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Juan Luis Eugenio-Martín, Noelia Martín Morales
and Riccardo Scarpa

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Juan Luis Eugenio-Martín, *Christel DeHaan Tourism and Travel Research Institute, University of Nottingham*
Noelia Martín Morales, *Departamento de Análisis Económico Aplicado Universidad de Las Palmas de Gran Canaria*
Riccardo Scarpa, *Environment Department, University of York*

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Summary

We consider the relationship between tourism and economic growth for Latin American countries since 1985 until 1998. The analysis proposed is based on a panel data approach and the Arellano-Bond estimator for dynamic panels. We obtain estimates of the relationship between economic growth and growth in tourists per capita conditional on main macroeconomic variables. We show that the tourism sector is adequate for the economic growth of medium or low-income countries, though not necessarily for developed countries. We then invert the causality direction of the analysis. Rather than explaining economic growth, we try to explain tourism arrivals conditional on GDP and other covariates such as safety, prices and education level, and investment in infrastructures. We employ a generalised least squares AR(1) panel data model. The results provide evidence that low-income countries seem to need adequate levels of infrastructures, education and development to attract tourists. Medium-income countries need high levels of social development like health services and high GDP per capita levels. Finally, the results disclose that price of the destination, in terms of exchange rate and PPP is irrelevant for tourism growth.

Keywords: Tourism, Economic growth, Panel data

JEL Classification: L83, O40, C33, O54

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Address for correspondence:

Juan Luis Eugenio-Martín
Christel DeHaan Tourism and Travel Research Institute
University of Nottingham
Phone: +44(0)115 84 66066
E-mail: juan.eugenio-martin@nottingham.ac.uk

1. Introduction

This paper analyses the relationship between tourism and economic growth in Latin America. Tourists usually demand four main goods and services in a location: accommodation, food, transportation facilities and entertainment services. In most developing countries, to satisfy this demand, the current level of production needs to increase. This provides two positive effects on the economy. On the one hand, an increase in production and income; on the other hand, since tourism sector is labour intensive, an increase in employment. Thus, the tourism sector may contribute significantly to both economic growth and employment in these regions. This is particularly relevant in the case of regions with high rates of unemployment, low levels of per capita GDP and with export products facing difficulties in competing internationally.

However, the success of the tourism sector in a country depends on different aspects. In this study we empirically investigate which aspects are relevant from a macroeconomic viewpoint. More precisely, the purpose of the paper is to study how relevant tourism sector is for the economic growth of the regions and vice-versa.

As a way of introduction we present a brief discussion of the relationship between tourism and sustainability in section 2. The main variables for the study of tourism and economic development are commented in section 3. The main relevant features of Latin America in this context are presented in section 4. The economic growth model is illustrated both theoretically and empirically in section 5, while the model of the tourists' arrivals is in section 6. Finally, in section 7 we draw the main conclusions.

2. Tourism, sustainability and economic growth

In the analysis of tourism, economists emphasize the economic effects of tourism on the economy. Imagine two identical regions A and B where the only difference between the two is that region A receives tourists, while region B does not. Consider a Keynesian model of an open economy. Within this model, although traditional national accounting has considered tourists' expenditure in the domestic economy as exports, we consider it as a stimulus to consumption produced by incoming visitors. Obviously this effect implies an increase in production and in income, but also an increase in market prices and exchange rate. We can

analyse this process focusing on a macroeconomic variable such as per capita GDP (Gross Domestic Product) in PPP (Purchasing Power Parity) terms, which shows the real effects on the economy leaving aside nominal aspects as inflation or appreciation of the currency.

The great advantage of tourism sector is that it tends to be labour intensive, so an increase in production is normally achieved by an increase in employment. This is advantageous for those economies that need to decrease unemployment, although it also produces a shock in the job market rising wages in the service sector, inducing mobility across sectors.

Thus from a macroeconomic point of view, tourism produces economic growth and employment.

Another critical feature of the tourism sector is the attractiveness of the location to be visited. Sometimes they are natural sites, such as beaches or mountains. In other cases they are cities or particular attractions within the city. We can define any of these tourism resources, as possessing a natural capital or cultural heritage. Different tourism resources have different values given by local citizens or visitors and they are heterogeneously affected by the impact produced by visitors. Moreover, we argue that each tourism resource is associated with a different depreciation rate and regeneration rate. Both rates are non-linear functions of the number of visitors. Obviously, the regeneration rate must be greater than the depreciation rate if sustainability is pursued. Nevertheless, this last restriction is usually relaxed during some period when natural capital is high enough to support some deterioration. The sources of this deterioration are multiple and they require a strict control. Policymakers might be concerned with the number of tourists or visitors that they receive and how many more they can receive. This is discussed in next section.

