Applied Econometrics and International Development. AEEADE. Vol. 1-2(2001)

ECONOMETRIC MODEL OF SERVICES SECTOR DEVELOPMENT AND IMPACT OF TOURISM IN LATIN AMERICAN COUNTRIES

AGUAYO, Eva
EXPOSITO, Pilar
LAMELAS, Nelida
University of Santiago de Compostela (Spain)

Abstract

Over recent decades some Latin-American countries have experienced an important development due to the positive effect of tourism on the services sector. Our model relates tourism with the increase of Value-Added in services, taking into account other important variables which influence the evolution of this sector and explain the important differences among developed and less developed countries.

Besides tourism the industrial evolution is also very important to improve the development of services through some intersectoral relations. The model suggests that some stagnation of services development in many countries is due largely to a lack of industrial investment, especially in countries with a low level of tourism.

Our main conclusions are that both factors, industry and tourism, need to be increased generally to contribute to development of employment and production of the services sector.

JEL Classification: C5, L80, O54

1.- Introduction

In this paper we present a vision of services sector development in 22 countries of the American continent, in order to highlight the importance of tourism. We consider two models, for the group of the world and of America, where we relate the value-added of the services sector, with the exports of this sector and with the value-added of both agriculture and industry sectors, in order to see the positive effect of tourism.

The data, corresponding to 22 American countries, is collected from the Economic Development Report of the World Bank and from other international organisations, based on figures at constant prices and according to purchasing power parities of 1999.

2.- Tourism in Latin American Countries

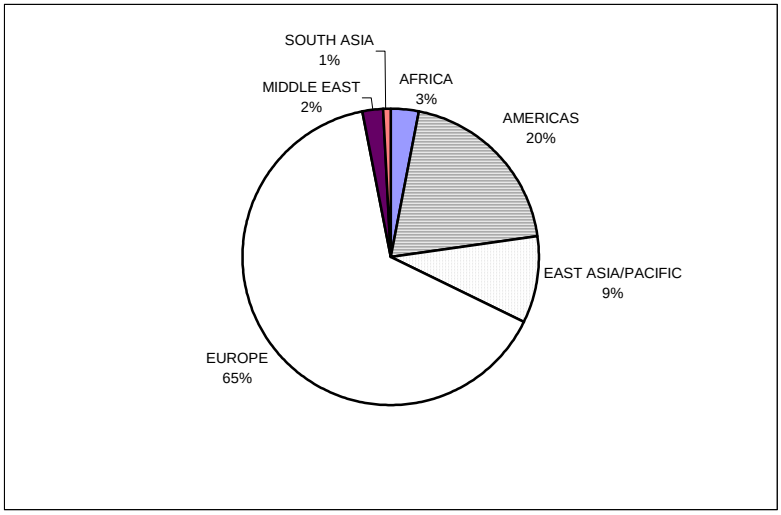
Table 1 shows the world ranking of tourism destinations over the last few decades. At the beginning of the 1990s European countries occupied the top positions, from 1st to 6th, with the exception of USA . We can observe that Mexico was the most visited country in Latin America.

