CONTRIBUTI DI RICERCA CRENOS

UNIVERSITÀ DI CAGLIARI UNIVERSITÀ DI SASSARI
CENTRE FOR NORTH SOUTH ECONOMIC RESEARCH
CRENoS
CENTRO RICERCHE ECONOMICHE NORD SUD

HIGH SKILLS, HIGH GROWTH: IS TOURISM AN EXCEPTION?

Adriana Di Liberto

WORKING PAPERS

2010/11

CUEC

CENTRO RICERCHE ECONOMICHE NORD SUD
(CRENoS)
UNIVERSITÀ DI CAGLIARI
UNIVERSITÀ DI SASSARI

Il CRENoS è un centro di ricerca istituito nel 1993 che fa capo alle Università di Cagliari e Sassari ed è attualmente diretto da Stefano Usai. Il CRENoS si propone di contribuire a migliorare le conoscenze sul divario economico tra aree integrate e di fornire utili indicazioni di intervento. Particolare attenzione è dedicata al ruolo svolto dalle istituzioni, dal progresso tecnologico e dalla diffusione dell'innovazione nel processo di convergenza o divergenza tra aree economiche. Il CRENoS si propone inoltre di studiare la compatibilità fra tali processi e la salvaguardia delle risorse ambientali, sia globali sia locali.
Per svolgere la sua attività di ricerca, il CRENoS collabora con centri di ricerca e università nazionali ed internazionali; è attivo nell'organizzare conferenze ad alto contenuto scientifico, seminari e altre attività di natura formativa; tiene aggiornate una serie di banche dati e ha una sua collana di pubblicazioni.

www.crenos.it
info@crenos.it

CRENOS – CAGLIARI
VIA SAN GIORGIO 12, I-09100 CAGLIARI, ITALIA
TEL. +39-070-6756406; FAX +39-070- 6756402

CRENOS - SASSARI
VIA TORRE TONDA 34, I-07100 SASSARI, ITALIA
TEL. +39-079-2017301; FAX +39-079-2017312

Titolo: HIGH SKILLS, HIGH GROWTH: IS TOURISM AN EXCEPTION?

ISBN: 978 88 84 67 589 7

Prima Edizione: Maggio 2010

Via Is Mirrionis, 1
09123 Cagliari
Tel./Fax 070 291201
www.cuec.it

High skills, high growth: is tourism an exception?

Adriana Di Liberto∗

Università di Cagliari and CRENoS,

Abstract

Despite the emphasis placed by growth models on technological progress, recent empirical evidence shows that tourism, a low-skill/low-tech sector and one of the fastest growing industries in the world, may offer a beneficial specialization strategy for growth. This paper focuses on a balanced panel of 72 countries (1980-2005) and confirms that the tourism sector indicator is always positive and significant in growth regressions. Moreover, results also imply that increased education contribute to growth and that the role of the tourism sector is significantly larger in countries with higher aggregate levels of human capital. Our main results are robust to the inclusion of additional variables and the use of alternative estimators in the regression analysis. Overall, this study confirms that the expansion of a low-tech sector such as tourism may be a valuable strategy for development. But it also suggests that an increase in human capital endowments is always beneficial, even when the development strategy focuses on the expansion of a (successful) unskilled sector.

JEL classification: I21, O15

Keywords: Economic development, Tourism, Human capital.

∗ Address for correspondence: viale S. Ignazio 78, 09123 Cagliari, Italy. Telephone - +39 070 6753765; fax + 39 070 6753760. E-mail: diliberto@unica.it.

I thank Claudio Deiana for his research assistance and Francesco Pigliaru, Fabiano Schiavardi and Stefano Usai for useful discussions.

1. Introduction

Given their emphasis on the role of technology, most theoretical growth models predict that human capital endowments are fundamental for catching-up and sustained growth to take place. In particular, this literature assumes that high-tech sectors act more powerfully on growth than, say, low-tech/low-skills activities. This idea was already present in the first contributions on endogenous growth developed by Romer (1986) and Lucas (1988), that have stimulated a resurgence of interest in growth studies, and it is still present in more recent contributions. Despite that, there is evidence of some exceptions to this rule. In particular, tourism seems to represent a special case, since in the last few years many countries that are specialized in this low-tech service sector feature among the countries that record fast rates of economic growth.

This evidence is documented by a growing literature that identify a positive relationship between growth and tourism. This literature has started in the nineties with the works of Copeland (1991), Hazari and Sgrò (1995) and Lanza and Pigliaru (1995) and, since then, has become an increasingly debated issue. In particular, the positive relationship between tourism and growth has been found in empirical studies that utilize large international datasets, and results are robust to the use of different samples and specifications (e.g. Lanza and Pigliaru, 2000; Brau *et al*, 2007) and different controls for possible endogeneity problems (e.g. Sequeira and Nunes 2008, Arezki et al., 2009).[1]

Moreover, it is also confirmed by many studies that investigate the impact of tourism on economic growth in specific countries (see, for example, Dritsakis (2004) and Gunduz and Hatemi (2005) respectively for Greece and Turkey). Finally, even recent sectoral studies show that the tourism industry can contribute to poverty relief, especially in developing countries. [2]

A few figures may help to understand why investigating the links between tourism development and economic growth could yield interesting results in terms of policy implications. The tourism sector is currently one of the fastest growing industries

---

[1] Sequeira and Nunes (2008) use the Blundell and Bond (1998) estimator, while Arezki et al. (2009) suggest an instrument to control for the endogeneity of tourism specialization in growth regressions based on the UNESCO World Heritage List. An exception may be found in Di Pietro and Figini (2007) where specialization in tourism is never significant in growth regressions.

[2] For example, Blake et al. (2008) provide an economy-wide analysis of the distributional effects of tourism expansion focusing on weather and how this industry contributes to poverty relief.

in the world. According to the World Tourism Travel Council (WTTC, 2010) tourism growth rate averaged 3.6% between 2004-2007, while in 2008, despite the global recession, its growth remained positive, but slowed down to 1.0%. Moreover, the scale of the world tourism industry is also significant: in 2009 it made up roughly 9.4% of the world's GDP, while its contribution to total employment is estimated at 7.6%. Data from the World Tourism Organization confirm this positive scenario. Specifically, international tourism receipts represented in 2003 approximately 6 per cent of worldwide exports of goods and services (expressed in US$) and nearly 30 per cent of exclusively service exports. World international tourism receipts amounted to 450 billion dollars in 2003 with an average 7.5% yearly rate of growth in current terms between 1980 and 2003 (World Tourism Organization, 2005).

Theoretically, tourism-led growth processes are usually explained by terms of trade factors. A common result in two-countries/two-sectors theoretical growth models is that the country with the high-tech specialization becomes growth-leader thanks to its higher capacity to introduce innovative technology (Lucas, 1988). However, if relative price dynamics between the high and low-tech goods are also taken into consideration, the results may change dramatically. For example, in a recent contribution Acemoglu and Guerrieri (2008) construct a two-sector model of non-balanced economic growth where the capital intensive sector grows faster than the rest of the economy but its price-weighted value grows slower due to its negative price dynamics.

Within the tourism-growth literature, Lanza and Pigliaru (2000) define the conditions under which being specialized in this sector does not necessarily imply a low-growth trap. In this model what is crucial is the elasticity of substitution between the two goods in consumer preferences. In particular, if the elasticity of substitution is sufficiently low, and/or tourism is a luxury good, the international terms of trade may move in favor of tourism fast enough to more than offset the sector disadvantage in productivity growth. Therefore, the relative price of low-tech good (holidays) may increase with respect to that of the high-tech (manufacturing) one and produce a growth-enhancing effect.

Finally, recent evidence by Jorgenson *et al.* (2005) show that, between 1959 and 2002, prices for IT-technology have significantly declined: the annual average percentage rates of growth between 1959 and 1995 is -4.6%, while between 1995 and

2002 is -10.5. GDP prices show a very different trend: +2.1 in 1959-1995 and +0.96 in 1995-2002.

Unlike previous studies, this paper focuses on the relationship between tourism specialization, human capital and growth. Firstly, we ask if, despite its low-skills content, tourism represents a good long-term opportunity for growth. If the answer is yes, its expansion can be seen as an especially good opportunity for countries that are poorly endowed with human capital. Secondly, since evidence of a positive link between a low skill sector and growth seems to dispute or weaken the widespread idea that human capital is a prerequisite for growth and convergence[3], we examine whether economies with higher levels of human capital are able to benefit more from the expansion of the tourism sector to promote their economic growth. We introduce in our regressions analysis an interaction term between tourism and human capital that should be able to capture possible complementarities between these two variables.

