Review of Economic Analysis 3 (2010) 287–303 1973-3909/2010287

Prospects and Limits of Tourism-Led Growth: The International Evidence

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We investigate the relationship between tourism specialization and economic growth. We deviate from previous studies – which have reported mixed evidence – by allowing the relationship to take a nonlinear form. We find that tourism specialization is associated with higher rates of economic growth at relatively low levels of specialization but eventually diminishing returns set in and tourism's contribution becomes minimal. The policy lesson is that there is promise for tourism-led growth in developing countries but other economic activities must also be developed in order to carry the economy forward once the potential of tourism-led growth has been exhausted.

Keywords: tourism, tourism specialization, economic growth

JEL Classifications: F43, O57

1 Introduction

Tourism and travel is a large and growing sector of the global economy. As world income grows, more individuals can afford the relative luxury of leisure travel. Demand for tourism services is expected to keep growing as more countries reach the stage of development where consumption of leisure services becomes affordable. Many countries have benefited from rising demand and developed vibrant hospitality sectors that generate much-needed foreign currency for the local economy. For many small countries, tourism is the single most important sector of the economy. This has a potential downside, as tourism demand is highly volatile and countries that become dependent on it are susceptible to negative shocks that can have a severe impact on the entire economy. The current downturn in the global economy illustrates well the perils of over-dependence on tourism.

[*]We gratefully acknowledge early contributions to this project from Panos Pashardes and Nicoletta Pashourtidou. We also benefited from helpful comments from Paolo Figini. The Cyprus Tourism Organization and the University of Cyprus Economics Research Centre provided financial support.

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In some sense, tourism is to services what clothing is to manufacturing. It requires relatively low levels of technology and basic labour skills. Countries at an early stage of development that have the required natural resources can relatively easily develop successful tourism sectors. Tourists usually demand four main types of goods and services: accommodation, food, transportation and entertainment. These services are mostly labour intensive, hence tourism leads to the creation of many jobs that are primarily low-skilled. The development of a tourism sector can thus lead to an increase in production, income and employment and foster overall economic growth. Many developing countries have been able to rapidly ascend global income rankings by successfully exploiting their natural resources in this way.

One question that arises is whether there are limits to the extent that tourism can carry an entire economy forward. It seems reasonable to expect that diminishing returns will eventually set in, putting a limit to the extent that the tourism sector can contribute to the national well-being. Consider, for example, the impact of labour cost. As a tourism country develops, wages rise. This will lead to an increase in the price of tourism services, which are mostly labour intensive. At the same time, other countries might be beginning to develop their own tourism sectors, starting from a lower point of development and offering a similar product at a lower price. Thus a country specializing in tourism will become less competitive as it becomes richer. This theoretical mechanism seems to be consistent with casual empirical observation. For example, traditional Mediterranean destinations such as Spain, Greece, and Cyprus now face tough competition from relative newcomers such as Croatia, Turkey, and Egypt.

The objective of this paper is to empirically examine the hypothesis that the development of a tourism sector can foster economic growth but that tourism's contribution to growth exhibits diminishing returns, possibly becoming negligible beyond some level of specialization. Our analysis is based on an international panel of countries covering the period 1980-2005. We start with a graphical depiction of the data which does not reveal any discernible correlations among the variables of interest. In the econometric analysis we first estimate a simple regression that suggests the existence of a concave relationship between tourism specialization and the rate of growth of the tourism sector. Our main object of interest is the relationship between tourism specialization and economic growth, which is explored within the context of the economic growth framework that is widely used in the literature. We find that tourism specialization is associated with a higher growth rate but the relationship is nonlinear. Once a threshold level of specialization is exceeded, tourism no longer contributes to economic growth, even though it can still continue to grow as a sector.

It should be noted that the development of a large tourism sector has some well-known negative aspects. In addition to the demand volatility mentioned above, tourism development imparts negative externalities on the environment and more generally on local residents' quality of life. Tourists consume a lot of water and energy at prices that often do not reflect the true cost of provision. As tourist destinations become increasingly popular the effects of pollution and congestion begin to compromise the quality of life of local residents and the sustainability of natural ecosystems. The quality of the tourist product itself also begins to suffer as a result. The external effects of tourism are obviously important but this is not an issue we address in this paper.

The rest of the paper is organized as follows. In section 2 we provide the recent literature and theoretical framework. In section 3 we present some descriptive evidence on the relationship between tourism specialization and growth. In section 4 we describe the econometric model and data. In section 5 we present and discuss the econometric results and we provide some concluding remarks in section 6.

2 Existing Theory and Evidence

The mechanics of economic development and the achievement of economic growth lie at the heart of economics. In a classic contribution, Rostow (1959) described how an economy might progress through different stages of development. He argued that economic modernization occurs in five basic stages of varying length - traditional society, preconditions for take-off, take-off, drive to maturity, and high mass consumption. Each stage is characterized by distinct patterns of investment, consumption and social trends. The process by which societies move through the various stages of development continues to be a subject of debate to this day, as witnessed by the endogenous growth literature that has blossomed since the 1980s. This literature has focused on the determinants of long-run economic growth and has highlighted the important role of human capital and technological progress in that process.