3. Tourism development

Meeting a growing demand from tourism poses some critical challenges. We argue that there are three main areas which policymakers need to be concerned with: infrastructures, education and safety.

The development of infrastructures is vital in any tourism project. In this area we include aspects such as: household utilities as water, electricity and telephone and transportation

facilities as roads or public transport system. Furthermore, we can include other kind of tourist infrastructures that may help to promote tourism to the region.

Education is also a necessary condition for the potential employment of local people in the tourist activities. It usually requires knowledge concerning different sectors as communication (languages), catering, hospitality, transportation and management skills. An optimal tourism development might take into account the current level of knowledge of the population and the speed of its potential improvement. This is relevant in order to design an optimal tourism development plan over time.

Safety is usually a highly appreciated feature in tourism resorts. Most of the tourists look for places to spend a nice and non-problematic stay. In this sense, we can argue that most of the tourists are risk averse. This is a very important issue to take into account when assessing the competitiveness of a tourist destination. Nevertheless, it seems that safety is related to per capita GDP and how it is distributed within the population.

The relationship of these three features with tourism growth seems to be non-linear. They are usually required to attain some critical threshold, above which investment becomes relatively inefficient.

Moreover, there is also a need for private investment. This comprises a set of industries and services that are generated by tourists' demand. Further this will be proportional to the number of tourists and most of the times such industries will grow without government intervention. Thus, it seems that in order to control the development process, what policymakers need to do is to control the number of tourists allowed to stay and determine limits for accommodation facilities through licensing. Therefore, it is necessary to design an optimal path for tourism development. For this purpose, it is also critical to define an objective to pursue and the timescale of the development. In practice this requires a welfare function, a planning horizon for the optimisation as well as an adequate rate of discount.

4. The case of Latin America

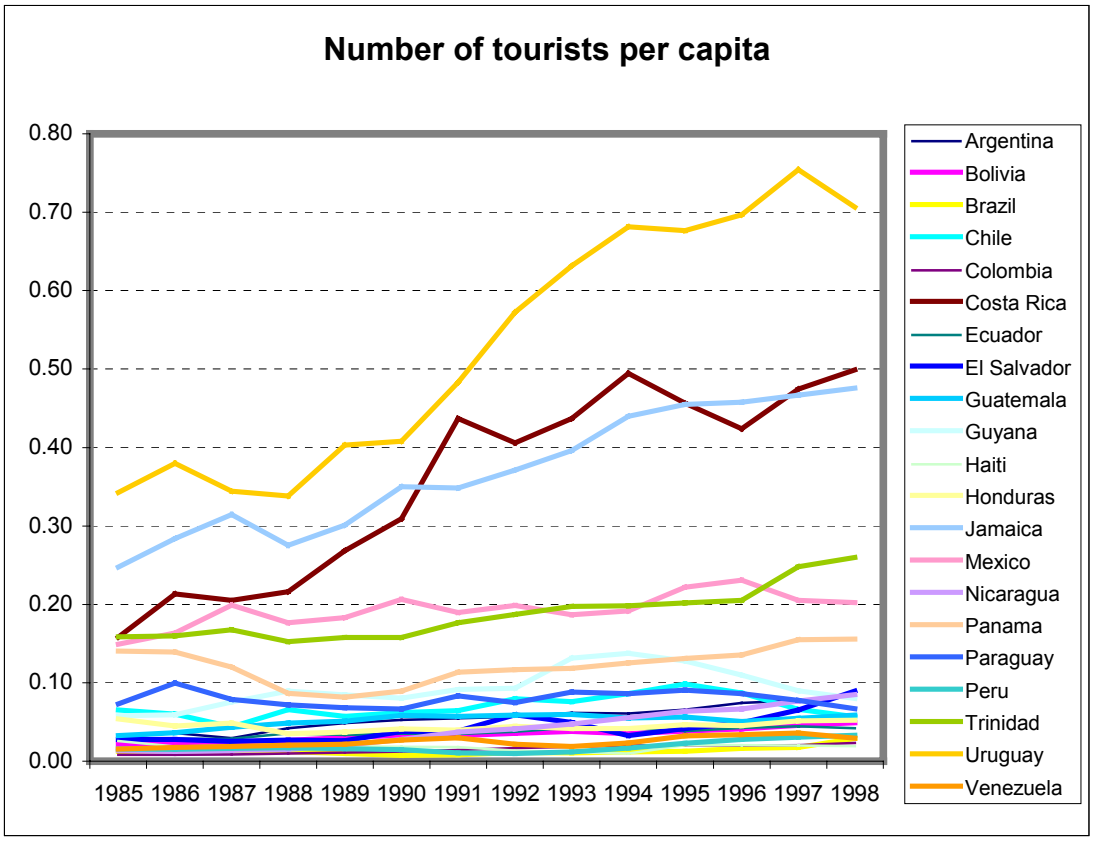
We consider the study of 21 Latin American countries. These are shown in appendix, in table A1.

