La relation « Flux Touristiques-Biodiversité Biologique » dans les Petits Pays Insulaires en Développement

Sonja S. Teelucksingh

Et

Patrick K. Watson

Université des West Indies

Trinidad et Tobago

Aperçu de la Présentation

- Introduction
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Introduction

- Tourism plays an extremely important part in the economic life of most Small Island Developing States (SIDS) and, due to geographical advantage, marine and coastal habitats play a particularly important role in SIDS.
- For many small islands, the marine environment can be the most important economic resource (Bass, 1993) and it is commonly accepted that the marine resources available to island states may, if properly utilised, significantly contribute to sustainable development (Dolman, 1990).

Introduction (suite)

- Such geographic advantage in marine habitat has led to tourism (and, increasingly, eco-tourism) playing a significant role in island economies (Teelucksingh and Perrings, 2010).
- In this paper, the Hausman-Taylor (HT) Estimator is used to investigate a tourism demand function in SIDS in which marine and terrestrial biodiversity play a key role, in addition to the traditional economic and price variables.

Introduction (cont'd)

- In recognition of the role that biological diversity may play in the tourism and other related industries, the Convention on Biological Diversity recognises tourism and eco-tourism as important tools for the promotion of biodiversity conservation and sustainable livelihoods (Honey, 2006; CBD, 2010).

Introduction (cont'd)

- Biodiversity is viewed as a crucial component of local livelihoods in SIDS, with marine and coastal biomes in particular contributing significantly to food security and income through their role in the provisioning services of capture fisheries and the tourism /eco-tourism industries (Teelucksingh and Perrings, 2010).
- Biodiversity change affects human wellbeing through the effect it has on the flow of ecosystem services.

Introduction (cont'd)

- In SIDS, this may be measured by the marginal impact of biodiversity change on these industries.
- It is therefore of great interest to investigate empirically the linkages between biodiversity and tourism demand, in order to assess the impact that biodiversity has on tourism activity.

Considérations Théoriques et Empiriques

- Most of the world's biodiversity "hotspots" found in the "developing world" (Myers *et.al*., 2000).
- The U.N. Developmental Agenda identified four overlapping categories of developing countries:
  - Africa
  - Least Developed Countries
  - SIDS
  - Landlocked Developing Countries (Desa, 2007)

Considérations Théoriques et Empiriques (Suite)

- SIDS have therefore emerged as a distinctive class in the area of environmental studies (Brookfield, 1990; Hein, 1990) and one to which growing attention is being paid (Shareef and McAleer, 2005).
- Geographically, SIDS are spread across the continents of Africa, Asia, and Latin America and the Caribbean.
- The United Nations classifies 51 states into the category of SIDS.

Considérations Théoriques et Empiriques (Suite)

- The underlying characteristics of SIDS are those of economic and environmental vulnerability (Scheyvens and Momsen, 2008).
- Economic vulnerability to the world economy results from a dependence on international trade for the absorption of exports and as a source of imports.
- SIDS are known to be extremely vulnerable to environmental degradation (Van Beukering *et.al*., 2007) and much research on them in fact focuses on the impacts associated with global warming and sea level rise (Shareef and McAleer, 2005).

Considérations Théoriques et Empiriques (Suite)

- Small populations are coupled with high population densities, concentrated in coastal zone areas which comprise much of the small land areas.
- An inevitably high ratio of coastal to total land area means that island ecosystems are frequently characterized as ‘fragile’, with a delicate balance existing between highly coupled terrestrial and marine ecosystems (McElroy *et.al*., 1990).

Considérations Théoriques et Empiriques (Suite)

- Many SIDS are tourism-oriented, yet few studies focus on the significance of tourism to these economies (McElroy, 2003; Shareef and McAleer, 2005).
- And yet this significance is widely acknowledged: Zhang and Jensen, 2005, for example, in estimating a global tourism model, used a dummy variable for small islands to capture these effects.
- Simultaneously, SIDS have been identified as an area where global biodiversity is most in danger (Global Environment Outlook, 2003) and yet Teelucksingh and Nunes, 2010, in a review the existing literature on biodiversity valuation and ecosystem services in SIDS, find studies for only 17 out of the 51 SIDS.