Some basic features of the mechanics of economic development can be illustrated with the Lucas (1988) model of endogenous growth. Consider a Ricardian trade model with labour as the unique factor of production. There are two countries, two goods and a representative household with CES preferences. Each country has a comparative advantage in one good and the two sectors differ in that knowledge accumulates faster in one than in the other. If the two goods are close substitutes, then in equilibrium each country will completely specialize in the production of the good in which it has a comparative advantage and both countries will experience economic growth. The country specializing in the high human capital accumulation sector will grow faster, while the other country will benefit from technical progress in the other country and also grow, albeit at a slower rate. The implication of the model is that a country with a comparative advantage in a less productive sector (such as tourism) might still benefit from specializing in it. Thus the hypothesis that we explore in this paper – that tourism specialization can help countries increase their economic or tourism growth but at a diminishing rate – runs counter to Ricardian models such as Lucas (1988). This is due to these models' assumption of linear technologies implying constant returns to scale.

Lanza and Pigliaru (2000) were first to investigate theoretically the link between tourism specialization and economic growth. They observed that countries with relatively large tourism sectors have two distinguishing characteristics: they exhibit higher than average rates of growth; and they are small. The authors developed a Lucas-type two-sector model with production in one of the sectors (which we shall call tourism) depending on endowments of a natural resource. They show that the country with a relative abundance of the natural resource will specialize in tourism and enter the faster growth path. If small countries are more likely to be relatively resource-rich, as seems likely, then it follows that small countries will specialize in tourism and achieve higher growth rates, as the data seem to suggest.

Empirical studies seeking to identify the impact of tourism specialization on growth can be classified as either case studies or cross-country comparisons using panel data. The case study approach was dominant for many years because cross-country data were hard to obtain. Some recent examples of studies exploring the link between tourism and growth in particular countries include Balaguer and Cantavella-Jordá (2002) for Spain, Dritsakis (2004) for Greece, and Durbarry (2004) for Mauritius. These studies rely on econometric techniques such as cointegration and error correction models and typically obtain evidence of a strong relationship between economic growth and tourism receipts.

In one of the first large-scale cross-sectional studies, Brau et al. (2007) set out to empirically investigate the observations made by Lanza and Pigliaru (2000). They employ a panel dataset of 143 countries, 14 of which are classified as "small tourism countries" (17 countries are classified as "tourism countries"; 14 of them are also classified as small). They try to evaluate the relative growth performance of these 14 countries by regressing economic growth on a set of dummy variables identifying groups of countries (OECD, Oil producers, LDCs, Small) and different control variables. The results indicate that tourism countries grow significantly faster than all the other sub-groups considered in their analysis. Almost half of the 29 countries classified as "microstates" are heavily dependent on tourism. The authors conclude that small tourism countries perform much better other small countries. In their findings, smallness per se can be bad for growth, while the opposite is true when smallness goes together with a specialization in tourism. Although these findings are useful they can not be considered definitive as the models do not include controls for factors that are considered important in the endogenous growth literature, such as investment and human capital (though they do include controls for some other factors, such as openness to trade and initial income levels).

Several recent studies have tried to follow the endogenous growth literature more closely. Eugenio-Martín et al. (2004) focus on Latin American countries and employ a dynamic model of economic growth, where they include the growth of the tourism sector as an explanatory variable. They find that tourism growth is associated with higher economic growth in low and medium income countries, but not in high income countries. Sequeira and Campos (2007) also use an endogenous growth approach but do not find evidence linking tourism specialization with higher growth rates. A closely related paper involving one of the previous two authors (Sequeira and Nunes, 2008) uses different control variables and a dynamic panel framework, this time reaching the conclusion that tourism specialization does contribute to economic growth, both in a broad sample of countries and in a sample of poor countries. Cortes Jimenez (2008) focuses on Spain and Italy and studies tourism expansion at both the regional and international level. Domestic tourism is found to be a relevant factor for Spanish growth, whereas international tourism seems to be more important for Italian economic growth. Finally, Figini and Vici (2010) try to explain growth in the longer run by looking at the entire 1980-2005 period and also the 1980-1990 and 1991-2005 sub-periods. They find some evidence for a link between tourism specialization and growth only in 1980-1990 but they point out that the data for that this period are not reliable and therefore conclude that there is no robust evidence linking tourism specialization and growth.