Countries in Latin America have many similarities in terms of language, culture, history, weather and tourism resources to offer. However, their economies have evolved very differently during last century. Alternative governance structures and economic policies have produced very different paths for the economic growth of the regions. Given that countries in Latin America possess similar tourist features but different paths of economic growth, it seems an interesting pursuit to analyse the relationship between tourism and economic growth within the framework suggested above.

Table 1. Tourists per capita and growth for the period 1985-1998

Ranking of tourists per capita (1985)		Ranking of tourists per capita (1998)		Average growth of tourists per capita (1985-1998)	
Uruguay	34.26	Uruguay	70.66	Nicaragua	763.83%
Jamaica	24.75	Costa Rica	49.89	Costa Rica	320.81%
Trinidad and Tobago	15.87	Jamaica	47.55	El Salvador	307.52%
Costa Rica	15.82	Trinidad and Tobago	25.99	Colombia	259.92%
Mexico	14.93	Mexico	20.23	Argentina	220.09%
Panama	14.03	Panama	15.59	Bolivia	205.51%
Paraguay	7.29	El Salvador	8.95	Brazil	177.85%
Chile	6.51	Nicaragua	8.47	Peru	173.33%
Guyana	5.80	Argentina	8.34	Venezuela	154.65%
Honduras	5.40	Guyana	8.01	Guatemala	152.38%
Guatemala	3.26	Paraguay	6.71	Uruguay	125.41%
Argentina	3.11	Guatemala	5.89	Ecuador	114.71%
El Salvador	2.79	Chile	5.67	Jamaica	114.16%
Ecuador	2.62	Honduras	5.21	Trinidad and Tobago	78.61%
Haiti	2.56	Bolivia	4.88	Mexico	72.15%
Bolivia	2.15	Ecuador	4.20	Guyana	47.83%
Venezuela	1.57	Peru	3.31	Honduras	42.04%
Peru	1.54	Venezuela	2.95	Panama	41.78%
Nicaragua	1.38	Brazil	2.90	Paraguay	33.08%
Brazil	1.28	Colombia	2.31	Chile	7.27%
Colombia	0.83	Haiti	1.92	Haiti	-2.00%

Figure 1. Evolution of the number of tourists per capita



5. Modelling economic growth

We consider two different models. One tries to explain economic growth depending on the number of tourists that visit the region given a set of covariates **x**. The other model attempts to understand the opposite relationship, i.e. how much tourism growth depends on the rate of growth of per capita GDP together with other potential determinants of tourism.

The Gross domestic product (GDP) is one of the most used macroeconomic indicators for measuring output. The rate of growth of this index reflects the gain or loss of wealth in a country.

An extensive body of literature has tried to find mechanisms that explain growth. In the Neoclassical model developed by Solow-Cass-Koopmans the rate of growth in an economy depends on the initial level of income, later Barro and Sala-i-Martin (1992) and Mankiw, Romer and Weil (1992) introduced the concept of "conditional convergence" that allows us to take into account differences among countries such as in the state of technology. Most of the empirical studies have used a cross-section analysis, although with a growing availability of

panel data, and the development in econometric techniques, this framework has been used widely to prove their hypothesis[1].

Letting y_{it} denote log per capita of income or output, the growth rate can be written as:

$$y_{it} - y_{it-1} = a + \beta y_{it-1} + u_{it}$$

Where:

- a , as the steady state
- $-1 < \beta < 0$, if there is convergence between countries (β-convergence).
- u_{it} , as the error term

If a is the same for all countries we will have absolute β-convergence, but if we allow for different steady states among countries, the model turns into a conditional convergence one.

In conditional convergence models analysts have used a range of variables as proxies for the different steady states. Examples of these include: population, human and physical capital, technology, fiscal and monetary indicators, political stability, income distribution, openness to international trade and development of the financial system. In these cases, the structural model is extended to:

$$y_{it} - y_{it-1} = a + \beta y_{it-1} + \varphi X_{it-1} + u_{it}$$

With X_i as the vector of determinants of the steady state per capita income or output. Following Barro's (1991) seminal work, we will use as a proxy for the different steady states among countries some selected education indicators, public expenditure and social variables related to political instability. In addition, we include tourists for controlling the effect of growth of tourists per capita on steady state.

