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Tourism and economic development: The beach disease?

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ABSTRACT

This paper analyses empirically the danger of a Dutch Disease Effect in tourism dependent countries in the long run. Data on 134 countries of the world over the period 1970–2007 is used. In a first step the long-run relationship between tourism and economic growth is analysed in a cross-country setting. The results are then checked in a panel data framework on GDP per capita levels that allows to control for reverse causality, non-linearity and interactive effects. It is found that there is no danger of a Beach Disease Effect. On the contrary, tourism dependent countries do not face real exchange rate distortion and deindustrialisation but higher than average economic growth rates. Investment in physical capital, such as for instance transport infrastructure, is complementary to investment in tourism.

1. Introduction

The Dutch Disease phenomenon describes the coexistence within the traded goods sector of booming and lagging sub-sectors. Traditionally, the booming sector is referred to be of an extractive kind (e.g. oil or gas) and the manufacturing sector is expected to be under deindustrialisation pressure. For the detailed description of the core model on a booming sector and deindustrialisation in a small open economy, including an algebraic formulation of the problem, see Corden and Neary (1982). For an extended and more general version of Dutch Disease economics, see Corden (1984).

Copeland (1991) adjusted the Dutch Disease model in order to examine the economic effects of an increase in tourism in a small, open economy. Adjustments are necessary because there are important differences between tourism and commodity exports. In the presence of tourism, goods that are normally non-tradable become partially tradable and tourists typically consume a bundle of goods and services jointly with unpriced natural amenities, such as climate and scenery. Thus, unlike in the Dutch Disease model, there is a direct increase in foreign demand for non-tradables in a tourist boom, the difference between a trade tax and a domestic commodity tax is fuzzy and unpriced natural amenities may generate rents.

Copeland shows that in the absence of taxation and distortions such as unemployment the appreciation of the real exchange rate is the only mechanism by which tourism can enhance domestic welfare (if there were no non-tradables, tourism would have no such effect). This would happen through a direct effect, which is the increase of the price of services, holding domestic spending constant, and an indirect spending effect, which is due to the change in domestic spending on services induced by the real income change. However, this could be only a small fraction of the potential gains, because this is a rather inefficient way of receiving rent from natural amenities. With international factor mobility the benefits of a tourism boom are even smaller as the price of non-tradables is less responsive to demand shocks. Copeland's results further include that if fixed factors in the non-tradables sector, such as land, are foreign-owned, rents will leave the country. As a result, the country may end up worse off than before the tourist boom. However it is important to note that the presence of domestic commodity taxes can increase the benefits of tourism, since they allow for some rents from the unpriced natural amenities.

Concerning the effects of a tourist boom on the pattern of production in other sectors and on factor returns it is hard to make clear predictions. Nevertheless, Copeland can show in a simple version of the specific factors model incorporating international capital mobility (labour is mobile across all sectors but is not mobile internationally) that tourism may result in a contraction of the manufacturing sector (because of manufacturing capital leaving the country) and that even more than the entire aggregate social benefits of tourism (due to an increase in the price of services) are captured by the immobile factor specific to the non-tradables sector (i.e. a part of the land specific to tourism) if there is no taxation. If external economies are important to economic growth, then such a process of deindustrialisation may have significant welfare effects. This is if the potential external benefits generated by industrial expansion are bigger than those generated by an expansion of the

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tourism sector (the model of Nowak, Sahli, & Sgro, 2003 comes to a similar conclusion).

Copeland's model incorporates capital mobility. Therefore it could be argued that these results not only refer to the short run but also to the long run. This is even truer if industry specific learning-by-doing effects are assumed, as in van Wijnbergen's (1984) extension of the Dutch Disease model. It is a stylised fact that technological progress is faster in the manufacturing sector than in the nontraded sector of an economy. Thus, if most of economic growth is caused by learning-by-doing induced technological progress which moreover is largely confined to the traded goods sector, even a temporary decline in that sector may permanently lower income per head in comparison with what could otherwise have been attained.

Moreover, Chao, Hazari, Laffargue, Sgro, and Yu (2006) develop similar results in a dynamic economy model, where an expansion of tourism leads to a terms of trade improvement, which in turn leads to a diversion of resources from the manufacturing sector to the non-traded sector. The result is a Dutch Disease type of deindustrialisation. The presence of capital-generated externalities further aggravates deindustrialisation, making tourism more likely to be welfare reducing. This is supported by the authors' numerical simulation. Chao et al. (2006) show that tourism increases the overall welfare of residents in the short and medium run due to an increase in the price of non-tradables, but welfare is declining in the long term. The cause is a process of capital decumulation in the long run.

Thus this paper provides an empirical analysis of the danger of a Dutch Disease Effect in tourism dependent countries in the long run: The "Beach Disease Effect". Specifically we check whether tourism dependent countries show a less dynamic economic development using a sample of more than 130 countries over almost four decades. Such a comprehensive assessment of this relationship has been lacking so far: The existing empirical literature on tourism and economic development has mainly focused on case studies of single countries or islands. This includes several case studies on Mediterranean countries (see e.g. Balaguer & Cantavella-Jorda, 2002; Dritsakis, 2004; Gunduz & Hatemi-J, 2005; Katircioglu, 2009a, 2009b; Ongan & Demiroz, 2005). There are also a number of studies on Asian and Pacific countries (see e.g. Chen & Chiou-Wei, 2008; Khalil, Kakar, & Waliullah, 2007; Kim, Chen, & Jang, 2006; Lee, 2008; Narayan, 2004; Narayan & Prasad, 2003; Oh, 2005) as well as on Mexico (Carrera, Brida, & Risso, 2007) and Mauritius (Durbarry, 2004). Most of the country studies employ Granger causality tests and provide evidence that both tourism-led growth and growth-led tourism development occurs. Only one of the country studies deliberately analyses the possibility of a Dutch Disease phenomenon caused by tourism (Capó, Font, & Nadal, 2007). The authors find evidence that the Balearics and the Canary Islands, whose economies are heavily orientated towards tourism, both show signs of Dutch disease and that, as a result, their economic growth might be compromised in coming years. To make a point, the paper presents detailed statistics on price developments in the service sector, production diversification and employment in high technology sectors of tourism specialised as compared to other regions of Spain.

Another set of studies has been looking at specific country groups. The case of small countries has been especially well researched (see e.g. Brau, Lanza, & Pigliaru, 2007; Candela & Cellini, 1997; Lanza & Pigliaru, 1994, 2000a, 2000b; Modeste, 1995). It is observed that microstates specialising in tourism grow faster. A few other studies concentrated on geographical country groups. Proenca and Soukiazis (2008) find in a panel of Southern European countries from 1990 to 2004 tourism to be a factor of income convergence. For a panel of African countries for the period 1995–2004 Fayissa, Nsiah, and Tadasse (2008) find a positive relationship between tourism and both the GDP level and economic growth. A similar result was found by Eugenio-Martin, Morales, and Scarpa (2004) for a panel of Latin American countries from 1985 to 1998.

