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Some Like it "Green".

Coastal Tourism Demand and Biodiversity: A Worldwide Analysis

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Abstract

Coastal (international and domestic) tourists seek beautiful places to spend their holidays and they tend to look for the same conditions that are generally associated to high environmentally amenities, namely warm weather, sunshine, pristine nature, clean air and water. A literature understudied research topic aims at understanding whether those biodiversity/environmental characteristics are instrumental to the enjoyment of touristic beach activities or to a direct enjoyment of biodiversity/ecosystem goods and services consumption. This paper aims at filling the gap, by studying the impacts of biodiversity on tourism flows globally, by testing whether species and habitat diversity exerts a significant influence on the tourist's destination choice. Tourist arrivals in 207 countries have been analysed and disentangled into an international and a domestic component and two types of tourists' destination choice have been analyzed: the "beach lovers" and the "greens". The three-stage-least squares (3SLS) estimations of three equations models for each selected category of tourists (international and domestic "beach lovers" vs. international and domestic "greens") suggest that international and coastal tourists choose their coastal destination based on destination preference, rather than prices / costs,. The (domestic and international) "beach lovers" do not seem to consider biodiversity and environmental amenities as factors directly affecting the destination choice. The "greens" destination choice, on the contrary, is affected by the environment, which is captured here by different environmental indicators. This effect is stronger among international tourists. Domestic visitor visitation appears to be related to motivations such as the desire to preserve national naturalistic patrimony. In the future, case-by case, survey supported valuation studies needs to deepen this worldwide preliminary econometrics study.

Keywords: International tourism, domestic tourism, species diversity, habitat diversity, biodiversity indicators, 3SLS.

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1. Introduction

Studying touristic industries require a heuristic approach, which goes well beyond the present research. In a "more strictly" economics perspective, two main streams of research have emerged which are pertinent to study touristic industries:

1) Research aiming at understanding the correlation between economic growth and tourism specialization in selected countries;
2) Research aiming at understanding the determinants that explain tourists' choice and demand.

The relationship between tourism specialisation and economic growth is becoming one of the principal areas of research in the growing field of tourism economics. Since the seminal works of Copeland (1991), Hazari and Sgrò (1995) and Lanza and Pigliaru (1995), the role played by tourism in the process of national development has captured increasing attention. In the last few years, many papers have attempted, mainly theoretically, to understand the underlying mechanisms at which determine tourism related economic development, but many shadows prevent light being shed on this issue. Notable empirical papers include the works of Brau, Lanza and Pigliaru (2004 and 2007, see also Lanza, Markandya , Pigliaru, 2005). There exist a large number of studies which aim to elucidate the variables affecting tourists' destination choice and the elasticity of touristic demand to price or income changes (for a detailed survey, see Candela and Figini, 2004)..

This study relates to the second branch of research and aims to understand determinants affecting the choice of worldwide coastal touristic destinations, highlighting, in particular, the effects of environmental and biodiversity indicators. The existing literature has explored tourists' destination choice and motivations with distinct perspectives, but has largely? neglected to incorporate environmental and biodiversity elements.

In coastal areas, for instance, the idea of "sea and sun bath" is an effective health remedy that has spread during the second half of the XIXth century among élites and, after World War II, among broader groups of population[1]. Coastal cities and areas, before this new "touristic revolution", were territories principally exploited for of fishing, and since have become elite? upscale? or mass touristic destinations. Therefore, the main motivation that spurred tourism in coastal areas and contributed to coastal tourism development is health care.

Other variables shown / thought to affect the choice of a coastal touristic destination include income, services prices, distance and cost of transportation and exchange rates (Dritsakis, 2004; Witt and Witt 1995; Hamilton et al., 2005; Bigano et al., 2007; Lise and Tol, 2002). Resident population density and tourists' population

[1] Since the Second World War, the growth of international tourism has been exponential. Annual tourist arrivals worldwide increased from 25 million in 1950 to 450 million in 1990.

density can also affect the destination choice. It is has been documented that some consumers prefer crowded destinations, other enjoy locations "*far from the madding crowd*". Fads and fashion affect destination choice (see Candela and Figini).

Economic variables such as income, tourism prices, cost of transportation and exchange rates are widely used as explanatory variables to describe tourist arrivals (Dritsakis, 2004; Witt and Witt 1995). In addition to the tourist's available income, GDP of the country of destination may also be a driver of tourism flows, based on the idea that the growth of international tourism tends to concentrate in regions with the highest level of economic development (Hamilton, 2005 a; Eugenio-Martín *et al.*, 2004). Population density has also been shown to affect international tourism through a proportional increase in departures. Hamilton points out the ambiguous interpretation of the impact of population density on tourism flows, since tourists may be attracted to densely populated countries with a larger number of towns and cities and / with associated tourist facilities and infrastructure. On the other hand, areas of high population density and therefore few or no natural and wilderness areas may be unattractive to certain tourists (Hamilton, 2004; Hamilton et al., 2005a). Several studies have focused on the relationship between climate and tourism demand. Temperature is typically considered as the most relevant climatic variable, since most climate parameters, such as humidity, cloudiness and weather extremes depend on temperature and climate change might shift international tourist towards higher altitudes and latitudes in the future (see Bigano et al., 2007; Hamilton et al. (2005 a; b); Lise and Tol (2002).