A pooled panel data representation of the economic model will capture the unobservable differences across countries and will generate consistent estimators. A fixed effect model is preferred as we assume that the unobservable variables (climate, preferences, etc) are correlated with the independent variables. Unobserved time-specific effects are controlled by

[1] Islam (1995) and Barro (2000)

using time-period fixed effects. This also accounts for business cycle movements. The reduced form of the structural model can be expressed as:

$$y_{it} - y_{it-1} = a + \beta y_{it-1} + \varphi X_{it-1} + \alpha_i + \eta_t + u_{it} \qquad (1.a)$$

or

$$y_{it} = a + (1+\beta) y_{it-1} + \varphi X_{it-1} + \alpha_i + \eta_t + u_{it} \qquad (1.b)$$

where α_i and η_t are respectively individual and temporal effects which influence the steady state of each country.

Also, the presence of an endogenous variable in the right hand side of the equation implies a more complicated estimation of the model due to collinearity with the error term.

The equation for the general model is:

$$z_{it} = \sum_{j=1}^{p} z_{it-j} + w_{it}\lambda + v_i + \varepsilon_{it}$$

where v_i is the error component correlated with ε and the independent variables w does not change over time for each element in the panel. First differencing equation (1) removes the individual effects and produces an equation that is estimable by instrumental variables:

$$\Delta z_{it} = \Delta \sum_{j=1}^{p} z_{it-j} + \Delta w_{it}\lambda + \Delta \varepsilon_{it}$$

Arellano and Bond (1991) developed a GMM dynamic panel data estimator that includes lags of both the dependent and independent variables as instruments such that one can obtain optimal coefficients provided that T/N be negligible. We will calculate such an estimator from our data.

Islam (1995), Barro and Sala-i-Martin (1992) and others authors divide the total period of the analysis into time spans, normally of 5 years, because it is assumed that yearly time spans are too short to be appropriate for studying growth. However, Lee, Pesaran and Smith (1997) argued that this kind of model, apart from the possibility of generating problems of autocorrelated errors, does not allow one to study *"the complex dynamic adjustment involved*

in the countries' output processes or the heterogeneity of growth rates across countries". Hence the equation we estimate is[2]:

$$\log(\text{GDP pc}_{it}) = c + (1+\beta)\log(\text{GDP pc}_{it-1}) + \psi_1 \text{DTURPC}_{it-1} + \psi_2 \text{GDI}_{it-1} + \psi_3 \text{PEDUCS}_{it-1} + \psi_4 \text{GCWITHOU}_{it-1} + \psi_5 \text{D}_{it-1} + \psi_6 \text{F}_{it} + \alpha_i + \eta_t + u_{it} \quad (2)$$

with t = 1,..,14 (1985-1998); i = 1,...,21 and $u_{it} \sim N(0,\sigma_i^2)$

A more detailed description of the variables:

- Rate of growth of tourists per capita (**DTURPC**) :

  It is defined as, $\frac{\frac{T_t}{P_t} - \frac{T_{t-1}}{P_{t-1}}}{\frac{T_{t-1}}{P_{t-1}}}$, where *T* denotes the number of international tourists arrivals and *P* denotes population.

- Gross domestic investment (**GDI**), measured as a percentage of GDP. It includes fixed assets such as land improvements (fences, ditches, drains, and so on); plant, machinery, and equipment purchases; and the construction of roads, railways, and the like, including commercial and industrial buildings, offices, schools, hospitals, and private residential dwellings.
- Public spending on education (**PEDUCS**): Public expenditure on education is the percentage of Gross National Product accounted for by public spending on public education plus subsidies to private education at the primary, secondary, and tertiary levels.
- General government consumption (**GCWITHOU**), measured as the percentage of GDP. General government consumption includes all current expenditures for purchases of goods and services by all levels of government, excluding most government enterprises. It also excludes capital expenditure on national defence and security and public spending on education.

[2] We have chosen this specification for convenience.

- Social variables:

  (a) The index of political stability (**D**) is approximated by the inverse of the degree of violence and its impact on the ability of the government to govern. The countries are ranked on a scale of 1 to 12 with the lowest rating allocated to the most instable countries (e.g. countries during a civil war) and the highest rating to the most stable countries.

  (b) The quality of governance of the political system of the country (**F**) is also approximated by a ranking of countries on a scale of 1 to 6. A ranking of 1 is allocated to the most corrupt countries. A ranking of 6 is allocated when the country is perceived to be corruption free.

The macroeconomic variables – GDP per capita, total gross domestic investment (GDI), Public spending on education and General government consumption – are directly collected from the World Development Indicators produced by The World Bank, and are all expressed in 1995 US$ constant prices or as percentages. The private investment due to divestiture and new investments is also collected from The World Bank. On the other hand, the social variables have been obtained from the International Country Risk Guide (ICRG, 1998). Data on number of tourists is from World Tourism Organisation.