Considérations Théoriques et Empiriques (Suite)

- The tourism literature is rich in empirical models that attempt to model and forecast tourism demand (Song and Li, 2008).
- A distinction may be made between domestic tourism and international tourism.
- While domestic tourism accounts for 80% of global tourism receipts (Neto, 2003; Freytag and Vietze, 2009), it is international tourism that has become the focus of recent interest, in particular with respect to developing countries where a large percentage of international tourism arrivals and receipts are centred (Freytag and Vietze, 2009).

Considérations Théoriques et Empiriques (Suite)

- The first challenge in any tourism model is how to capture tourism demand.
- With no standard measure of tourism flows, many different variables have been utilised (Freytag and Vietze, 2009).
- Song and Li (2008) provide a list of prospective variables that have been utilised, including tourist arrivals, tourist expenditure, tourism revenues, tourism employment, and tourism import and export.

Considérations Théoriques et Empiriques (Suite)

- Freytag and Vietze, 2009, argue that tourist arrivals data do not capture either the length of stay or spending intensity of the individual, and prefer to use instead tourism expenditure (per capita), as does Divisekera, 2003.
- Zhang and Jensen, 2005, discuss the conflict between what is measured by tourist arrivals versus tourist expenditure.
- Tourist arrivals, nevertheless, continues to be the more popular choice as a measure of tourism demand (Eliat and Eniav, 2004; Chan *et.al*, 2005; Croes and Vanegas, 2005; Zhang and Jensen, 2005; Shareef and McAleer, 2005; Garin-Munoz, 2006; Song and Li, 2008; Athanasopoulos *et.al*, 2011).

Considérations Théoriques et Empiriques (Suite)

- Traditional tourism demand models identify a host of determinants of such demand and, primary among these, are income and price factors (Croes and Vanegas, 2005).
- Though many models of tourism demand traditionally use demand-side explanatory variables, some argue the case for an analysis from the supply side perspective (Murphy *et.al*, 2000; Zhang and Jensen, 2005).
- Eugenio-Martin *et.al*, 2004, identify four main destination characteristics that influence a tourist's decision to visit: prices, investment, infrastructure and safety.

Considérations Théoriques et Empiriques (Suite)

- Eilat and Einav, 2004, classify possible explanatory variables into four main groups: price, variables that are destination specific, those that are origin specific, and those that describe the relationship between origin and destination.
- Zhang and Jensen, 2005, also identify explanatory variables relevant to country of origin (income, population) and between origin and destination countries (such as relative prices, transportation, and relative exchange rates).
- Song and Li, 2008, identify the most important determinants to be tourists' income, tourism prices in the destination country relative to the country of origin, tourism prices in competing destinations and exchange rates.

Considérations Théoriques et Empiriques (Suite)

- The introduction of price factors can be a challenging affair, given that data on tourism prices are not generally available.
- Eilat and Einav, 2005, discuss the different options available to obtain proxies for tourism prices, such as exchange rates (nominal, real, or adjusted for inflation in origin and destination countries), or the price of transportation adjusted for distance of travel from origin country.
- Interestingly, they find empirically that tourism arrivals to less developed countries (as opposed to more developed countries) has a low price elasticity, as opposed to tourism to more developed countries which is highly price elastic.

Considérations Théoriques et Empiriques (Suite)

- Though the types of explanatory variables included in models of tourism demand may vary widely, there have been few attempts to include biodiversity-related factors in this list.
- Biodiversity is often seen as a result, and not a factor, of production (Freytag and Vietze, 2009).
- Murphy *et.al*, 2000, included environment-related questions in a primary data analysis that attempted to calculate the likelihood of a visitor's return to a particular destination.