We focus on a balanced panel of 72 countries, both developing and industrialized, over the period 1980-2005. This is the largest panel obtainable using both suitable human capital stock variables and tourism sector indicators. As standard in this literature, we use the Barro and Lee (2000) dataset on educational attainment of the labor force to proxy human capital. This enable us to decompose the total stock of human capital into components corresponding to the average years of schooling in primary, secondary and tertiary education attained by the countries' labor force. That is, we ask if different levels of education produce different impacts on growth and if the interaction between human capital and the expansion of the tourism sector is different for primary, secondary and university education.

We find that, although tourism alone plays a positive role in contributing to growth, different levels of human capital imply different returns: countries with high human capital levels seem to gain significantly more from the expansion of the tourism sector than less educated ones. We find that this result holds true even after controlling for a large number of other variables that have significant influences on economic growth and also after addressing concerns regarding endogeneity.

The rest of the paper is organized as follows. In section 2 we provide a descriptive analysis on tourism, human capital and growth, while in section 3 we

[3] Di Liberto (2007) proposes a survey on both theoretical and empirical contributions to growth and human capital.

describe our chosen methodology to perform our panel regression study. Section 4 shows our main results and, finally, section 5 shows some robustness checks. Conclusions are drawn in section 6.

2. Tourism: low skills, high growth?

As said above, in recent years the role of tourism in development processes is an issue that has caught the attention of economists. This is mainly due to the growing importance of this sector in the world economy. In this section we introduce a brief descriptive analysis on the main variables that will be used in our investigation, that is, per capita GDP (levels and growth rates), tourism specialization and human capital. A full description of the dataset and details on data sources can be found in the Appendix together with Figures and Tables.

Figure 1 depicts a general overview of the international tourism receipts during the period of our analysis, 1980-2005. International tourism receipts were estimated in 100 billion dollars in 1980. In ten years they more than doubled (more than 200 in 1990) while they reached a peak level (more than 600) in 2005. Between 1980 and 2005 they attained an average 7.5% yearly rate of growth. Apart from the worldwide trend, Figure 1 shows that all regions have a clear positive trend. Europe was and still is the largest "holiday" market (international tourism receipts reached almost 350 billion in 2005), while during 1980-2005 Asia saw the highest rate of growth (around 10%).

Figure 1

In order to measure the importance of tourism in an economy, in our empirical analysis we opt for a variable which is likely to account for the importance of income generated by inbound tourism in relation to total domestic income. As most studies in this literature, we have used the degree of tourism specialization as the ratio of international tourist receipts to GDP.[4]

[4] Two alternative indicators used to capture the specialization in tourism are the number of international tourist arrivals over population, and the numbers of establishment and bed places. However, these are not appropriate indicators for empirical macro-growth analysis.

In Table 1 we compare average growth rates of per capita GDP 1980-2005 for different sub-samples including tourism countries. Notice that there is no consensus in this literature on what is the definition of a tourism country. Therefore, we include per capita GDP average growth rates for 3 groups of countries with different levels of tourism specialization: a group of 15 economies for which the degree of tourism specialization is higher than 4%, plus a second and third group for which the share of tourism on GDP is larger than, respectively, 5% and 7%. Table 1 also includes information on the sample of industrialized countries, medium and less developed countries (as defined by the World Bank) and the full 72 countries sample.

Tables 1 and 2

Table 1 suggests that the specialization in a low-tech service sector such as tourism does not seem to represent a drawback for development. First of all, our data confirms that, in recent years, tourism economies exhibit high average growth rates of GDP, comparable to the OECD ones. Further, tourism economies seem to grow faster than Medium GDP, Less Developed countries and the whole sample. These numbers corroborate others found in previous studies that focus specifically on small tourism economies where the positive effect of tourism on growth is even stronger (Brau *et al.,* 2007). Indeed, the role played by the tourism sector has been often raised in the debate on weather smallness affects long run growth (Easterly and Kraay, 2000). Therefore, Table 1 shows that the same evidence holds true with data from a standard international sample, like the ones used in most empirical studies on growth.

Further, as shown in Table 2, in our 72 countries sample the range of this variable is significant: the ratio of international tourist receipts to GDP ranges from 28% in Barbados to 0.08% in Japan during the period 1980-2000. At the same time we observe significant heterogeneity also in terms of human capital endowments and GDP growth rates.

Figure 2 illustrates the relationship between the growth rate of per capita GDP (average 1980-2005) and the degree of tourism specialization (average 1980-2000, in logs).

Figure 2

In Figure 2 we differentiate the group of 15 economies for which the degree of tourism specialization is higher than 4% (identified by a red triangle). Overall, we do not observe a significant positive significant relationship between these two variables but, with the exception of Jordan, all tourism countries experienced positive GDP growth rates and some of them are among those with the best performance.

Furthermore, we turn our analysis focusing on the relationship between growth and human capital. Figure 3 shows the correlation between the growth rate of per capita GDP and average (1980-2000) human capital levels. We observe that tourism countries are not among the less educated and are characterized to some extent by above than average educational levels: average years of schooling range from 3,7 in Tunisia to 8,5 in Hong Kong. Figure 4 shows that the positive relationship is much stronger if we compare average human capital levels with average levels of per capita GDP (instead of growth rates).

Figures 3 and 4

Finally, to justify our claim that tourism is actually a low skills sector, we report some data on the level of workforce skills across sectors. Unfortunately, we do not have data for the whole sample of 72 countries, as these are usually available only for developed countries. For the latter, detailed country specific data confirm the low-skill content of this sector[5] but in order to compare information across different countries, we use the recently published EU-Klems[6] dataset that contains information on most European and some industrialized countries. In this dataset tourism is measured differently than in the previous analysis, as the share of value added from the hotels and restaurants sector over total gross value added for 2005.

Note that the EU-Klems definition of the tourism sector (measured as hotels and restaurants value added) is more restrictive than that employed by the World Bank and introduced in our regression analysis. Further, it would not however be the appropriate definition in the context of our growth analysis since, unlike tourism receipts, this

[5] See for example Wood (1997) for UK and Unioncamere - Ministero del Lavoro (2008) for Italy.
[6] See http://www.euklems.net/

indicator is essentially positively related to the level of economic activity of an area.[7]

Nevertheless, although they are not usable to investigate the causal links between tourism and growth, as we shall see, these data provide strong evidence on the low skills content of the tourism sector. Table 3 includes both the levels of tourism specialization for a group of EU countries and the share of hours worked by high-skilled workers as a measure of high tech specialization. Not surprisingly, Greece and Spain are top of the league, while Netherlands, Germany, Belgium and Scandinavia are below the EU average specialization.

In particular, these sector specific data show how the tourism sector can be classified among those less technologically advanced and which use less skilled labor force in all of the economies examined. As said above, Table 3 includes the share of hours worked by high-skilled workers as a measure of high tech specialization and reveals that, apart from construction, tourism is the sector where fewer skills are needed by its workforce.

In sum, even if it is fair to say that this evidence is only suggestive rather than conclusive since relates to solely a sample of industrialized countries, we believe that it is very likely to hold true in most economies.

3. Regression model and choice of the estimator

We study the role of tourism by introducing the share of tourism[8] into a standard beta-convergence growth regression that represents the standard approach when growth processes are analyzed.[9]

In general, the transitional dynamics of the Solow model implies there is a clear relationship between the growth rate of income and its initial level and in a panel setting this relationship is usually estimated introduce an AR(1) specification, or model in levels, where the dependent variable is the logarithm of per capita GDP, y_{it}, in period t for country i, and the estimated beta coefficient on $y_{it-\tau}$ should capture the speed of

[7] More on endogeneity of the tourism variable in sections 4 and 5.

[8] As said in section 2, tourism specialization is measured as the ratio of international tourist receipts to GDP

[9] Other studies on tourism that use this approach are Fayissa *et al.* (2008), Cortès (2008) and Proença and Soukiazis (2008).

convergence.[10] In sum, we use data between 1980 and 2005 to estimate:

$$(1)\quad y_{it} = \alpha + \beta y_{it-\tau} + \gamma TOURISM_{it-\tau} + \delta HK_{it-\tau} + \mu_i + \varepsilon_{it}$$

where y_{it} is the logarithm of per capita GDP in period t for country i, $y_{it-\tau}$ is the lagged dependent variable, $TOURISM_{it-\tau}$ is the lagged value of our tourism sector indicator, $HK_{it-\tau}$ is the of stock of human capital measured as average years of education. Finally, μ_i are fixed effects that should control for all unobservable components, which are heterogeneous across countries and constant through time.

The variable *HK* will represent our four different school attainment indices: primary, secondary and tertiary education plus the total stock[11]. That is, we introduce different human capital indicators in most of our regression analysis to investigate the role of human capital in the catching-up process and its possible interactions with the development of the tourism sector.

