Tourism productivity: incentives and obstacles to fostering growth

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Abstract

This paper intends firstly to estimate tourism productivity in 208 countries in the years 1990, 1995, 2000 and 2004. Secondly, it analyzes if the differential of productivity across countries could be due to some structural characteristics of the countries themselves. The study uses a stochastic production frontier approach and a technical efficiency model to analyze the determinants of efficiency across countries. Private capital and labour result to be more influential than public capital on the number of arrivals. The results suggest that the tertiary school enrolment, the level of communication technologies, the country openness to international trade all significantly contribute to efficiency.

JEL Classification: D24, L83, O10, O40, O50

1. Introduction

International tourism represents the principal exports source for 83% of developing countries. Tourism is considered as an important source of foreign exchange earnings, employment of domestic labour and a source of growth for a country. But the tourism industry is one of the least productive sectors in the most developed economies. Sectors that suffer from below-average labour productivity tend to face procurement problems in the factor markets. In fact tourism faces difficulties in both attracting capital and attracting highly qualified staff (OECD 2006).

The paper takes into consideration two distinct traditions: Growth theory and stochastic frontier models.

Endogenous growth theory suggests that economic growth is related to a) large scale b) sectors with high intensity of R&D and high productivity. Moreover, growth theories stress the role of human capital (Lucas 1988), public infrastructure (Barro 1990) or incentives to innovate (Romer 1990).

More and more studies have been focusing on the relationship between tourism and the economic growth rate; Pigliaru (1999) find that many small tourism countries have grown faster compared to other countries. Lozano, Gomez, and Rey-Maquiera (2005) state that the length of the growth period of a destination depends on the quality of private tourism services; a stylized fact of this literature is that the fastest growth rate countries are the ones with the highest tourism specialization but most of the literature results demonstrate that tourism does not lead per se to economic growth (Neves Sequeira and Campos 2005). The question of how relevant is the tourism sector for the economic growth of an area is remarkable in a more and more services globalized society. Eugenio-Martín, Martín Morales and Scarpa (2004) study how relevant tourism sector is for the economic growth of the regions and vice versa. They show that the tourism sector is significant for the economic growth of medium or low-income countries, though not necessarily for developed countries.

The question posed by this study is about the relationship between tourism productivity and the number of tourists arrivals.

Most of both theoretical and empirical studies in the economics of tourism focus on the demand side. One of the contributions of this works is exploring some economics empirics on the supply side of tourism. Tourism is not a homogeneous product. The supply side combines the three main components: transport, tour operators and travel agents, and accommodation. Tourism is a peculiar sector, also because it is a collection of interrelated industries and thus comprises many services. Small and mid-size businesses dominate in tourism, both in developing and developed countries (ILO 2001). In developing countries, in the hotel industry where international chains are concerned, the labour market is organized in the same way as other industrial sectors, while in other small-scale tourism activities things are different. Thus problems with the definition and measurements of tourism productivity arise, such as the definition of the output itself, the quality, and the impact of technical change.

Taking into account the difficulty of drawing conclusions about the relative productivity in this industry without considering the mix and nature of the services provided (Anderson et al. 1999), the literature in hospitality industry firstly used average occupancy rates and average room/ rates as indicators of performance, labour cost ratio; then there have been cost-volume-profit analysis. Nowadays the most used techniques in analyzing productivity and efficiency belong to four groups: the Data Envelopment Analysis (DEA), the Distributon-Free Technique, the Thick Frontier Approach and the Stochastic Frontier Approach (Anderson, Fish, Xia and Michello 1999). All these techniques attempt to define variations from an efficient frontier using alternative assumptions regarding the probability distributions of the X-efficiency and random error. Among these techniques, the DEA assumes that there are no random fluctuations from the efficient frontier model, thus considering all the deviations as inefficiency. DEA, but is sensitive to the input/output specification of the model and can only measure relative efficiency levels. DEA is very popular because it does not require a functional form assumption. Its presence is strong in the literature, see Banker (1993), Bessent and Bessent (1980), Brown and Ragsdale (2002), Chiang et al. (2004), Cooper et al. (2004), Hwang and Chang (2003), Barros and Athanassiou (2004), Barros and Alves (2004). The Distribution-Free Approach assumes that efficiency differences are stable over time while random error will approach to zero. Is limit is that requires data for many years in order for the random term to cancel out (Berger, 1991, 1993; Berger and Humphrey, 1992a). The Thick Frontier Approach divides the magnitude of the error terms into quartiles, and any differences in efficiency within groups represents random error, while inefficiency differences between the highest and lowest quartiles represent inefficiencies (Berger and Humphrey, 1991, 1992b; Berger 1993). The stochastic Frontier Approach not only provides overall industry estimates but also individual firm estimates. Thus identifying units relatively efficient, and determining the magnitude of firm's inefficiencies we could suggests paths in order to reduce these inefficiencies (Anderson, Fish, Xia and Michello 1999) . Representative studies using traditional stochastic frontier techniques are to Ferrier and Lovell (1990), Timme and Yang (1992), Simeone and Li (1997), and Anderson et al. (1998b)