The theoretical expectations for the proposed model are as follows:

- a positive sign in DTURPC, i.e. an increase in the number of tourists increases the rate of growth in an economy, as it was mentioned in section 2.
- a less than one in log(GDP pc $_{it-1}$), i.e. β-convergence.
- a positive sign in GDI, PEDUCS but negative in GCWITHOU. As the theory predicts, we expect that, on one hand, a bigger rate of savings and more educational investment will result in faster growth. On the other hand, because the definition of "government consumption" (GCWITHOU) as a non-productive expenditure, a negative relationship with the growth rate is expected due to the opportunity cost of capital.
- a positive relationship between the growth rate and the social variables (D, F) as we suppose that a country free of corruption and stable leads to a greater efficiency in the economy and higher returns to capital.

We have used the STATA *v.8.0* econometric software to obtain the Arellano-Bond dynamic panel estimates of the linear model (2) described above. The consistency of the estimation depends on whether lagged values of the endogenous and exogenous variables are valid instruments in our regression. Also, this methodology assumes that there is no second-order autocorrelation in the errors, therefore a test for the previous hypotheses is needed. We have also conducted a test for autocorrelation and the Sargan test for over-identifying restrictions as derived by Arellano and Bond (1991). Failure to reject the null hypothesis in both tests gives support to our model.

Another problem to tackle is the assumption of strict exogeneity of all the independent variables in the model. Misspecification would lead to inconsistent estimation. A variable x_{it} is said to be strictly exogenous if $E(x_{it}, u_{is}) = 0$ for all t and s. If $E(x_{it}, u_{is}) = 0$ only for $t < s$ then x_{it} is said to be *weakly* exogenous or *predetermined*. It means that if the error term at time t has some feedback in the future realizations of x_{it} we have to model this variable as a predetermined one. In our research, although we can suspect that future realizations of some of the variables depend on past values of GDP, (i.e. this seems clear in the case of the Gross domestic investment (GDI): An adverse economic situation may imply a reduction of the investment in future periods, and also the opposite is plausible. Moreover, a test for strict exogeneity of the tourist variable is needed.

We have used an estimator robust to heteroskedasticity. Using this robust estimation produces higher standard errors, thus lower t-statistics and a larger probability of not rejecting the null of parameters being different from zero. To mitigate this effect we have chosen in our t-test a significance level of 10 %[3].

We may suspect that the amount of investment (total or private) can have a delayed effect on the dependent variable due to a slow transmission mechanism. We have allowed for further lags in their estimation, but to restrict the size of the problem, we have limited the number of lagged levels to two (D1 and LD), both to be included as instruments for the predetermined variables.

[3] In a two-sided test a 10 % level of significance implies a *t*-value of 1.645.

Table 2: Arellano-Bond Dynamic Panel estimation

		Total		Dh		Dm		Dl	
		Coef.	t-ratio	Coef.	t-ratio	Coef.	t-ratio	Coef.	t-ratio
lgdppc_1	LD	.77733	**19.30**	.7659331	**12.64**	.7388723	**10.16**	.5979116	**4.14**
dturpc	D1	.0003673	**1.68**	-.0001936	**-2.54**	.0006355	**1.92**	.0006294	**2.63**
Gdi	D1	.0003914	0.50	-.0031037	**-4.23**	.0016637	**1.97**	.0026815	1.54
	LD	-.0010438	-1.23	-.0009448	-0.55	-.001621	-1.48	.0038271	**2.78**
Peduc	D1	-.0085303	**-2.80**	-.0035931	-0.73	-.0100045	**-2.11**	.0161036	**1.79**
Gcwithou	D1	-.0003997	-0.36	-.0029056	**-2.48**	-.0023086	-0.70	-.003491	**-2.47**
D	D1	.0044371	**2.01**	.013505	**3.81**	.0013283	0.71	.005702	**1.78**
F	D1	-.0110391	-1.53	-.0315067	**-15.55**	.0013398	0.18	.0021562	0.29
_cons		.0037285	**2.63**	.0034118	**2.18**	.004909	**5.51**	-.010997	**-3.29**
N		228		76		120		32	
Test		value	prob	Value	Prob	value	prob	value	prob
Wald		126.18	.000	438.53	.000	201.65	.000	8.75	.000
Sargan		162.09	.062	69.86	1.00	153.36	.160	22.68	1.00
Autocorrelation2		.06	.951	-0.12	.903	-1.38	.167	1.11	.265

