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TOURISM AND GROWTH NEXUS IN THE EU

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ABSTRACT

This paper investigates the heterogeneous effects of tourism on economic growth within the European Union from 2000 to 2019. We employ a panel quantile regression approach to analyse how tourism's impact varies across countries at different levels of economic development. This methodology, unlike traditional regression techniques, accounts for unobserved heterogeneity and is robust to outliers, making it particularly suitable for the diverse economic landscape of the EU. Our findings confirm the tourism-led growth hypothesis, providing evidence that tourism makes a significant contribution to economic growth, particularly in lower-growth economies. This suggests that tourism serves as a crucial "catch-up" driver, stimulating growth in countries where other economic alternatives may be scarce. Moreover, the obtained results are robust even when controlling for potential endogeneity by using a measure of GDP net of tourism. While our analysis supports the importance of physical capital and a negative effect of corruption, the impact of tourism is found to be most pronounced at lower quantiles of the growth distribution, highlighting its strategic importance for Southern and peripheral European countries seeking to boost economic prosperity.

KEY WORDS

tourism-led growth hypothesis, economic growth, core-periphery, European Union (EU), panel quantile regression

JEL CODES

L83, C33, O11

1 INTRODUCTION

Can International tourism be a government strategy for generating growth and employment? In the absence of better alternatives, it can be effective, especially in less developed countries that struggle to compete with advanced economies in high-class manufacturing and knowledge economies. Such a growth strategy could be successful if countries adopt a liberal travel visa regime and establish a competitive passenger transport system.

By creating such conditions, European integration has played a vital role in stimulating the growth of the European tourism industry. Tourism, the third largest economic sector in Europe

(European Parliament, 2015), significantly contributes to the economic development of many countries (Scott and Gössling, 2015). As Lew (2011) points out, tourism is the world's largest Service Sector Industry.

One should keep in mind that before the 2008 global financial crisis, the Economic and Monetary Union (EMU) was a union of diverse economic strategies. The core countries of the EMU have pursued diverse paths for economic growth. Some have relied on exporting manufacturing sector products or ICT-based services as drivers of aggregate demand (Hassel and Palier, 2021). Others, such as the Nordic countries and the Netherlands, have harnessed high domestic demand. Central and Eastern European economies, along with Ireland, have leveraged lower labour costs and/or favourable tax schemes and incentives to attract foreign direct investment for growth and job creation (Ban and Adascalitei, 2020; Bohle and Regan, 2021).

In contrast, the southern European economies within the EMU pursued a growth strategy based on expanding domestic demand. In these countries, domestic private and public consumption is stimulated by easy credit access and generous wage and fiscal policies (Hassel and Palier, 2021). These models coexisted within the EMU, supported by financial integration and capital flows from Germany, France, and the UK to peripheral economies (Blyth, 2013).

However, such complementarity collapsed when the global financial crisis disrupted financial markets and stopped interbank lending. Panic and uncertainty generated a crisis and a reversal of financial flows towards northern Europe (Merler and Pisani-Ferry, 2012).

Despite the challenges posed by the Eurozone crisis, Southern European countries demonstrated their resilience by adopting the concept of export-led growth. As Perez and Matsaganis (2019) highlight, these countries were compelled to export or 'fail' on the path of economic growth. The European integration process directed the countries of Southern Europe to use their comparative advantages in international tourism. Leveraging their comparative advantage in the tourism industry, these economies have significantly increased their exports, primarily in the form of internationally traded tourist services. Therefore, tourism-driven growth in southern European countries is de facto export-driven growth.

Debates about the causality of tourism and economic growth, as well as the mechanisms by which tourism contributes to economic growth, are never-ending stories. Our research aims to investigate the effect of tourism on economic growth within the neoclassical growth model (a theoretical framework that emphasises the role of technological progress and capital accumulation in economic growth). In doing so, we consider the existence of non-linearity in the tourism-growth relationship and the heterogeneous effects of tourism across countries at different stages of economic growth distribution.

In this paper, we demonstrate the degree to which tourism contributes to economic growth and how this contribution varies with the level of economic development. Unlike many studies that use traditional regression techniques, which focus only on conditional mean responses, we model the entire distribution of growth rates and follow a panel quantile regression approach.

Namely, the EU comprises economies with vastly different characteristics (e.g., core vs. periphery, tourism-dependent vs. diversified). Panel quantile regression is a suitable tool for revealing whether the impact of tourism on growth is more substantial in struggling economies (such as Greece at low quantiles of growth after the 2008 crisis) compared to booming economies (such as Germany at high quantiles of growth).