Note that within the growth-tourism literature, human capital is usually proxied by enrollment rates since these variables are easier to find in large international samples than educational attainment levels and thus enable researchers to obtain a larger sample. However, the drawback of this approach is that enrolment rates have been highly criticized as human capital proxies. First of all, it has been argued that the connection across time between growth and educational enrolment rates is likely to be very weak. Why should a change in school enrolment rates instantly produce an increase in the growth rate as implicitly assumed in many empirical analyses? Further, stocks of human capital would be a better proxy as they represent the educational attainment of the labor force actually present in an area and capable of contributing to its productivity. Therefore, our choice is to focus on the largest panel obtainable using both a more appropriate human capital stock indicator and the tourism sector indicator. This choice forces us to restrict our analysis to a balanced panel of 72 countries that includes

[10] Within the empirical growth-convergence literature equation (1) represents a conditional convergence model. For more on this, see Durlauf *et al.* (2005).

[11] We use Barro and Lee (2000) data on education attained by the total population aged 15 and over. See the Appendix for more details.

both developed and developing countries.[12]

We use a suitable time span τ of five years in order to control for business cycle fluctuations and serial correlation, which are likely to affect the data in the short run. In addition, our regressors are taken at their $t-\tau$ level in order to control for likely endogeneity problems. Overall, given the use of initial values and since our tourism indicator is measured as the share of *international* receipts on GDP it is reasonable to assume that, with respect to this regressor, endogeneity problems do not represent a major problem. However, as a robustness check we will also perform our analysis using an estimator that controls for endogeneity.

In general, in this context the choice of the estimator is not an easy one. In particular, one of the main problems we face when we estimate a dynamic panel data model such as the one represented by equation (1) is which estimator suits our case better. The answer is not simple and different available estimators offer the usual pros and cons. Problems arise since the macro panels used in growth analysis, such as the one introduced in this study, feature a relatively small number of time periods and persistent time series.

The Within Group estimator (WG henceforth) offers a first possible option. As shown by Amemiya (1967), unlike standard micro panel analysis[13], WG is consistent in macro panel but it is characterized by small sample problems and, in particular, it is known to produce downward biased estimates in small samples.

Two alternatives have been proposed by Arellano and Bond (1991) and Blundell and Bond (1998). Their estimators (GMM-AB and GMM-SYS from now on) are becoming increasingly popular since they both have the advantage of producing consistent estimates in a dynamic panel regression with endogenous right hand side variables as well as measurement error. However, as shown by Blundell and Bond (1998) and Bond *et al.* (2001), when T is small, and either the autoregressive parameter, our beta parameter in eq. (1), is close to one or the variance of the individual effect is high relative to the variance of the transient shock, even the GMM-AB estimator is

[12] A possible alternative is to use each time the largest sample obtainable given the set of variables introduced. However, this implies to work with significantly different sample size depending on the model estimated, and it makes it difficult to compare the results obtained from different specifications.

[13] While micro panels are characterized by a large number of individuals and short T (assumed as fixed in asymptotics), macro panels have small N and a large T (not assumed fixed in asymptotics).

downward biased. This is why GMM-SYS is often preferred in growth studies. [14]

A final possible alternative to consistently estimate equation (1) has been recently offered by Kiviet (1995) who puts forward a more direct approach to the problem of the WG finite sample bias by estimating a small sample correction to the WG estimates.

In order to choose which estimator suits our case better, we rely on Monte Carlo analysis that find that for small T (such as the one we have here) WG estimates corrected for the bias (KIVIET from now on) performs better than GMM. [15] In particular, results find that for balanced panel and small (less or equal to ten) or moderate T (or T=30) KIVIET has more attractive properties than other available estimators.[16]

Let us now turn to our specific case. Our panel includes the period 1980-2005 for 72 countries. Using the five-year time span (or $\tau = 5$) implies that we are left with T=5 observations for each of the N=72 countries. Given the dimension of our panel and the above discussion, the Kiviet-corrected WG estimator is the best choice.

4. Results

Table 4 shows the results of the most parsimonious specifications of our analysis. In particular, we set the scene by first estimating a standard convergence equation including only our measure of the tourism sector. [17] See model (1) Table 4.

Table 4

The estimate of β implies a conditional convergence among the 72 countries of our sample of approximately 2% a year, which is consistent with numerous stylized

14 See Sequeira and Nunes (2008) for the tourism case.

[15] See Kiviet (1995), Judson and Owen (1999), Everaert and Pozzi (2007). An exception can be found in Hauk and Wacziarg (2004) who suggest the use of a Between estimator in the presence of measurement error. However, surprisingly, in their Monte Carlo analysis they do not consider the Kiviet estimator that is the preferred one in all other studies.

[16] In particular, these Monte Carlo studies find that the KIVIET and Anderson-Hsiao estimators consistently outperform alternative estimators in most cases but suggest to use the KIVIET estimator for smaller panels, while Anderson-Hsiao should be preferred for large panels, as the efficiency of the latter improves with T.

[17] The analysis is performed assuming a bias correction up to order O(1/T) and Arellano-Bond as consistent estimator in the first step. Results are not sensitive to the use of alternative options. Standard errors are calculated through bootstrapping (500 replications).

facts on international convergence.[18] Further, the coefficient on the tourism sector turns out positive and significant. As said above, most previous studies confirm this result using shorter time series, different samples and different estimation methodologies.

In model 2 we include our first aggregate human capital term that represents average years of schooling. Previous studies on tourism and growth usually find puzzling results on human capital with negative or non significant coefficient.[19] As said above, this result may be explained by the use of controversial human capital indicators such as secondary schooling enrollment rates. Unlike previous results[20], in our analysis the human capital variable turns out positively signed and significant, a result consistent with the findings suggested by most theoretical studies. Secondly, the conditional convergence parameter falls from 0.87 to 0.81, implying an increase in the speed of convergence from 2.7% per annum to 4.2%.

In models 3 to 6, we decompose the total stock of human capital into components corresponding to the average years of schooling in primary, secondary and tertiary education attained by the countries' labor force. We focus on different levels of schooling since a number of growth models suggest that higher levels of educational attainment should act more powerfully on growth than primary levels. In particular, in growth equations the analysis of the effects of the different levels of education may represent an indirect test of the hypothesis of the Nelson and Phelps (1966) approach recently further developed by Benhabib and Spiegel (1994) and (2005) and Vandenbussche et al. (2006) among others. In these models human capital has a fundamental but indirect role in the growth and catch-up process of an economy, by increasing the capacity to adopt and implement innovations or new technologies, and implicitly suggest that higher levels of education should be more relevant for growth than lower levels. [21]

In model 3 we include all three levels of education and find positive but non significant results. However, our three educational indicators are highly correlated (values range between 0.73 and 0.76) and this may results in large standard errors due

---

[18] The Solow growth model implies that the speed of convergence, λ, can be calculated using $\lambda = -\frac{\ln(\hat{\beta})}{\tau}$. See Barro & Sala-i-Martin (2004) and Islam (1995).

[19] See Eugenio-Martin *et al.* (2004) and Sequeira and Nunes (2008) among others.

[20] See Sequeira and Nunes (2008). In their work, the human capital measured as secondary years of schooling above 25 years is not significant and often negative.

[21] See also Romer (1990) and Aghion & Howitt (1998).

to multicollinearity. Therefore, we introduce our human capital indicators one by one in the basic specification. Models (4) to (6) show that the primary school coefficient is positive but not significant while both secondary and tertiary education are positive and significant (the first at 5%, the second 10%).

Overall, these results suggest that, unlike most previous macro studies on tourism and growth, which bring into question the role of human capital in development processes, investing in both the tourism sector and in human capital seems to positively influence the development of a large sample of countries. Furthermore, the coefficient of the tourism sector does not change significantly and is always positive and constant. Point estimates would imply that when tourism (measured by the ratio of international tourist receipts to GDP) increases by 10%, the level of per capita GDP would also increase by approximately 0.45%. Positive results are not new in this literature. For example, Brau *et al* (2007), using a large sample of both developed and less developed countries, show that an increase of 1% in the ratio of tourism receipts to GDP is associated with an increase of 0.05% in the annual growth rate of per-capita GDP. Moreover, results very similar to ours have been found in papers that focus on regional samples, such as Proença and Soukiazis (2008) who find that (for Greece, Italy, Portugal and Spain) a 10% increase in international tourism revenues generates an increase of approximately 0.3 percentage points in per capita income, and Fayissa *et al* (2008) that for a sample of 42 African countries find an effect of 0.4%.