To our knowledge only two studies focused on a world-wide panel of countries. Lee and Chang (2008), using a panel of 55 countries over the period 1990–2002 are still rather interested in the results for various subgroups as well as causality issues, employing a model with tourism proxies and real effective exchange rate. The later variable is used as a proxy for competitiveness following Balaguer and Cantavella-Jorda (2002) and Dritsakis (2004). One of the results is that tourism development has a greater impact on GDP in non-OECD countries than in OECD countries. Sequeira and Nunes (2008) are the first to evaluate the world-wide impact of tourism, recurring to dynamic panel data techniques that deal with endogeneity and following the empirical economic growth literature. Specifically they also analyse a sub-sample of small countries. Their prime estimator is a System-GMM estimator as developed by Arellano and Bover (1995) and Blundell and Bond (1998). The panel consists of five 5-year periods between 1980 and 2002 for about 90 countries. The results indicate that tourism specialisation is an important determinant of economic growth and that the effect of tourism decreases when small countries are considered, which is contrary of what literature have suggested so far.

However, to our knowledge only one empirical study (Lanza, Temple, & Urga, 2003) has analysed possible long-run implications of tourism specialisation in the context of a highly productive manufacturing sector and a less productive tourism sector, including the issue of the price level in tourism countries. It is interesting to note that this article is not referring at all to Copeland (1991) and the Dutch Disease literature. Estimating a model on the share of expenditure on tourist goods and services provided overseas, using data on 13 OECD countries for the period of 1975–1992, the authors find positive and values of expenditure elasticity exceeding one, indicating that international tourism is a luxury good for consumers in industrialised countries. These findings suggest that for tourism dependent countries the costs of foregoing learning-by-doing in a more productive non-specialisation sector might be sufficiently outweighed by more learning-by-doing in the less productive sector and especially favourable terms of trade. This is mainly confirming a model of trade and endogenous growth as developed by Lucas (1988).

In this research we want to combine the two strands of existing literature that are purely interested first in the impact of tourism specialisation on economic growth in the long run across all the countries of the world (e.g. Sequeira & Nunes, 2008) and second in the possible channels by which tourism specialisation can improve or deteriorate economic development (e.g. Lanza et al., 2003), based on the theoretical model of Copeland (1991). The results of our research will allow drawing specific policy recommendations and may lay the empirical foundations for new theoretical models explaining the actual channels by which tourism can impact economic development of nations.

The present econometric analysis consists of two parts. We first use a methodology similar to the one applied in Gylfason (2001) and Sachs and Warner (2001) to achieve empirical evidence from econometric studies of the cross-country relationships between natural resource abundance and economic growth around the world. We modify this methodology for tourism sector dependence instead of natural resource abundance. We also study the transmission channels and calculate the indirect effects of tourism on economic growth for each transmission channel, according to the methodology described in Papyrakis and Gerlagh (2004, 2007). In the second part, we apply a panel data framework on GDP per capita levels that allows for checking the results and for paying specific attention to the time dimension. This second approach also allows for controlling for reverse causality, non-linearity and interactive effects.

The reasoning behind this procedure is the following: Firstly, to find out whether, given traditional growth-explaining factors, tourism can harm economic growth across countries. Secondly, through which channels tourism affects growth. Especially we want to analyse whether tourism revenues lead to an overvalued real exchange rate and subsequent deindustrialisation as shown both in the static model of Copeland (1991) and the dynamic model of Chao et al. (2006) or not. Thirdly, we want to check the results on economic growth also on levels of economic development across countries as well as across time in a more sophisticated framework. In addition to analysing both, the general impact of tourism on economic development as well as the impact channels, this study employs the biggest data set ever used for this purpose both, in terms of country and time coverage.

2. Cross-country analysis

2.1. The growth model

For the purpose of our research the cross-country analysis is based on a growth model similar to the Solow growth model with Cobb–Douglas production including physical and human capital as for instance developed by Romer (1996). Moreover we follow the standard literature by Barro (1991), Levine and Renelt (1992), Barro and Sala-i-Martin (1995) and Sachs and Warner (2001) which leads to the following equation:

$$g = f[y_0, k, h, x], \qquad (1)$$

where the growth of output per labour unit g is a function f of the initial output per labour unit y_0 (according to the conditional convergence theory), the physical and human capital input per labour unit k and h. Using the interpretation of Mo (2001), which is based on Schumpeter (1912, 1939), the described relationship reflects two main classes of influence on the evolution of an economy in the long run. One is the growth component, which is due to changes in the factor availability of physical capital and labour. The other is the development component of social and technological changes driving total factor productivity (i.e. the initial output and the human capital). The reason why, beside the human capital, the initial output level is also defined as a development component is that under the conditional convergence theory initially poorer countries have the possibility to grow faster as they can learn, imitate and apply technological achievements of the leading countries in a relatively short period of time, given all the other 'conditioning variables'. Thus the initial output also indicates different technological levels.

As this research aims at analysing the relationship between tourism and growth, the basic growth function as described in equation (1) also includes the variable x, which should be an indicator of the tourism dependency of a country. As a working assumption we could also consider this variable to represent something like "tourism capital" in the production function. Here one could think of a capital stock made up of e.g. natural amenities, such as climate and scenery, cultural heritage of all kinds as well as tourism related infrastructure and hospitable attitudes of the local population. Alternatively, it could also be argued that tourism contributes to total factor productivity. Using equation (1), a testable equation can be defined as:

$$g_i = \alpha_0 + \alpha_1 y_{0i} + \alpha_2 k_i + \alpha_3 h_i + \alpha_4 x_i + \varepsilon_i, \qquad (2)$$

where i corresponds to each country in the sample, α_0 is a constant term, α_1–α_4 are the coefficients of the respective explanatory variables and ε is the error term. As a proxy for g we use the average annual growth of the natural logs of real GDP per capita at Purchasing Power Parities (PPP) between the years 1970 and 2007. This variable is constructed using data from the Penn World Table, Version 6.3 (PWT 6.3, see Heston, Summers, & Aten, 2009). For y_0 the real GDP per capita at PPP in the initial year 1970 from PWT 6.3 was used. The investment share of the real GDP per capita, averaged over the period of 1970–2007 is the proxy for k, also taken from PWT 6.3. The gross secondary school enrolment ratio, averaged over the period of 1970–2007 is used as a proxy for h. The secondary school enrolment variable was taken from the Global Development Network Growth Database collected by Easterly (2001) for the years up to 1990. Data for the years 1990–2007 was taken from the World Development Indicators (WDI) 2008 database provided by The World Bank. Missing data points were interpolated. The share of travel services exports in % of GDP, averaged over the period of 1970–2007 is being used as a proxy for tourism dependency or tourism capital x. Data was taken from the WDI 2008 database. Here, a number of island states show values between 10% and 40% of GDP. The median country has a tourism dependency rate of about 2% of GDP. For more descriptive statistics see Appendix Table 3.

After a graphical assessment of possible non-linearities it was decided to take the initial GDP, the investment share and the tourism dependency variable in natural logs. Also an outlier analysis has been performed. Data for China and Equatorial Guinea was dropped due to unrealistically high average economic growth rates (above 7% on average), which hints at some serious problems with national statistics. The two countries that had an average growth rate of below −4% (Liberia and Congo) have been dropped too as we cannot control for the recurring occurrence of war in our model. Finally the Lebanon was dropped, as tourism data for this country only exists in the most recent years after the end of a long period of war.