The method models the relationship between predictor variables and the conditional quantiles of the response variable, given the values of the predictor variables, to account for the effect of tourism at different levels of economic growth. In this way, we can quantify the asymmetric effect of tourism on the conditional distribution of growth rates, obtaining a clearer picture of this relationship. Empirical studies that apply quantile regression approaches to study the heterogeneous effects of tourism on different parts of the growth rate distribution are relatively

scarce. Research shows that countries facing relatively low growth rates can benefit more from tourism than countries facing relatively high growth rates (see Fayissa et al., 2011; Sahni et al., 2021).

Economic growth data often contains outliers (e.g., Ireland's GDP figures, sharp recessions). Panel quantile regression focuses on quantiles like the median and is more robust to extreme values and non-normality of data than mean-based estimators.

The paper is organised as follows. After the introduction, Section 2 reviews related literature. Section 3 presents the applied methodology, while Section 4 describes the data. Empirical findings are presented in Section 5. Finally, Section 6 brings concluding remarks and some policy recommendations.

2 LITERATURE REVIEW

Numerous studies have investigated the role of tourism in economic growth. While Pablo-Romero and Molina (2013) and Brida et al. (2016) provide a comprehensive literature review, Ahmad et al. (2020) and Eluwole et al. (2022) show recent evidence of the tourism-led growth hypothesis.

Many studies have focused on the causal relationship between tourism and economic growth. As Eluwole et al. (2022) and Panagiotidis et al. (2024) note, such research can be categorised into four groups. The first group views tourism as a driver of economic growth, characterised by unidirectional causality, which means that tourism directly causes economic growth but not vice versa (Xia et al., 2021). The second group assumes that causation can be observed in the opposite direction, meaning that economic growth drives tourism (Payne and Mervar, 2010). The third group indicates that economic growth and tourism development are highly interdependent (Mitra, 2019; Roudi et al., 2019). The fourth group, known as the neutrality hypothesis, does not support the tourism-led growth hypothesis (see Ekeocha et al., 2021; Tuğcu, 2014).

Lee and Chang (2008) investigate the validity of the tourism-led growth hypothesis in OECD and non-OECD countries. They use panel cointegration and panel causality analysis to examine the relationship between tourism and economic growth for both groups of countries. Empirical findings show a unidirectional causality from tourism to economic growth. That confirms the tourism-led growth hypothesis for the OECD, while the feedback link is confirmed for a group of non-OECD countries. Mitra (2019) also confirms such a result in a study of 158 countries, establishing a two-way cause-and-effect relationship between tourism and economic growth. Saint Akadiri et al. (2019) confirmed the tourism-led growth hypothesis for a panel of selected Mediterranean small island countries using the Johansen Fisher cointegration test and fixed-effect panel regression with Driscoll-Kraay standard errors.

Xia et al. (2022) confirmed the validity of the tourism-led growth hypothesis for 34 European countries. The study uses common correlated effects (the augmented mean group and group-mean as econometric tools).

In line with Brida et al. (2016), which emphasise the importance of using non-linear assumptions when researching the tourism-led growth hypothesis, Chiu and Yeh (2017) and Sahni et al. (2021) find evidence of a non-linear relationship in samples of heterogeneous countries. Moreover, Eugenio-Martín et al. (2004) and Lee and Chang (2008) show that the effect of tourism is heterogeneous in different parts of the distribution of economic growth. Tang and Tan (2018) find that a country's income level and institutional quality significantly explain the relationship between tourism and economic growth. Portella-Carbó et al. (2023) emphasise the importance of the relationship between tourism and growth in all business cycle phases. Using the quantile approach for 12 European countries, they show that the contribution of tourism to economic growth is significant during periods of crisis and prosperity.

Aslan et al. (2021) show that the tourism-led growth hypothesis is confirmed at low growth levels, using panel quantile regressions on a sample of 17 Mediterranean countries. Lolos et al. (2023) find similar results for Greece. Saboori et al. (2022) studied the effect of tourism market diversification on economic growth using a quantile regression approach for 109 countries. They find that tourism market diversification positively affects economic growth in countries with low and lower middle incomes, but in the lower part of the growth distribution. However, research shows that tourism can also negatively affect economic growth. Saboori et al. (2022) show that when we consider higher economic growth levels, tourism market diversification's impact on economic growth for high-income countries is negative.

Bojanic and Lo (2016) use data for 187 countries and show that tourism has a moderate effect on economic development in all countries, mostly at higher levels.

Some studies show that tourism has no direct impact on growth. Du et al. (2016), using cross-sectional data for 109 countries and applying quantile regression methods, find no evidence supporting a direct link between tourism and growth. Instead, they suggest that tourism affects economic growth through standard determinants of income, such as labour, capital, and technology, which are traditionally considered the main drivers of economic growth.