In Table 5 (models 1 to 4) we replicate the previous analysis introducing in our regressions an interaction term between tourism and human capital. That is, we interact tourism with human capital and use this as a regressor to test for the significance of tourism in enhancing the positive externalities associated with higher human capital levels. Our main regression equation now becomes:

$$(2) \quad y_{it} = \alpha + \beta y_{it-\tau} + \gamma TOURISM_{it-\tau} + \delta HK_{it-\tau} + \vartheta INTER + \mu_i + \varepsilon_{it}$$

Specifically, in the following, we introduce alternatively our four different human capital indicators (total human capital, primary, secondary and tertiary education) and their corresponding multiplicative interaction terms. To ensure that the interaction term does not proxy for tourism or educational levels, both of the latter variables are always included in the regression analysis.

Further, since it is not advisable to look at separate t statistics in models with interaction terms[22] we also include the p-value of a chi square test on the joint hypothesis that the coefficients of both the interaction term and the tourism indicator are zero. A positive and significant coefficient on this variable would suggest that the role of the tourism sector is larger in countries with higher levels of human capital and would then indicate the presence of positive externalities of education on a low-tech sector such as tourism.

Table 5

Overall, our results confirm this interpretation. In model 1 we introduce our first multiplicative interaction term between tourism and our measure of average years of education. In Table 5 we also report (a) the joint significance test of the tourism variable with the interaction term and (b) the joint significance test of human capital with the interaction term. If we only consider separate *t* statistics we observe that the coefficient on the tourism variable becomes non significant. However, the p-value of the joint test implies that the coefficients on tourism and the interaction term are both positive and jointly significant.

Our point estimates suggest that if a country has 5.7 years of education, that is, the sample mean value of our schooling variable, a 10% increase of tourism would imply an approximately 0.5% increase of per capita GDP. For countries with high levels of education, the positive effect of tourism is considerably larger: considering 12 years of education (the highest value in our sample, corresponding to the US data) we observe a 0.8% impact in per capita GDP.

Finally, when we consider the different levels of schooling (primary, secondary and tertiary education) we find that the variance of the impact of tourism on GDP is largest when we consider the interaction with secondary schooling (model 3). In this case, a 10% increase of tourism would imply a 0.3% increase on per capita GDP levels for countries with low levels of secondary schooling but a 1% increase for countries with high levels.

[22] Because of (among other factors) likely multicollinearity. See Wooldridge (2003).

5. Robustness: additional controls and different estimators

This section analyzes the robustness of previous results on growth, tourism and human capital. First of all, we control if these are robust to the inclusion of additional explanatory variables. Note that, a typical problem of the empirical growth literature is model indeterminacy, as there is no consensus on which growth determinants ought to be included in a growth model. [23] Secondly, the choice of regressors is not neutral since, as noted by Durlauf *et al.* (2005), the absence of a significant relationship between growth and other variables in many studies may be due to the model specification and the use of a parsimonious specification, as we have adopted so far, may be preferable.[24]

An obvious and popular choice to avoid problems of model indeterminacy is to replicate the structural equation of the neoclassical growth model augmented by human capital as proposed in Mankiw, Romer and Weil (1992) adding our variable of interest, that is, tourism. In this case, equation (1) has to be amended introducing two additional regressors: the ratio of investment to GDP and a second indicator that represents the sum of the population growth rate, the depreciation rate and the technology growth rate.[25] As we show in Table 6, our main results are robust to the inclusion of these additional indicators.

Table 6

Another important control in this analysis is to introduce an indicator for the degree of openness in our model specification. Since tourism is an export industry[26] our indicator could, in fact, capture the effect of exports that are recognized in both the theoretical and empirical literature on growth among its most important determinants. Results show that including the openness variable as in Table 5 (models 6 and 8) and Table 6 (models 2, 4, 6 and 8) does not affect our results on the effect of tourism and

[23] Durlauf *et al.* (2005) list 145 variables which have been found to be statistically significant in different studies.
[24] Also Krueger and Lindhal (2001) suggest that the absence of a positive and significant relationship between growth and human capital in many studies may be due to the model specification and suggest the use of parsimonious specifications.
[25] As it is standard in this literature, we construct this variable as the sum between an observable variable, the population growth rate, and 0.05, the assumed sum of technology growth and depreciation. For more on this see Mankiw Romer & Weil (1992), Islam (1995) and Durlauf et al. (2005) among many others.
[26] Foreign visitors who travel to a country purchase a service, the touristic experience, of that country.

human capital on growth. The variable itself is never significant, while the value of the coefficient and the significance of our tourism and interaction term remain almost unaffected.

As a final robustness check we have replicated the analysis using popular alternative dynamic panel data estimators, such as the simple Within Group and the Blundell-Bond (1998) or system-GMM estimators. The former analysis fully corroborates our previous one, and results are available upon request. Moreover, when we have replicated the analysis using the Blundell-Bond (1998) we obtain puzzling results that indirectly support our starting estimation strategy.

In particular, as said in section 3, the system-GMM estimator has the advantage of producing consistent estimates in a dynamic panel framework characterized by both endogenous right hand side variables and measurement error. However, it does not perform well when samples are characterized by small T (as in our case) and, further, the potential weak instrument problem for the system GMM estimator is a well known issue in the dynamic panel data literature.[27] It seems that these problems arise in our analysis since in all specifications results show strong evidence against the null hypothesis that the overidentifying restrictions are valid.[28]

In sum, neither the use of additional controls nor the use of an alternative estimator significantly changes our main analysis. That is, robustness checks confirm our results of a positive effect of tourism and of the interaction term on per capita GDP.

6. Conclusions

Can tourism, a low skill sector, be regarded as a good long term opportunity for growth and, thus represent a potential for developing countries with low human capital endowments? And, if the answer is yes, does this also imply that there is no role (or reduced one) for human capital policies?

To investigate empirically these issues, we focus on the relationship between tourism, human capital and growth using a representative sample of 72 countries, both developed and less developed, for which we are able to obtain a balanced panel in our

[27] See Bun and Windmeijer (2009).

[28] This estimator may be applied under very different assumptions on the endogeneity of the included regressors. Firstly, we have assumed tourism as the only endogenous indicator. But treating the tourism regressor as predetermined or the human capital term as endogenous does not make any difference. These results are available upon request.

regression analysis over the period 1980-2005.

In general, the existing empirical evidence shows that tourism, a low tech and low skills sector with favorable terms of trade dynamics, may represent a valuable specialization strategy for growth. Further, most empirical studies on the role of tourism on development show puzzling results on human capital. Overall, these results seem to question the role of technology and human capital policies in growth processes.

First of all, our study corroborates previous results that find the tourism sector indicator (measured as the ratio of international tourist receipts to GDP) to be always positive and significant in growth regressions. Secondly, in contrast to previous results on tourism and growth, human capital measured as average years of schooling is positively signed and significant in our analysis. In addition, we decompose the total stock of human capital into components corresponding to the average years of schooling in primary, secondary and tertiary education, and we find that both secondary and tertiary education indicators are positive and significant. These results suggest a major role for secondary schooling.

Further, we deepen our analysis on the role of tourism and human capital on growth by introducing in our regressions a multiplicative interaction term between tourism and human capital. We find that the growth enhancing role of the tourism sector is larger in countries with higher aggregate levels of human capital. The variance of the impact of tourism on GDP is largest when we consider the interaction with secondary schooling. In this case results suggest that the impact of a 10% increase of tourism ranges from a 0.3% positive effect on per capita GDP (for countries with low levels of secondary schooling) to a 1% increase for countries with high human capital levels. Our main findings are robust to the inclusion of additional variables in the regression analysis and the use of different estimators.

To sum up, our results suggest that the expansion of specific low-tech sectors, such as tourism, may be a valuable strategy for development. But they also suggest that increases in human capital endowments seem to be always beneficial - even when the development strategy focuses on the expansion of a (successful) low-tech sector.

References

Acemoglu, D., and Guerrieri V. (2008) Capital Deepening and Nonbalanced Economic Growth, *Journal of Political Economy*,116, 3, 467–98.

Aghion, P., Meghir, C. and Vandenbussche J. (2006) Growth distance to frontier and composition of human capital, *Journal of Economic Growth*, 11, 97-127.

Aghion, P. and Howitt P. (1998) Endogenous Growth Theory, MIT Press, Cambridge.

Amemiya, T. (1967) A Note on the Estimation of Balestra-Norlove Models, Technical Report No.4, Institute for Mathematical Studies in Social Sciences, Stanford University.

Blake, A., Arbache, J., Sinclair, T. and Teles, V. (2008) Tourism and poverty relief, *Annals of Tourism Research*, 35, 107–126.

Arellano, M. and Bond, S. (1991) Some Tests of Specification for Panel Data: Monte Carlo Evidence and an Application to Employment Equations, *Review of Economic Studies*, 58, 277-97.

Arezki, R., Cherif, R. and Piotrowski J. (2009) Tourism Specialization and Economic Development: Evidence from the UNESCO World Heritage List, *MPRA Paper 17132*, University of Munich, Germany.