Dependent variable is the log of GDP per capita
In bold t-test values with a statistical significance different from zero of at least of 90%
Wald test is for jointly significance
Sargan test of over-identifying restrictions (rejection of the null implying a bad specification)
Autocorrelation2 is a correlation test which the null hypothesis is that the first-difference regression errors are no second order serial correlated

Sargan's test supports the assumption that model is correctly specified and that it might consider the variables of investment and growth in tourists per capita as predetermined variables. Since the parameter associated with growth of per capita GDP is positive and less than one, the model guarantees the existence of β-convergence. As expected, the growth in the number of tourists per capita produces a positive effect on the economic growth of the countries. However, if we decompose this effect among different groups of countries according to the level of income per capita (as shown in Appendix A.1), we observe that growth in tourists per capita is associated with economic growth in the group of countries with low and medium levels of income per capita, but not in the group of rich countries. This finding suggests that the increase in the number of tourists' arrivals in a country offers an opportunity for economic growth while countries are developing, but not when countries are already developed.

6. Modelling tourists' arrivals

Tourism demand has been extensively analysed in the literature. Many aspects have been considered. Push and pull factors, Rugg (1973); life cycle, Oppermann (1995); loyalty and repetition, Hanefors and Mossberg (1998); risk aversion Tsaur, Tzeng and Wang (1997); information, Fodness and Murray (1997); nationality, Pizam and Sussmann (1995). Moreover, the attributes of the destinations have been also studied, as congestion, Eugenio-Martin and Thiene (2003); safety Sonmez (1998); image Litvin and MacLaurin (2001), infrastructures, Prideaux (2000); and attraction, Wall (1997).

In the tourism literature, the issue that economists have paid more attention to is forecasting inbound tourism demand. In this context, the most frequent approach is time series analysis. See for instance Clewer, Pack and Sinclair (1990), Dharmaratne (1995), Kulendran and King (1997), Morley (1998), Smeral and Weber (2000) and Brännäs, Hellström and Nordström (2002). Within this approach, the most common determinants of demand are income and price levels, which is measured in terms of relative prices by exchange rates, CPI and cost of transportation. Other exogenous variables are also considered depending on the purposes of the studies, for instance: marketing, lagged variables or weather. The great advantage of these models relies on their ability to deal with trends and seasonal components. The focus of all these models is forecasting and not the exploration of determinants of demand.

Alternative approaches have been considered, as almost ideal demand systems, Papatheodorou (1999) and Divisekera (2003); structural equations system, Bakkal and Scaperlanda (1991); or seemingly unrelated regressions Pyo, Uysal and McLellan (1991).

Most of these approaches have considered price of the destination and income of the tourists as the more relevant variables in tourism demand. We argue that at the macro level, determinants of destination choice by tourists need to be studied further. For this purpose, we model tourists' arrivals considering four main features of the destination: *price*, in terms of exchange rate and purchasing power parity; *investment and infrastructures*, which includes aspects as roads, hospitals or home utilities; *safety*, it considers variables as expectancy of life or income per capita and *education*.

We used Generalised Least Squares (GLS) estimation for panel data[4]. This approach allows for the presence of autocorrelation and heteroskedasticity in the error term. In our data we detected first order autocorrelation in the error term.

The basic equation for the model is:

$$y_{it} = \beta x_{it} + \varepsilon_{it}$$

where $\mathrm{Var}[\varepsilon_{it}] = \sigma^2$ and $\mathrm{Cov}[\varepsilon_{it}, \varepsilon_{js}] = 0$ are relaxed and they are no longer assumptions of the model.

Therefore, in our particular case, the equation to be estimated is the following:

$$\begin{aligned} \text{TOURpc}_{it} = c + \psi_1 \text{GDFIpc}_{it-1} + \psi_2 \text{GDPpc}_{it-1} + \psi_3 \text{PRICE}_{it-1} + \psi_4 \text{EDUCpc}_{it-1} + \\ \psi_5 \text{SECUNDAR}_{it-1} + \psi_6 \text{TERTIARY}_{it-1} + \psi_7 \text{LIFEEXP}_{it-1} + \psi_8 \text{TRADE}_{it-1} + u_{it} \end{aligned} \quad (3)$$

with t = 1,..,18 (1980-1997); i = 1,...,20

The variables, as defined by World Bank Indicators (1999), are:

- International tourism per capita, number of arrivals (**TOURPC**): International inbound tourists are the number of visitors who travel to a country other than that where they have their usual residence for a period not exceeding 12 months and whose main purpose in visiting is other than an activity remunerated from within the country visited.
- Gross domestic fixed investment per capita (**GDFIPC**): investment includes land improvements (fences, ditches, drains, and so on); plant, machinery, and equipment purchases; and the construction of roads, railways, and the like, including commercial and industrial buildings, offices, schools, hospitals, and private residential dwellings. Data are in constant local currency.
- Gross Domestic Product per capita (**GDPPC**)
- Price (**PRICE**): calculated as the ratio between the official exchange rate and purchasing power parity conversion factor (PPP). The PPP is the number of units of a country's currency required to buy the same amounts of goods and services in the domestic market as $1 would buy in the United States. Official exchange rate refers to the actual, principal

