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Is tourism a long-run economic growth factor?

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Introduction

Whether tourism can lead to economic growth is an important question. In theory, it can complement the standard economic theory to better understand the determinants of growth. In practice, its policy implication is significant, since “Recreation and tourism is one of the largest economic activities of the world, some even say it is the largest.” (Bigano et al. 2007, p147). As a result, there is a voluminous literature on the tourism-led growth hypothesis (TLGH). See Balaguer and Cantavella-Jorda (2002), Dristakis (2004), Gunduz and Hatemi-J (2005), Ongan and Demiroz (2005), Oh (2005), Kim et al. (2006), Katircioglu (2009), and Belloumi (2010). The literature, in general, finds evidence in support of the notion that tourism promotes economic growth.

Nevertheless, there may be two methodological weaknesses in previous studies. First, the dominant approach in previous studies is the cointegration test, which is not motivated by economic theory but rather econometrics. Specifically, previous studies typically do not control for standard growth determinants, such as technology, human capital, and institutions. Therefore, the estimations may be biased due to the omitted variable problem. Second, previous studies usually focus on individual countries. As a result, whether the findings have general implication is questionable.

Motivated by these two observations, we revisit the tourism-led growth hypothesis. We first develop a tourism-growth model that is well motivated by the literature. Then, based on our theoretical model, we use a newly-available international database to test the tourism-led growth hypothesis. We find that if we do not control for standard growth factors such as technology, human capital and institutions, tourism appears to lead to growth; however, as soon as we take into account these standard growth determinants, tourism does not have marginal explanatory power anymore even within the tourism economies.

The remainder of the paper is organized into four parts: Section 2 presents our model. Section 3 describes the data and reports our empirical results. The conclusions follow.

2 A model of tourism and growth

The literature has proposed many possible linkages between tourism and growth. We focus on one particular linkage to motivate our model. The first piece comes from the literature of the export-led growth hypothesis. Romer (1987), Frankel and Romer (1999), and Broda, Greenfield, and Weinstein (2006), among others, show theoretically and empirically that trade can raise productivity and growth. The second piece comes from the literature on the travel–trade relationships. Fischer (2007) and Gil-Alan and Fischer (2010), among others, provide theoretical models and empirical evidence suggesting that tourism can promote trade. These two lines of research suggest that tourism can positively affect productivity and growth through its impact on trade. We build a model of tourism and growth based on this notion.

Specifically, we consider a production function as in Dell et al. (2008):

$$Y_{it} = A_{it} L_{it} e^{\varepsilon_{it}} \tag{1}$$

where Y is real GDP, L is population, A is labor productivity, and ε_i is a random disturbance term. We focus on income per capita. Thus, we have

$$\frac{Y_{it}}{L_{it}} = A_{it} e^{\varepsilon_{it}} \tag{2}$$

Eq. (2) says that income per capita mainly depends on labor productivity, which is the core idea of modern growth theory. To capture the idea that productivity is determined by tourism (through its influence on trade) as well as other standard growth factors, we model productivity as a function of these relevant determinants.

$$A_{it} = e^{\alpha T_{it} + \sum_{j=1}^{n} \beta_j F_{it}} \quad (3)$$

where *T* represents tourism activity, and *F*'s stand for other standard growth factors. Combining Eqs. (2) and (3) and taking log on both sides, we have

$$\log(\frac{Y_{it}}{L_{it}}) = \beta_0 T_{it} + \sum_{j=1}^{n} \beta_j F_{it} + \varepsilon_{it} \quad (4)$$

Technology and human capital are well-known to be important for growth (e.g. Romer, 1986; Hall and Jones, 1999). Institutions also play a critical role in explaining economic growth (e.g. Mauro, 1995; Acemoglu et al. 2001). Therefore, in this paper, we include technology, human capital and institutions as *F*s in our model.