Environmental amenities are also considered by most studies as a relevant component of tourism demand determinants (Wunder, 2000; Naidoo and Adamovicz, 2005; Green, 2001). Furthermore, several studies consider specific types of tourism attractions at certain destinations, such as art and local culture, wine and gastronomic production (Medina, 2003; Poria, 2003; Hamilton, 2004, Brunori and Rossi, 2000; Telfer, 2001; Correia et al., 2004). Cultural and natural heritage are also deemed to be significant determinants of the tourist's destination choice. Heritage tourism is often analysed as a specific tourism segment, influenced by the tourist's personal characteristics, awareness and perception as well as by the site's attributes (Poria, 2003). Hamilton (2004) uses the number of UNESCO World Heritage sites as a proxy for a country's cultural attractiveness and the total protected area at the national level as a proxy for the availability of undeveloped land. An important determinant of tourism destination choice is the presence of coastal areas and beaches. Previous studies have demonstrated that a country's coastline and beach length positively influence the number of tourist arrivals (Madison, 2001; Bigano *et al*., 2007).

The biodiversity component of the natural and environmental amenities available in different countries has not been addressed in the reviewed literature. Research has mostly focused either on ecotourism or? specific segment in the tourism market (Wunder, 2000; Naidoo and Adamovicz, 2005). An integrated assessment of different components of biodiversity and their impact on tourism flows is lacking. This papers aimsto fill this

gap in the literature by... To our knowledge, in fact, an under-studied key factor affecting touristic coastal destinations choice is the amount of biodiversity in the touristic destination. analysing the impacts of biodiversity on domestic and international tourism flows globally[2]. The underlying hypothesis to be tested is that species and habitat diversity can exert a significant influence, in addition to other variables , on the tourist's destination choice. Each countries' biodiversity profile is described using a set of suitable species and habitat diversity indicators from data published by the World Bank and the World Resource Institute. The demand for a country's tourism services is disentangled into an international and a domestic component, as thesemay follow distinct patterns and may be sensitive to different aspects of the biodiversity profile of the destination. Therefore we focus on both international and domestic tourism arrivals in 207 (developed and developing countries[3]) countries, adopting 1995 as a reference year, and explore the links between tourism flows and species and habitat diversity. The present paper builds upon the state of the art literature extending the current tourist destination choice models to include biodiversity variables in addition to the widely used socio-economic drivers of destination choice; climate factors and the proximity of natural and cultural heritage sites. On the methodological point of view, the paper adopts a three equations model, simultaneously estimated by 3SLS, in order to simultaneously capture different determinants that explain (international and domestic) tourists' coastal destination choice and in order to rigorously build economic and empirical relationships between distinct variables. Tourism, shows a stronger dependency on a healthy environment than other industries and economic sectors. Tourists seek out beautiful places and they tend to look for the same conditions that are generally associated to high environmentally amenities, namely warm weather, sunshine, pristine nature, clean air and water. It is important to understand the extent to which those biodiversity/environmental characteristics are instrumental to the enjoyment of touristic beach activities (it is

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[2] For the sake of this study, biodiversity is defined as the stock of endogenous fauna and flora at the coastal destination. Biodiversity has several economic dimensions, spanning from use, non use, option, bequest values. Biodiversity is tested as one of the spurring elements for the choice of the touristic coastal destination.

[3]Between 1969 and 1979, the World Bank encouraged developing countries to invest in tourism as a strategy for attracting foreign investment, and the governments of developing countries began to see tourism as a means to redistribute resources from North to South. The World Tourism Barometer (WTO, 2008) reports that, in the last few years, international tourism has registered a sharp increase in the number of arrivals, reaching 900 million in 2007. The Middle East has registered the highest growth rate, with an estimated 13% rise with respect to 2006. In second place stand Asia and the Pacific, with an increase of 10%, followed by Africa, registering an 8% rise to the figure of 44 million visitors in 2007. East Asia and the Pacific, Asia, the Middle East and Africa, on the other hand, are forecast to record growth rates of over 5% per year, compared to the world average of 4.1% (Honey and Krantz, 2007). Although Europe and North America remain the top destinations in international travel, representing about 65% of all international tourist arrivals, these more mature regions are anticipated to show lower than average growth rates in the forthcoming decades. In addition, tourism has become increasingly important for developing countries, accounting for 70% of exports from the Least Developed Countries (LDCs). The United Nations Conference on Trade and Development (UNCTAD) qualifies tourism as one of the main contributors to GDP of 49 least-developed countries, as well as one of the main sectors in terms of employment (Christ *et al.*, 2003). Furthermore, many of those countries host a significant share of worldwide biodiversity hotspots, including Mexico, Brazil, Thailand, Malaysia and Indonesia. However, tourism in developed countries can also have significant implications for biodiversity conservation, because biodiversity hotspots also occur in these northern destinations, such as the California Floristic Province, the northern part of Mesoamerica, the Mediterranean Basin, the Caucasus, and the mountains of south-central China. Therefore it becomes important to assess the degree to which tourism is dependent on biodiversity, in particular, among biodiversity-rich countries. This way it would be possible to shed light on the proportion of tourism's GDP contribution and its link with biodiversity, which may represent the principal tourism attraction factor.