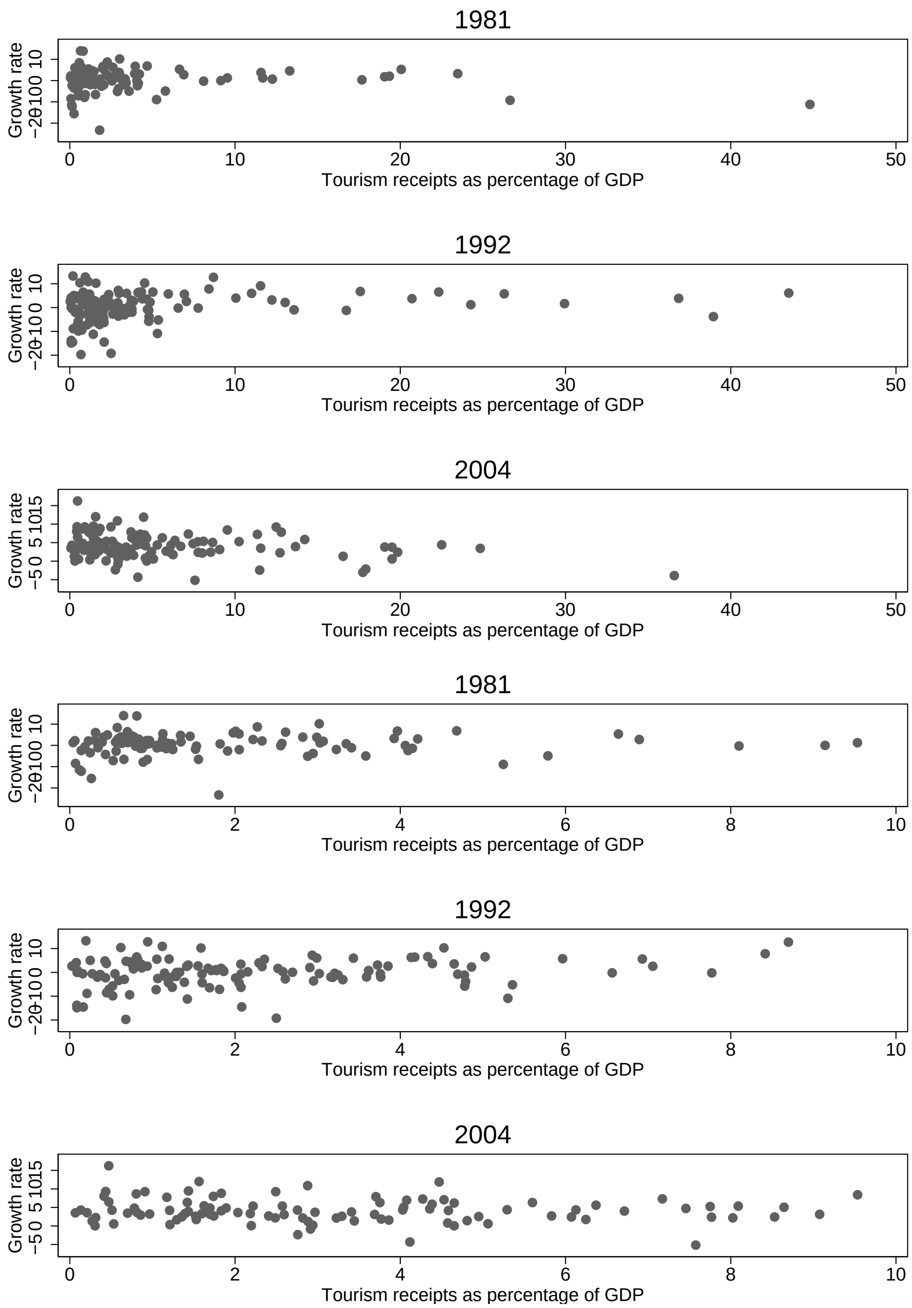
The picture that emerges from this literature is somewhat fuzzy. There is some evidence of tourism specialization having a positive impact on growth, but it is certainly not conclusive. The mixed results are not due to data differences, as all the papers cited above use essentially the same dataset on tourism. Rather, differences in the results are due to different methodologies and specifications. Our work seeks to shed some light on this issue by adding a different dimension to the problem at hand.

3 Descriptive Evidence

We start by looking for descriptive evidence on the relationship between tourism specialization and economic growth. We collected annual data for tourism receipts and economic growth in 162 countries during the period 1980-2005 (data sources are provided in the next section). As is common in the literature, we define tourism specialization as tourism receipts as a percentage of GDP (an alternative measure is tourist arrivals as a percentage of population). The extent of tourism specialization varies substantially, ranging from a negligible 0.09% to an impressive 45.1%. Economic growth experiences are also quite varied, with annual growth rates ranging from -13.9% to 27.8%. A somewhat striking 27% of the observations exhibits negative economic growth.