Considérations Théoriques et Empiriques (Suite)

- Eilat and Einav, 2004 define climate characteristics as a determining factor.
- Freytag and Vietze, 2009, undertake a useful analysis on the linkages between international tourism and biodiversity (measured by the number of bird species) in developing countries, finding empirical evidence that biodiversity provides a comparative advantage to the tourist industry.
- Loureiro *et.al*, 2012, construct biodiversity indicators, include them as explanatory variables, and find them to be significant factors influencing both the choice of county destination and the duration of stay.

Considérations Théoriques et Empiriques (Suite)

- Finally, it is important to identify that data constraints may play a role in the choice of variables in tourism demand models.
- A heavy reliance on secondary data means that the choice among both the relevant proxy for tourism demand and the list of explanatory variables may be constrained by their availability.
- Data issues in fact plague developing countries and in many cases may act as a severe limitation to empirical work (Naude and Saayman, 2005).
- Interestingly, Song and Li, 2008, identify this dependence on secondary data as one of the possible reasons that much of the empirical literature on tourism demand has a developed world focus.

Méthodologie et Données

- An econometric model is specified based on the following general formulation:

ta= f(invest, expenditure, rer, gdp_pc, mpa, tpa, kba, temp)

- *ta* = international tourist arrivals to SIDS
- *invest* = fixed investment expenditure in destination country for facilities, capital equipment and infrastructure for visitors;
- *expenditure* = current expenditure made by government in destination country to provide or support travel and tourism;

Méthodologie et Données (Suite)

- *rer* = real exchange rate;
- *gdp_pc* = GDP per capita in destination country;
- *mpa* = marine protected areas in destination country;
- *tpa* = terrestrial protected areas in destination country;
- *kba* = number of key biodiversity sites in destination country;
- *temp* = annual average temperature in destination country.

Méthodologie et Données (Suite)

- Data are collected for the period 1988-2010.
- Data for the three tourism-specific variables (*ta*, *invest* and *expenditure*) are obtained from the online database of the *World Travel and Tourism Council*.
- The data for *ta* are in thousands while data for *invest* and *expenditure* are in billions of US dollars (2000 prices).
- Economic variables (nominal exchange rates and consumer price indices, which are used to calculate *rer* and *gdp_pc*) are drawn from the online databases of the World Bank.
- *rer* is in the currency of the destination country and *gdp_pc* is in US dollars (2000 prices).

Méthodologie et Données (Suite)

- The biodiversity-related data used are *mpa*, *tpa*, and *kba*.
- Data for *mpa* and *tpa* come from the World Database of Protected Areas.
- *mpa* is measured as the percentage of territorial waters up to 12 nautical miles and *tpa* as the percentage of protected terrestrial area.
- Data for *kba*, a measure of trends over time in the protection of areas of particular importance to biodiversity, are found in the Integrated Biodiversity Assessment Tool (IBAT) database.

Méthodologie et Données (Suite)

- Data for *temp* are obtained from the Tyndall Centre for Climate Change Research.
- *kba* is measured as the number of key biodiversity sites in the destination country.
- *temp* is measured as the annual average temperature in the destination country (degrees Celsius).

Méthodologie et Données (Suite)

- The data set is plagued by missing data, which places constraints on the empirical investigation.
- In the tourism databases alone, data were unavailable for 15 of the 51 SIDS.
- The level of aggregation of some of the data used is also a consideration.
- The tourism variable used here is the aggregate number of international tourist arrivals with no distinction as to country of origin.

Méthodologie et Données (Suite)

- Furthermore, data used are annual since most of the data are available only at this frequency.
- The biodiversity data, in particular, which is fundamental to this study, are available only annually.
- One major consequence of using annual data is that this study cannot account for seasonal influences, which many other studies do by using quarterly, or even monthly, data.