more peasant sunbathing on a white immaculate sand beach rather than on a polluted area!) or to a direct enjoyment of biodiversity/ecosystem cultural goods and services. The paper organized as follows. Section 2 describes the data sources used for this analysis and explains the choice of the selected biodiversity indicators. The model specification and the empirical strategy are discussed in Section 3, while Section 4 presents and discusses estimation results. Finally, Section 5 draws some conclusions, providing inputs for further research.

2. Data

Data has been gathered from a broad set of different sources to create a comprehensive database, encompassing many relevant determinants of tourism demand highlighted in the literature. Table 1 shows the full set of variables used in this study, including the respective data sources and the unit of measurement. Data on tourism arrivals, both at the national and sub-national level, on GDP per capita, expenditures and length of stay have been retrieved from Bigano et al. (2004), who created a worldwide database, encompassing cross-sectional data for 207 countries, adopting 1995 as a reference year. Population density data for 1995 was collected from the World Resource Database (2001), the country surface area from the CIA World Factbook (2001), coastline and beach length from Reefbase (2000) and the Report of the IPCC Coastal Zone Management Subgroup (1999).
Since the present paper aims to explore the impact of biodiversity on tourism flows on a global scale, it has been chosen to focus on two types of biodiversity indicators, habitat abundance and species richness. Habitat abundance is defined as the share of a country's surface covered by a particular habitat type; here the surface covered by wetland and forests. This indicator is considered important in the description of a country's biodiversity profile since spatial landscape patterns and habitat distribution are strongly linked to the overall condition of ecological resources (O'Neill et al., 1997). Wetlands and forests, are well-studied ecosystems for which good quality data are available and their role in the hosting and conservation of biodiversity is widely acknowledged. Forests are a biodiversity-rich ecosystem and they support a vast array of species from birds and mammals to soil microbes. As a consequence, logging and deforestation may cause substantial changes in tree species abundance and distribution as well as significant losses of critical habitat hindering the survival of those species (Lyndenmayer, 1999; Bawa and Seidler, 1998).In addition/ Similarly the high biological productivity of wetlands and the strong selection pressure peculiar to the aquatic environment produce a rich biota associated only with wetlands. This ecosystem typically occurs in discrete patches, so populations tend to be isolated and more vulnerable to extinction. A minimal threshold of wetland density needs to be maintained in order to sustain the wetland biota (Gibbs, 2000).

Species richness is defined as the number of different species living in a given area. This indicator is related to community diversity and it underlies many ecological models and conservation strategies (Gotelli and

Coldwell, 2001). It is a highlyintuitive measure of biodiversity and it is relatively easy to compute once the scale of the analysis has been determined. Previous studies suggest that the species richness of certain indicator taxa, namely birds, may reflect that of other, more poorly studied taxa (Prendergast and Eversham, 1997). Chase et al. (2000) use birds and small mammal species as biodiversity indicators for the coastal sage scrub habitats of southern California. Noss (1990) suggests that flagship species and vulnerable species may be used as indicators of species diversity. Due to the geographical scale of the present analysis, it was decided to focus on bird and mammal richness, testing whether these behave as flagship or charismatic species, by exerting a sensible effect on tourist preferences. Several studies use bird and mammal species richness (the number of birds and mammals species recorded in each country) as indicators of the overall species diversity. . The data for both habitats and species was retrieved from the World Bank (2007). In addition to the number of species, we included the Biodiversity Index for birds and mammals which takes into account both the number of species per unit of area and the respective level of threat which those species are subject to. This index captures / describes the number of threatened species living in a 10 square kilometre area[4] weighted by the level of risk to which they are prone, thus providing a rough? indication of the effectiveness of the country's biodiversity conservation policies and an indirect measure of the degree of stress of species and ecosystems[5] (Wendland *et.al.*, 2009). Finally, in addition it has was decided to include a additional synthetic indicator reflecting the level of threat to which each species is exposed. This is interpreted as a response indicator, giving a measure of the effectiveness of protection policies. Synthetic biodiversity indicators have regularly been computed for bird and mammal species (Wendland, 2009). These indices are constructed using the most recent available global vector data on species ranges of birds (BirdLife International, 2006) and mammals (Baillie et al., 2004) weighted by their threat status as defined by the IUCN Red List (IUCN, 2007). In addition, the number of sites recorded in the World Heritage List for each country was retrieved from UNESCO (2003). Finally, data on average annual temperature and precipitation for the period 1961-1990 have been retrieved from Bigano et al. (2004).