Usually the literature examining the efficiency of the hotel industry uses revenues as proxy for output. Specifically, the total revenues are supposed to be generated from rooms, gaming, food and beverage, and other (such as store spaces, laundry, beauty salons, ball courts etc.). As far as the inputs are concerned the literature considers the number of full- time equivalent employees, the number of rooms, total gaming related expenses, total food and beverage expenses, and other operating expenses[2]. Morey and Dittman (1995) find that the hotel industry operates at 89% efficiency. Efficiency is often hard to evaluate because it is difficult to determine an efficient amount of resources and generally, hotel organizations have not developed standard cost estimates of outputs. That is why, differently from previous studies on tourism productivity, in this study only real variables will be taken into consideration, and as a proxy for output the number of international arrivals is taken into consideration.

This study intends firstly to estimate productivity in tourism from a production function of tourism. Due to the availability of both data on private and public sectors capital invested in tourism all over the world we could test the influence of both kinds of capital on tourists international arrivals and the level of the efficiency of the hotel industry for each country in the world. Owing to the lack of comparable data, at a country level I could not use monetary variables as it have been done by previous studies.

Secondly, this study analyzes if the differential of productivity across countries could be due to some structural characteristics of the countries themselves, thus verifying the relationship between the institutional and governance structure and the economic performance.

[2] See Bell and Morey (1995), Anderson et a. (2000), Anderson, Fish, and Michello (1999), Barros (2004).

The study uses a stochastic production frontier approach in order to measure country level technical efficiency for a better comparison of economic performances. Through the stochastic production frontier model the paper also intends to seek for the determinants of technical efficiency.

The results suggest that the percentage of tertiary school people, the level of communication technology, and the country openness to international trade all significantly contribute with the expected negative sign to inefficiency.

The remainder of the paper is organized as follows. The next section provides a definition and a very brief overview on the debate on productivity and efficiency. Section 3 explains the model and the methodologies applied. Section 4 shows the results obtained. Section 5 concludes.

2. Productivity and efficiency when looking at growth

Productivity is the ratio of output to input. One firm is more productive than another if it can produce more with the same inputs or it can produce the same output with less of all inputs. The literature individualizes five drivers to productivity: investment, innovation, skills, enterprise, and competition. The contention that these drivers are the main ones of productivity has neither been theoretically nor empirically tested. But regional development policy is very influenced by this set of indicators.

Investment in physical capital can affect economic growth both directly (because it increases aggregate demand) and via augmented productivity. Investment can expand the production possibility frontier without changing marginal products or increase the marginal contribution of the capital. That is to say that, other things being constant, economic growth could be due to a bigger stock of capital or to an introduction of new capital of higher productivity. In the economic literature most of the studies (Bradford Delong and Summers 1991, Jorgenson 2005) find a positive relationship between investment in physical capital and economic growth, mostly based on the assumption that successive vintages of capital embody technological progress.

Critics to this literature (Mankiw, Romer and Weil 1992, Blomstrom et al. 1996) state that the causality relationship can go from growth to investment or that investment in the long run has no effect on economic growth.

Innovation is a continuous process of discovery, learning and application of new technologies and techniques (that are both cumulative and interdependent) from many sources. Schumpeter (1934) was the first one to stress the importance of innovation to fostering growth. Innovation includes both fundamental and applied innovation. Moreover, it can also take the form of organizational changes and new market strategies which expand demand for products, support existing structure for new methods of production and increase the efficiency of the other types of innovative effort, leading to productivity improvements. Nickell and Van Reenen (2001) show that innovation can only impact productivity if it is spread around the economy.