In Figure 1 we provide scatter plots of the degree of tourism specialization (measured as tourism receipts as a percentage of GDP) and economic growth in three specific years, corresponding to the beginning, mid-point and end of our sample period. The cross-sectional representation of the entire range of the data in the top figure does not provide any robust patterns. Focusing on countries with tourism specialization above 10%, there appears to be a slight negative relationship in years 1981 and 2004 but a positive relationship in 1992. Countries with relatively low specialization are clustered closely together, making it hard to discern any patterns. For this reason in the bottom figure we plotted only observations with tourism specialization below 10%. There is a hint of a positive relationship in 1981 and 1992, while the data for 2004 are very dispersed. Overall, no clear patterns emerge from looking at the cross-sectional variation presented in these scatter plots.

Figure 1: Economic Growth and Tourism Specialization



Note: the top three panels use all data; the bottom three panels show observations with less than 10% tourism specialization.

Figure 2: Temporal Evolution of Tourism Specialization for Selected Countries

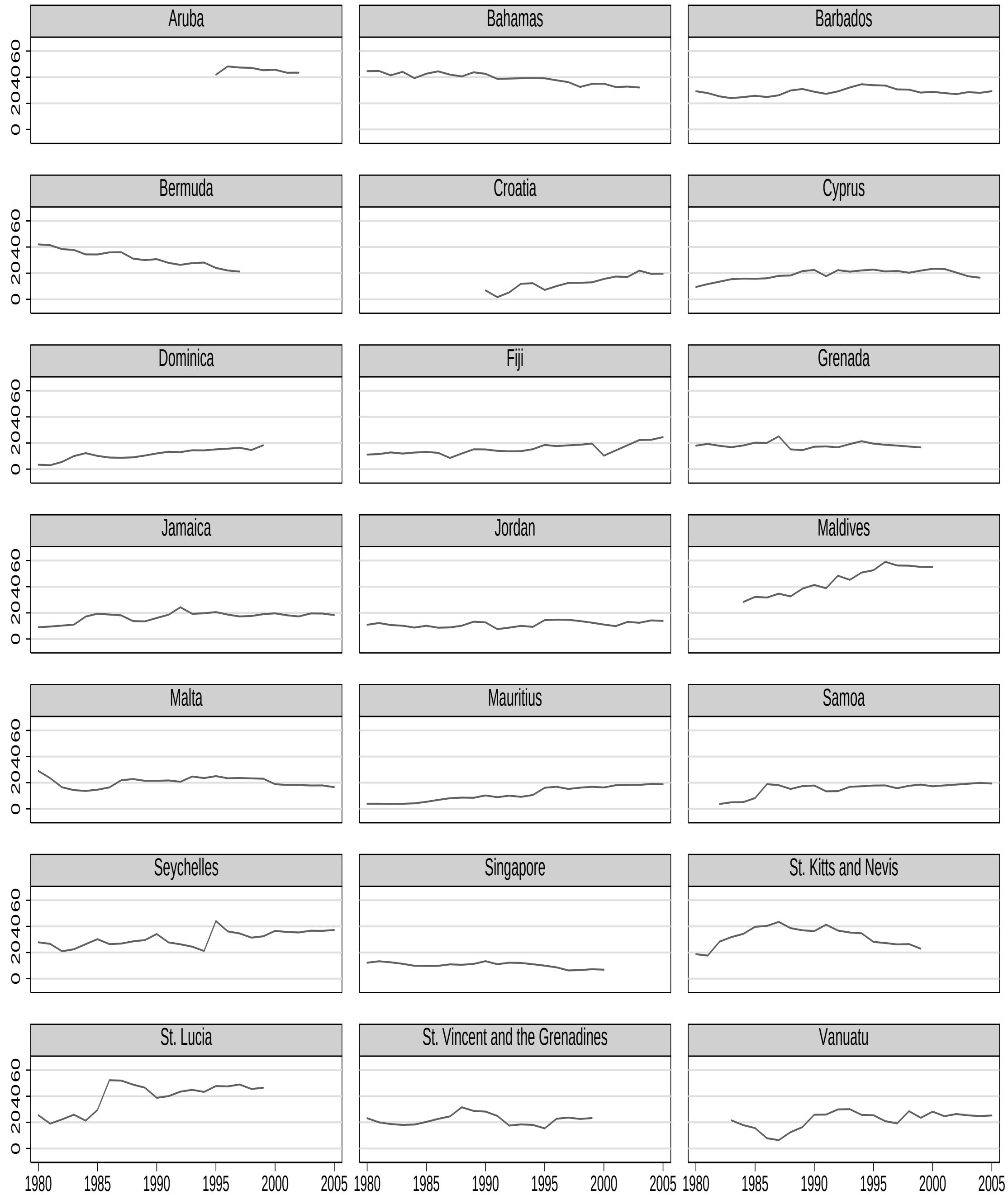


Figure 2 explores the time dimension of the data. We selected the 21 countries that had the highest mean level of tourism specialization during our sample period and plotted the evolution of specialization for these countries over time. Several of them maintained high levels of specialization throughout the sample period. For example, Aruba, Barbados, and the Bahamas maintain receipts above 25% of GDP. A number of countries that started at relatively low levels of specialization increased their dependence on tourism substantially (Samoa, Mauritius, Croatia, Dominica), while several countries that were highly specialized in the 1980s and early 1990s are now exhibiting a downward trend (Bermuda, Bahamas, St Kitts and Nevis, and to a lesser degree Malta, Cyprus, Grenada, Singapore). The fact that so many countries are currently on a downward trend in terms of tourism specialization seems consistent with the hypothesis that there are diminishing returns in that activity. This possibility is investigated more rigorously in the next two sections.