Table 1 shows the results of the stepwise application of the cross-country regression equation (2). After adding all the relevant variables, specification A4 shows the coefficients of the variables in the equation as well as their significance for a sample of 134 countries around the world. This sample has been chosen out of a data pool of 209 countries and territories of the world on the basis of data availability of all five employed variables. In order not to diminish the sample further, those three variables that were calculated as averages (k, h, x) do not necessarily represent an average over the whole period of 38 years. Rather, they represent an average of years due to data availability. Here, the average investment data has the highest quality since the time series is complete for practically all of the countries, then comes the human capital variable with a mean of 33 observations per country that were used to calculate the average, and the tourism variable with a mean of 27 observations per country. A Breusch–Pagan/Cook–Weisberg test revealed that heteroskedasticity is present in the data. Therefore all the specifications in Table 1 have been estimated robust. Finally the matrix of simple correlation coefficients (see Appendix Table 1) of the variables of estimation A4 (and the following cross-country estimates) shows that multicollinearity can be ruled out (none with a correlation coefficient above 0.75).

In specification A4 all the classical economic growth variable coefficients have the expected signs and are highly significant. The estimated coefficient of the initial GDP per capita level has a negative sign, as rich countries tend to grow at a lower pace than poorer countries (given their investment in physical and human capital), as suggested by the conditional convergence theory. The estimated coefficients of physical and human capital have both positive signs, confirming their importance in explaining growth in the long run.

With regard to the estimated coefficient of the tourism dependency variable x, the result is significant at the five percent level too and the sign of the coefficient is positive. Given the linear-log relationship, this implies the following: an increase of the share of tourism exports in GDP by ten percent increases (ceteris paribus) the growth rate of real GDP per capita by about 0.02 percentage points after controlling for initial GDP per capita as well as physical

Table 1
Tourism and economic growth.

Estimations	A1	A2	A3	A4
	Dependent variable			
Independent variables	Growth	Growth	Growth	Growth
Constant	1.200 (8.66)***	1.020 (0.95)	−0.369 (−0.45)	3.689 (2.72)***
Initial GDP per capita	–	0.022 (0.17)	−0.204 (−1.55)	−0.663 (−3.61)***
Physical capital	–	–	1.161 (4.59)***	0.620 (2.21)**
Human capital	–	–	–	0.026 (3.66)***
Tourism	0.530 (5.80)***	0.529 (5.66)***	0.321 (3.79)***	0.223 (2.59)**
R^2	0.192	0.193	0.333	0.393
Number of observations	135	135	135	134

Note. Values of the *t* statistics are in parentheses. The symbols *, **, and *** following the *t* statistics represent a 10, 5, and less than 1% significance level, respectively.

and human capital. This appears as a rather modest impact. Fig. 1 shows the scatter plot of the relationship of tourism and growth including the (partial) regression line. The goodness of fit (R^2) of the model with regard to the data is moderate. The model can explain about 40% of the variance of the dependent variable.

2.2. The transmission channels

In order to find out more about the channels through which tourism influences economic growth we augment regression A4 by variables used in the Copeland (1991) and the Chao et al. (2006) models that explain the relationship between tourism dependency and economic development. Moreover this task can be seen as a sensitivity analysis to the growth model above. We included the following variables: As a proxy for an appreciated real exchange rate we use the log of the real exchange rate distortion (RERD) index, averaged over the period of 1970–2007 (rerd). Based on the methodology of Dollar (1992) RERD was calculated by dividing the actual relative price level (RPL) by the predicted price level (PPL). This provides a measure of the extent to which the real exchange rate is distorted away from a hypothetical free-trade level. An index above 100 indicates a distorted real exchange rate. Estimating the PPL is based on the assumption that there is a systematic relationship between the per capita GDP and the price level. The applied regression is comparable to regression number 6 in Table 2 of Dollar (1992). Data was taken from the PWT 6.3 database.

All the subsequent variables were constructed using the WDI 2008 database. As a proxy for domestic commodity taxes we used the share of taxes on goods and services in percent of the value added of industry and services, averaged over the period of 1970–2007 (tx). For the manufacturing sector we used the log of the share of manufactures exports in percent of exports of goods and services, averaged over the period of 1970–2007 (mxxgs), as our first choice proxy (manufacturing value added in percent of GDP) proved to be less robust. The former proxy might better capture the innovative and internationally competitive manufacturing sector.

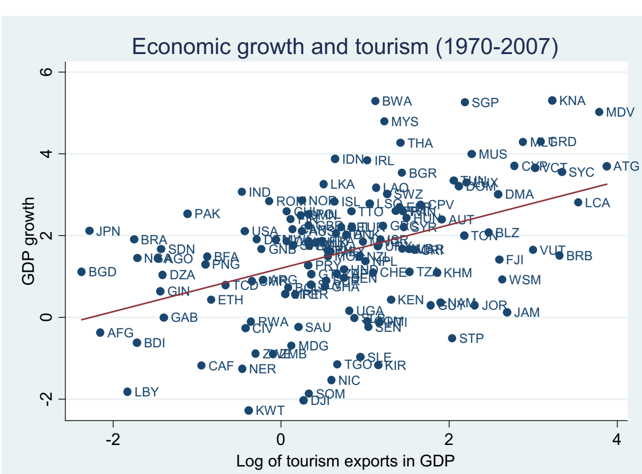

Fig. 1. Regression A4 (partial regression line).

Table 2 presents the results of the estimations including the above-mentioned three variables separately into regression A4. The inclusion of the real exchange rate distortion variable reduces the significance of the tourism variable to the 10% level. Thus it appears as if the two variables stand for similar things, just that the RERD variable explains it a bit better. According to Dollar (1992) the RERD index can also be seen as a trade openness indicator. In fact the Spearman rank correlation coefficient between tourism and RERD is negative (see Table 3), indicating that countries with a high level of tourism revenues have a less "distorted" real exchange rate. However the rank correlation coefficient is not significant. Nevertheless, in this respect it is interesting to look also at the correlation between the fraction of years during the period 1970–1990 in which each country is rated as an open economy (sopen) from the Sachs & Warner (SW) database (see Sachs & Warner, 2001 and earlier working papers) and the tourism variable. Here the rank correlation coefficient is positive and significant. Therefore we can assume that tourism dependent countries do not have appreciated real exchange rates and rather follow a trade openness policy.

The other channel through which tourism can benefit the economy in the Copeland (1991) model is domestic commodity taxes. Here one could think of taxed rents being reinvested to achieve

Table 2
Tourism, real exchange rate, taxes and manufacturing.

Estimations	B1	B2	B3
	Dependent variable		
Independent variables	Growth	Growth	Growth
Constant	7.447 (3.03)***	5.130 (3.48)***	2.783 (2.10)**
Initial GDP per capita	−0.768 (−3.94)***	−0.912 (−4.93)***	−0.661 (−4.25)***
Physical capital	0.775 (2.79)***	1.019 (3.95)***	0.838 (3.44)***
Human capital	0.029 (3.84)***	0.032 (4.30)***	0.017 (2.61)***
Real exchange rate distortion	−0.769 (−2.06)**	–	–
Taxes on goods and services	–	−0.077 (−2.88)***	–
Manufacturing exports share	–	–	0.283 (3.89)***
Tourism	0.157 (1.67)*	0.208 (2.09)**	0.213 (2.39)**
R^2	0.417	0.491	0.471
Number of observations	134	101	131

Note. Values of the *t* statistics are in parentheses. The symbols *, **, and *** following the *t* statistics represent a 10, 5, and less than 1% significance level, respectively.