[4] The resolution is 0.083333 degree, corresponding to ca. 10km at equator (Wendland *et al.*, 2009)

[5] According to the Convention on Biological Diversity, biodiversity is defined as *"the variability among living organisms from all sources including, inter alia, terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are part; this includes diversity within species, between species and of ecosystems"* (CBD, 1992). The convention foresees an obligation for each contracting party to develop national strategies and plans for the conservation of biodiversity. At the very basis of biodiversity conservation stands the need to be able to measure it and to quantify its status and trends. Since biodiversity, and the manipulation of the respective data, are rather complex to be mapped, their quantitative assessment is often done by means of indicators. In turn, there is a variety of potential biodiversity indicators and the choice of the most appropriate ones, as well as the level of detail of their measurement, depends on the objective and on the scope of the analysis under consideration.

Table 1. Description of the Data and Data Sources

Variables	Unit of measurement	Year	Source
International arrivals	000	1995	Bigano et al, 2004
Domestic arrivals	000	1995	Bigano et al, 2004
International arrivals NUTS II	000	1995	Bigano et al, 2004
Domestic arrivals NUTS II	000	1995	Bigano et al, 2004
Number of days	Number	1995	Tol and Bigano, 2006
Expenditures	USD/person/day	1995	Tol and Bigano, 2006
Total Expenditures	USD	1995	Constructed variable
Population	000	1995	CIA World Fact Book (2001)
Population/km2	000	1995	World Resources Database 2000-2001
Area km2 (land+water)	Km2	1995	CIA World Fact Book (2001)
GDP per capita 1995 USD	USD	1995	Bigano et al, 2004
Length coastline	Km	2000	World Vector Shoreline (2000)
Beach length	Km	1990	IPCC (1990)
Harbour Length	Km	1990	IPCC (1990)
Area covered by wetlands	%	2000	World Bank (2007)
Area covered by forests	%	2000	World Bank (2007)
Area covered by reefs	%	2000	World Bank (2007)
Area covered by mangroves	%	2000	World Bank (2007)
Number of amphibians species	Number	2000	World Bank (2007)
Number of reptiles species	Number	2000	World Bank (2007)
Number of plant species	Number	2000	World Bank (2007)
Number of bird species	Number	2000	World Bank (2007)
Number of mammal species	Number	2000	World Bank (2007)
Biodiversity index for birds	Number of species * threat status	2007	Wendland et al. (2008)
Biodiversity index for mammals	Number of species * threat status	2007	Wendland et al. (2008)
Biodiversity index for plants	Number of species * threat status	2007	Wendland et al. (2008)
No. world heritage sites	Number	2003	UNESCO
Annual precipitation	Mm	Average 1961-1990	Bigano et al, 2004
Annual temperature	°C	Average 1961-1990	Bigano et al, 2004

3. Empirical Strategy

When selecting the touristic destination (where to go and how long to stay), consumers usually choose according to income constraints/money availability and preference for the destination. The preference for the destination may depend (or be formed) on several, different factors, like fashions, informative cascades, the recreational characteristics of the destination, the environmental quality and the nature of the holiday itself.

In order to model and capture all these complex relationships, we simultaneously estimate by 3SLS the following three equations models:

1) Number of Arrivals = f(total expenditures, preference for the destination characteristics);

2) Total expenditures = f(macroeconomic environment-(socio-economics and demographics- of the destination);

3) Preference for the Destination = f(intrinsic recreational and environmental features of the selected destination and touristic type)

The empirical strategy is motivated by two main requirements. The first one is econometrics diagnostics based, since a simple linear model that explains arrivals in particular destinations as a function of selected explanatory variables, estimated by OLS, produces estimates, affected by heteroschedasticity and multicollinearity[6]. The second requirement responds to the attempt to construct and test an econometric model that describes and captures complex relationships in a better/more efficient way than a single, linear specification. In Equation 1 we attempt to explain the number of arrivals in a destination as a function of budget constraint (total expenditures) and preference for the destination. Since we are studying coastal tourism, the preference structure is represented by beach tourism (length of the beach, following Maddison et al (2007)) and environmental/cultural tourism at the coast (presence of protected areas and UNESCO protected sites). We simultaneously test the hypotheses that expenditures negatively affect arrivals. On the other hand, the preference for the destination positively affects the choice for that location, and therefore the number of arrivals. Equation 2 attempts to explain the total expenditures (mostly prices of touristic destinations) as functions of the macroeconomic milieu (socio-economics and demographics variables) of the destination itself. We expect that the richer the country (in terms of per capita GDP) the higher the total expenditures, which can be mitigated by decreasing the number of days spent on holidays.

Equation 3 models determinants of tourist preference for the destination. If the consumer chooses the destination, as a result of, for instance, the extension of the coastal protected areas in a selected country, what are the factors affecting that variable? In this case, we expect that, among the others, environmental variables, such as biodiversity indicators and the presence of threatened animal species might positively affect the breadth of protected areas. Climatic variables might also affect (positively or negatively) the endogenous variable at issue.