Skills reflect the fact that more skilled labour is likely to be more productive. Two strands of literature are relevant to this regard: 1) Lucas (1988) claiming that the relationship between growth and productivity depends on the rate of accumulation of human capital and 2) Nelson and Phelps (1966) assuming differently that the relationship is due to the stock of human capital, thus implying that an increase in human capital affects permanently economic growth.

Enterprise involves seizing new business opportunities (both for new and incumbent firms) . The importance of a vibrant enterprise culture has long been recognized as essential for growth. There are a number of features that contribute to the overall state of enterprise in the economy: a) Entrepreneurship: the motivation for business creation and business growth in an economy, seizing opportunities and being rewarded for success. b) Socio-cultural attitudes: social and cultural norms influence a community's attitudes and preferences . c) Capital markets: efficient and effective financial markets provide organizations and individuals with funding for new ventures and investments.

Competition: the effect of competition on productivity is not as clear-cut as the other drivers of productivity. From one side competition forces prices to converge to marginal costs and more competitive markets encourage cost-reducing improvements because their higher price elasticity of demand means that there is more room for firms to increase profits than in less competitive markets. From the other side, innovation thrive in highly concentrated markets, because monopoly rents are eroded in competitive ones. Aghion and Howitt (1998) tried to reconcile these two adverse effects stating that the relationship between product market competition and productivity growth should be positive in industries: a) characterised by weak control of managers by shareholders, b) where tacit knowledge is the main limiting barrier to imitation relative to patent protection, c) with low density of technologic-specific fixed investments.

In this paper we consider as the economic unit the country and not the firm, thus we will construct a production function.

Productivity is used as a performance benchmark to rank firms and countries or as a measure of the performance improvement over time. It is well known that productivity is often associated with indicators of success. Nevertheless measuring productivity carries ambiguity (Van Biesebroeck 2006). Assumptions on the production technology, the functional form, the firm behaviour, the other unobservable elements that affect

output matter and can lead to different measures. The production function $Q_{it} = A_{it} f_{(it)}(X_{it})$ relates inputs X_{it} to output Q_{it}. A_{it} is an unobservable term that varies across firms i and time periods t. There are different measures of productivity: the ones mostly used are total factor productivity and labour productivity[3].

We could implement the same definitions at a country level. The idea here is to measure the economic performance in the tourism sector in terms of arrivals at a country level. Thus a country should manage its scarce inputs efficiently; and tourism

[3] Given $Y_t = Z_t F(K_t,L_t)$, Total Factor Productivity (TFP) is defined to be $Y_t/F(K_t,L_t)$. Labor productivity is the quantity of output per time spent or numbers employed.

destination performance can be evaluated through a measurement of efficiency (Cracolici, Nijkamp, and Rietveld 2008).

Of course the arrivals variable include both a demand and a supply component, it is basically a "demanded supply" variable[4]; taking this into mind, we then compare each country's output with the maximum output that could be obtained with the same resources (that is to say the world best possible output), given the available resources and technology in the period considered. We are thus measuring technical efficiency.

The literature (e. g. Fare, Grosskopf et al. 1994) decomposes productivity into changes in efficiency (catching up) and changes in technology (innovation). Each country is compared to a frontier. How much a country is close to the world frontier stands for the catch up (efficiency); if the world frontier moves, it means technical change or innovation.

Measuring productive efficiency allows one to test competing hypotheses regarding sources of efficiency or differentials in productivity. Moreover, such measurement enables us to quantify the potential increases in output that might be associated with an increase in efficiency (Farrel 1957). The economic literature on production efficiency typically distinguishes two types of efficiency: technical efficiency and allocative efficiency. The latter includes as components cost minimization, revenue maximization, and profit maximization. A technically efficient implies producing the maximum output for a given amount of inputs, conditional on the production technology available to it. An allocative efficient *"economic unit"* applies the optimal amount of inputs to produce the optimal mix of outputs given the production technology and the prices it faces.