Table 1. World's Top Tourism Destinations

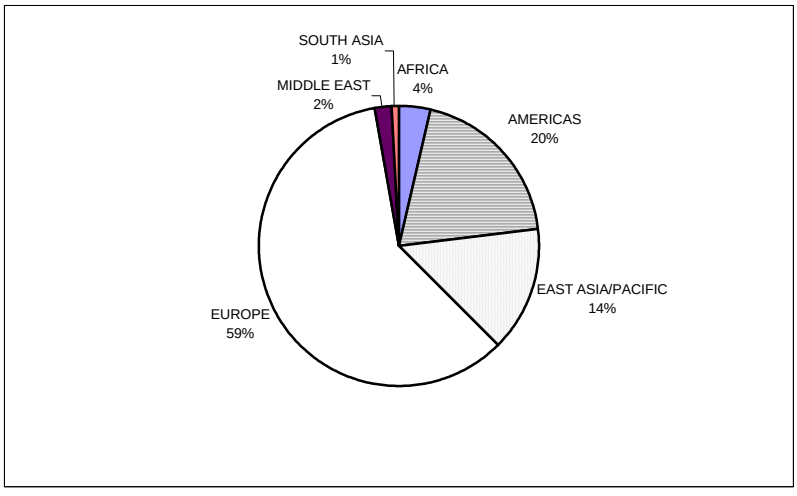
Rank	1950	1970	1990	2000
1	United States	Italy	France	France
2	Canada	Canada	United States	USA
3	Italy	France	Spain	Spain
4	France	Spain	Italy	Italy
5	Switzerland	United States	Hungary	China
6	Ireland	Austria	Austria	United Kingdom
7	Austria	Germany	China	Russian Federation
8	Spain	Switzerland	*Mexico*	*Mexico*
9	Germany	Yugoslavia	Germany	Canada
10	United Kingdom	United Kingdom	Canada	Germany
11	Norway	Hungary	Switzerland	Austria
12	*Argentina*	Czechoslovakia	United Kingdom	Poland
13	*Mexico*	Belgium	Greece	Hungary
14	Netherlands	Bulgaria	Portugal	Hong Kong
15	Denmark	Romania	Malaysia	Greece

Source: WTO

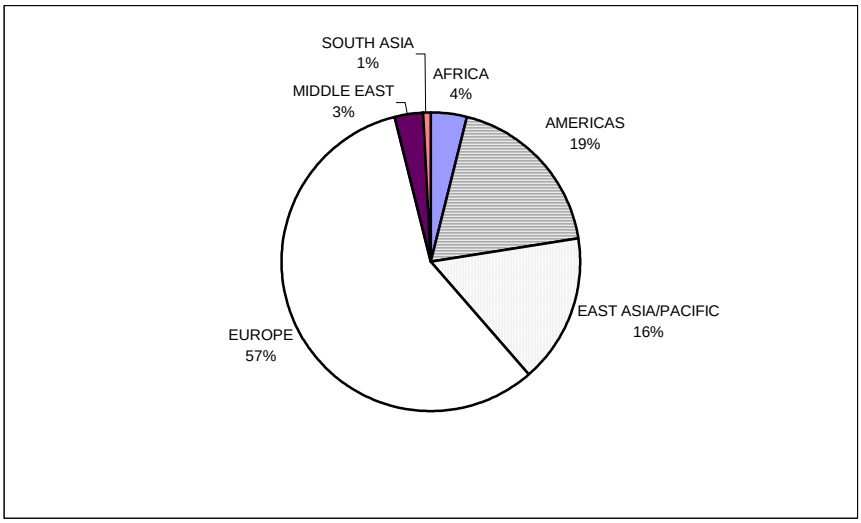
International Tourism Arrivals. Share of Total World. 1985



International Tourism Arrivals. Share of Total World. 1995



International Tourism Arrivals. Share of Total World. 2000



Source: WTO

In the three graphs above, we can appreciate the remarkable growth of tourism in the East Asia/Pacific region, which shows an increment from 9% to 16% from 1985 to 2000. Europe and the Americas are the main tourist-receiving regions. The Americas almost maintain the same levels in the entire time period selected and Europe shows a slight decrease.