Table 3
Spearman rank correlation coefficients.

	Tourism
Real exchange rate distortion	−0.039 (0.651)
Taxes on goods and services	0.267 (0.007)***
Manufacturing exports share	0.128 (0.147)
Trade openness	0.384 (0.000)***
Physical capital	0.435 (0.000)***
Human capital	0.327 (0.000)***

Note. *P*-Values are in parentheses. The symbols *, **, and *** following the *P*-values represent a 10, 5, and less than 1% significance level, respectively.

growth. Including the tax indicator in the regression yields only a slight reduction of the significance of the tourism variable. However the tax coefficient itself is negative and significant. The tax indicator is significantly positively correlated with the tourism variable. Given that Copeland (1991) and Chao et al. (2006) assume higher tourism revenues to be associated with a smaller manufacturing sector we would also like to check for the manufacturing share in GDP. Estimation B3 shows that the inclusion of the share of manufactures exports in percent of exports of goods and services lets the tourism coefficient's significance drop only slightly. Here the manufacturing coefficient is also positive and highly significant. The Spearman rank correlation with the tourism dependency variable is positive and significant at the 10% level. Together with the acquired results for the real exchange rate distortion and openness this again hints at tourism countries being rather trade open and not at all lagging behind in the manufacturing sector. In addition Table 3 also presents the correlation coefficients between tourism and investment in physical and human capital. Both are positive and significant.

After testing the central propositions of the Copeland (1991) and the Chao et al. (2006) model, the main empirical findings of our cross-country analysis are as follows. Countries dependent on tourism revenue do not experience lower economic growth. Rather the opposite is true. It was shown that countries with higher shares of tourism income in GDP grow faster than others after controlling for traditional growth-explaining variables (initial output level, physical and human capital). However it has to be noted that the sensitivity analysis has shown that the tourism dependency variable in the growth equation is not entirely robust. Checking for alternative specifications has let the significance of the tourism coefficient drop in some cases to the 10% significance level (including the inclusion of the outlier countries). Thus, at least it can be said that the coefficient of the tourism dependency variable was never found to be negative. This can be shown also in other specifications, which have been looked at as additional robustness checks. In one of the specifications we have added natural resource abundance proxies in order to also control for the original Dutch Disease phenomenon. Here a non-linear relationship was found. Augmenting estimation A4 by the share of fuel exports in total merchandise exports as well as the squared fuel export share we found a positive coefficient for the former and a negative coefficient for the latter variable. This indicates a negative growth effect of excessive fuel export shares. All the other coefficients of the original A4 estimation remained significant.

We have also performed a sensitivity analysis using different sub-samples according to tourism dependency, growth and initial GDP. We looked at the lower, upper and central half of the respective category distribution. For different non-linear settings of specification A4, we find that tourism specialisation has a positive and significant growth impact in the group of countries with an intermediate share of tourism dependency, with both higher and lower growth countries, as well as with countries that had a higher initial GDP. In the other specifications the tourism coefficient proofed to be not significant. This might hint at tourism being growth enhancing only in more developed countries and not necessarily among countries that started from a low level of economic development. Finally we have performed bootstrap and jackknife estimations of specification A4. However, the significance of the results does not change substantially.

To sum up, countries with higher income from tourism tend not only to have higher economic growth rates but also higher levels of investment and secondary school enrolment. These indirect effects of tourism could be explained by the necessities of tourism specific investment in physical and human capital as for example in transport infrastructure and the acquisition of languages. The appreciation of the real exchange rate does not appear to be a mechanism by which tourism can benefit the economy. In fact, the empirical evidence we have provided above shows that tourism is not related to a higher domestic price level. Countries dependent on tourism were shown to be rather outward oriented, having low levels of real exchange rate distortion. Our cross-country analysis confirmed the idea that countries with high income from tourism have high revenues from taxes on goods and services too. However, whether a country can benefit from that or not depends probably rather on the way in which the country is spending those tax revenues. Finally, tourism seems not to lead to a contraction of the manufacturing sector. This is a rather unexpected result given the implications of the models by Copeland (1991) and Chao et al. (2006).

Given the above findings we would like to study in more depth the transmission channels in the following section. Here we calculate the indirect effects of tourism on economic growth for each of the transmission channels.

2.3. *Tourism's direct and indirect effects on growth*

In closely following the methodology of Papyrakis and Gerlagh (2004, 2007) which is based on Mo (2000, 2001) we can reformulate equation (2) in a more general way:

$$g_i = \alpha_0 + \alpha_1 y_{0i} + \alpha_2 x_i + \alpha_3 z_i + \varepsilon_i, \tag{3}$$

where z is a vector of explanatory variables including k, h, rerd, tx and mxxgs. This is a set of variables that, according to Copeland (1991), are potentially important transmission channels for the impact of tourism on economic growth. Estimating equation (3) using our data set yields the results as described in estimation C1 of Table 4. All the estimated coefficients are of considerable magnitude and significant, the sole exception being the variable for tourism dependency. After inclusion of all the variables from z the tourism coefficient has become tiny and insignificant. This might indicate that a large part of the effects tourism on economic growth is explained through indirect transmission channels.

In order to analyse the magnitude and relative importance of the transmission channels we have to first estimate the dependence of the z variables on tourism as follows:

$$z_i = \beta_0 + \beta_1 x_i + \mu_i, \tag{4}$$

where z_i, β_0, β_1 and μ_i are vectors of which each element is associated with the variables k, h, rerd, tx and mxxgs. Table 5 presents the results of this exercise.

These results are in line with the previous correlations we have been conducting, except for the coefficient of tourism with regard to manufacturing, which is here negative but not significant. Using these results we are able to calculate the direct and indirect effects of tourism on growth. Substituting equation (4) into (3) yields:

$$g_i = (\alpha_0 + \alpha_3 \beta_0) + \alpha_1 y_{0i} + (\alpha_2 + \alpha_3 \beta_1) x_i + \alpha_3 \mu_i + \varepsilon_i. \tag{5}$$

Here $\alpha_2 x_i$ represents the direct effect of tourism on economic growth, $\alpha_3 \beta_1 x_i$ denotes the indirect effect via the transmission channels and μ_i are the residuals of the estimations of equation (4).

Table 4
Direct and indirect effects of tourism on growth.