Balaguer, J. and Cantavella M. (2002) Tourism as a Long-Run Economic Growth Factor: The Spanish Case, *Applied Economics*, 34, 877-884.

Barro, R. and Sala-i-Martin X. (1992) Convergence, *Journal of Political Economy*, 100(2), 223-51.

Barro, R. and Lee, J. (2000) International data on educational attainment: updates and implications, Working-Paper 42, Centre for International Development, Harvard University.

Benhabib, J. and Spiegel, M., M. (1994) The role of human capital in economic development evidence from aggregate cross-country data, *Journal of Monetary Economics*, Elsevier, 34(2), 143-173.

Benhabib, J. and Spiegel, M., M. (2005) Human Capital and Technology Diffusion, in: Philippe Aghion and Steven Durlauf (ed.), *Handbook of Economic Growth*, edition 1, 935-966, Elsevier.

Blundell, R. and Bond, S. (1998) Initial conditions and moment restrictions in dynamic panel data models, *Journal of Econometrics*, 87(1), 115-143.

Bond S., Hoeffler A. and Temple J. (2001) GMM Estimation of Empirical Growth Models, Economics Papers 2001-W21, Nuffield College, University of Oxford.

Brau, R., Lanza, A., and Pigliaru, F. (2007) How fast are small tourism countries growing? The 1980-2003 evidence, *Tourism Economics*, 13, No 4.

Bun, M. and Windmeijer, F. (2009) The Weak Instrument Problem of the System GMM Estimator in Dynamic Panel Data Models, Tinbergen Institute Discussion Paper 2009-086/4.

Copeland, B.R. (1991), Tourism, welfare and de-industrialisation in a small open economy, *Economica*, 58:515-29.

Cortes, J., I. (2008) Which type of tourism matters to the regional economic growth? The cases of Spain and Italy, *International Journal of Tourism Research*, 10(2), 127-139.

Durlauf, S., N., Johnson, P., A. and Temple, J., R., W. (2005) Growth Econometrics, in: Philippe Aghion and Steven Durlauf (ed.), *Handbook of Economic Growth*, 555-677 Elsevier.

Di Liberto, A. (2007) Convergence and Divergence in Neoclassical Growth Models with Human Capital, *Economia Politica*, 2/2007.

Di Pietro, B. and Figini, P. (2007) Tourism Specialization, Growth and Social Sustainability: an Empirical Assessment, First Conference of the International Association for Tourism Economics, Palma de Mallorca.

Dritsakis, N. (2004) Tourism as a long-run economic growth factor: an empirical investigation for Greece, *Tourism Economics*, 10, No 3, 305–316.

Easterly, W., and A. Kraay (2000), Small states, small problems? Income, growth and volatility in small states, *World Development*, 28:2013-27.

Eugenio-Martin, N. Morales, R. Scarpa (2004) Tourism and economic growth in Latin American Countries: A panel data approach, Working Papers FEEM, No. 26, 2004, Milan, Italy.

Everaert, G. and Pozzi, L. (2007) Bootstrap-based bias correction for dynamic panels, *Journal of Economic Dynamics and Control*, 31(4), 1160-1184.

Fayissa, B., Nsiah, C. and Tadasse B. (2008) Impact of tourism on economic growth and development in Africa, *Tourism Economics*, 14(4), 807-818(12).

Fisher, A., C. (1981) *Resource and environmental economics*, Cambridge University Press.

Gunduz, L. and Hatemi, J., A. (2005) Is the tourism-led growth hypothesis valid for Turkey? *Applied Economics Letters*, 12(8), 499-504.

Hauk, W., R. and Wacziarg, R. (2004) A Monte Carlo Study of Growth Regressions, NBER Technical Working Papers 0296.

Hazari, B., and P.M. Sgrò (1995), Tourism and growth in a dynamic model of trade, *Journal of International Trade and Economic Development*, 4(2).

Islam, N. (1995) Growth Empirics: A Panel Data Approach, *Quarterly Journal of Economics*, 4, 1127–1170.

Jorgenson, D. (2005), Accounting for Growth in the Information Age, in P. Aghion and S. Durlauf, eds., *Handbook of Economic Growth*, Volume 1A, Amsterdam, North-Holland, pp. 743-815.

Judson, R., A. and Owen, A., L. (1999) Estimating dynamic panel data models: a guide for macroeconomists, *Economics Letters*, 65(1), 9-15.

Kiviet, J., F. (1995) On bias, inconsistency, and efficiency of various estimators in dynamic panel data models, *Journal of Econometrics*, 68(1), 53-78, Elsevier.

Krueger, A., B. and Lindahl, M. (2001) Education for Growth: Why and for Whom?, *Journal of Economic Literature*, 39(4), 1101-1136.

Lanza, A. and F. Pigliaru (1995), Specialization in tourism: the case of small open economy, in H. Coccossis and P. Nijkamp (eds), Sustainable Tourism Development, Aldershort: Avebury.

Lanza, A. and Pigliaru, F. (2000) Why Are Tourism Countries Small and Fast-Growing?, in: A. Fossati and G. Panella (eds), *Tourism and Sustainable Economic Development*, Dordrecht: Kluwer Academic Publisher, 57-69.

Lucas, R., E. (1988) On the Mechanics of Economic Development, *Journal of Monetary Economics*, 22(1), 3-42.

Mankiw, N., G., Romer, D. and Weil, D. (1992) A contribution to the empirics of economic growth, *Quarterly Journal of Economics*, 107, 407-437.

Nelson, R., R. and Phelps, E., S. (1966) Investments in Humans, Technological Diffusion, and Economic Growth, *American Economic Review*, 56, 69-75.

Proença, S. and Soukiazis, E. (2008) Tourism as an economic growth factor: a case study for Southern European countries, *Tourism Economics*, 14(4), 791-806.

Romer, P., M. (1986) Increasing Returns and Long-run Growth, *Journal of Political Economy*, 94(5), 1002-37.

Romer, P., M. (1990) Endogenous Technological Change, *Journal of Political Economy*, 98(5), S71-102.

Sequeira, T., N. and Nunes, P., M. (2008) Does Tourism influence economic growth? A dynamic panel data approach, *Applied Economics*, 40:2431-41.

Solow, R., M. (1956) A Contribution to the Theory of Economic Growth, *Quarterly Journal of Economics*, 70, 65-94.

Unioncamere, Ministero del Lavoro (2008), Rapporto Excelsior sui fabbisogni occupazionali, Unioncamere, Roma.

Wooldridge, J., M. (2003) *Introductory Econometrics: A Modern Approach*, Thomson.

Wood, R., C. (1997) *Working in Hotels and Catering*, 2nd Edition, London: Routledge.

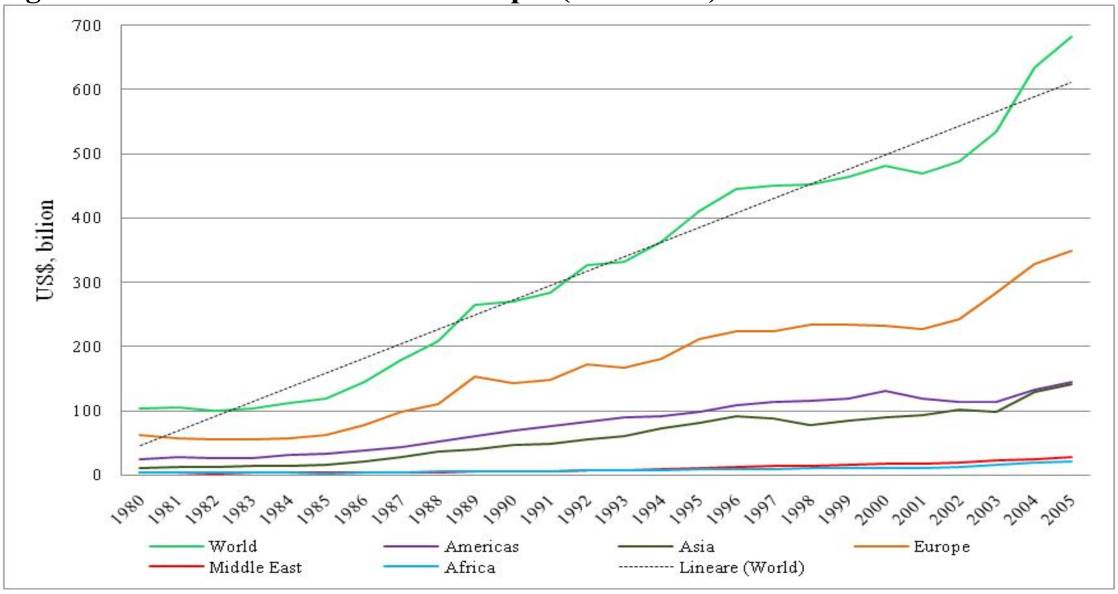
WTO (2005) Yearbook of tourism statistics, Madrid: World Tourism Organization.