Overall, the simultaneous equations model seeks to explain three endogenous variables: (1) Touristic arrivals at a destination; (2) Tourist expenditures; (3) Tourist preferences for trip characteristics in order to test a simple consumers' choice model in a microeconomic framework.

[6] Detail upon request.

The 3SLS method estimates a system of structural equations, where some equations contain endogenous variables among the explanatory variables. "*It goes one step further than 2SLS, since it estimates all coefficients of the entire system simultaneously*" (Zellner and Theil, 1962, pag. 54)[7]. Therefore, it appear to be the proper method to estimate our 3.equations system.

4. 3SLS Results: "Beach Lovers" and "Greens".

In this section we present selected 3SLS results[8]. The broad model presented in the above section is operationalized, making the use of different explanatory variables. In particular, given the dataset, we want to target the "preferences structure" effect and our reasoning (and estimations) have been performed along the following lines. A consumer might choose a coastal touristic destination for several reasons. It is, however, fair to assume that a tourist can choose a coastal location because of two main (alternative) reasons: (1) going to the beach ('beach lover'); (2) enjoying the natural landscapes, flora and faunaprovided by the coastal destination ("green").

We separately modelled and tested these two distinct tourists' types/preference structures: "beach lover" and "green" since this allows us to separate different tourists' profiles and, possibly, motivational and preference structures.

We, first, simultaneously estimated a 3 equations model, where the (logged) number of (domestic and international) coastal arrivals principally depends on the beach characteristics and other socio-economic, demographics and climatic variables. In particular, we estimated the number of (domestic and international) arrivals of the "beach lovers", that is, those who select a destination because of the amenities provided by the beach. After several checks, we simultaneously estimated the following three equations model, where variables are mostly expressed in logarithms, so that estimated coefficients can be interpreted as elasticities.

[7] Typically, the endogenous explanatory variables are dependent variables from other equations in the system. In particular, under 3SLS a structural equation is defined as one of the equations specified in the system. A dependent variable will have its usual interpretation as the left-hand-side variable in an equation with an associated disturbance term. All dependent variables are explicitly taken to be endogenous to the system and are treated as correlated with the disturbances in the system's equations. All other variables in the system are treated as exogenous to the system and uncorrelated with the disturbances. The exogenous variables are taken to be instruments for the endogenous variables.

[8] Additional results are available upon request.

Three Equations Model (A): the "beach lovers"

(1) $(Log)Coastal\ Arrivals_i = \beta_0 + \beta_1(Log)Total\ Expenditures_i + \beta_2(Log)Beach\ Length_i + \varepsilon_i$

(2) $(Log)Total\ Expenditures_i = \beta_0 + \beta_1(Log)Destination\ GDP\ per\ Capita_i + \beta_2(Log)Coastal\ Population\ Density_i + \varepsilon_i$

(3) $(Log)Beach\ Length_i = \beta_0 + \beta_1(Log)Annual\ Average\ Precitipation_i + \beta_2(Log)Harbour\ Lenght_i + \varepsilon_i$

Equation 3A relates country *i* beach length to climatic variables, like annual average precipitation and the extension of harbours. Harbours diminish the beach extension, since they are places, where port activities take place. At the same time, average precipitation might hamper the beach extension, given to the contribution to erosion impacts. Therefore, we expect that both variables present negative estimated coefficients. The 3SLS results are presented in Table 2.

Table 2 Choice of Coastal Destination: "Beach Lovers"

Specification	**Number of Observations**	**(International Coastal Arrivals) "R-Squared"**	**(Domestic Coastal Arrivals) "R-Squared"**
Equation 1	59	0.37	0.42
Equation 2	59	0.69	0.69
Equation 3	59	0.43	0.41
3SLS Estimated Coefficients		**International Coastal Arrivals**	**Domestic Coastal Arrivals**
Equation 1			
(Log) Coastal Arrivals			
(Log) Total Expenditures		0.32**	0.04
(Log) Beach Length		1.31***	2.74***
Constant		5.70***	2.99
Equation 2			
(Log) Total Expenditures			
(Log) Destination GDP per Capita		0.90***	0.89***
Population Density on the Coast		0.02	0.006
Constant		0.28	0.39
Equation 3			
(Log) Beach Length			
(Log)Annual Precipitations		-0.16*	-0.27***
(Log) Harbour Dimension (in Km^2)		- 0.52***	-0.61***
Constant		1.73	0.89
Endogenous variables: International/Domestic Coastal Arrivals; Total Expenditures; Beach Length **Exogenous variables:** Destination GDP per capita, Coastal population density; Harbour Lenght in Square Km; Annual Average Precipitation;			