Estimations	C1 direct only	C2 incl. indirect
	Dependent variable	
Independent variables	Growth	Growth
Constant	9.200 (4.13)***	10.305 (6.92)***
Initial GDP per capita	−1.074 (−5.97)***	−1.074 (−5.97)***
Physical capital	1.127 (4.56)***	1.127 (4.56)***
Human capital	0.036 (4.80)***	0.036 (4.80)***
Real exchange rate distortion	−0.863 (−2.47)**	−0.863 (−2.47)**
Taxes on goods and services	−0.067 (−2.63)***	−0.067 (−2.63)***
Manufacturing exports share	0.197 (1.84)*	0.197 (1.84)*
Tourism	0.158 (1.61)	0.550 (6.32)***
R^2	0.559	0.559
Number of observations	101	101

Note. Values of the *t* statistics are in parentheses. The symbols *, **, and *** following the *t* statistics represent a 10, 5, and less than 1% significance level, respectively.

Table 6
Relative importance of the transmission channels.

Transmission channels	α_3	β_1	Contribution to $\alpha_2+\alpha_3\beta_1$	Relative contribution in %
Tourism			0.158	29
Physical capital	1.127	0.175	0.197	36
Human capital	0.036	6.952	0.250	46
Real exchange rate distortion	−0.863	−0.009	0.008	1
Taxes on goods and services	−0.067	0.935	−0.062	−11
Manufacturing exports share	0.197	−0.003	−0.001	0
Total			0.550	100

The results of the estimation of equation (5) are presented in specification C2 of Table 4. Now the tourism coefficient is highly significant and of considerable magnitude. Thus including direct and indirect effects an increase of the share of tourism revenues in GDP by ten percent is related to an increase of the GDP per capita growth rate by about 0.05 percentage points. As compared to the specification C1 the value of the tourism coefficient more than doubled, though it is still very small. Further we can also quantify the relative importance of each transmission channel in the explanation of the overall impact of tourism on growth.

Table 6 presents in the first column the α_3 coefficients of the respective transmission channels as found in estimation C1 of Table 4. The second column in Table 6 shows the β_1 coefficients as provided by Table 5. In the last two columns the direct contribution α_2 as well as the indirect contributions $\alpha_3\beta_1$ are being shown, also as percentages of the total. It appears that the most important transmission channel of tourism on growth is the human capital variable with almost half of the total contribution share. Physical capital comes next with about a third of the total contribution. The other channels seem to be unimportant or even negative such as the taxation channel. Tourism's direct growth effect makes 29% of the total effects.

3. Panel data analysis

This part seeks to check the main results of the above cross-country analysis section on the long-run relationship of tourism and economic growth from a panel data analysis perspective. The main advantage is that panel data allows for the analysis of the cross-section and the time dimension. Estimators based on panel data are often more accurate even with identical sample sizes, and the use of a panel data set will often yield more efficient estimators than a series of independent cross-sections. We shall try the following panel data approaches: a Cobb–Douglas production function and a trans-log production function. The latter allows us to avoid the assumption of a constant elasticity of output with respect to input, imposed by the Cobb–Douglas production function as well as to examine the pattern of complementarity and substitutability between inputs into the production function.

A major issue that can be dealt with in a panel data setting is the problem of reverse causality (i.e. endogeneity) in an aggregate production function, with e.g. an increase in income leading to an increase in physical capital (for example through a savings function determining investment). Also, output and capital variables may be non-stationary. As a consequence, the production function may represent a long-run cointegrating relationship. For this case panel data cointegration methods would be appropriate (see Baltagi & Kao, 2000). In order to check this we conducted a Fisher-type panel unit-root test for the base line model as developed in the next section. The test includes a time trend and a lag structure of five. Following the inverse chi-squared statistics for the case of a finite number of groups N (see Choi, 2001) we find that for the logs of the variables GDP per capita, physical capital and tourism a unit root in all panels can be rejected at the 1% significance level and for human capital at the 10% significance level. Nevertheless, a cointegrated relationship cannot be assumed. Thus, in order to control for the possible endogeneity of tourism and the other income explaining variables, we will use a dynamic panel data estimator. One of the most commonly used is the System-GMM estimator as developed by Arellano and Bover (1995) and Blundell and Bond (1998). This also allows us to compare the results with those obtained in Sequeira and Nunes (2008).

3.1. Cobb–Douglas production function estimates

Our starting point to investigate the long-run impact of tourism on economic growth in a panel data Cobb–Douglas production function setting is a common world-wide production function given by

$$y_{it} = f[k_{it}, h_{it}, x_{it}], \quad (6)$$

where y is the log output per capita as a function f of k, h and x, which represent the log of per capita inputs of physical capital, human capital and tourism dependency (or 'tourism capital')

Table 5
Indirect transmission channels.

Estimations	D1	D2	D3	D4	D5
	Dependent variables				
Independent variable	Physical capital	Human capital	Real exchange rate distortion	Taxes on goods and services	Manufact. exports share
Constant	2.808	51.561	4.554	8.650	3.004
Tourism	0.175	6.952	−0.009	0.935	−0.003
(*t*)	(3.72)***	(2.80)***	(−0.30)	(2.61)***	(−0.03)
R^2	0.122	0.074	0.000	0.065	0.000
Number of observations	101	101	101	101	101

Note. Values of the *t* statistics are in parentheses. The symbols *, **, and *** following the *t* statistics represent a 10, 5, and less than 1% significance level, respectively.

respectively. In this section we allow the production function f to be Cobb–Douglas, so that, in logs, we have

$$f[k_{it}, h_{it}, x_{it}] = \beta_1 k_{it} + \beta_2 h_{it} + \beta_3 x_{it}. \tag{7}$$

With regard to estimating this production function possible endogeneity might be a major problem, where capital inputs may determine output, but output may also have a feedback into capital accumulation. Therefore we shall try to estimate the following equation

$$y_{it} = \gamma_t + \alpha y_{it-1} + \beta_1 k_{it} + \beta_2 h_{it} + \beta_3 x_{it} + \eta_i + \nu_{it} \tag{8}$$

where equation (6), using (7), was augmented by period-specific intercepts γ_t, that capture productivity changes that are common to all countries, and the lagged output variable, which can be interpreted to measure conditional convergence. The η_i represents unobserved individual-level effects and the ν_{it} reflect the observation-specific errors. Moreover the estimator uses as GMM-style instruments the lags of the first differences of y, k, h and x, as well as the time dummies as standard IV-style instruments. Finally the equation is estimated in a robust way. This is necessary as tests have revealed both groupwise heteroskedasticity in the residuals as well as serial correlation in the idiosyncratic errors of the panel data model. Thus, the resulting standard error estimates are consistent in the presence of any pattern of heteroskedasticity and autocorrelation within panels. Although panel results based on annual time series that are usually subject to cyclical movements in some of the series can blur the long-run relationship, we are confident that the main properties of the system-GMM estimator (lagged variables and instruments as well as time dummies) will overcome most of this problem.

For the levels of output per capita y_{it} we use the natural logs of real GDP per capita at PPP between 1970 and 2007. We construct a physical capital stock k_{it} (in natural logs), for the years of the period 1970–2007, using a perpetual inventory method. Assuming a capital-output ratio of three in a base year (for our purpose this is 1960) we update each year's capital stock by adding investment and subtracting as depreciation 7% of the existing capital stock. The human capital stock h_{it} is being proxied by the natural logs of the gross secondary school enrolment ratio from 1970 to 2007. Our proxy for the 'tourism capital stock' x_{it} is the natural log of the share of travel income in % of GDP for the years of 1970–2007. In fact one could interpret the variable x_{it} as an indicator of tourism dependency. However, assuming x_{it} to represent a stock of tourism capital is again a working assumption in order to fit the basic assumptions of the Cobb–Douglas production function. Data sources are the same as in the cross-country part.