Méthodologie et Données (Suite)

- The biodiversity dataset suffers from even further limitations.
- Obtaining data that measure marine biodiversity in SIDS is a very challenging task.
- The measurement of biodiversity through indicators is a burgeoning area but many of the indicators are in formative stages only and cannot be universally and quantifiably assessed.
- For example, the declaration of a protected area does not necessarily imply that the area is protected, nor does it imply that the objectives of protection are fulfilled.
- The indicators of marine and terrestrial protected areas used may therefore not entirely measure the effectiveness of those protected areas or their management.

Méthodologie et Données (Suite)

Table 1: Descriptive Statistics of Data

	ta	*invest*	*expenditure*	*rer*	*gdp_pc*	*mpa*	*tpa*	*kba*	*temp*
Mean	813.76	0.297	0.083	290.821	4793.576	2.744	8.316	8.549	25.781
Median	233.40	0.050	0.010	2.782	2639.189	0.320	4.910	5.000	25.800
Maximum	10,487.2	6.534	1.789	12984.11	29185.160	45.820	42.010	47.000	28.600
Minimum	1.000	0.000	0.000	0.198	140.709	0.000	0.000	0.000	21.800
Std. Dev.	1448.2	0.778	0.201	1602.88	5423.594	7.653	9.417	10.690	1.504
Obs.	950	805	805	646	709	961	960	1173	901

Méthodologie et Données (Suite)

- There is a wide amount of variation in the economic and biodiversity data (except for *temp*) and in all cases (again, except for *temp*), most of the population are below mean value.
- Tourism arrivals per annum, in particular, range from 1,000 to over 10 million.
- Investment and government expenditure in the tourism sector also vary very widely from one country to the next, starting from very small amounts and going in excess of US $6 billion in the case of investment and close to US $2 billion in the case of expenditure.

Méthodologie et Données (Suite)

- GDP per capita ranges from US $140, which would indicate a poor country, to US $29,000, which would be the income in a middle to upper income country.
- Some countries have precious little protected (marine or land) areas or none at all, while others have over 40% of marine and land areas under protection.
- Panel data techniques are employed, allowing for the capture of both space and time effects: compared to cross sectional or time series studies, panel data analysis permits the investigation of spatial effects that may be particularly relevant in studies that involve multiple locations.

Méthodologie et Données (Suite)

- The presence of time invariant variables, which poses certain problems for panel data estimation, is particularly a problem in environmental datasets, as they are in this study.
- Indeed, the biodiversity variables used are either time invariant (*kba*) or slowly changing (*mpa* and *tpa*).
- In the case of the latter two, there is hardly any change in values over time and, for some of the countries, they do not change at all.
- In the case of *kba*, the value is constant across time. This means that, for all intents and purposes, there are three time invariant variables in the model so that the classic Fixed Effects (FE) model is inapplicable.

Méthodologie et Données (Suite)

- Coefficient estimates are obtained using the Hausman-Taylor (HT) model applied to a semi-logarithmic specification, where the dependent variable, *ta*, is in logarithmic form but all the explanatory variables are in levels.
- The coefficients of the explanatory variables measure, therefore, the contribution of that variable to growth in tourism demand.
- The coefficients of all the explanatory variables are expected to be positive.

Méthodologie et Données (Suite)

- A Hausman test is performed to determine if the HT specification is superior to a RE specification, and variable exclusion tests are conducted to determine whether or not the inclusion of the environmental variables into the traditionally economic formulation has significantly added information to the model.
- For completeness, the Hausman-Taylor results are compared (using the Hausman specification test) to those obtained from a *within* estimator (which is equivalent to the Fixed effects estimation of the coefficients of the time-variant variables only).

Méthodologie et Données (Suite)

- For purposes of the HT estimation, one time varying variable, *gdp_pc*, and two time-invariant variables, *mpa* and *tpa*, are taken as endogenous variables.
- The choice of *gdp_pc* is obvious since, in tourist dependent economies, income will depend on tourist activity.
- The main hypothesis of this paper is that tourism activity depends on the biodiversity.
- It would seem logical, therefore, that the amount of protected sites will be influenced, in turn, by tourist activity under this hypothesis.
- The instruments used are the remaining regressors in the model (*invest, expenditure, rer, kba, temp*).