Table 2. International Tourist Arrivals (thousands)

	1995	2000
Argentina	2288	2909
Brazil	1991	5313
Canada	16932	20423
Cuba	742	1700
Chile	1539	1742
Dominican Rep.	1776	2977
Mexico	20241	20643
Puerto Rico	3131	3341
United States	43318	50891
Uruguay	1710	1968

Source: WTO

Table 3. International Tourism Receipts (US $ Million)

	1995	2000
Argentina	2144	2813
Brazil	2097	4228
Canada	7882	10768
Cuba	977	1756
Chile	900	827
Dominican Rep.	1576	2918
Mexico	6179	8295
Puerto Rico	1828	2541
United States	63395	85153
Uruguay	611	652

Source: WTO

The evolution of the selected American countries demonstrates that Brazil, Cuba and Dominican Republic present the biggest growths, as much in terms of International Tourist Arrivals (ITA) as in International Tourism Receipts (ITR). In both cases Brazil occupies the first position with figures of increments superior to 100% comparing the year 2000 with 1995. With regards the ITA, Cuba occupies the second position, followed by Dominican Republic, Canada and United States as for the ITR. Dominican Republic reaches the second place followed by Cuba, Puerto Rico and Canada.

3. Analysis of the Services Sector

In this section we show the evolution of the variables of the our econometric model.

Firstly, we have the data for Gross Domestic Product per capita of the services sector, in constant prices of 1999 (purchasing parities power) for the years 1990 and 1999.

We can see that, apart from the high values for USA and Canada, the evolution of Mexico (5670 $ per capita in 1999) and Argentina (7818 $ per capita in 1999) stand out. Also, the significant rise in Chile is noted (3301 $ per capita to 5557) and in Uruguay (3977 $ per capita to 5541). Nevertheless, some countries such as Venezuela and Brazil, which start initially in a good situation, showed no significant increase until 1999.

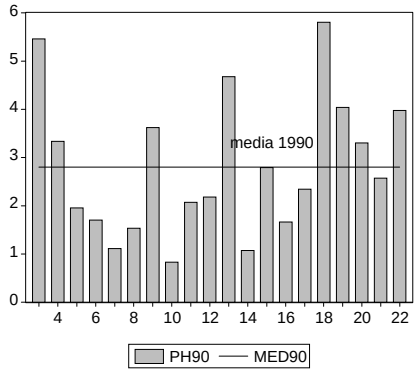
Table 4. Value-Added in services sector per inhabitant at constant 1999 prices, (PPP of this year). 1990 and 1999. (Miles de $).

	PH90SPP	PH99SPP
Canada	16.476	16.916
USA	20.772	22.977
Mexico	5.458	5.670
Costa Rica	3.335	4.266
El Salvador	1.955	2.662
Guatemala	1.705	2.173
Honduras	1.111	1.248
Nicaragua	1.535	1.270
Panama	3.620	4.527
Haiti	0.828	0.680
Jamaica	2.072	1.929
Dominican Republic	2.179	3.023
Venezuela	4.674	4.094
Bolivia	1.070	1.349
Colombia	2.793	3.767
Ecuador	1.664	1.676
Peru	2.343	2.847
Argentina	5.805	7.818
Brazil	4.040	4.552
Chile	3.301	5.557
Paraguay	2.571	2.433
Uruguay	3.977	5.541
Media (sin Usa y Canada)	2.801	3.354

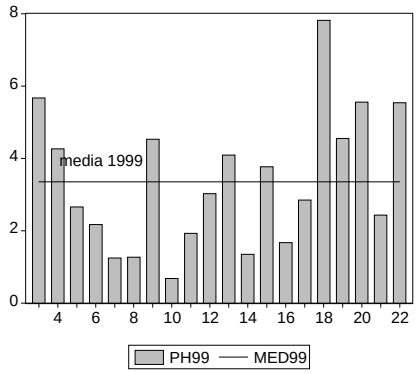
Source: Guisan and Aguayo(2002), based on statistics from the World Bank, United Nations and other international organizations.

In next graphs we represent this variable (PHS) for 22 Latin American countries, for the years 1990 and 1999, comparing their situation with the average. We have excluded USA and Canada in the calculus of the mean, in order to increase its representativeness.

Graph 4. Value-added of the Services Sector per inhabitant. 1990
(not included Canada and USA).