[4] Recent authors have employed panel data estimations in tourism demand analysis. See for instance Chase, Lee and Schulze (1998) and Ledesma-Rodriguez, Navarro-Ibañez and Pérez Rodríguez (2001)

exchange rate and is an annual average based on monthly averages (local currency units relative to U.S. dollars) determined by country authorities or on rates determined largely by market forces in the legally sanctioned exchange market. This ratio reflects how expensive the cost of living in each country with respect to U.S. is.

- Public spending on education per capita (**EDUCPC**).
- School enrollment, secondary (**SECUNDAR**): Gross enrollment ratio is the ratio of total enrollment, regardless of age, to the population of the age group that officially corresponds to the level of education shown. Estimates are based on the International Standard Classification of Education (ICSED). Secondary education completes the provision of basic education that began at the primary level, and aims at laying the foundations for lifelong learning and human development, by offering more subject- or skill-oriented instruction using more specialized teachers.
- School enrollment, tertiary (**TERTIARY**): Same as before though taking into account that tertiary education, whether or not to an advanced research qualification, normally requires, as a minimum condition of admission, the successful completion of education at the secondary level.
- Life expectancy at birth (**LIFEEXP**): Life expectancy at birth indicates the number of years a newborn infant would live if prevailing patterns of mortality at the time of its birth were to stay the same throughout its life.
- Trade (**TRADE**): measured as a share of PPP GDP is the sum of merchandise exports and imports measured in current U.S. dollars divided by the value of GDP converted to international dollars using purchasing power parity conversion factors.

The results are shown in tables 3 and 4. Table 3 presents the general case, where the main variables that determine the arrival of tourists are positively related with GDP per capita, life expectancy at birth and percentage of trade (as imports and exports) in GDP. According to this general model, economic growth seems to be a necessary condition to obtain tourism growth. Nevertheless, we can decompose the analysis into different groups of countries in order to analyse their differences and different needs for an adequate tourism development policy.

Table 3: Generalised Least Squares AR(1) Panel Data estimation of Tourists' Arrivals

	Total	
	Coef.	t-ratio
Gdppc	0.000022	4.01
Lifeexp	0.0096678	4.22
Trade	0.0004197	3.32
_cons	-0.6173997	-3.96
Log likelihood	885.0145	
N	348	
Test	Value	prob
Wald	52.41	.000

In table 4 we decompose the model according to the level of GDP per capita. Those countries with GDP per capita higher than $3,000 are considered for high income group, those countries between $1,500 and $3,000 for medium income group and finally, those countries with GDP per capita less than $1,500 define the low income group. We can see significant differences depending on the group analysed.

Table 4: Generalised Least Squares AR(1) Panel Data estimation of Tourists' Arrivals for different groups of income per capita

	High income		Medium income		Low income	
	Coef.	t-ratio	Coef.	t-ratio	Coef.	t-ratio
gdfipc	-0.000065	**-2.18**	0.0000161	0.3	0.0001644	**2.7**
gdppc	0.0000336	**2.64**	0.0000618	**2.01**	0.0000533	**2.96**
price	-0.0093351	-1.01	-0.0043781	-0.65	-0.0048009	-1.21
educpc	-0.0000478	-0.54	0.0000793	0.33	0.0005644	**1.94**
secundar	0.0031167	**3.53**	0.0009876	0.94	0.0020898	**2.62**
tertiary	-0.0020715	-1.3	-0.0061825	**-4.13**	-0.0073325	**-7.79**
lifeexp	0.0056177	0.87	0.019803	**5.45**	0.0050121	**2.62**
Trade	0.0004119	1.48	0.0008882	**3.13**	0.0005168	**2.14**
_cons	-0.4821713	-1.16	-1.370663	**-5.51**	-0.3813206	**-3.47**
Log likelihood	294.27		252.55		265.84	
N	138		108		102	
Test	Value	Prob	value	prob	value	prob
Wald	47.77	.000	105.27	.000	349.13	.000

High income group of countries base the tourists' arrivals positively on high GDP per capita and high level of secondary education while negatively on the level of fixed investment per capita. Last result seems to point out an opposite relationship between high levels of

investment and tourism, which may reveal two alternative models of economic growth, an industrial model vis-à-vis a tourism model.