A firm, or in our case a country, can lie on or within the frontier, and the distance between actual output and the frontier output represents technical inefficiency. The technique assumes that given inputs, a maximum attainable output exists. The

[4] Also the revenues considered in other studies as a proxy for output face the same problem.

country’s production lies on the frontier, if it uses the inputs efficiently, or within the frontier, if it uses the inputs inefficiently. The distance between the frontier and the actual production point measures technical inefficiency. Over time, a country’s performance relative to the frontier includes two factors. First, a country can become more efficient, and get closer to the frontier. Second, the frontier itself can shift over time. Frontier shifts reflect purely technological factors. In addition, a country can move along the frontier by changing inputs. Hence, output growth can be thought of in terms of three components; efficiency change, technological change, and input change. A simple growth accounting analysis that only looks at input quantity and an exogenous technology does not take into account the country’s efficiency in using its inputs and the available technology. This is especially true for developing countries where serious institutional obstacles can impede the production process and cause a misuse not only of capital and labour, but also of the imported technology. A stochastic frontier analysis evaluates these effects as technical inefficiency. By separating technical inefficiency from other variables, a stochastic frontier analysis decomposes TFP into factors that are external to the country (technological change) and factors that are internal to the country (its ability to absorb and use the available inputs).

We allow for efficiency and productivity as important determinant of cross-country growth performance. Thus, we focus on several aspects that are most relevant to efficiency: openness to trade, the development of infrastructures, the level of literacy, the importance of the tourism sector, and the level of communication technologies. In this way the paper is able to catch productivity differences across countries on a comparable basis.

3.The model and the methodology applied

“Attempts to characterize tourism market supply have been limited due to a general lack of product definition and explicit corporation of external characteristics critical to producing tourism output. Furthermore, there are important natural-resource-based public goods that tourism uses in its production that defy empirical analysis due to their non-priced and common-pool characteristics."(Marcouiller 1998).

This paper uses a different approach to Marcouiller (1998) and explicitly models a tourism quasi-production function that includes capital and labour as inputs like in a generic production function. But in this case the modelling of tourism supply comprises two parts: firstly the stochastic production frontier (the estimates of productivity from the production function); and secondly the technical efficiency model, that examines the determinants of the inefficiency.

3.1 The Stochastic Production Frontier

The basics of the stochastic production frontier define:

$$Y_{it} = X_{it}\beta + \varepsilon_{it} \tag{1.1}$$

where

$$\varepsilon_{it} = u_{it} + v_{it} \tag{1.2}$$

Parametric estimation assumes the same input trade-off and returns to scale for all firms/countries. Stochastic frontiers make explicit distributional assumptions on the unobserved productivity and this allows avoiding the endogeneity problems that consistent estimation of the input parameters faces (Van Biesebroeck 2006). The model (Aigner, Lovell and Schmidt, 1977) is a pooled frontier model, in which the error term is divided into two components: a normally distributed error v_{it}, capturing general measurements errors and heterogeneity; and a half-normal random term[5] u_{it}, representing the technical inefficiency of firm i at time t relative to the best-practice production frontier ($u_{it} = -\ln A$) as a one-sided non negative disturbance, where v_{it} ~

[5] The most common distribution assumption about the inefficiency term consists of half –normal, exponential, and truncated distribution.

iid $N(0,\sigma_v^2)$ and u_{it} ~ iid $N^+\left(0,\sigma_u^2\right)$[6], where $N^+\left(0,\sigma_u^2\right)$ stands for the positive part of a normal distribution. Both error components are assumed to be uncorrelated with each other and the regressors. This model is estimated by Maximum Likelihood and the inefficiency component is estimated from the residuals $\varepsilon_{it} = u_{it} + v_{it}$ by the conditional expectation $E(u_{it}/\varepsilon_{it})$, proposed by Jondrow et al. (1982).

An advantage of stochastic frontiers is that it allows to generalize the production function in order to permit for more sophisticated specifications. A disadvantage of this methodology is that it does not allow determining if the observed performance of a particular observation is due to inefficiency or to random variation in the frontier. It just estimates the mean inefficiency over the sample.

We selected two estimable functional forms with acceptable theoretical and application properties: the Transcendental Logarithmic and the Cobb-Douglas Production functions, which substantially differ because the translog is quadratic in the logarithms of its inputs and does not require a priori homotheticity and separability assumptions. The factor shares of output are independent of total output if the production function is homothetic, and the elasticities of substitution are constant and equal for any pair of inputs if the function is both homothetic and additive. We thus assume a quasi production function of the following form:

$$\ln Y = \ln a_0 + \sum_{i=1}^{n} a_i \ln x_i + \frac{1}{2}\sum_{i=1}^{n}\sum_{j=1}^{n} \beta_{ij} \ln x_i \ln x_j \tag{1.3}$$

using a Translog or

$$\ln Y = \ln A + \alpha \ln L + \beta \ln K_1 + \gamma \ln K_2$$

[6] An alternative interpretation of the term u_{it} is that the firm-specific production function lies u_{it} below the most productive observation in the sample (Van Biesebroeck 2006).

using a Cobb-Douglas

Where:

• Y is the output in form of Tourism arrivals. This variable represents the international inbound tourists who travel to a country outside their place of residence for a period not exceeding 12 months and whose main purpose in visiting is other than a remunerated activity in the country visited. The source is: The World Bank, World Development Indicators. Tourist output is evaluated here by a non-financial measure as in Cracolici, Nijkamp, and Rietveld (2008).