Graph 5. Value-added of the Services Sector per inhabitant. 1999
(not included Canada and USA).



1-Canada /2-USA / 3-Mexico/4-Costa Rica/5-El Salvador / 6-Guatemala/7 - Honduras/8-Nicaragua / 9-Panama / 10 - Haiti / 11 - Jamaica / 12 - Dominican Republic / 13-Venezuela / 14 - Bolivia / 15 - Colombia / 16 - Ecuador / 17 - Peru / 18 - Argentina / 19 - Brazil /20 - Chile / 21 - Paraguay / 22 - Uruguay

Table 5. Exports in services sector per inhabitant. 1990 and 1998. (miles de $)

	EXPS90H	EXPS98H
Canada	0.692	0.998
USA	0.528	0.887
Mexico	0.088	0.123
Costa Rica	0.195	0.370
El Salvador	0.058	0.045
Guatemala	0.034	0.053
Honduras	0.024	0.058
Nicaragua	0.009	0.031
Panama	0.375	0.567
Haiti	0.007	0.023
Jamaica	0.414	0.669
Dominican Republic	0.154	0.292
Venezuela	0.058	0.056
Bolivia	0.019	0.030
Colombia	0.048	0.050
Ecuador	0.048	0.062
Peru	0.033	0.067
Argentina	0.070	0.124
Brazil	0.025	0.043
Chile	0.136	0.272
Paraguay	0.094	0.089
Uruguay	0.149	0.422
Media (sin USA y Canada)	0.101	0.172

Source: Guisan and Aguayo (2002), based on statistics from the World Bank, United Nations and other international organizations.

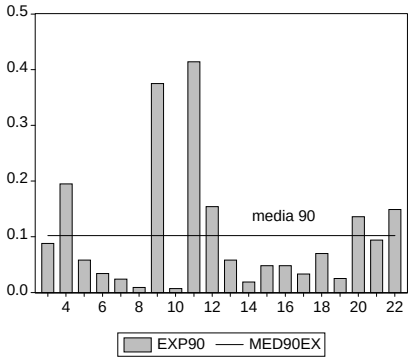
In table 5, apart from the values of USA (887 $ per capita in 1998) and Canada (998 $ per capita in 1998), we can highlight the next countries, because of their high value compared to the others: Panama (567 $ per capita in 1998) and Jamaica (669 $ per capita in 1998).We point out the significant increment shown by Uruguay from 1998 to 1990 (from 149 $ per capita to 422).

In these graphs we can see the countries that stood out against the mean in 1990, maintain their positions in 1998. Panama and Jamaica stand out clearly.

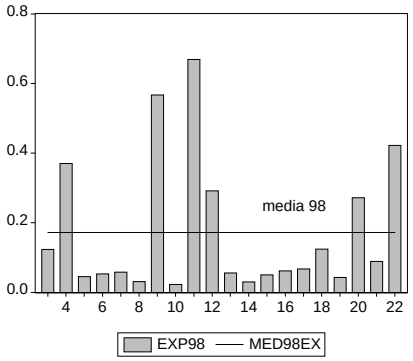
Costa Rica is the third Central American country that is located so much above the stocking in the year 1990 as in 1998. Uruguay and Chile, in the South American area, surpass the stocking in both years, highlighting both countries for their notable increment in 1998 in relation to 1990.

From 1990 to 1998, Haiti, Nicaragua and Bolivia remained in the lower position although having increased their exports. El Salvador, Paraguay and Venezuela decreased their exports in services sector per inhabitant in this period.

