, Multiplier effects, econometric simulation models, Computable General Equilibrium, the tourism satellite Accounts

According to the tradition of tourism economic studies, "the economic impact of tourism" covers a lot of economic changes resulting from the presence of tourists. The economic impact of tourism is comprised of changes in regional investment, distribution of incomes,

employment, tax, new plants or investment, foreign exchange rate or international balance of payments, that are components and factors of economic development. There are a large panel of authors who have broadly analysed the tourism economic impact. However, today the results of Complex equilibrium models seem to be used for a more general analysis, introducing indirectly some opportunity costs as new information for public and private decisions. Measuring the economic consequences of national or regional tourism activities provides valuable information for economic policy.

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. Frechtling and Muha[1], 1975 built the first economic model designed to estimate the value of visitor spending and its impact on employment, labour income and tax revenue at the sub-national level across a country. In 1982, Mathieson and Wall's[2] (1982) wrote the first book-length treatment of the economic consequences of tourism. They defined the "economic impact", to indicate the primary and secondary impacts, costs and benefits of tourists on their areas of destination. They analysed the economic benefits on generation of income or employment, foreign exchange earnings and balance of payments or improvement on entrepreneurship. By 1988, most of these analyses were focused on measuring the national, regional or local economic benefits of tourism, with a special attention on who obtained economic benefits from visitors, and who have to pay the costs[3].

Multiplier Effects

The approaches estimated the direct or primary effects of visitor spending on business receipts, employment, labour earnings and tax revenue for a country. In addition, there are secondary effects as other

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[1] Frechtling, D. and Muha, S. (1975). *Travel Economic Impact Model, Volume I: Final EconomicAnalysis Methodology*, U.S. Travel Data Center.

[2] Mathieson, A., and Wall, G. (1982). *Tourism: economic, physical and social impacts*, Longman Group Limited, London.

[3] Reece, W. (2009), Economy of tourism, Prentice-Hall, Prentice Hall.

businesses buy and sell from one another to supply the visitor, and as the employees of these establishments spend their earnings inside the country. The sum of these secondary effects gave rise to various multipliers. There are three methods employed to estimate such multiplier effects:

- First, the economic base model requires calculating the base multipliers to get total (primary plus secondary) sales earnings for the GDP or employment. This approach assumed that all economic growth in the country was export-driven, and the distribution of the visitor spending did not change over time.

- Second, the ad hoc multiplier models apply the principles of the Keynesian multiplier to regional tourism analysis. It consists to find the induced effects of visitor spending on the regional economy[4].

- The Input-output model is still popular today[5]. It proposes a general equilibrium approach to determining the results of a change imposed on an economic system, such as visitor spending. Its use allows calculating the direct, indirect and induced value-added effects attributed to the productive activities directly connected to visitor spending. Indirect value added is value created in the goods and services industries that supply the industries that directly serve visitors, during and after a visit. The induced effect is value added generated by industries providing goods and services to consumers who gain income from the direct and indirect processes. Dividing the total impact measure for a variable by the initial visitors spending can derive multipliers.

The technique of Input-Output analysis comprises two stages.

- First there is the construction of a table of the inter-industry transactions, or supply, very useful for managers and policy-makers

- The second stage of the analysis involves the conversion of the table into an input-output model, by dividing the value contained in each cell by the corresponding column total. This process produces a table

[4] For instance, Figini P., Vivi, L. (200) Tourism and growth in a cross-section of countries, Tourism Economics, 2010. With data from 150 countries, they find that contrary to previous findings (e.g., Brau *et al.,* 2004 and 2007), tourism-based countries did not grow at a higher rate than non- tourism based countries, except for the 1980-1990 period for which, however, the data on international tourism are not fully reliable

[5] Fletcher, J. (2000). "Input-Output-Analysis" *Encyclopedia of Tourism* (J. Jafari, ed), New York, Routledge, pp. 310-312.

of coefficients where the vertical columns show the production functions of each industry. 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.

The application of Input-Output analysis produces useful estimates for measuring the multiplier, but there are restrictive assumptions that generated interest in Computable General Equilibrium (CGE) models

The Computable General Equilibrium (CGE) Models.