The Xs are the inputs used.

• x_1 = L is the labour utilized: Travel & Tourism Total Employment (in thousands) that shows the total number of people employed in the Travel & Tourism industry, including those jobs associated with Travel & Tourism, such as airline caterers, laundry services, food suppliers, wholesalers, accounting firms, etc, government agencies, manufacturing and construction of capital goods and exported goods used in Travel & Tourism and supplied commodities, including steel producers, lumber, oil production, etc. Source: World Travel & Tourism Council. α is the elasticity of output to labour.

• x_2 =K_2 stands for public capital, Government Expenditure on Travel & Tourism (US$ Million) that consists of two main components: collective and individual expenditures. The collective government expenditures include expenditures by government agencies and departments associated with the Travel & Tourism industry made on behalf of the community at large. This includes tourism promotion, aviation administration, security services and sanitation services. Individual government expenditures include cultural institutions (art museums), national parks and customs and immigration on behalf of individual visitors. Source: World Travel & Tourism Council. γ is the elasticity of output to public capital.

• $x_3 = K_1$ stands for private capital that has been derived from the constraint

$$K = K_1 + K_2 \tag{1.4}$$

And K is the Capital Investment in Travel & Tourism (US$ Million) which includes the value of all investments made by Travel & Tourism providers (the private sector) and government agencies (the public sector) to provide facilities, equipment and infrastructure for visitors. Source: World Travel & Tourism Council. β is the elasticity of output to private capital.

These functional forms allow for either increasing, or constant, or decreasing returns to scale[7], just the isoquant being convex, but cannot identify factor-bias in technological change.

Different specifications of the model consider just the private capital, both the public and private capital, and just the total capital. When considering just the private capital the public sector will play a role in explaining the efficiency trough the infrastructure frame.

We used both a cross section of 208 countries in the year 2004 and a panel with the same countries for four years (1990, 1995, 2000, 2004). Unfortunately, we could use the data over the four years just for the production function but not for the technical efficiency model.

[7] Variable returns to scale is more appropriate in the tourism sector, because, for example, when bed-nights are considered as the output, its changes are unpredictable. (Peypoch 2007)

3.2 The Technical Efficiency Model

The technical efficiency model is specified as

$$U_{it} = Z_{it}\varphi + w_{it} \tag{1.5}$$

Where w_{it} is a random variable, defined by the truncation of the normal distribution, Z_{it} is a vector of country specific characteristics, and U_{it} represents technical inefficiency.

Thus our specification of the technical efficiency model becomes:

$$\begin{aligned} U_{it} &= \inf_{it} + op_{it} + hur_{it} + tech_{it} + Tshare_{it} + w_{it}\delta_0 eaasia + \\ &+\delta_1 eu \,\&\, casia + \delta_2 la \,\&\, c + \delta_3 me \,\&\, na + \delta_4 na + \\ &+\delta_5 sasia + +\delta_6 subsa \end{aligned} \tag{1.6}$$

We focus on several aspects that could be relevant in explaining technical efficiency across countries:

1)inf: the role of the public sector through an infrastructure index (ranging from 0 to 100) that shows the level of infrastructure development, combining the Road Index, the Sanitation Index and the Water Access Index. Source: The World Bank, World Development Indicators.

2)op: the role of international trade: the openness to trade index (ranging from 0 to 100) shows the level of a country's openness towards international trade and international visitors. The Openness Index is an aggregate index combining the Visa Index, Tourism Openness Index, Trade Openness Index and Taxes on International Trade Index. Source: World Travel & Tourism Council.