Graph 6. Exports of Services in 1990
(not included USA and Canada)



Graph 7. Exports of Services in 1998
(not included USA and Canada)



1-Canada / 2-USA / 3-Mexico / 4-Costa Rica / 5-El Salvador /
6-Guatemala / 7- Honduras / 8-Nicaragua / 9-Panama / 10 - Haiti /
11- Jamaica / 12 -Dominican Republic / 13-Venezuela / 14 - Bolivia /
15 - Colombia / 16 - Ecuador / 17 - Peru / 18 - Argentina / 19 - Brazil /
20 - Chile / 21 - Paraguay / 22 – Uruguay

Table 6.Value-Added of Agriculture (A) and Industry (I) per inhabitant at constant 1999 prices, (PPP of this year). 1990 and 1999.

	PH90APP	PH99APP	PH90IPP	PH99IPP
Canada	0.781	0.781	7.900	8.328
USA	0.407	0.417	5.880	8.297
Mexico	0.494	0.638	1.952	2.251
Costa Rica	0.862	0.933	1.271	1.466
El Salvador	0.667	0.480	0.897	1.222
Guatemala	0.982	0.862	0.598	0.712
Honduras	0.493	0.432	0.646	0.720
Nicaragua	0.819	0.623	0.467	0.503
Panama	0.460	0.489	0.788	1.101
Haiti	0.885	0.408	0.353	0.272
Jamaica	0.249	0.262	1.257	1.079
Dominican Republic	0.623	0.616	1.287	1.959
Venezuela	0.316	0.288	1.347	1.384
Bolivia	0.419	0.375	0.614	0.774
Colombia	1.184	0.851	1.527	1.458
Ecuador	0.308	0.366	0.930	1.006
Peru	0.283	0.422	1.309	2.003
Argentina	0.698	0.757	2.996	4.035
Brazil	0.531	0.661	1.809	2.129
Chile	0.511	0.754	2.042	3.108
Paraguay	1.161	1.217	1.014	1.030
Uruguay	0.627	0.804	2.375	2.592

Source: Guisan and Aguayo (2002), based on statistics from the World Bank, United Nations and other international organizations.

In table 6 we have the production data per capita for Agriculture and Industrial Sectors, respectively, for the years 1990 and 1999. The agriculture sector shows great stability. With regards the industrial sector, we can say that it presents, for value-added, a moderate growth, and an excessive growth for population. This leads to a stagnation of production per capita; with decreases in cases such as Colombia (1527 $ to 1458), Haiti (353 $ to 272) and Jamaica (1257 $ to 1079).

4.- Econometric Models

The specification of the model follows the form of a *mixed dynamic model*, where PHS99PP is the explained variable; and the explanatory variables are: their lagged value in levels (PHS90PP); the increment of the value-added of the agriculture and industry sectors per inhabitant (DPHAI), and the increment of the exports of the services sector per inhabitant (DEXPSH). This model is based on the specification suggested by Guisan et al (2002) at world level. We estimate the model for American countries and compare our results with the world model of these authors.

The following tables show the results of the world model (model 1), and our model for American countries (model 2).

The first model considers the world group (99 countries in total). The second model, with the same relationship, considers 22 countries of the American continent. Both models provide a high goodness of fit.

The results show an important positive impact on the production of the agriculture and industry sectors in the services sector, as well as in tourism which would be included in the exports of the services sector.

We have carried out alternative estimates including fixed effects to see if the impacts were different according to the continents, but they were not significant in any case.

We can observe at world level that the impact on the agriculture and industry sectors, and the exports, is slightly inferior to what would happen if we took the American countries individually.

The model variables are:

PH99SPP = Value-added of services sector per inhabitant at constant 1999 prices,
(PPP of this year).

DPHAI = First difference of the increment of the value-added of agriculture and industry sectors per inhabitant (1990-99).

DEXPSH = First difference of the increment of services exports per inhabitant (1990-98).