WTTC (2010) *Annual reports, progress and priorities 2004/05*, The World Travel and Tourism Council.

Appendix

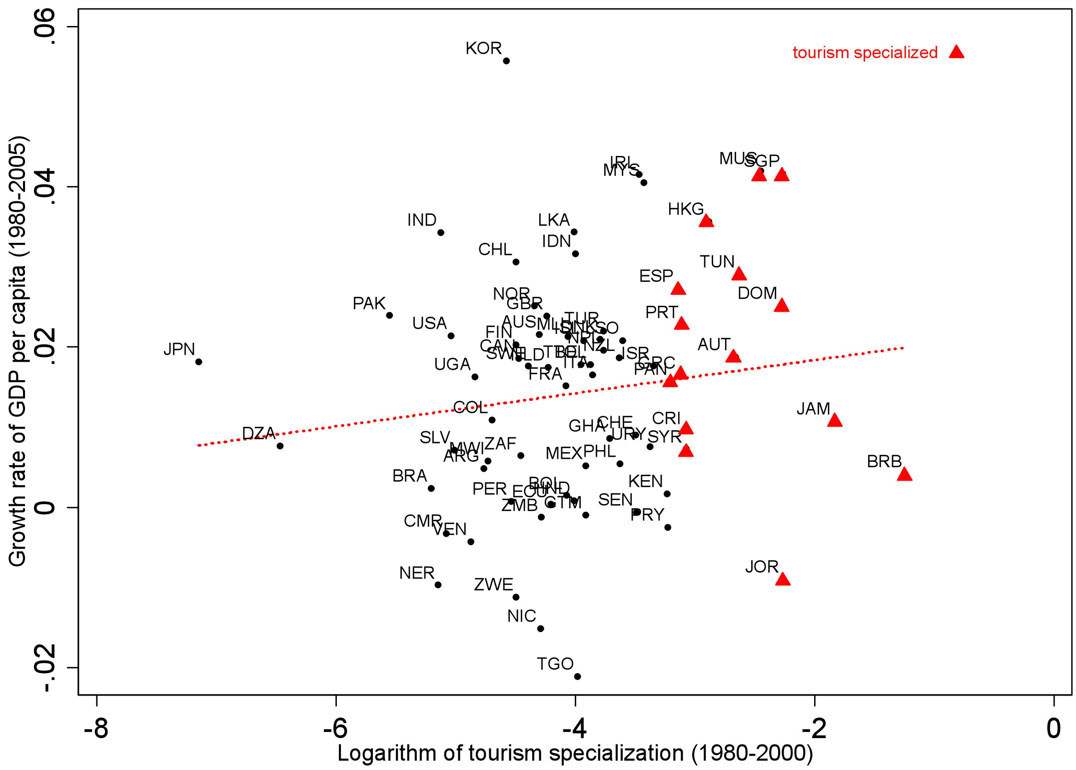
A - FIGURES

Figure 1: International Tourism receipts (1980-2005)



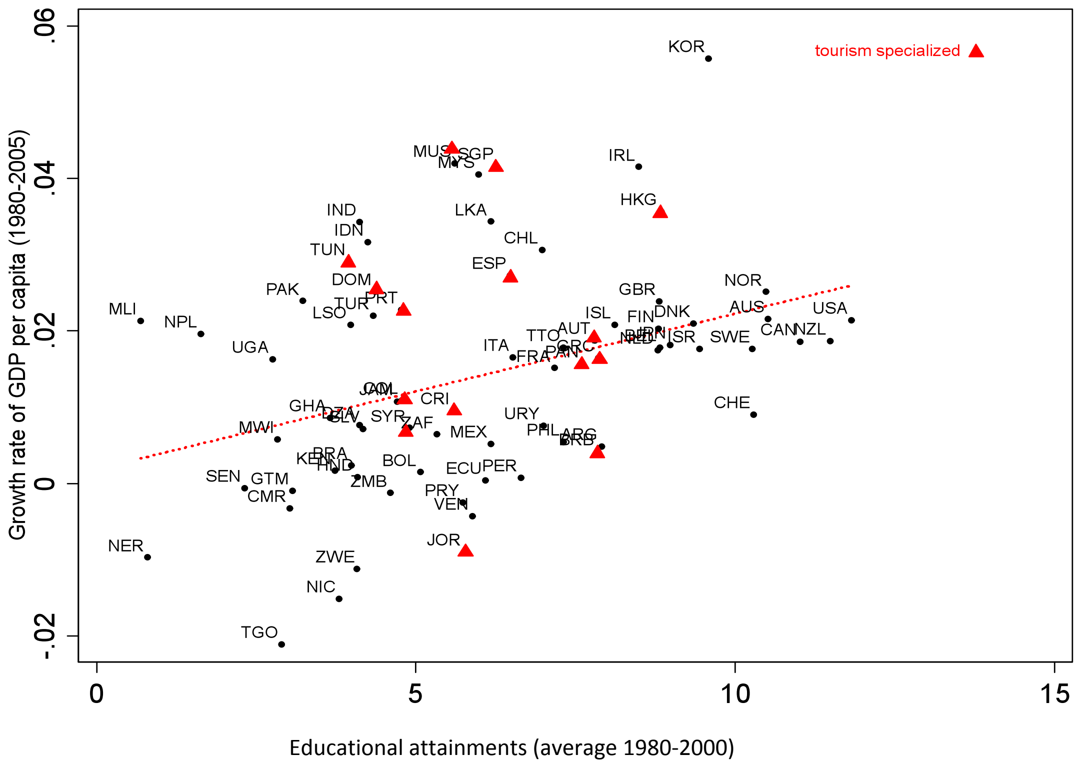
Source: World Bank.

Figure 2: GDP per capita growth rates and tourism specialization



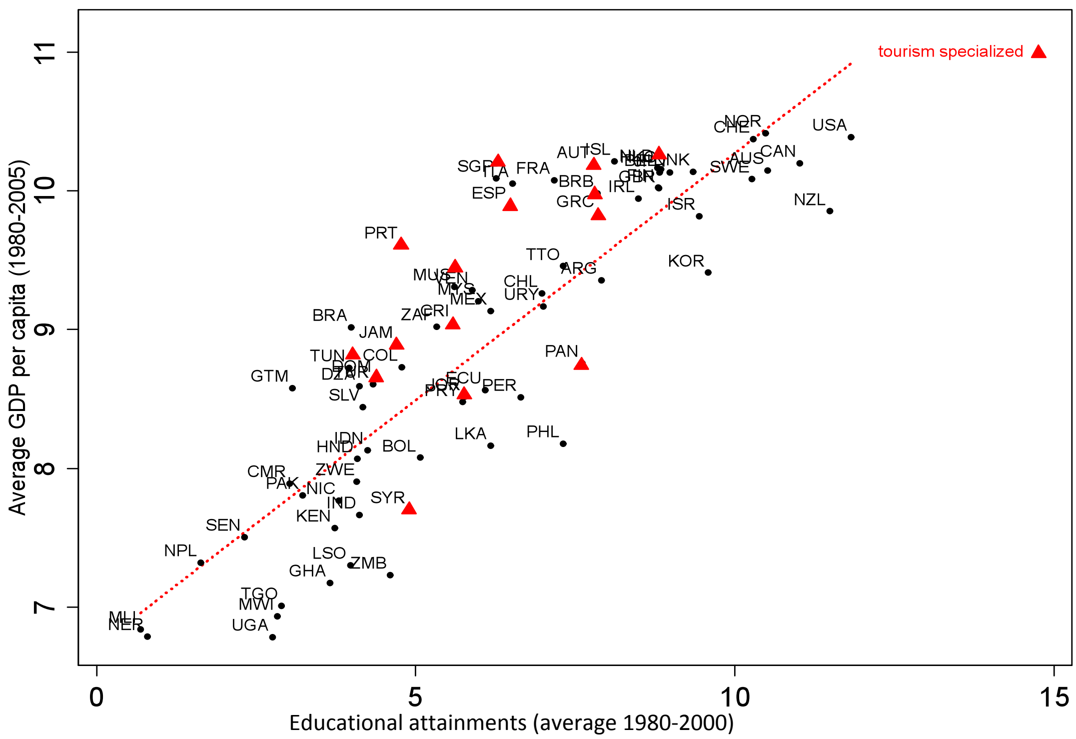
Source: World Bank Data and PWT 6.2.

Figure 3: GDP per capita growth rates and average years of education



Source: World Bank Data and PWT 6.2.

Figure 4: Per capita GDP levels and average years of education



Source: World Bank Data and PWT 6.2.