What can be observed from the results of estimation E1 in Table 7 is that in this simple model without time dummies the coefficients of both traditional growth-explaining capital variables (physical and human) are positive and significant. Interestingly, after adding world-wide time dummies in estimation E2, the estimated coefficient of the human capital variable diminishes and looses all its significance. Most probably this can be explained by the fact that our human capital variable, proxied by secondary school enrolment, does not vary much over time. However, the few variations for the single countries seem to be better explained by the world-wide changes of total factor productivity over time (i.e. the time dummies).

With respect to the tourism variable, the results don't change a lot over the two specifications. In fact size and significance improves after the inclusion of the time dummies. Therefore we shall focus on the main estimation E2, which is the estimation of equation (8), as defined above.

The panel data set used in E2 is made up of 99 countries of the world with an average of 27 years per country, which results in 2698 observations. The estimated coefficient for the tourism variable is positive and significant. Though, the coefficient is not amazingly high. The interpretation of the results is that a 1% increase in the share of tourism in GDP results in a 0.02% higher GDP per capita, given the investment in physical and human capital. Thus, we can conclude that tourism has a positive impact on the aggregate output of nations. It should be also mentioned that the AR(1), AR(2) and the Hansen specification tests indicate that the instruments applied seem to be valid.

Table 7
Tourism and output.

Estimations	E1	E2
Time dummies	No	Yes
	Dependent variable	
Independent variables	GDP per capita	GDP per capita
Constant	0.084 (1.59)	0.082 (1.48)
Lagged GDP per capita	0.941 (35.98)***	0.950 (35.49)***
Physical capital	0.040 (2.13)**	0.035 (1.77)*
Human capital	0.018 (2.05)**	0.008 (0.83)
Tourism	0.011 (2.00)**	0.018 (2.84)***
Countries	99	99
Average T	27.3	27.3
Number of observations	2698	2698

Note. Values of the *t* statistics are in parentheses. The symbols *, **, and *** following the *t* statistics represent a 10, 5, and less than 1% significance level, respectively.

These results are in line with those comparable in Sequeira and Nunes (2008) in Table A1, column (3). With close to 3% the estimated rate of convergence is very similar and also comparable to the standard literature. Moreover, they also find an insignificant human capital variable, which thus is not inconsistent with previous contributions. Also the coefficient of the tourism variable is quite similar. However, while it is highly significant in our estimation it is only significant at the 10% level in Sequeira and Nunes (2008). Moreover, they did not control for the possible transmission channels of tourism specialisation on economic development.

Table 8 provides first a short sensitivity analysis for our tourism variable and second a quick confirmation of our earlier results on possible transmission channels in the cross-country section. It has to be noted though that applying the same sample of 99 countries to the cross-section specification of estimation A4 lets the tourism coefficient remain positive but insignificant.

In a general regression (F1) which includes, beside the tourism dependency variable, physical and human capital, RERD and the manufacturing exports share, the coefficient of the tourism variable remains positive and its significance drops only a bit to the 5% significance level. We had to restrain from including the taxation variable as it caused collinearity with most of the time dummy variables. As in the cross-country section the coefficient of real exchange rate distortion is negative but not highly significant.

Table 8
Real exchange rate and manufacturing.

Estimation	F1
	Dependent variable
Independent variables	GDP per capita
Constant	0.129 (2.34)**
Lagged GDP per capita	0.970 (52.93)***
Physical capital	0.023 (1.51)
Human capital	0.000 (0.02)
Tourism	0.008 (2.08)**
Real exchange rate distortion	−0.021 (−1.83)*
Manufacturing exports share	0.008 (2.66)***
Countries	97
Average T	22.6
Number of observations	2191

Note. Values of the *t* statistics are in parentheses. The symbols *, **, and *** following the *t* statistics represent a 10, 5, and less than 1% significance level, respectively.

However, the manufacturing exports coefficient is positive and very significant and curbs some of the significance of the tourism variable. This again hints at tourism specialisation not being detrimental to a competitive manufacturing sector. Thus we see our earlier results being confirmed also in a panel data specification.

3.2. Trans-log production function estimates

The trans-log specification as for instance developed in Canning and Bennathan (2000) allows us to avoid the assumption of a constant elasticity of output with respect to input, imposed by the Cobb–Douglas production function as well as to examine the pattern of complementarity and substitutability between inputs into the production function.

In this section we allow the production function f of the equation (6) to have the following logarithmic form

$$f[k_{it}, h_{it}, x_{it}] = \beta_1 k_{it} + \beta_2 h_{it} + \beta_3 x_{it} + \beta_4 k_{it}^2 + \beta 5 h_{it}^2 + \beta_6 x_{it}^2 + \beta_7 k_{it} h_{it} + \beta_8 k_{it} x_{it} + \beta_9 h_{it} x_{it}. \quad (9)$$

Here, equation (7) is augmented by the squared terms of the capital inputs (allowing for either increasing or decreasing returns) as well as the interactive terms, which are the products of the three variables with each other.

A testable equation could therefore have the following form

$$y_{it} = \gamma_t + \alpha y_{it-1} + \beta_1 k_{it} + \beta_2 h_{it} + \beta_3 x_{it} + \beta_4 k_{it}^2 + \beta_5 h_{it}^2 + \beta_6 x_{it}^2 + \beta_7 k_{it} h_{it} + \beta_8 k_{it} x_{it} + \beta_9 h_{it} x_{it} + \eta_i + \nu_{it}, \quad (10)$$

where equation (6), using (9), was augmented by the period-specific intercepts γ_t and the lagged output variable, as described in the section above. Again, the η_i represents unobserved individual-level effects and the ν_{it} reflect the observation-specific errors. The equation is estimated robust, including the earlier described GMM and IV-style instruments. Table 9 reports the results of the trans-log production function estimates for all the three inputs as put forward in equation (10). The important results to analyse in the trans-log production function estimate are the coefficients of the squared and the interactive terms.

Estimation G1 can be interpreted in the following way. Among the squared terms only the human capital coefficient is significant and positive. This implies that investment in human capital has increasing returns. Regarding the interactive terms only the interaction effects between tourism and physical capital are positive and significant. This suggests the two being rather complements than substitutes. Thus, one could think of investment in traditional physical capital, such as an airport, to be complemented by investment in 'tourism capital', such as e.g. a golf court and vice versa. All the other coefficients, apart from the coefficient for lagged GDP per capita, are not significant in this specification.

To conclude, in countries with higher levels of physical capital, such as for instance infrastructure, investment in tourism is more profitable. This result seems to be comparable to our earlier cross-country growth regressions on income level sub-samples, where tourism specialisation had only a significant impact in countries with above-average income per capita levels.

Table 9
Trans-log production function.