Incoming of tourists for the medium income group are positively related with GDP per capita, trade and expectancy of life at birth. It reveals that social conditions related with health are relevant to attract tourists to the country. On the other hand, the school enrolment in tertiary studies seems not be related with those countries specialised on tourism.

Finally, the model for the low-income group is the most complex. The arrival of tourists depends positively on per capita GDP, once again; per capita GDFI, which we interpret to mean that some basic infrastructures are a necessary condition for tourists' arrivals; public spending on education per capita; level of school enrolment in secondary studies; expectancy of life at birth and level of trade. As before, the school enrolment in tertiary studies is not positively related with high incoming of tourists. Therefore, it seems that an adequate tourism development policy might want to encourage student enrolment up to secondary level. Consequently, we can see that low income countries need the three factors mentioned in section 3: Infrastructure (GDFI pc), Education (Public spending on education pc, secondary enrolment) and safety (GDP pc, expectancy of life at birth).

The variable *price* is not significant in all the models above. This suggests that other variables as GDP per capita or level of education or expectancy of life in the country are more relevant for the tourist decision than the relative price of goods and services. This finding is relevant for the tourism literature since most of the works carried out so far have considered the price of the destination as a relevant variable. Nonetheless, it must be noted that most of the works carried out so far have analysed developed countries as potential destinations.

7. Conclusions

In this study we considered two different points of view. First we studied the role of tourism in economic growth of Latin American countries. The Arellano-Bond dynamic panel data estimator showed that for Latin American countries, the growth in tourists per capita experienced a significant economic growth during the period between 1985 and 1998. However, decomposing Latin American countries into three different groups according to GDP per capita, we observed that tourism growth was associated with economic growth only in low and medium income countries, but not in high income countries. It seems that tourism development might contribute to the economic growth of the country provided it is below a GDP per capita threshold, while such role is unclear if the country is already developed.

Second, we analysed foreign tourist arrivals employing a generalised least squares AR(1) panel data model. For the whole set of countries it shows that tourist arrivals are positively related with GDP per capita, international trade and life expectancy at birth. According to this model, it seems that in order to achieve high level of arrivals, Latin American countries need to increase their GDP per capita in a first instance. However, if we decompose the analysis into three groups as before, we find out significant differences. High income countries rely on GDP per capita and secondary education enrolment. Medium income countries need to rely on GDP per capita and high expectancy of life. Finally, low income countries obtain higher number of tourists' arrivals if three main areas are developed: Infrastructures (GDFI pc), Education (Public spending on education pc, secondary enrolment) and safety (GDP pc, expectancy of life at birth). The results suggest the main factors behind an adequate tourism development policy.

In this sense, a last finding relates to the fact that the variable *price*, defined in terms of exchange rate and purchasing power parity, becomes statistically insignificant in all the models. This is suggestive that other variables as per capita GDP, infrastructure, level of education and life expectancy of the host country are more relevant for the choice of tourists' destinations than the relative price of goods and services.

APPENDIX

Table A.1: Subdivision among countries according to income per capita

Country	Income per capita
Argentina	High
Bolivia	Middle
Brazil	High
Chile	High
Colombia	Middle
Costa Rica	Middle
Ecuador	Middle
El Salvador	Middle
Guatemala	Middle
Guyana	Middle
Haiti	Low
Honduras	Low
Jamaica	Middle
Mexico	High
Nicaragua	Low
Panama	Middle
Paraguay	Middle
Peru	Middle
Trinidad and Tobago	High
Uruguay	High
Venezuela	High

Source: World Bank Economic Indicators (1999)

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(lix) This paper was presented at the ENGIME Workshop on "Mapping Diversity", Leuven, May 16-17, 2002
(lx) This paper was presented at the EuroConference on "Auctions and Market Design: Theory, Evidence and Applications", organised by the Fondazione Eni Enrico Mattei, Milan, September 26-28, 2002
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(lxv) This paper was presented at the EuroConference on "Auctions and Market Design: Theory, Evidence and Applications" organised by Fondazione Eni Enrico Mattei and sponsored by the EU, Milan, September 25-27, 2003
(lxvi) This paper has been presented at the 4th BioEcon Workshop on "Economic Analysis of Policies for Biodiversity Conservation" organised on behalf of the BIOECON Network by Fondazione Eni Enrico Mattei, Venice International University (VIU) and University College London (UCL) , Venice, August 28-29, 2003
(lxvii) This paper has been presented at the international conference on "Tourism and Sustainable Economic Development – Macro and Micro Economic Issues" jointly organised by CRENoS (Università di Cagliari e Sassari, Italy) and Fondazione Eni Enrico Mattei, and supported by the World Bank, Sardinia, September 19-20, 2003

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