Analyse des Résultats

The estimates obtained from the Hausman-Taylor Model are shown in Table 2 (*All variables and Wald statistic significant at the 1% level)*

Table 2

Explanatory Variable	**Coefficient Estimate**
invest	0.427
expenditure	1.055
rer	0.009
gdp_pc	3.10×10^{-11}
mpa	0.056
tpa	0.025
kba	0.086
temp	0.368
Constant	-5.513
Wald χ^2	192.4

Analyse des Résultats (Suite)

- The overall fit is exceptionally good given the high significance of the Wald statistic (the associated p-value is close to 0).
- All coefficients are significant at the 1% level and have the expected positive sign.
- In addition, a standard Lagrange multiplier (LM) test is performed to determine whether or not the environmental variables may be excluded from the model and this is rejected outright (p-value close to 0).
- This provides ample evidence that the environmental variables are properly included in the model in that they add significantly to the explanation of tourism demand.

Analyse des Résultats (Suite)

- Policies aiming at protection of the biodiversity stock will positively impact tourism arrivals.
- Deterioration of the marine protected areas by 1%, the terrestrial protected areas by 1% and the key biodiversity sites by one site, respectively, will result in a fall of 5.6%, 2.5% and 8.6% in tourist arrivals.
- This is not at all negligible for policy-making purposes.

Analyse des Résultats (Suite)

- In the case of the more traditional economic variables, an increase (decrease) of US 1 billion of government expenditure and capital investment in the tourism sector (at constant 2000 prices), respectively, results in a 106% and a 43% increase (decrease) in tourist arrivals.
- This translates into a 11% and 4% increase (decrease) for an increase (decrease) of U$ 100 million (at constant 2000 prices).

Analyse des Résultats (Suite)

- This is a relatively large amount of expenditure for the given impact on tourist arrivals and must be compared to the cost of preventing the deterioration of the environmental assets for an approximately similar impact.
- In addition, a unit appreciation in the real exchange rate (in domestic currency) leads to approximately 1% decrease in arrivals.

Analyse des Résultats (Suite)

- It is clear, therefore, that while the traditional economic policy levers do have an effect on the demand for tourism in SIDS, the biodiversity factors are perhaps just as important, if not more important.
- They could very well become even more important in the future as a more environmentally conscious tourist develops in the richer countries of the world, where the bulk of tourists to SIDS originate.

Conclusion

- Increasing the investment and expenditure in the tourism sectors of the destination countries is one of the obvious policy prescriptions that arise from our study.
- There is also a clear, positive link between economic development of the destination country (proxied by GDP per capita) and tourist arrivals.
- These results are in line with both economic theory and other empirical findings in the literature.

Conclusion (Suite)

- The biodiversity factors are also clearly very important and must also figure in policy decisions.
- The Convention on Biological Diversity recognizes the linkages between tourism and biodiversity conservation, with tourism as an economic tool by which both biodiversity conservation and sustainable livelihoods can be generated.
- The empirical results are in line with this recognition, telling us that in fact tourism arrivals are in a large part influenced by biodiversity richness.

Conclusion (Suite)

- Conversely, we may say that lower levels of biodiversity imply lower levels of tourist arrivals, which may have negative effects on the tourism-dependent economies of the SIDS.
- This is an important empirical finding.
- While there is a long-standing debate between the economy-environment trade-off of the developing world, this is not an option in the context of small island tourist economies where biodiversity richness and economic well-being are found to be co-dependent.
- Given that it has also been suggested that tourism levels may have a negative impact on biodiversity richness, it is clear that this is an uneasy but vital relationship that warrants closer study and monitoring in SIDS.