*** =statistically significant at the 1% level; * =statistically significant at the 5% level.

Table 2 reports estimated coefficients for both international and domestic arrivals. It is worth highlighting some commonalities and differences in the results. For both cases, the logged amount of arrivals positively depends on total expenditures, which, in turn positively depend on the macroeconomic milieu, expressed by the destination GDP per capita and coastal population density. This result can be interpreted in different ways. Total expenditures represent tourists' money availability, therefore, arrivals increase with an increase of money availability (and beach coastal tourism behaves as a normal good). On the other hand, this result could be interpreted as a kind of "fads" effect, that is money invariant, or as a particular effect, according to which, consumers choose according to a particular affection to the final destination, despite budget constraints. Although estimated coefficients are positive in both cases (Equation 1), the coefficient for total expenditures is not statistically significant in the model that estimates domestic tourists' arrivals. The estimated coefficients for the beach length are, as expected, positive in both cases and statistically significant deomonstrating thatdomestic and international arrivals positively depend on the selected destination beach dimension. Equation 3 results are peculiar, especially because they come out after several checks. Logged annual average precipitation (climate impact) and harbour dimensions (economic activities) negatively affect the beach length, which, in turn, is a fundamental determinant of both domestic and international arrivals in the countries.

A second exercise implies the 3SLS estimate of a 3 equations model, in order to explain (domestic and international) tourists' arrivals as a function of environmental and biodiversity variables. In this case, the (logged) number of (domestic and international) coastal arrivals mostly depends on the natural characteristics of the destination country and other socio-economic, demographic and climatic variables. In particular, we estimate the number of (domestic and international) arrivals of the "greens", that is, those who select a destination because of the cultural services and environmental amenities provided by the coastal destination. After several checks, we simultaneously estimate the following three equations model, where most variables are similarly expressed in logarithms, so that estimated coefficients can be interpreted as elasticity.

Three Equations Model (B): the "greens"

$$(1)\ (Log)Coastal\ Arrivals_i = \beta_0 + \beta_1(Log)Total\ Expenditures_i + \beta_2(Log)Protected\ Areas_i + \beta_3(Log)UNESCO\ Cultural\ Sites_i + \varepsilon_i$$

$$(2)\ (Log)Total\ Expenditures_i = \beta_0 + \beta_1(Log)Destination\ GDP\ per\ Capita_i + \beta_2(Log)Coastal\ Population\ Density_i + \varepsilon_i$$

$$(3)\ (Log)Protected\ Areas_i = \beta_0 + \beta_1(Log)Annual\ Average\ Precitipation_i + \beta_2(Log)Annual\ Average\ Temperature_i + \beta_3(Log)Forest\ Area_i + \beta_4(Log)Wetlands\ Area_i + \beta_5 Biodiversity\ Index\ for\ Mammals_i + \beta_6\ Biodiversity\ Index\ for\ Birds_i + \varepsilon_i$$

Equation 1B relates arrivals to "cultural services" provided by the destination coastal tourism: the percentage of the country territory destined to protected area and the number of UNESCO protected cultural sites, which usually also have environmental features. Equation 3B explains the protected areas surface in the destination country as a function of selected climatic, environmental variables and biodiversity indicators. The 3SLS results are presented in Table 3.

Table 3 Choice of Coastal Destination: "Greens"

Specification	**Number of Observations**		**(International Coastal Arrivals) "R-Squared"**	**(Domestic Coastal Arrivals) "R-Squared"**
	Int.	**Dom.**		
Equation 1	47	49	0.61	0.47
Equation 2	47	49	0.68	0.68
Equation 3	47	49	0.36	0.57
3SLS Estimated Coefficients			**International Coastal Arrivals**	**Domestic Coastal Arrivals**
Equation 1				
(Log) Coastal Arrivals				
(Log) Total Expenditures			0.39***	0.11
(Log) Number of Unesco Sites			1.39***	2.38***
(Log) Protected Area (% of national territory)			0.60*	1.65
Constant			9.03***	11.92***
Equation 2				
(Log) Total Expenditures				
(Log) Destination GDP per Capita			0.82***	0.83***
Population Density on the Coast			-0.02	-0.001
Constant			1.04	0.97
Equation 3				
(Log) Protected Areas				
(Log) Annual Average Temperature			0.52	0.50*
(Log) Annual Average Precipitation			-1.11***	-1.12***
Biodiversity Index Mammals			0.01*	0.01***
Biodiversity Index Birds			0.41	0.5***
(Log) Forest Area			0.43	0.45*
(Log) Wetlands Area			0.15***	0.12*
Constant			4.50***	5.20*
Endogenous variables: International/Domestic Coastal Arrivals; Total Expenditures; Protected Areas **Exogenous variables:** Destination GDP per capita; Coastal population density; Number of Unesco Sites; Annual Average Precipitation; Annual Average Temperature; Biodiversity Index for Mammals; Biodiversity Index for Birds; Forest Area; Wetlands Area.				

*** = statistically significant at the 1% level; * = statistically significant at the 5% level.

Table 3 reports estimated coefficients for both international and domestic arrivals. The (logged) number of UNESCO World Heritage sites produces a positive impact on both international and domestic tourists' arrivals. The (logged) percentage of the destination country's territory that is within a protected areas

positively affects tourists arrivals. However, the estimated coefficient is not statistically significant for domestic tourists, nor are the (logged) total expenditures. This is in contrast to previous the 3SLS model, where the beach length positively influences domestic visitor arrivals at the coastal destination. International tourists are weakly affected by the existence of protected areas in the coastal destination, however the estimated coefficients for UNESCO cultural sites are much more positive, suggesting that more than "greens", international tourists are "geeks".