4 Econometric Model and Data

The focus of our study is on the relationship between tourism specialization and economic growth. Our analysis utilizes the economic growth regression framework proposed by Barro (1991) and Barro and Sala-i Martin (2003). The framework relates the real per capita growth of GDP to two kinds of variables: state variables, which describe the initial state of the economy, and control or environmental variables, which are determined either by government or by the actions of private agents. The key state variables are the stock of physical capital and the stock of human capital. There are many possible choices of control variables, such as investment, the size of government, openness to international trade, and the quality of institutions. The general form of the function linking per capita growth rate in period t with growth determinants is:

$$\tilde{Y}_t = F(K_{t-1}, H_{t-1}, \mathbf{C}_t), \tag{1}$$

where $\tilde{Y}_t$ is the growth rate of per capita GDP, K_{t-1} and H_{t-1} are initial per capita physical and human capital respectively, and $\mathbf{C}_t$ is an array of control and environmental variables.

This framework has been used widely to test the impact of dozens of different variables on economic growth. In the tourism literature attention has focused on whether tourism specialization enables a country to grow faster than it would have otherwise. This is typically tested by including a measure of tourism specialization as one of the control variables in equation (1) (Brau et al., 2007; Sequeira and Campos, 2007; Sequeira and Nunes, 2008; Figini and Vici, 2010). Our main contribution is to recognize the possibility that tourism specialization may have a growth-boosting effect at low levels of specialization but that this may not be sustained as specialization reaches high levels. We therefore allow for a nonlinear relationship between tourism specialization and economic growth by including the squared term of the former variable in the regression.

Table 1: Descriptive Statistics

Variable	Mean	Std dev.	Median	Min	Max
Tourism receipts as % of GDP	5.50	8.37	2.44	0.09	45.14
Growth in tourism receipts/GDP (%)	0.12	0.26	0.07	-0.04	2.81
Arrivals as % of population	44.35	95.34	10.84	0.09	690.78
Growth in arrivals/population (%)	0.09	0.09	0.07	-0.07	0.49
Real GDP per capita (US$)	9,907	9,974	5,920	657	47,866
Economic growth (%)	0.02	0.02	0.02	-0.04	0.09
Life expectancy (years)	65.32	10.38	68.74	38.83	79.42
Investment (% of GDP)	15.28	7.59	14.39	2.52	42.22
Government consumption (% of GDP)	17.39	7.60	16.25	4.69	58.31
Openness (exports+imports as % of GDP)	84.41	49.81	72.82	19.78	412.92
Fertility rate	3.59	1.71	3.23	1.26	7.71
Inflation rate	0.50	1.59	0.08	0.01	13.04

Data on physical capital are limited and may be unreliable because they depend on arbitrary assumptions about depreciation. The empirical growth literature addresses this issue by using initial real GDP as a proxy of physical capital. The stock of human capital is typically proxied using measures of educational attainment (such as school enrolment) and health indicators (such as life expectancy). Assuming linearity and substituting in some of the variables described above, the economic growth equation above can be written as follows:

$$\tilde{Y}_{it} = \alpha Y_{i,t-1} + \beta H_{i,t-1} + \theta_1 S_{i,t-1} + \theta_2 S^2_{i,t-1} + \sum_{j=1}^{r} \gamma_j C_{jt}, \qquad (2)$$

where $Y_{i,t-1}$ is country i's initial per capita GDP (the proxy for physical capital) and $S_{i,t-1}$ is a measure of tourism specialization.

Data were obtained from the Penn World Tables and the World Bank's World Development Indicators (full details are provided in the appendix). Descriptive statistics for the variables we use are provided in Table 1. As already mentioned, we use lagged real per capita GDP (in logs) as a proxy for physical capital. The associated coefficient represents the rate of conditional convergence and is expected to be negative. In order to proxy for human capital we experimented with male enrolment in secondary school and life expectancy. The two variables are highly correlated (0.8); we chose to use life expectancy because the data are more complete.