Model 1 (WORLD)
LS / / Dependent Variable is PH99SPP
Included observations: 99
Excluded observations: 85 after adjusting endpoints

Variable	Coefficient	Std. Error	t-Statistic	Prob.
DPHAI	0.768378	0.081659	9.409591	0.0000
DEXPSH	1.996705	0.318234	6.274319	0.0000
PH90SPP	1.029184	0.016916	60.83946	0.0000

R-squared	0.986767	Mean Dependent var	5.582161
Adjusted R-squared	0.986492	S.D. dependent var	6.266568
S.E. of regression	0.728335	Akaike info criterion	-0.604153
Sum squared resid	50.92535	Schwarz criterion	-0.525513
Log likelihood	-107.5693	F-statistic	3579.378
Durbin-Watson stat	1.829389	Prob(F-statistic)	0.000000

Model 2 (AMERICA)
LS / / Dependent Variable is PH99SPP
Included observations: 22 after adjusting endpoints

Variable	Coefficient	Std. Error	t-Statistic	Prob.
DPHAI	0.957120	0.276809	3.457694	0.0026
DEXPSH	2.555862	1.495980	1.708487	0.1038
PH90SPP	0.971705	0.040237	24.14930	0.0000

R-squared	0.988672	Mean Dependent var	4.862580
Adjusted R-squared	0.987480	S.D. dependent var	5.282911
S.E. of regression	0.591125	Akaike info criterion	-0.925332
Sum squared resid	6.639146	Schwarz criterion	-0.776553
Log likelihood	-18.03800	F-statistic	829.1434
Durbin-Watson stat	2.145719	Prob(F-statistic)	0.000000

Countries included in the regression:

1-Canada / 2-USA / 3-Mexico / 4-Costa Rica / 5-El Salvador / 6-Guatemala / 7 – Honduras / 8-Nicaragua / 9-Panama / 10 - Haiti / 11 - Jamaica / 12 -Dominican Republic / 13-Venezuela / 14 - Bolivia / 15 - Colombia / 16 - Ecuador / 17 - Peru / 18 - Argentina / 19 - Brazil /20 - Chile / 21 - Paraguay / 22 - Uruguay

Bibliography

Gardella, R. and Aguayo, E. (2002). "Impacto económico del turismo en el MERCOSUR y Chile (1990-2000)". *Estudios Económicos de Desarrollo Internacional*. Vol. 2-1. pp. 27-50. Edited by Euro-American Assoc. of Economic Development Studies. Site www.usc.es/economet/eaa.htm

Guisan, C., Cancelo, M.T., Neira, I., Aguayo, E. and Exposito, P. (2001). *Crecimiento económico en los países de la OCDE 1. Modelos de crecimiento y empleo en Irlanda, Francia, España, Alemania, USA y Japón*. Estudios Económicos de la Asociación Hispalink-Galicia, nº 4. Distribution: Mundi-Prensa, Madrid.

Guisan, C., Cancelo, M.T., Aguayo, E. and Diaz, R. (2001). *Modelos econométricos interregionales de crecimiento de la industria y los servicios en las regiones europeas 1985-95. Estudios* Económicos de la Asociación Hispalink-Galicia, nº 5. Distribution: Mundi-Prensa, Madrid.

Guisan, C. and Aguayo, E. (2002). "Education, Industry, Trade and Development of American countries in 1980-99". *Applied Econometrics and Internacional Development*. Vol. 2-1. Edited by Euro-American Assoc. of Economic Development Studies.

Guisan, C., Aguayo, E. and Exposito, P. (2002). **"**Relaciones intersectoriales en Latinoamérica en el período 1980-99: un análisis econométrico". *Estudios Económicos de Desarrollo Internacional.* Vol. 2-1, pp. 7-26. Edited by Euro-American Assoc. of Economic Development Studies.

Rey, C. (1998). *Economía del Turismo. Estructura de mercados e impacto sobre el desarrollo*. Estudios Económicos de la Asociación Hispalink-Galicia, nº 1. Distribution: Mundi-Prensa, Madrid.

WTO(2001). *Tourism Highlights.*

WTO(2001). *Tourism Market Trends: America*

WTO(2001). *Statistics Yearbook.*