Estimation	G1
	Dependent variable
Independent variables	GDP per capita
Constant	0.072 (0.23)
Lagged GDP per capita	0.943 (31.92)***
Physical capital	0.063 (1.01)
Human capital	−0.041 (−0.41)
Tourism	−0.041 (−0.97)
Physical capital, squared	−0.000 (−0.02)
Human capital, squared	0.027 (2.19)**
Tourism, squared	0.003 (1.08)
Physical capital × human capital	−0.011 (−0.77)
Physical capital × tourism	0.011 (2.16)**
Human capital × tourism	−0.011 (−1.32)
Countries	99
Average T	27.3
Number of observations	2698

Note. Values of the *t* statistics are in parentheses. The symbols *, **, and *** following the *t* statistics represent a 10, 5, and less than 1% significance level, respectively.

4. Conclusion

The aim of this research was to analyse empirically the danger of a Dutch Disease Effect for tourism dependent countries in the long run (i.e. the 'Beach Disease Effect') as described in the Copeland (1991) and the Chao et al. (2006) models. We performed econometric analyses of the long-run effects of a large tourism sector on aggregate output using data for 134 countries over the period of 1970–2007. Our proxy for tourism capital is the share of travel services exports in GDP. It has to be noted that such variables like the number of star rated hotels and the number of natural attractions would have been better proxies for tourism as an input in a production function. However, this type of data is not available for that many countries and years. Thus our variable of interest can also be interpreted as an indicator of tourism dependency.

In a first econometric analysis the general, long-run relationship between tourism, growth, the real exchange rate, taxation and the manufacturing sector was analysed in a cross-country setting. These are the relevant variables in the Copeland and the Chao et al. models. A panel data framework gave the possibility to check the acquired results. Moreover, this second approach allowed to control for reverse causality, non-linearity and interactive effects.

In the cross-country analysis it was shown that countries with higher shares of tourism income in GDP grow faster than others after controlling for traditional growth-explaining variables (initial output level, physical and human capital). Moreover, countries with higher income from tourism tend not only to have higher economic growth rates but also higher levels of investment and secondary school enrolment. Countries dependent on tourism showed to be rather outward oriented having low levels of real exchange rate distortion. Finally tourism seems not to lead to a contraction of the manufacturing sector. An analysis of possible transmission channels of tourism on growth showed that most of the indirect effects of tourism can be expected to work via the physical and human capital channels.

The panel data analysis has generally confirmed the results of the cross-country analysis. The estimation of a traditional Cobb–Douglas production function suggests that tourism has a positive impact on the aggregate output of nations. A trans-log model showed that tourism capital and physical capital are complements.

The main policy recommendation for countries in development with a potential for tourism specialisation is to invest apart from tourism specific also into traditional infrastructure, which can be used both by the tourism sector as well as by the manufacturing sector. This might reduce the general costs of doing business and therefore possible real exchange rate distortions. Thus, a productive manufacturing industry and a less productive tourism sector can co-exist and both can generate above-average income based on common investment in physical infrastructure.

To conclude, it can be said that at least in the long run there is no danger of a Dutch Disease Effect in tourism dependent countries. Thus, no fear of a Beach Disease! Still this effect could be valid in the short or medium run and should be analysed further in future research.

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Appendix

Appendix Table 1
Cross-country data pairwise correlation matrix, results significant at the 5% level.

	Growth	Initial GDP	Physical capital	Human capital	Tourism	RERD	Taxes	Manuf. exports	sopen
Growth	1.00								
Initial GDP		1.00							
Physical capital	0.45	0.29	1.00						
Human capital	0.34	0.71	0.55	1.00					
Tourism	0.44		0.42	0.32	1.00				
RERD			0.30			1.00			
Taxes			0.23	0.33	0.26		1.00		
Manuf. exports	0.35	0.26	0.17	0.36		−0.17		1.00	
sopen	0.57	0.63	0.52	0.71	0.33			0.49	1.00

Appendix Table 2
Panel unit-root test.

Inverse chi-squared statistics	*P*-Value
GDP per capita	0.001
Physical capital	0.000
Human capital	0.081
Tourism	0.004
N = 99	
Average number of periods = 27.25	

Note: the Fisher-type unit-root test based on Phillips–Perron tests assumes as a null-hypothesis that all panels contain unit roots.

Appendix Table 3
Descriptive statistics.

Code	Country name	Average travel services exports in % of GDP (1970–2007)	Average real exchange rate distortion index (1970–2007)	Average manufacturing exports in % of total (1970–2007)	GDP per capita at PPP in 2007	Average GDP per capita growth rate (1970–2007)
ATG	Antigua and Barbuda	48.2	111	29.8	18,527	3.7
MDV	Maldives	44.2	199	6.6	4998	5.0
LCA	St. Lucia	34.4	67	10.1	12,708	2.8
SYC	Seychelles	28.3	107	0.6	18,175	3.6
BRB	Barbados	27.5	56	16.3	25,486	1.5
KNA	St. Kitts and Nevis	25.3	122	14.5	14,774	5.3
GRD	Grenada	22.1	80	4.0	14,498	4.3
VCT	St. Vincent and the Grenadines	20.5	174	3.9	6231	3.7
VUT	Vanuatu	20.1	80	1.3	5582	1.6
MLT	Malta	17.9	112	49.7	20,982	4.3
CYP	Cyprus	16.1	122	21.2	25,136	3.7
JAM	Jamaica	14.8	74	32.4	8219	0.1
WSM	Samoa	13.9	61	12.7	5796	0.9
FJI	Fiji	13.4	100	9.9	5819	1.4
DMA	Dominica	13.2	177	20.8	4941	3.0
BLZ	Belize	11.8	80	6.1	9530	2.1
JOR	Jordan	10.0	112	24.3	5165	0.3
MUS	Mauritius	9.7	35	44.2	20,008	4.0
LUX	Luxembourg	9.1	102	26.7	77,766	3.3
SGP	Singapore	8.9	103	65.2	44,599	5.3
TON	Tonga	8.8	68	3.8	5762	2.0
DOM	Dominican Republic	8.3	85	32.3	9665	3.2
TUN	Tunisia	7.8	57	36.5	10,121	3.3
STP	Sao Tome and Principe	7.7	44		4400	−0.5
AUT	Austria	6.8	104	57.4	36,027	2.4
NAM	Namibia	6.7	79	36.2	6395	0.4
KHM	Cambodia	6.4	74	63.5	2824	1.1
GUY	Guyana	5.9	152	10.0	2458	0.3

Appendix Table 3 (*continued*)