3)hur: some characteristics of the inputs used as the human resource index proxied by using the Education Index obtained from the 2001 UNDP report. The education Index consists of the adult literacy rate and the combined primary, secondary and tertiary gross enrolment ratios. Source: The Human Development Report UNDP; or tse: the tertiary school enrolment that refers to the Gross enrolment Ratio of tertiary school calculated as a ratio of total enrolment in the tertiary education, regardless of age, to the population of the age group that officially corresponds to the level of education shown[8]. Source: The World Bank, World Development Indicators. The correlation among these variables is very high, so It will be included just one of them in the equation.

4)tech: the level of communication technology through a technology index (ranging from 0 to 100) that combines the Internet Index, Telephone Index, Mobile Index and Hi-Tech Index. Source: World Travel & Tourism Council.

5)Tshare: the ratio between the sum of international tourism receipts and tourism expenditure to GDP[9]; it is a proxy for the importance of the tourism in the country called the tourism impact index. It measures the direct economic effects of the international tourism industry in the economy. Source: The World Bank, World Development Indicators.

All these variables are presumed to have a negative impact on technical inefficiency.

And then we add geographical country group dummies, where eaasia stands for East Asia and Pacific, eu & casia for Europe and Central Asia, la & c for Latin America and Caribbean, me & na for Middle east and North Africa, na for North America, sasia for South Asia and subsa for Sub Saharan Africa[10].

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[8] 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.

[9] International tourism receipts are the expenditures made by international inbound visitors, including payments to national carriers for international transport as well as any other pre-payment made for goods or services received in the destination country. Receipts may include expenditures made by same-day visitors, except in cases where these are so important as to justify a separate classification. International tourism expenditures are the expenditures made by international outbound visitors in other countries, including payments to foreign carriers for international transport. These may include expenditures by residents travelling abroad as same-day visitors, except in cases where these are so important as to justify a separate classification.

[10] All the regressors in the equation (1.6) are proxies of the level of countries development, thus it was not necessary to add dummies referring to different stages of development.

4.Results

The theoretical models previously described have been estimated and on average the results confirm the implicit hypothesis and reveal differences in the role played by the two kinds of capital and the labour variables. The coefficients of the panel confirm the prediction of the cross section. Owing to problems of multicollinearity present in the data, the Cobb–Douglas functional form proved to be more appropriate with respect to the Translog function.

Looking at the coefficients of our regressions, the most relevant variable to output is the labour one confirming that tourism is a labour intensive sector. Between the two kinds of capital the more important one is the private capital variable, while the public capital is nor important or significant to output, while the second model suggests that public investments and subsidies concerning tourism affect more the framework in which tourist operators work.

The first model allows us to test for the elasticities of labour, public and private capital to output[11]. See Table 1 for the results from the cross section and table 2 for the panel. When separating total capital into private and public, When separating total capital into private and public, the elasticity of output to public capital is not econometrically significant and sometimes even with the opposite expected sign (negative); and the elasticity of output to labour is on average 1.25: that is, a 1% increase in labour would lead to an increase of international arrivals of 1.25 percentage points. Adding a dummy relative to the level of income the capital is not significant, while the dummy is significant, and being a rich country affect positively the output, while being a poor country affect it negatively at 1% significance level. For the subset of low income countries the elasticity of output to government expenditure is 0.74.

[11] As far as the capital variable is concerned, even though the theoretical model includes separately both private and public capital, in the empirics attempts have been made also using a measure representing the total capital (private plus public) and using just the private capital variable. The results take into accounts also the results from these empirics.

As far as the technical efficiency model is concerned, the results suggest that the human resource index, the level of communication technology, the country openness to international trade all significantly contribute with the expected negative sign to inefficiency. The variable regarding the importance of the tourism sector for the economy of a country and the variable about the infrastructure level are never significant. The country groups dummies reveal that there are some differences among country groups: there is a proclivity in East Asia, Middle East, Europe and Central Asia, and North America to affect positively the level of efficiency. See table 3.

5.Conclusion

Because of the growing importance of tourism, it has become fundamental to deepen the empirical research on destination tourist performance and destination competitiveness. In the service industry productivity definition and its measurement becomes a difficult task due to different reasons. It is difficult to define and measure “input and “output” in some services cases. Of course depending on the measure used we will have different results. But the state of the art of literature in this field still rely on a limited set of studies based on qualitative data.

Moreover, there is a lack of innovation in tourism. The tourism industry also suffers from below-average labour productivity (OECD 2006). And tourism growth affects economic growth in low and middle income countries, but not in rich countries.