The choice of environmental and control variables depends on the question one seeks to address and on data availability. In our case we are forced to work with a relatively short panel because information on tourism specialization is not available prior to 1980. Moreover, we want to include as many countries as possible, particularly small countries that are often important tourism destinations. Hence we work with a parsimonious specification that includes only control variables found to be most important in existing literature, plus our tourism specialization to measures. Investment is an important variable to include as both theory and empirical evidence suggest that it is a key determinant of growth. It enters as a ratio to GDP. The extent of government involvement in the economy is measured as the ratio of government consumption to GDP. This variable captures the effects of government-induced distortions and political corruption on long-run growth. The degree of openness is another key variable and it is measured as the ratio of the sum of exports and imports to output. The fertility rate is a determinant of population growth, which has a negative effect on the steady-state ratio of capital to effective worker in the neoclassical growth model. Hence, a higher fertility rate would be expected to reduce economic growth. It enters the model in logarithmic form. The inflation rate is used as a measure of macroeconomic stability. An important variable that we had to omit is a proxy for institutions (or rule-of-law), as it is not available for most small tourism countries.

5 Econometric Results

As a pre-cursor to our main results, we first estimate the following simple regression:

$$\tilde{T}_{it} = \alpha_i + \beta_1 S_{i,t-1} + \beta_2 S^2_{i,t-1}. \tag{3}$$

$\tilde{T}_{it}$ denotes the growth rate of tourism receipts, α_i is a country fixed effect and $S_{i,t-1}$ is the degree of specialization (tourism receipts as a percentage of GDP). The purpose of this regression is to obtain a simple estimate of how the growth rate of receipts varies with specialization. Results obtained using fixed effect estimation are presented in Table 2. When specialization is the included in the regression on its own (without its square) it is positive and statistically significant, indicating a positive correlation between specialization and growth in tourism receipts. When the squared term is term both coefficients are significant, indicating that the relationship is in fact concave. This provides some early evidence that allowing for nonlinearity is important. The estimates imply that the growth rate of receipts is maximized when specialization reaches 36.9%. As specialization increases beyond that point receipts continue to grow but at a diminishing rate. Note, however, that this is the point that maximizes tourism growth, not economic growth. As a country can divert resources from tourism to another activity, we expect that the contribution of tourism to economic growth will reach its maximum point at a lower level of tourism specialization.

We now move to the main object of interest, equation (2). Estimation of this expression requires making several decisions with regard to modeling, specification and choice of estimation method. One issue concerns the length of the time interval that is to be considered as a single observation. Growth models are designed to measure the impact of different factors on long-run growth. Established practice is to arrange the variables in five- or even ten-year intervals, rather than use annual data, in order to focus on the long-run effects and to minimize the impact of

Table 2: Estimates of Tourism Growth Equation

Dependent variable: growth rate of tourism receipts		
Receipts/GDP	0.018**	0.042**
	(0.0039)	(0.0068)
Receipts/GDP squared		-0.00057**
		(0.00014)
Wald test	8.65**	9.58**
Observations	3,350	3,350
Hausman test	42.76**	57.73**

Significance levels: † : 10%, ∗ : 5%, ∗∗ : 1%. Standard errors are reported in parentheses. A a constant term and time fixed effects were also included but are not reported for brevity. Results were obtained using fixed effect estimation.

measurement errors and of cycles in variables. Because our sample is short, we use three-year intervals in our main specification and report results using five-year intervals in appendix B. We use the ratio of receipts to GDP as our primary index of tourism specialization; estimates using arrivals as a proportion of population are also reported in appendix B. The model was estimated using both fixed and random effects but the random effects estimator was rejected on the basis of the Hausman test. We thus report fixed effects estimates only.

Results from fixed effect estimation using three-year intervals are reported in Table 3. In addition to the variables listed, our models include time effects (dummy variables for each time period), which we do not report in the interest of brevity. The first two columns present results without instrumenting for potentially endogenous variables while in the last two columns lagged GDP is instrumented for. The difference between the first and second column (and between the third and the fourth) is the inclusion of the squared specialization term in the second (and fourth) column. Starting with the first two columns, we first note that the estimates are very much in line with the literature. Initial GDP has the expected negative coefficient; it is higher than what Barro and Sala-i Martin (2003) find but the time period is different. Life expectancy, investment, and openness have a positive impact on long-run growth while government size, inflation and fertility rate have a negative impact. Tourism specialization is statistically significant regardless of whether it is included linearly or quadratically. The quadratic coefficients imply that the growth rate is maximized at a specialization level of 36.4%.

Several of the right-hand side variables are likely to be endogenous and the literature typically proceeds by instrumenting those variables using their lagged values as instruments. In the last two columns we present results obtained when lagged GDP is instrumented using first and second lags as instruments. Standard tests perform well. The null hypothesis of under-