Certain species and habitat diversity indicators do exert a significant influence on the country's extent of protected areas The Biodiversity Indexes for bird and mammal species and the country's (logged) forest[9] and wetland area werepositively related to domestic and international tourist arrivals. Those biodiversity related?? variables affect the logged percentage protected area by country, which, in turn, affects tourist arrivals in coastal destinations.

Finally, climatic variables affect the extent of protected areas. In particular, (logged) annual average precipitations negatively impact the area designated with protected status. Interestingly, average annual temperature positively affects the existence of protected areas, suggesting that those might not be sensitive to desertification problems.

It is worth highlighting that results differ for Equation 3B between international and domestic arrivals. The model explains much more of the variation for domestic tourism than for international tourism, denoted by a higher R-squared value. The existence of extensive protected areas is not a convincing determinant of domestic coastal arrivals. This result might be interpreted as suggesting that although domestic tourists do not account for protected areas when choosing their coastal destination, they do however care that a percentage of the national territory is protected, so that the environment and biodiversity are safeguarded. This result might depend on nationalistic feelings, or other variables that we have not considered here.

5. Conclusions and Inputs for Further Research

Tourism is the largest business sector of the world economy, accounting for 10% of global GDP and 35% of the world's export services. Since 1985, tourism flows have been growing an average of 9% per year. In 2005, receipts from international tourism reached US$ 6.82 trillion, an increase of $49 billion over 2004 (Honey and Krantz, 2007). Tourism, shows a stronger dependency on a healthy environment than many other industries and economic sectors. Tourists seek beautiful places to spend their holidays and they tend to look for conditions that are generally associated with high quality environmental amenities, namely warm weather, sunshine, pristine nature, clean air and water. This study assessed a set of features of biodiversity and their influence on the number of (domestic and international) tourists visiting a country's coastal areas. We attempted to disentangle whether environmental amenities (instrumentally) affect the "beach lovers" pleasure to beach activities consumption or directly affect the "greens"' love for ecosystem/biodiversity

[9] Forest area implies coastal forest areas.

goods and services consumption. Our 3SLS estimations of a three equations models provided interesting results, the most important of which were the following for the "beach lovers":

1) Domestic and international arrivals positively depend on total expenditures, which, in turn positively depend on the macroeconomic milieu, indicated / deonted by the destination GDP per capita and coastal population density. Howeverthe estimated coefficient for total expenditures was not statistically significant in the model that estimates domestic tourists' arrivals.
2) Domestic and international arrivals positively depend on the selected destination beach dimension, as expected. Logged annual average precipitations (climate) and harbours' dimensions (economic activity) negatively affect the beach length, which, in turn, are fundamental determinants of both domestic and international arrivals in these countries. This implies that beach lovers' destination choice is not directly affected by biodiversity and natural amenities.

Importantly, our 3SLS estimations of a three equations Model suggest that for the "greens":

1) The existence of protected areas and UNESCO cultural sites positively affects tourists arrivals.
2) Several species and habitat diversity indicators exert a significant influence on the extent of protected areas (which, in turn, affects arrivals). Domestic visitors, instead, turn out to be less influenced byprotected areas than international tourists .
3) Climatic variables affect the existence of protected areas. In particular, (logged) annual average precipitation negatively impacts the extent of protected areas. On the other hand, average annual temperature positively affects the existence of protected areas.

Overall, these results suggest that international and coastal tourists choose their coastal destination based on destination preference despite money availability,. The domestic and international "beach lovers" do not seem to directly consider biodiversity and environmental amenities as factors directly affecting the destination choice. The "greens", on the contrary, are affected by different environmental indicators, especially international tourists, , whilst domestic tourism appears to be related to other motivations, like the desire to preserve national naturalistic patrimony.

These results need to be further investigated using case-by case analytical valuation studies. There seems to be ground for further research concentrating on the supply of tourism services, specifically linked to coastal recreation. Since data are not available with the necessary? accuracy for all countries, it would seem reasonable to implement such an analysis on selected countries or regions rather than at the worldwide level.

References

Bawa K.S. and Seidler R. (1998), Natural Forest Management and conservation of biodiversity in tropical forests, *Conservation Biology*, Vol. 12, No. 1, pp. 46 – 55

Bigano A., Hamilton J.M., Tol R.S.J. (2007), The impact of Climate Change on international and domestic tourism: A simulation study, *The Integrated Assessment Journal*, Vol. 7, Issue 1, pp. 25 – 49

Butchart SHM, Stattersfield AJ, Bennun LA, Shutes SM, Akçakaya H.R. (2004) Measuring Global Trends in the Status of Biodiversity: Red List Indices for Birds. *PLoS Biol*, 2(12): e383.

Candela, G., Figini, P., 2004. *Economia del Turismo. Principi Micro e Macroeconomici*, McGraw-Hill, Milan.