If an economic unit (in our case a country) is operating in a in a competitive market, managers and workers may feel pressure to work more efficiently and vice versa. Obtaining a high efficiency estimate means being productive and this is consistent with a competitive market . And because the hotel industry is not a highly regulated sector (thus close to a competitive environment), and this industry is composed by many firms that offer differentiated services, we should expect high efficiency. The quality of managerial efficiency of the hotel industry could differ due to different causes (Hwang and Chang 2002): 1) Market conditions: results demonstrate that leisure hotels are better managed than urban hotels. Thus developing a low-season market strategy becomes important. 2) Sources of customers: hotels in Taiwan whose customers are mainly foreigners are more efficient than those only servicing local customers. 3) Management style: "*Compared to the independently operated local hotels, international franchise-chains hotels have sounder reputation, better brand image, internet marketing, efficient reservation system and economy of scale*" (Hwang and Chang 2002).

This is an explorative econometric paper, that used a stochastic frontier approach to estimate productivity in tourism all over the world in the years 1990, 1995, 2000 and 2004, and a technical efficiency model to analyze the determinants of efficiency across countries.

As in Cracolici, Nijkamp and Rietveld (2008) the study found a proper way of dealing with different indicators on the supply side in order to explain how countries transform their resources into tourism flow.

The pioneer contribution of this study is threefold: 1) differently to previous studies of this kind (Hwang and Chang 2002, Barros 2004, Cracolici et al. 2008) it analyzes tourism supply and productivity at a worldwide level; 2) it proposes a way to model tourism supply by estimating productivity from a quasi-production function of tourism; 3) it analyzes if the differential of tourism productivity across countries could be due to some structural characteristics of the countries themselves.

As far as the estimation of the production function is concerned, and trusting the reliability of the data, the paper demonstrate that private capital and labour result to be much more influential than public capital on the number of arrivals.

The state is responsible for ensuring a peaceful society, individual freedom, the rule of law, security in terms of health, reliable public services and son on; moreover it provides the legislative and regulatory framework for tourism. "Government should not subsidise outright innovation, so as to avoid opportunism and rent-seeking behaviour. Government's role should be limited to that of a facilitator, coach or "incubation" partner, passing prototypes to the private sector at the end of the innovation process (Weiermair OECD2006). That is to say that one of the prescription of this study is to recommend the public sector not to subsidizing hotel industry directly but supporting and investing on the environment and legal framework in which the tourism firms compete.

The paper asks the following questions: "How influential is productivity (in terms of technical efficiency) in determining the number of arrivals? Are systematic differences in efficiency among countries?". The results demonstrate that efficiency contributes to the number of arrivals and there are systematic differences among countries.

Although there are many factors that influence the levels and changes in tourist supply, the level of literacy, the role exercised by the international trade trough the openness to foreign markets, and the level of communication technologies, as far as the results of this paper are concerned, are very important in explaining different level of productivity across countries. That is to say that the more these variables are taken into consideration in a country, the more productive the tourism industry is in that country, the more these countries are able to compete in the world market.

Further developments of this research, depending on the availability of data will test if countries with a higher productivity in tourism grow faster.

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Table 1 Dep Var: lnY with separate K in the cross section

regressors	coefficients	(standard errors)
privk	.09431161 **	.4377597
public k	-.2790074	.3673533
employ	1.257269 ***	.3214064
	Log likelihood=- 406.64526	Wald chi2(4)=1239.34

Table 2 Dep Var: lnY with separate K in the panel

regressors	coefficients	(standard errors)
privk	1.030949 ***	.2182554
public k	-.7492693 ***	.1803824
employ	1.05286 ***	.1485589
	R-squared = 0.9083	F(4, 567) = 1404.24

Table 3 Dep Var: technical inefficiency

regressors	coefficients	(standard errors)
Technology index	-.0977836 ***	.0365435
Openness index	-.0020147 *	.0131642
Infrastructure index	-.0021535	.0010038
Tourism impact index	-.0376333	.043587
Human resources index	.0076231 ***	.0181172
easteasia	-.1070559 ***	.0356419
europeandcentralasia	-.0784788 ***	.0378086
latinamerica	-.0565697	.031821
middleeast	-.0768763 ***	.0371436
northamerica	-.1536005 ***	.06436
southasia	-.0709636	.0388611
	Log likelihood = -138.86011	Wald chi2(3) = 6.27