Table 3: Fixed Effect Estimates of Economic Growth Equation

Variables	No instruments		LGDP instrumented	
Lag of GDP (LGDP)	-0.1005**	-0.1011**	-0.1045**	-0.1017**
	(0.0077)	(0.0076)	(0.0182)	(0.0180)
Lag of life expectancy	0.0011**	0.0011**	0.00081†	0.00084†
	(0.00041)	(0.00035)	(0.00047)	(0.00046)
Investment	0.0013**	0.0013**	0.0021**	0.0021**
	(0.00035)	(0.00035)	(0.00043)	(0.00042)
Government consumption	-0.00076†	-0.00077†	-0.00053	-0.00062
	(0.00041)	(0.00041)	(0.00053)	(0.00053)
Openness	0.00028**	0.00026**	0.00029**	0.00027**
	(0.000081)	(0.000081)	(0.000097)	(0.000096)
Fertility rate	-0.025*	-0.024*	-0.025	-0.023
	(0.012)	(0.012)	(0.015)	(0.015)
Inflation rate	-0.00092**	-0.00093**	-0.00040	-0.00043
	(0.00026)	(0.00026)	(0.00028)	(0.00028)
Receipts/GDP	0.0020**	0.0041**	0.0011	0.0039**
	(0.00056)	(0.00096)	(0.0007)	(0.0012)
Receipts/GDP squared		-0.000057**		-0.000094**
		(0.000021)		(0.000030)
Constant	0.84**	0.84**		
	(0.069)	(0.068)		
Wald test	21.90**	21.16**	12.20**	11.99**
Observations	876	876	620	620
Under-identification test			0.000	0.000
Sargan test			0.337	0.384

Significance levels: † : 10%, ∗ : 5%, ∗∗ : 1%. Standard errors are reported in parentheses. Time fixed effects were also included but are not reported for brevity.

identification is rejected while the Sargan test of over-identifying restrictions does not reject the null hypothesis that the instruments are valid. The results in columns three and four are very similar to those in columns one and two, although they are estimated with less precision. The coefficients of primary interest – those on the specialization terms – are estimated precisely. The two coefficients imply that the economic growth rate is maximized at a specialization level of 20.8%. This is what we take away as our best estimate of the turnaround point for tourism's contribution to economic growth. The estimate seems consistent with the descriptive evidence presented in section 3, where we had observed the tourism sectors of several countries going on a relative decline after peaking at above 20% of GDP.

Our conclusions depend to some extent on the modeling and specification choices we had to make in the face of data limitations. In appendix B we discuss some of those choices in more detail and provide additional results from alternative specifications. Ideally one would like to have a longer panel and more variables in order to be able to test more general specifications. Given those limitations, we do not consider our findings as definitive but rather as suggestive of a relationship that merits some further exploration if and when better data become available.

6 Conclusion

Many countries have been able to achieve high growth rates by specializing in the tourism industry. A question arises whether the contribution of tourism to a country's growth can continue indefinitely as suggested by Ricardian trade models, or whether there are limits to tourism-led growth. In order to address this question we compiled an international panel data set covering 162 countries over the period 1980-2005. Controlling for other well-established growth determinants, we find that specialization in tourism adds to a country's rate of economic growth but it does so at a diminishing rate. This means that at high levels of specialization the independent contribution of tourism to economic growth becomes minimal and tourism can even become a hindrance to further growth. The turning point is estimated to be at a 20.8% level of specialization (measured as tourism receipts at a percentage of GDP). After this point tourism can still contribute to economic growth but at a smaller rate and countries may be better off diverting their resources to other areas of economic activity.

These results are obtained from a panel analysis and are therefore average effects over a large number of countries with diverse circumstances. Clearly each country should decide the extent of its tourism specialization based on its particular characteristics, such as its natural resource endowment, human capital, and technological level. The general message that comes out of this analysis is that specialization in tourism can yield large dividends to countries at relatively early stages of development, but at the same time these countries should have an eye toward developing new areas of economic activity that will carry their economy further once the potential benefits of tourism are exhausted.

Appendix

A Data Sources

Our data come from the World Bank's World Development Indicators (WDI) and the Penn World Table (Heston et al., 2006, PWT). Table A1 provides a full explanation and source for each variable we used. We started with a dataset that included 218 countries during the period 1980-2005. From this we completely removed 56 countries that had missing values problems for the majority of our variables, leaving us with 162 countries. For the remaining countries data may be missing for some periods; this problem is minimized by the fact that the analysis is carried out in three-year periods rather than with annual data.

Table A1: Description of Variables and Sources

Variable	Description	Source
Tourism receipts / GDP	International Tourist Receipts (current US$) divided by GDP at market prices	WDI
Tourism arrivals / population	International arrivals divided by population	WDI
Real per capita GDP	Measured in year 2005 US$	PWT
Openness	Imports (as % of GDP) + Exports (as % of GDP)	WDI
Investment	Investment as a % of GDP	PWT
Government size	General government final consumption expenditure (% of GDP)	WDI
Life expectancy	Total life expectancy at birth (years)	WDI
Fertility rate	Total fertility rate (births per woman)	WDI
Inflation	Consumer prices (annual %)	WDI

B Additional Estimates

Estimation of equation (2) required making many decisions with respect to the variables to be included, including among others the length of the period, the instruments to use, the specialization index, and the estimation method. The choice between fixed and random effects was determined by the Hausman test which rejected the random effects specification, as is usually the case with this type of data. The results reported in the main text are based on three-year intervals and use receipts as a percentage of GDP as the tourism specialization index. Two sets of estimates are reported, one without instruments and one that instruments for lagged GDP only.