B - TABLES

Table 1: Growth rate of GDP (1980-2005): different sub-groups

Countries	Average Growth Rate of GDP (%)	Numbers of Countries in our Sample
Ocse	2,12	22
Medium GDP	1,14	28
Tourism Specialized (>4%)	**1,98**	**15**
Tourism Specialized (>5%)	**2,12**	**9**
Tourism Specialized (>7%)	**1,91**	**7**
Less Developed Countries	0,56	19
Whole Sample	1,38	72

Source: World Bank Data and Penn World Tables 6.2.

Table 2: Descriptive statistics (average values 1980-2000)

Countries	Per capita GDP growth rates	Tourism specialization	Average years of education	Countries	Per capita GDP growth rates	Tourism specialization	Average years of education
Algeria	1,18	0,16	4,74	Malawi	1,47	0,88	3,68
Argentina	0,59	0,85	5,66	Malaysia	4,38	3,25	5,86
Australia	2,21	1,36	6,67	Mali	2,32	1,73	3,36
Austria	2,13	6,99	6,15	Mauritius	4,23	8,61	5,74
Barbados	1,32	28,89	6,02	Mexico	1,13	2,00	5,31
Belgium	2,02	2,08	6,30	Nepal	1,60	2,32	3,73
Bolivia	0,22	1,71	4,42	Netherlands	1,79	1,46	6,28
Brazil	0,99	0,55	4,76	New Zealand	1,37	2,64	6,59
Cameroon	0,39	0,62	3,91	Nicaragua	-2,26	1,37	3,66
Canada	1,95	1,14	6,78	Niger	-0,84	0,58	2,79
Chile	3,51	1,12	5,90	Norway	2,62	1,30	7,03
Colombia	1,49	0,91	4,81	Pakistan	2,56	0,39	4,37
Costa Rica	1,25	4,59	5,10	Panama	2,32	4,07	5,64
Denmark	2,13	2,25	6,39	Paraguay	0,97	3,98	4,75
Dominican Repub.	2,54	10,25	4,96	Peru	-0,07	1,07	4,97
Ecuador	0,68	1,50	4,84	Philippines	0,91	2,66	5,10
El Salvador	0,35	0,67	4,51	Portugal	2,72	4,49	5,52
Finland	2,09	1,12	6,41	Senegal	-0,23	3,06	3,50
France	1,75	1,70	5,93	Singapore	4,62	10,40	6,30
Ghana	0,80	2,44	3,83	South Africa	0,85	1,16	5,02
Greece	1,78	4,37	6,05	Spain	2,35	4,30	5,91
Guatemala	0,48	2,00	4,23	Sri Lanka	3,44	1,81	5,29
Honduras	0,50	1,82	4,28	Sweden	1,59	1,24	6,64
Hong Kong	4,45	5,59	6,74	Switzerland	1,22	3,04	6,46
Iceland	2,39	1,96	6,32	Syria	0,97	4,62	4,44
India	3,22	0,59	4,71	Togo	-1,58	1,87	3,17
Indonesia	3,46	1,83	4,88	Trinidad &Tobago	2,26	1,92	5,86
Ireland	4,09	3,13	6,67	Tunisia	2,96	7,20	5,09
Israel	1,34	3,51	6,12	Turkey	1,92	2,31	4,88
Italy	2,09	2,11	5,83	Uganda	0,31	0,79	3,57
Jamaica	0,11	15,95	4,70	United Kingdom	2,25	1,45	6,33
Japan	2,06	0,08	6,30	United States	2,22	0,65	6,98
Jordan	0,70	10,42	4,89	Uruguay	1,43	3,43	5,45
Kenya	0,38	3,94	3,94	Venezuela	-0,63	0,76	4,96
Korea (Rep. of)	5,64	1,03	6,96	Zambia	-1,06	1,38	3,94
Lesotho	2,62	2,73	4,27	Zimbabwe	-1,27	1,12	3,96

Table 3: Hours worked by high-skilled persons engaged (share in total hours) EU15 (2005)

SECTORS/COUNTRIES	Austria	Belgium	Denmark	Spain	Finland	France	Germany	Greece	Ireland	Italy	Netherl	Portugal	Sweden	UK
MINING AND QUARRYING	5,85	9,97	5,10	13,29	29,43	9,54	8,24	13,31	10,00	3,27	7,60	6,70	13,12	12,75
TOTAL MANUFACTURING	8,00	10,92	6,71	16,97	34,07	9,97	9,49	14,06	15,93	4,88	9,22	11,09	17,05	18,38
ELECTRICITY, GAS AND WATER SUPPLY	5,85	10,84	5,21	13,59	34,07	9,97	9,42	14,06	11,62	3,30	9,22	6,70	14,58	18,38
CONSTRUCTION	1,60	4,22	0,77	7,22	16,95	2,83	3,50	4,62	3,29	0,88	1,87	3,74	3,86	7,01
WHOLESALE AND RETAIL TRADE	4,12	8,47	4,13	12,11	24,10	8,05	4,25	12,61	10,00	3,14	4,63	5,28	7,44	8,70
HOTELS AND RESTAURANTS	**4,12**	**8,45**	**3,74**	**9,15**	**24,10**	**7,75**	**3,73**	**11,54**	**6,80**	**1,54**	**3,11**	**5,28**	**6,33**	**7,23**
TRANSPORT AND COMMUNICATION	3,04	8,07	2,19	7,67	21,28	7,75	3,50	11,54	6,80	1,35	2,99	5,28	4,57	7,01
FINANCIAL INTERMEDIATION	16,79	20,49	12,05	39,79	43,36	15,84	11,05	42,65	28,63	18,39	21,35	33,25	32,66	25,01
REAL ESTATEAND BUSINESS ACTIVITIES	24,61	25,94	15,99	49,04	54,62	25,99	12,71	54,13	39,66	30,51	22,19	33,56	34,92	26,98
PUBLIC ADMIN, DEFENCE; SOCIAL SECURITY	14,93	16,13	8,65	24,19	40,76	14,50	9,58	15,08	16,23	7,19	14,64	11,58	21,03	19,79
EDUCATION	58,05	28,08	18,97	77,91	71,20	52,97	33,24	82,73	62,92	58,78	25,43	60,80		46,83
HEALTH AND SOCIAL WORK	27,99	27,62	17,38	50,35	57,63	30,89	13,87	58,29	41,10	45,13	23,38	35,15	34,92	33,17
OTHER SOCIAL AND PERSONAL SERVICES	15,83	16,21	11,00	32,95	42,59	15,30	9,87	22,38	18,59	12,75	17,53	13,24	29,49	19,79
PRIV. HOUSEH WITH EMPLOYED PERSONS	15,83	16,70	12,00	35,79	42,59	15,84	9,87	41,92	20,93	15,57	19,69	19,99	31,89	20,58
TOTAL INDUSTRIES	13,54	15,41	8,34	21,63	35,00	11,66	9,58	15,08	16,23	5,50	12,95	11,09	19,92	18,87
TOURISM SPECIALISATION	**4,6**	**1,6**	**1,46**	**7,66**	**1,49**	**2,3**	**1,62**	**8,6**	**2,18**	**3,79**	**1,84**	**4,41**	**1,48**	**2,96**

Notes: Tourism specialization is the share of tourism (Hotels and restaurants) in gross value added in 2005. Value added is measured at current basic prices (in millions of Euros). Source: EU KLEMS database.

Table 4: Parsimonious specifications
Sample: 72 countries, T=5
Dependent variable: log of per capita GDP (yit)

	1	2	3	4	5	6
(1) lag yit	0.87	0.81	0.78	0.85	0.81	0.82
	(0.041)	(0.045)	(0.048)	(0.042)	(0.045)	(0.048)
(2) Tourism	0.049	0.045	0.044	0.046	0.046	0.046
	(0.011)	(0.010)	(0.010)	(0.011)	(0.010)	(0.01)
(3) Average HK		0.02				
		(0.009)				
(4) Primary education			0.001	0.02		
			(0.021)	(0.018)		
(5) Secondary education			0.03		0.04	
			(0.024)		(0.018)	
(6) Tertiary education			0.09			0.13
			(0.084)			(0.073)
beta convergence	0.027	0.042	0.050	0.033	0.042	0.040
No. Obs	360	360	360	360	360	360

Notes:
Standard errors in parenthesis;
KIVIET is the LSDV estimator with the Kiviet (1995) correction proposed by Bruno (2005);
Bootstrap standard errors in KIVIET (no. of repetitions = 500);
Primary, secondary and tertiary education are average years of schooling for the corresponding level of education;
beta convergence is the estimated speed of convergence parameter (see footnote 18).