These models have three general characteristics[6]:

- First, 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. 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.

- Second, 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.

3) Third, 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

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[6] Adams, P., and Parmenter, B. (1995) "An Applied General Equilibrium Analysis of the Economic Effects of Tourism in a Quite Small, Quite Open Economy", *Applied Economics*, **27**, pp. 985-994.

they generally do consider feedback effects from other markets.

CGE models are sometimes criticised
- First, they are too time-consuming to build and too complicated to use.

- Second, CGE analyses are very expensive compared to simpler techniques such as Input-Output analysis.

- Third, in contrast to Input-Output modelling, the equations representing the structure of the CGE model are not revealed. This prevents scholars from examining the assumptions, relationships and data vintage of the models and produce opacity[7].

- Comparing the results of CGE and Input-Output analysis is interesting. Generally, Input-Output results failed to evaluate their 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. However, it is also questionable whether CGE models can describe economic reality, because the hypotheses on the efficiency of markets must be discussed.

The Tourism Satellite Account

The World Tourism Organization (UNWTO) has developed the Tourism Satellite Account (TSA) to measure the impact of visitor consumption expenditures on Gross Domestic Product and employment in a country[8]. The TSA is limited to dealing with "tourism," defined by UNWTO as "specific types of trips: those that take a traveller outside his/her usual environment for less than a year

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[7] Dwyer, L., Forsyth, P. , Spurr, R. and Vanho, T. (2003) "Tourism's Contribution to the State Economy: A Multi-Regional General Equilibrium Analysis", *Tourism Economics*, **9**(4), pp. 431-448.

[8] World Tourism Organization (2008). *2008 International Recommendations for Tourism Statistics*, World Tourism Organization

and for a main purpose other than to be employed by a resident entity in the place visited." 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.

When a country undertakes developing a TSA, it necessarily defines tourism characteristic products; it designates a set of "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 There is considerable interest in extending the TSA to subnational levels, such as provinces and major metropolitan areas.

Tourism Economic Impact Studies for the Next Decade.

During the last decade, economics of tourism was interested mainly by the general impact of tourism. Today, the main interest seems to be concentrated on the impact of large-scale events (such as Olympic games or large music festivals) very important for regional development[9]. They constitute a decisive marketing and political tool for the promotion of the region. The mega events have an impact on tourism, with the construction of event facilities and related infrastructure. The Olympic games create direct investment, income revenues and employment for 8 years; they give an long-term attraction effect and a great quality of infrastructure. There are also perverse effects, with environmental degradation, traffic congestion, terrorists' threats, violent manifestation, and concentration of national investment inside a town or a small area, infrastructures used only during the competition[10]. The modern series econometrics must be used[11], in relation with not statistically confident heuristic methods for a general orientation analysis[12].

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[9] Dwyer, L., Forsyth, P. and Spurr, R. (2004), "Evaluating Tourism's Economic Effects: New and Old Approaches", *Tourism Management*, **25**, pp. 307-317.

[10] The Case of Lillehammer 1994", *Evaluation of Events: Scandinavian Experiences* (L. Mossberg ed), Cognizant Communication Corporation, pp. 122-147

[11] Fontanel, M, Fontanel, J. (2009), Géoéconomie des Jeux Olympiques, L'Harmattan, Paris.

[12] Smeral, E., and Wüger, M. (2005), "Does complexity matter? Methods for improving forecasting accuracy in tourism", *Journal of Travel Research*, **44** (1), pp. 100-110.

Intervention Models

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.

The auto-regressive, integrated moving average or "ARIMA" models attempt to explain time series movements based on their intrinsic dynamics (autoregressive terms and moving averages). 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.

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), innovation 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. There are 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).

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

• Markets reacting inefficiently to unexpected shocks

• Human behaviour failing to follow the maximization principles of neoclassical economic theory.

• The results of these complications may be unacceptably long intervals between the event and accurate measurement of its effects.

. The main problem is to compute the opportunity costs in the short, medium or long runs.

• Research distinguishing short-lived impacts on economic activities from long-term or structural changes in an economy due to the event.

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