Christ C., Hillel O., Matus S., Sweeting J (2003), *Tourism and Biodiversity: Mapping Tourism's Global Footprint*, Conservation International and UNEP, p. 7.

Honey M. and Krantz D. (2007), *Global trends in coastal tourism*, Center on Ecotourism and Sustainable Development, Washington D.C.

Chase M.K., Kristan W.B., Lynam A.J., Price M.V., Rotenberry J.T. (2000), Single species as indicators of species richness and composition in California sage scrub birds and small mammals, *Conservation Biology*, Vol. 14, No. 2. pp. 474-487

Dritsakis N. (2004), Co-integration analysis of German and British tourism demand for Greece, *Tourism Management*, Vol. 25, pp. 111 – 119.

Eugenio-Martín J.L., Martín Morales N., Scarpa R. (2004), *Tourism and economic growth in Latin American countries: a panel data approach*, Nota di Lavoro 26.2004, Fondazione Eni Enrico Mattei, available on the website http://www.feem.it/Feem/Pub/Publications/WPapers/default.htm

European Environmental Agency (1995), *Europe's Environment: the Dobris Assessment*, State of the Environment – Report 1

Gibbs J.P.(2000), Wetland loss and biodiversity conservation, *Conservation Biology*, Vol. 14, No. 1, pp. 314 – 317

Gotelli N.J. and Coldwell R.K. (2001), Quantifying biodiversity: procedures and pitfalls in the measurement and comparison of species richness, *Ecology Letters*, 4 379 – 391

Hamilton J. M. (2004), *Climate and the destination choice of German tourists*, Nota di Lavoro 21.2004, Fondazione Eni Enrico Mattei, available on the website: http://www.feem.it/Feem/Pub/Publications/WPapers/default.htm

Hamilton, J. M., Maddison, D. J. & Tol, R. S. J. (2005a), 'Climate change and international tourism: A simulation study', *Global Environmental Change*, Vol. 15, No. 3, pp. 253–366.

Hamilton, J. M., Maddison, D. J. & Tol, R. S. J. (2005b), The effects of climate change on international tourism, *Climate Research*, 29, pp. 255–268.

Lise W and Tol R.S.J. (2002), Impact of climate on tourism demand, *Climatic Change*, Vol. 55, No. 4, pp.29–49

Lyndenmayer D.B. (1999), Future directions for biodiversity conservation in managed forests: indicator species impact studies and monitoring programmes, *Forest Ecology and Management*, 115, pp. 277 – 287

Maddison, D. (2001a), *In Search of Warmer Climates? The Impact of Climate Change on Flows of British Tourists*. In D. Maddison (Ed.), The amenity value of the global climate, pp. 53-76, London: Earthscan

Naidoo R., Adamovicz W. L. (2005), Biodiversity and nature-based tourism at forest reserves in Uganda, *Environment and Development Economics*, Vol. 10, pp.159 – 178

Noss R. (1990), Indicators for monitoring biodiversity: A hierarchical approach, *Conservation Biology*, Vol. 4, No. 4, pp.355 – 364

O'Neill R. V., Hunsaker C.T., Jones B.K., Riitters K.H., Wickham J.D., Schwartz P.M, Goodman I.A., Jackson B.L. and Baillargeon W.S. (1997), Monitoring Environmental Quality at the Landscape Scale, *BioScience*, Vol. 47, No. 8, pp. 513-519

Poria Y., Butler R.W., Airey D. W. (2003), *The core of heritage tourism*, School of Mangement Tourism Research, University of Surrey

Prendergast J. R. and Eversham B. C. (1997), Species Richness Covariance in Higher Taxa: Empirical Tests of the Biodiversity Indicator Concept, *Ecography*, Vol. 20, No. 2 (Apr., 1997), pp. 210-216

Ryan, C. (2002). Tourism and cultural proximity: Examples from New Zealand, *Annals of Tourism Research*, Vol. 29, pp. 952-971.

Van den Berg J. and Nijkamp P. (1998), Economic aspects of global change impacts and response strategies in the coastal zone of The Netherlands, *Journal of coastal conservation*, Vol. 4, No. 2, pp. 161 – 168

Wunder S. (2000), Ecotourism and economic incentives – an empirical approach, *Ecological Economics*, Vol. 32, pp. 465 – 479

Wendland K.J., Honzak M., Portela R., Vitale B., Rubinoff S., Randrianarisoa J. (2009), Targeting and implementing payments for ecosystem services: opportunities for bundling biodiversity conservation with carbon and water services in Madagascar, *Ecological Economics* (in press)

Witt, S. F., and Witt, C. A. (1995), Forecasting tourism demand: A review of empirical research, *International Journal of Forecasting*, 11, 447-475.

World Tourism Organization (2008), UNWTO World Tourism Barometer, Volume 6, No. 1, January 1st 2008

Zellner, A., and Theil, H. (1962). "Three-stage least squares: simultaneous estimation of simultaneous equations". *Econometrica* 30 (1): 54–78.