3 Data and empirical results

In this paper, we use a recently-available international dataset due to Bigano, Hamilton, Lau, Tol and Zhou (2007). This dataset contains economic data for over 200 countries. Following Gunduz and Hatemi-J (2005), we use number of international tourist arrivals as our measure of tourism activity. Telephone per 1000 is used as a proxy of technology. Literacy (above 15 both genders) and life expectancy are employed to proxy human capital.[1] The economic freedom index is utilized to measure institutions. Therefore, our empirical model is

$$\log(\frac{Y_{it}}{L_{it}}) = a_i + \beta_0 Arrives_{it} + \beta_1 Telephone_{it} + \beta_2 Literacy_{it} + \beta_3 life_{it} + \beta_4 Freedom_{it} + e_{it} \quad (5)$$

Due to data availability, we use 1995 as the testing year. We also have to use the interpolated Life Expectancy values by averaging the 1994 and 1996 data because there are only 40 countries with 1995 data on life expectancy as compared to the 190 countries for 1994 and 1996. Table 1 presents our summary statistics.

Empirical results are reported in Table 2. In Model 1, we only include the number of international arrivals. Consistent with previous studies, tourism has a statistically significant positive effect on income per capita. Our parameter estimate suggests that a one million arrivals increase can lead to a 0.83% increase in GDP per capital. The estimate is not only statistically significant but also economically significant. However, one potential problem with Model 1 is that it omits standard growth factors such as technology, human capital and institutions. Consequently, the estimations may be biased due to the omitted variable problem. Therefore, we next add in standard growth factors. As we can see in Table 2, as soon as relevant growth factors are added, the number of arrivals becomes statistically insignificant. Therefore, our results do not support the tourism-led hypothesis and suggest that significant results in previous studies may be due to the omitted variable bias.

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[1] Since healthier workers exhinit higher productivity (e.g. Fogel, 2004), life expectancy is relevant for productivity.

Table 1 Summary statistics

	GDP	Population	Arrivals	Literacy	Telephone	Freedom	Life Expectancy
Min	0.000	1.280e+04	1000	5.7	0.3	1.300	31.22
1st Quartile	2.016e+09	1.072e+06	85500	49.4	11.0	2.550	51.46
Median	6.758e+09	4.924e+06	310000	75.6	74.2	3.050	65.69
Mean	1.569e+11	2.597e+07	2650770	69.1	155.8	3.096	61.79
3rd Quartile	6.033e+10	1.533e+07	1552000	91.0	247.8	3.600	71.24
Max	7.787e+12	1.278e+09	62406000	99.8	758.0	5.000	79.99
Standard Deviation	6.730e+11	1.036e+08	7014393	24.88	180.2	0.771	11.70

Empirical results are reported in Table 2. In Model 1, we only include the number of international arrivals. Consistent with previous studies, tourism has a statistically significant positive effect on income per capita. Our parameter estimate suggests that a one million arrivals increase can lead to a 0.83% increase in GDP per capital. The estimate is not only statistically significant but also economically significant. However, one potential problem with Model 1 is that it omits standard growth factors such as technology, human capital and institutions. Consequently, the estimations may be biased due to the omitted variable problem. Therefore, we next add in standard growth factors. As we can see in Table 2, as soon as relevant growth factors are added, the number of arrivals becomes statistically insignificant. Therefore, our results do not support the tourism-led hypothesis and suggest that significant results in previous studies may be due to the omitted variable bias.

Table 2 Regression results without tourism economy dummy

	Model 1	Model 2	Model 3	Model 4
Constant	7.255 (57.72)	-0.543 (-6.87)	-4.204 (-9.28)	-0.734 (-0.98)
Arrivals	8.34×10^{-8} (5.91)	2.43×10^{-9} (0.29)	3.77×10^{-9} (0.36)	3.73×10^{-9} (0.62)
Telephone		0.007 (20.24)	0.005 (7.65)	0.004 (5.69)
Literacy			0.006 (1.55)	0.010 (2.39)
Life expectancy			0.055 (5.78)	0.034 (3.46)
Freedom				-0.736 (-5.85)
R^2	0.18	0.78	0.80	0.85
N	155	155	105	78

The numbers in the parentheses are the *t*-statistics.

For robustness, we carry out two more sets of tests. The first set is to differentiate tourism economies from other economies. Intuitively, tourism activity should be more significant for economies that depend heavily on tourism. Previous studies also generally focus on tourism economies. We take this into account by adding a dummy variable for tourism economy and an interaction term of the dummy and the number of arrivals in Eq. (5). The results are reported in Table 3. Consistent with the results in Table 2, if we do not include the standard growth factors, tourism is a statistically and economically significant factor of growth; however, as soon as we take into account technology, human capital and institutions, tourism activity does not have marginal explanatory power. Therefore, even within tourism economies, our results do not support the tourism-led hypothesis and suggest that significant results in previous studies may be due to the omitted variable bias.