We also estimated the model using the alternative specialization index of arrivals as a percentage of population. The results are reported in Table B1 and they are similar to those obtained using receipts/GDP as the specialization index. Without instruments both specialization terms are significant and imply a turnaround ratio of arrivals to population of 284%. This is not unreasonable as several countries reach and exceed that level of specialization.

In Table B2 we report two additional sets of estimates that serve as robustness checks. The first two columns estimate the model using five-year intervals, which is the de facto standard

Table B1: Estimates of Growth Equation Using Arrivals as Specialization Index

Variables	No instruments		LGDP instrumented	
Lag of GDP (LGDP)	-0.10**	-0.10**	-0.09**	-0.09**
	(0.0073)	(0.0074)	(0.017)	(0.017)
Lag of life expectancy	0.0010**	0.0011**	0.00064	0.00068
	(0.00041)	(0.00041)	(0.00046)	(0.00047)
Investment	0.0013**	0.0012**	0.0022**	0.0022**
	(0.00035)	(0.00035)	(0.00042)	(0.00042)
Government consumption	-0.00141**	-0.00136**	-0.00126*	-0.00126*
	(0.00041)	(0.00041)	(0.00055)	(0.00054)
Openness	0.00036**	0.00037**	0.00034**	0.00034**
	(0.000077)	(0.000077)	(0.000091)	(0.000092)
Fertility rate	-0.029**	-0.030**	-0.032*	-0.033*
	(0.011)	(0.011)	(0.015)	(0.015)
inflation rate	-0.00079**	-0.00077**	-0.00043	-0.00042
	(0.00025)	(0.00025)	(0.00028)	(0.00028)
Arrivals/population	0.00018**	0.00048**	0.00012*	0.00021
	(0.000045)	(0.00012)	(0.00006)	(0.00015)
Arrivals/population^2		-0.00000085**		-0.00000023
		(0.00000030)		(0.00000037)
Constant	0.81**	0.83**		
	(0.065)	(0.065)		
Wald test	23.98**	22.62**	14.42**	13.40**
Observations	886	886	633	633
Underidentification test			0.000	0.000
Sargan test			0.196	0.198

Significance levels: † : 10%, ∗ : 5%, ∗∗ : 1%. Standard errors are reported in parentheses. Time fixed effects were also included but are not reported for brevity.

in the literature. The results are in line with those in the case of 3-year intervals but they are estimated less precisely, as would be expected with only 486 observations. We only present results without instruments as instrumenting would reduce the number of observations to 214, making inference impossible. The specialization term is statistically significant but its squared is not. The implied turnaround point with those estimates is 26.3%. The second set of estimates in Table B2 goes back to three-year intervals but instruments for all variables, as in Barro and Sala-i Martin (2003) (and not just lagged GDP, as in Table 3). The Sargan test fails in this case but the estimates are in any case very much along the lines of those reported in Table 3, with an implied turnaround point of 21.1%.

Table B2: Additional Estimates of Growth Equation

Variables	Five-year intervals, No instruments		Three-year intervals, All instrumented	
Lag of GDP (LGDP)	-0.098**	-0.098**	-0.12**	-0.12**
	(0.0096)	(0.0096)	(0.019)	(0.018)
Lag of life expectancy	0.000055	0.000068	-0.00013	-0.000075
	(0.00059)	(0.00059)	(0.00057)	(0.00057)
Investment	0.0015**	0.0015**	0.0017	0.0019†
	(0.00047)	(0.00047)	(0.0011)	(0.0010)
Government consumption	-0.00037	-0.00038	0.0028*	0.0024†
	(0.00049)	(0.00049)	(0.0013)	(0.0013)
Openness	0.00039**	0.00038**	0.00036*	0.00031†
	(0.00010)	(0.00010)	(0.00016)	(0.00016)
Fertility rate	-0.014	-0.012	-0.039†	-0.039†
	(0.014)	(0.014)	(0.021)	(0.021)
Inflation rate	-0.00088*	-0.00089*	-0.00037	-0.00042
	(0.00038)	(0.00038)	(0.00029)	(0.00029)
Receipts/GDP	0.00117	0.0027*	0.0022	0.0065**
	(0.00071)	(0.0012)	(0.0017)	(0.0025)
Receipts/GDP squared		-0.000051		-0.000155†
		(0.000032)		(0.000080)
Constant	0.8206**	0.8206**		
	(0.083)	(0.083)		
Wald test	17.98**	16.77**	8.85**	8.60**
Observations	486	486	588	588
Underidentification test			0.000	0.000
Sargan test			0.002	0.000

Significance levels: † : 10%, ∗ : 5%, ∗∗ : 1%. Standard errors are reported in parentheses. Time fixed effects were also included but are not reported for brevity.

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