Code	Country name	Average travel services exports in % of GDP (1970–2007)	Average real exchange rate distortion index (1970–2007)	Average manufacturing exports in % of total (1970–2007)	GDP per capita at PPP in 2007	Average GDP per capita growth rate (1970–2007)
CPV	Cape Verde	5.3	73	6.7	7745	2.8
CRI	Costa Rica	4.9	91	26.0	11,833	1.7
TZA	Tanzania	4.6	154	8.8	922	1.1
MAR	Morocco	4.6	60	28.3	5419	1.7
HUN	Hungary	4.5	66	56.2	17,183	2.4
SYR	Syrian Arab Republic	4.3	220	12.4	2932	2.2
PAN	Panama	4.3	158	1.3	9137	2.6
ALB	Albania	4.2	180	32.2	4729	1.7
BGR	Bulgaria	4.2	152	44.2	9755	3.5
THA	Thailand	4.1	75	38.8	9407	4.3
ESP	Spain	4.1	97	45.7	31,443	2.7
PRT	Portugal	3.9	95	52.1	20,123	2.6
KEN	Kenya	3.7	69	12.1	2024	0.4
SWZ	Swaziland	3.5	47	63.3	7297	3.0
MYS	Malaysia	3.4	77	40.5	17,893	4.8
GRC	Greece	3.4	96	21.7	27,720	2.2
ISR	Israel	3.3	126	53.1	24,048	1.9
HTI	Haiti	3.2	71	31.1	1581	−0.1
KIR	Kiribati	3.2	108	0.1	1802	−1.2
URY	Uruguay	3.2	84	24.4	12,921	1.7
LAO	Lao PDR	3.1	79		2280	3.2
BWA	Botswana	3.1	77	73.7	9406	5.3
CHE	Switzerland	3.0	132	68.0	37,309	1.1
LSO	Lesotho	2.9	74	79.2	2335	2.8
SEN	Senegal	2.8	89	19.1	1901	−0.2
IRL	Ireland	2.8	123	54.3	41,635	3.8
COM	Comoros	2.8	65	4.9	1747	−0.1
NPL	Nepal	2.7	56	29.8	1932	1.4
MNG	Mongolia	2.6	285	18.1	2590	1.9
SLE	Sierra Leone	2.6	43	41.3	1884	−1.0
NZL	New Zealand	2.5	111	17.1	25,397	1.5
SLB	Solomon Islands	2.4	178	0.0	1327	0.0
TUR	Turkey	2.3	123	36.1	7737	2.2
TTO	Trinidad and Tobago	2.3	96	21.2	25,895	2.6
UGA	Uganda	2.3	160	6.3	1171	0.2
DNK	Denmark	2.2	148	42.6	34,287	2.0
BEN	Benin	2.1	90	7.0	1412	1.0
HND	Honduras	2.1	106	8.7	3693	1.2
BEL	Belgium	2.0	117	80.8	33,794	2.2
TGO	Togo	2.0	117	12.3	868	−1.2
ZAF	South Africa	1.9	74	33.4	10,483	1.1
ITA	Italy	1.9	107	69.0	28,816	2.1
IDN	Indonesia	1.9	71	24.7	5186	3.9
ISL	Iceland	1.9	144	6.5	38,197	2.8
NIC	Nicaragua	1.8	184	10.2	2177	−1.5
MEX	Mexico	1.8	97	42.7	11,203	1.6
MOZ	Mozambique	1.7	91	5.3	2219	1.5
PHL	Philippines	1.7	58	35.0	4791	1.6
SUR	Suriname	1.7	93	141.8	9997	0.9
GHA	Ghana	1.7	152	6.7	1653	0.8
LKA	Sri Lanka	1.7	58	31.1	6050	3.3
FRA	France	1.6	123	62.8	29,632	1.9
NLD	Netherlands	1.5	107	49.9	34,391	1.8
GTM	Guatemala	1.4	69	24.0	6095	1.1
SLV	El Salvador	1.4	80	30.5	5589	0.8
ECU	Ecuador	1.4	88	4.1	6025	1.7
MLI	Mali	1.4	80	5.4	1273	1.8
SOM	Somalia	1.4	177		463	−1.9
POL	Poland	1.4	87	53.2	14,478	2.5
GBR	United Kingdom	1.4	112	56.2	32,176	2.2
PRY	Paraguay	1.4	65	5.2	4713	1.3
DJI	Djibouti	1.3	55	0.8	4271	−2.0
AUS	Australia	1.3	119	17.7	36,303	2.1
NOR	Norway	1.3	140	22.9	48,391	2.9
OMN	Oman	1.3	55	21.8	24,696	2.5
SAU	Saudi Arabia	1.2	58	5.7	20,202	−0.2
PER	Peru	1.2	86	11.9	6400	0.6
SWE	Sweden	1.1	144	63.9	32,952	1.8
CAN	Canada	1.1	110	49.6	36,166	2.2
MDG	Madagascar	1.1	87	12.5	856	−0.7
FIN	Finland	1.1	149	66.8	32,481	2.4
BOL	Bolivia	1.1	81	7.0	3779	0.7

(*continued on next page*)

Appendix Table 3 (*continued*)

Code	Country name	Average travel services exports in % of GDP (1970–2007)	Average real exchange rate distortion index (1970–2007)	Average manufacturing exports in % of total (1970–2007)	GDP per capita at PPP in 2007	Average GDP per capita growth rate (1970–2007)
CHL	Chile	1.1	87	8.8	18,380	2.6
COL	Colombia	1.1	72	19.5	7790	1.9
MRT	Mauritania	1.0	85	2.0	2301	0.6
MWI	Malawi	0.9	69	5.6	1254	1.9
ZMB	Zambia	0.9	105	6.1	1978	−0.9
ROM	Romania	0.9	136	64.3	9310	2.8
ARG	Argentina	0.8	97	25.2	15,273	0.9
GNB	Guinea-Bissau	0.8	106	1.1	623	1.7
DEU	Germany	0.7	117	87.7	31,303	1.9
ZWE	Zimbabwe	0.7	63	25.3	1894	−0.9
CMR	Cameroon	0.7	77	5.6	2602	0.9
RWA	Rwanda	0.7	61	3.2	1135	−0.1
KWT	Kuwait	0.7	82	17.0	42,061	−2.3
CIV	Cote d'Ivoire	0.7	91	10.7	2228	−0.3
USA	United States	0.6	103	53.0	42,897	2.1
NER	Niger	0.6	97	3.3	860	−1.3
IND	India	0.6	72	48.7	3825	3.1
TCD	Chad	0.5	95	1.4	2440	0.8
ETH	Ethiopia	0.4	61	4.7	1111	0.4
BFA	Burkina Faso	0.4	98	7.3	1382	1.5
PNG	Papua New Guinea	0.4	153	3.8	2206	1.3
CAF	Central African Republic	0.4	100	29.4	864	−1.2
PAK	Pakistan	0.3	67	61.4	3589	2.5
GAB	Gabon	0.2	86	3.9	7859	0.0
DZA	Algeria	0.2	146	2.3	6422	1.0
SDN	Sudan	0.2	153	1.3	2276	1.7
GIN	Guinea	0.2	87	21.5	3584	0.6
AGO	Angola	0.2	134	0.0	5116	1.4
NGA	Nigeria	0.2	147	0.8	2528	1.4
BDI	Burundi	0.2	73	2.2	644	−0.6
BRA	Brazil	0.2	105	38.7	9644	1.9
LBY	Libya	0.2	127	1.6	19,085	−1.8
AFG	Afghanistan	0.1	122	8.2	753	−0.4
JPN	Japan	0.1	138	85.9	30,587	2.1
BGD	Bangladesh	0.1	54	67.4	2341	1.1
Average values		4.9	102	27.0	12,454	1.6
Median values		2.0	95	21.2	6231	1.7
Average of travel share > 5% countries		16.3	97	23.1	14,977	2.6
Average of travel share < 1% countries		0.5	101	21.8	8115	0.7

Note: averages of travel services export shares are calculated according to data availability.

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