Table 3 Regression results with tourism economy dummy

	Model 1	**Model 2**	**Model 3**	**Model 4**
Constant	7.148 (53.49)	6.340 (77.89)	2.707 (5.92)	6.097 (8.00)
Dummy	0.434 (1.00)	0.111 (0.48)	-0.275 (-1.19)	-0.163 (-0.60)
Arrivals×Dummy	3.25×10^{-7} (1.22)	1.50×10^{-7} (1.07)	1.95×10^{-7} (1.28)	1.14×10^{-7} (0.76)
Arrivals	8.62×10^{-8} (6.14)	4.32×10^{-9} (0.51)	2.44×10^{-9} (0.23)	5.00×10^{-9} (0.51)
Telephone		0.007 (19.82)	0.005 (7.60)	0.004 (5.65)
Literacy			0.006 (1.63)	0.011 (2.47)
Life expectancy			0.055 (5.67)	0.034 (3.35)
Freedom				-0.722 (-5.60)
R^2	0.20	0.78	0.80	0.85
N	155	155	105	78

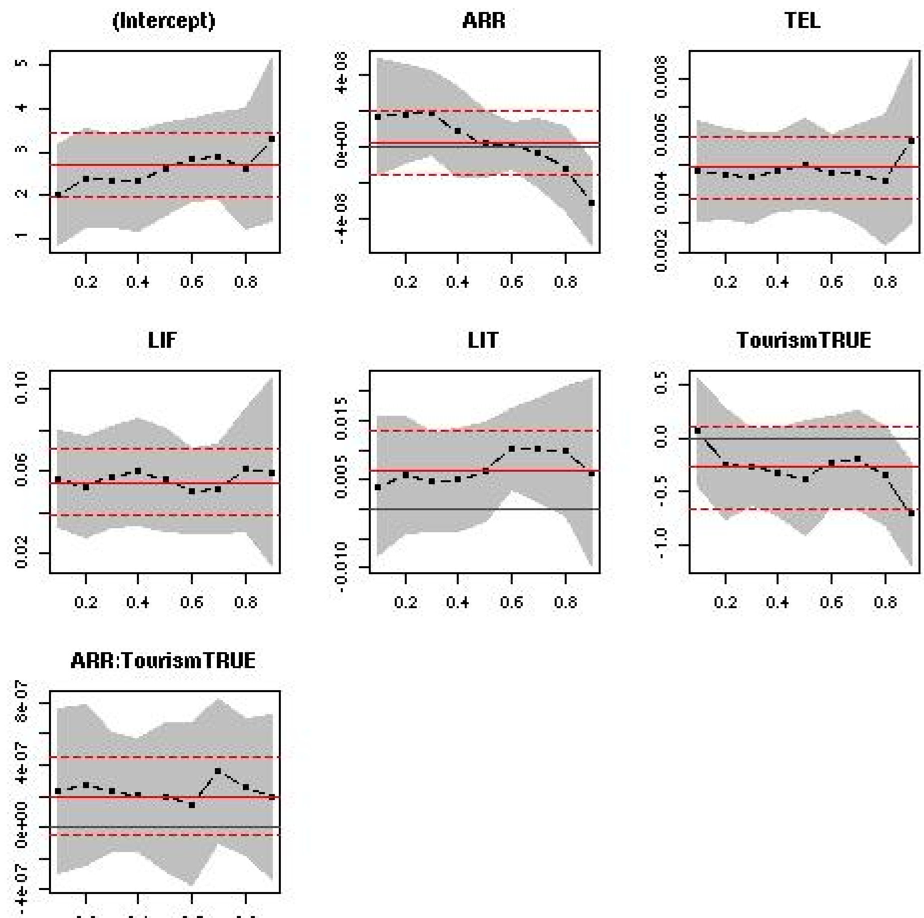
The numbers in the parentheses are the *t*-statistics.