Table 5: Tourism and human capital interactions
Sample: 72 countries, T=5
Dependent variable: log of per capita GDP (yit)

	1	2	3	4	5	6	5	6
(1) Lag yit	0,79	0,84	0,79	0,82	0,8	0,77	0,81	0,78
	(0.046)	(0.044)	(0.045)	(0.048)	(0.046)	(0.047)	(0.046)	(0.047)
(2) Tourism	0.026	0.031	0.031	0.044	0.034	0.031	0.031	0.025
	(0.020)	(0.024)	(0.015)	(0.011)	(0.016)	(0.015)	(0.021)	(0.020)
(3) Average HK	0.038						0.036	0.036
	(0.019)						(0.019)	(0.020)
(4) Primary education		0.043						
		(0.036)						
(5) Secondary education			0.094		0.085	0.089		
			(0.044)		(0.045)	(0.046)		
(6) Tertiary education				0.18				
				(0.171)				
(7) Interaction term	0.004	0.005	0.013	0.013	0.012	0.012	0.003	0.004
	(0.004)	(0.007)	(0.010)	(0.046)	(0.01)	(0.01)	(0.004)	(0.004)
(8) ngd					0.020		0.053	
					(0.069)		(0.072)	
(9) Investments					-0.046		-0.050	
					(0.024)		(0.024)	
(10) Openess						0.02		0.02
						(0.027)		(0.027)
beta convergence	0.047	0.035	0.047	0.040	0.045	0.052	0.045	0.052
No. Obs	360	360	360	360	360	360	360	360
Chi square Test (p-value)	19.40	19.74	21.87	18.93	21.57	18.57	21.57	18.57
(2)+interaction=0	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)

Notes:
Standard errors in parenthesis;
KIVIET is the LSDV estimator with the Kiviet (1995) correction proposed by Bruno (2005);
Bootstrap standard errors in KIVIET (no. of repetitions = 500);
beta convergence is the estimated (conditional) speed of convergence parameter;
Primary, secondary and tertiary education are average years of schooling for the corresponding level of education;
Ngd is the (log of) the population growth rate plus 0.05 (see footnote 25);
Investments is the log of the investment share on GDP;
Openess is the share of import+exports on GDP;
The interaction term is calculated by multiplying Tourism times the included human capital indicator.

Table 6: Robustness analysis (different model specifications)
Sample: 72 countries, T=5
Dependent variable: log of per capita GDP (yit)

	1	2	3	4	5	6	7	8
(1) lag yit	**0,82**	**0,79**	**0,86**	**0,82**	**0,82**	**0,79**	**0,82**	**0,8**
	(0.045)	**(0.047)**	**(0.042)**	**(0.046)**	**(0.046)**	**(0.047)**	**(0.048)**	**(0.049)**
(2) Tourism	**0.047**	**0.043**	**0.048**	**0.044**	**0.049**	**0.045**	**0.048**	**0,044**
	(0.01)	**(0.011)**	**(0.011)**	**(0.011)**	**(0.011)**	**(0.011)**	**(0.011)**	**(0.011)**
(3) Average HK	**0.02**	**0.018**						
	(0.01)	**(0.01)**						
(4) Primary education			**0.023**	**0.019**				
			(0.02)	**(0.018)**				
(5) Secondary education					**0.036**	**0.037**		
					(0.019)	**(0.019)**		
(6) Tertiary education							**0.12**	**0.118**
							(0.076)	**(0.08)**
(7) Ngd	**0.06**		**0.043**		**0.035**		**0.026**	
	(0.07)		**(0.074)**		**(0.068)**		**(0.068)**	
(8) Investments	**-0.05**		**-0.05**		**-0.048**		**-0.051**	
	(0.025)		**(0.025)**		**(0.024)**		**(0.025)**	
(9) Openess		**0.023**		**0.029**		**0.024**		**0.02**
		(0.027)		**(0.027)**		**(0.027)**		**(0.028)**
beta convergence	**0.04**	**0.047**	**0.03**	**0.04**	**0.04**	**0.047**	**0.04**	**0.045**
No. Obs	**360**	**360**	**360**	**360**	**360**	**360**	**360**	**360**

Notes:
Standard errors in parenthesis;
KIVIET is the LSDV estimator with the Kiviet (1995) correction proposed by Bruno (2005);
Bootstrap standard errors in KIVIET (no. of repetitions = 500);
beta convergence is the estimated (conditional) speed of convergence parameter;
Primary, secondary and tertiary education are average years of schooling for the corresponding level of education;
Ngd is the (log of) the population growth rate plus 0.05 (see footnote 25);
Investments is the log of the investment share on GDP;
Openess is the share of import+exports on GDP.

C – VARIABLE SOURCES AND DEFINITIONS

Source: World Development Indicators (2004):

- *Tourism*: share of international tourism receipts on GDP.

Source: Penn World Tables 6.2:

- *yit*: real per capita GDP, constant prices,
- *Investments*: investments divided by real per capita GDP.
- *Openness*: exports plus imports divided by per capita GDP.

Source: Barro and Lee (2000):

- *Average HK:* Average years of total education (population aged 15 and over).
- *Primary education:* Average years of primary schooling (population aged 15 and over).
- *Secondary education:* Average years of secondary schooling (population aged 15 and over).
- *Tertiary education:* Average years of university education (population aged 15 and over).

Source: EUKLEMS database (2008):

- Share of the tourism sector (hotel and restaurant) in gross value added (2005).
- Hours worked by high-skilled persons engaged as share in total hours (2005).

Ultimi Contributi di Ricerca CRENoS

I Paper sono disponibili in: http://www.crenos.it

- **10/10** *Vittorio Pelligra, Andrea Isoni, Roberta Fadda, Iosetto Doneddu,* "Social Preferences and Perceived Intentions. An experiment with Normally Developing and Autistic Spectrum Disorders Subjects"
- **10/09** *Luigi Guiso, Luigi Pistaferri, Fabiano Schivardi,* "Credit within the firm"
- **10/08** *Luca Deidda, Bassam Fattouh,* "Relationship Finance, Market Finance and Endogenous Business Cycles"
- **10/07** *Alba Campus, Mariano Porcu,* "Reconsidering the well-being: the Happy Planet Index and the issue of missing data"
- **10/06** *Valentina Carta, Mariano Porcu,* "Measures of wealth and well-being. A comparison between GDP and ISEW"
- **10/05** *David Forrest, Miguel Jara, Dimitri Paolini, Juan de Dios Tena,* "Institutional Complexity and Managerial Efficiency: A Theoretical Model and an Empirical Application"
- **10/04** *Manuela Deidda,* "Financial Development and Selection into Entrepreneurship: Evidence from Italy and US"
- **10/03** *Giorgia Casalone, Daniela Sonedda,* "Evaluating the Distributional Effects of the Italian Fiscal Policies using Quantile Regressions"
- **10/02** *Claudio Detotto, Edoardo Otranto,* "A Time Varying Parameter Approach to Analyze the Macroeconomic Consequences of Crime"
- **10/01** *Manuela Deidda,* "Precautionary saving, financial risk and portfolio choice"
- **09/18** *Manuela Deidda,* "Precautionary savings under liquidity constraints: evidence from Italy"
- **09/17** *Edoardo Otranto*, "Improving the Forecasting of Dynamic Conditional Correlation: a Volatility Dependent Approach"
- **09/16** *Emanuela Marrocu, Raffaele Paci, Marco Pontis,* "Intangible capital and firms productivity"
- **09/15** *Helena Marques, Gabriel Pino, Juan de Dios Tena,* "Regional inflation dynamics using space-time models"
- **09/14** *Jaime Alvarez, David Forrest, Ismael Sanz, Juan de Dios Tena,* "Impact of Importing Foreign Talent on Performance Levels of Local Co-Workers"
- **09/13** *Fabio Cerina, Francesco Mureddu,* "Is Agglomeration really good for Growth? Global Efficiency and Interregional Equity"
- **09/12** *Federico Crudu,* "GMM, Generalized Empirical Likelihood, and Time Series"
- **09/11** *Francesca Mameli, Gerardo Marletto,* "Can national survey data be used to select a core set of indicators for monitoring the sustainability of urban mobility policies?"
- **09/10** *Emanuela Marrocu, Raffaele Paci,* "They arrive with new information. Tourism flows and production efficiency in the European regions"
- **09/09** *Oliviero A. Carboni,* "An Empirical investigation of the Determinants of R&D Cooperation"
- **09/08** *Fabiano Schivardi, Eliana Viviano,* "Entry Barriers in Retail Trade"
- **09/07** *Rinaldo Brau, Carlo Carraro,* "The Design of Voluntary Agreements in Oligopolistic Markets"

Finito di stampare nel mese di Giugno 2010
Presso **studiografico&stampadigitale Copy Right**
Via Torre Tonda 8 – Tel. 079.200395 – Fax 079.4360444
07100 Sassari

www.crenos.it

ISBN 978-88-84-67-589-7