The least squares regression results reported in Tables 2 and 3 provide estimates of the *average* effects of the various independent variables on the income level. They depict the effects of the independent variables on the dependent variable near the center of the income level distribution. However, the effects of the various economic variables on income may not be the same across different portions of the income distribution. For example, tourism activity may impact income differently in nations that have low income (e.g. developing nations) than those that have high income (e.g. developed nations) even after taking into consideration the effects of technology, human capital and institutions. Least-squares regression is incapable of revealing this sort of potential variation when focusing on the average of the income distribution, while quantile regression invented by Koenker and Bassett (1978) is best for identifying these potential differential impacts. A special case of the quantile regression at the τ = 0.5 quantile (or 50 percentile), the median regression also serves as a robust (to outliers) alternative to the least-squares regression.

Figure 1 presents the regression quantile coefficients of the independent variables (Arrivals, Telephone, Life expectancy, Literacy, Economic Freedom, the Tourism dummy and the interaction between Arrivals and the Tourism dummy) on log GCP per capita used in Equation (5). Each panel represents the estimated regression quantile coefficients for one independent variable on the dependent variable (log GCP per capita) across the whole spectrum of the dependent variable distribution for $0 \le \tau \le 1$. For example, the vertical axis of the upper middle panel in the figure represents the magnitude of the regression quantile coefficients of Arrivals across τ ranging from 0.1 to 0.9 on the horizontal axis.

Moving from the left to the right along the horizontal axis, the vertical distances of the dots in the dot-dash line represent the magnitudes of the regression quantile coefficients for τ = 0.1, 0.2, …, 0.8, 0.9. The grey band around the dot-dash line in each panel represents the 95% confidence band for the quantile regression coefficients. Hence, the quantile regression coefficient at a particular τ value is considered statistically significantly different from zero when the band at that τ does not cover the $y = 0$ axis. The horizontal solid line represents the magnitude of the least-squares regression coefficient while the dash-lines around it depict the 95% confidence interval for the least-squares coefficient.

Figure 1



Each panel shows the estimated regression quantile coefficients for each of the various independent variable ((*arrives*, *telephones*, *life*, *literature*, the tourism dummy variable *TourismTRUE* and the interaction between *arrives* and *TourismTRUE*) on the dependent variable (log income per capita) across the whole spectrum of the dependent variable distribution for $0 \leq \tau \leq 1$. Moving from the left to the right in each panel, the vertical distances of the dots in the dot-dash line represent the magnitudes of the regression quantile coefficients for τ = 0.1, 0.2, …, 0.8, 0.9 quantiles. The grey band around the dot-dash line in each panel is the 95% confidence band for the quantile regression coefficients. The quantile regression coefficient at a particular τ value is considered statistically significantly different from zero when the band at that τ does not cover the horizontal axis. The horizontal dot-dash line represents the magnitude of the least-squares regression coefficient while the dash-lines around it show the 95% confidence interval for the least-squares coefficient. Hence, the least-squares regression coefficient is statistically insignificant if the horizontal dash-lines envelope the horizontal axis.

The regression quantile coefficient for a particular τ measures the impact of a one unit change in the corresponding independent variable on the τ -th quantile of the dependent variable holding constant the effects of all the other independent variables. For example, the quantile regression coefficient of Arrivals on log GCP per capita is around 0 for τ = 0.5 from the upper-middle panel of Figure 1. This is close to the estimated by the least-squares regression, and suggests that our results in Table 2 are robust to outliers. As we also can see, across different quantiles, the coefficient of Arrivals on log GCP per capita is always insignificant, indicating that the insignificant relationship between income and tourism is robust across different quantiles. Taken all the evidence together, our findings suggest that significant results in previous studies may be due to the omitted variable bias.

4 Conclusions

Whether tourism can lead to economic growth is an important question. In general, previous studies find evidence in support of the notion that tourism promotes growth. However, previous studies typically do not control for standard growth determinants, such as technology, human capital, and institutions. Therefore, the estimations may be biased due to the omitted variable problem. Motivated by this observation, we revisit the tourism-led growth hypothesis. We first develop a tourism-growth model that is well motivated by the literature. Then, based on our theoretical model, we use a newly-available international database to test the tourism-led growth hypothesis. We find that if we do not control for relevant growth factors, tourism appears to lead to growth; however, as soon as we take into account these relevant growth determinants, tourism does not have marginal explanatory power anymore even within the tourism economies. Therefore, our results suggest that a country should still focus on technology, human capital and institutions to promote growth.

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