Sinclair (1998) suggests that the relationship between tourism and economic activity can be viewed from two perspectives. Specifically, tourism as a stimulus for economic growth has positive and negative effects. The positive contribution is reflected in the reduction of the gap in the foreign exchange market through the inflow of foreign currency, financing of the import of capital goods, increased demand for certain goods and services, increased personal income, higher tax revenues, and increased employment. Foreign tourists' consumption increases the accumulation of physical capital and affects the growth of investments in human capital through the demand for skilled labour in the tourism sector. Hazari and Ng (1993) point out that tourism affects the consumption of the largest part of tertiary and non-durable goods, and the adverse effects of an increase in domestic prices on well-being would be more than offset by a positive impact on the country's overall well-being. However, the expenditure of foreign tourists can change domestic consumption patterns through the so-called demonstration effect, which can have an inflationary impact.

Foreign tourists' demand for non-traded goods can create distortionary monopoly power, leading to a welfare-reducing effect (Balaguer and Cantavella-Jordá, 2002; Hazari and Sgro, 2004). Sinclair (1998) points out that the costs incurred due to the growth of the tourism industry (such as infrastructure) are primarily specific to tourism and not general-purpose. However, costs also arise due to the specialised education necessary for the tourism industry. Besides, tourism development requires much physical capital, and different types of qualified labour are necessary. That is why investment in human capital in the tourism industry will increase in the destination country. Tourism also imposes other costs on the host country, such as increased pollution or destruction of the sensitive environment (Gursoy and Rutherford, 2004). That is why such costs that certain groups or regions must bear are often the result of the implementation of mass tourism in less developed countries.

While some studies using quantile regressions find evidence supporting the tourism-led growth hypothesis, others either do not find evidence for it or present mixed results. However, many studies use standard quantile regression methods (Koenker and Bassett Jr, 1978), which may be biased for several reasons. For example, they do not consider unobserved heterogeneity (i.e., an unobserved country-specific effect) and specific effects (such as treating fixed effects as constant across quantiles (Koenker, 2004) or potential endogeneity between tourism and economic growth. Our research aims to eliminate such shortcomings by applying the panel quantile regression approach proposed by Machado and Silva (2019).

3 DATA AND METHODOLOGY

The sample includes annual data for the EU27 countries over the period 2000–2019. In all models, the dependent variable used as a proxy for economic growth is the growth rate of real GDP per capita (EG). Furthermore, to avoid the potential endogeneity problem that could arise from the relationship between GDP and tourism, we also estimated the models using the growth rate of real GDP per capita net of tourism (EGnet).

The availability of data determines the choice of tourism variable. We use travel expenditure per capita in millions of US$ as a proxy for tourism development and travel expenditure as a percentage of GDP for tourism specialisation. The impact of tourism on economic growth in EU27 countries is not straightforward. In Southern and peripheral European countries, due to the absence of high-value industrial sectors, tourism acts as a substitute for manufacturing exports. Namely, tourism compensates for the lack of other economic alternatives by stimulating infrastructure and creating working opportunities for the local societies. Indirectly, tourism also boosts non-tourism growth by financing imports of capital goods, fostering demand for domestic goods and services, and promoting labor demand.

We also include a lagged dependent variable (growth rate of real GDP per capita) to account for the theory of conditional convergence. Hence, the peripheral EU economies, with a lower initial level of GDP per capita, are expected to grow faster than countries with a higher initial level of GDP per capita.

Regarding the control variables, in all models we include gross capital formation as a measure of the stock of physical capital and a proxy for infrastructure, trade openness, and the government's size. We also control for human capital (measured by an index based on average schooling years and return-to-education rates) and for the level of corruption (measured by the Bayesian Corruption index).

According to Solow's growth theory, physical capital is a critical driver of economic growth. First, as a prerequisite for establishing the infrastructure needed for generating economic growth, but also for generating growth in specific economic sectors, such as tourism. Trade openness is included in the model as an indicator of the country's ability to access foreign markets, technology, and investment. The government's size accounts for the possibility that a fiscal expansion could crowd out private investments. The level of corruption acts as a proxy for the institutional quality, meaning that corruption discourages investments and leads to misallocation of resources. Human capital is an important determinant of economic growth through improvements in labor productivity or providing specialized skills and qualifications needed for a specific sector.

A detailed description of data, sources, measurements, and labels is displayed in Tab. 1.

The analysis of the effect of tourism on economic growth is based on the panel fixed effect regression model:

$$y_{i,t} = \alpha + \beta_1 Y_{i,t-1} + \beta_2 \text{Tourism}_{i,t} + \beta_3 X_{i,t} + \eta_i + \delta_t + \epsilon_{i,t} \tag{1}$$

For country $i = 1, 2, \ldots, N$ and period $t = 1, 2, \ldots, T$, $y_{i,t}$ is a real growth rate of the outcome variable, $Y_{i,t-1}$ is one period lag of the outcome variable, $\text{Tourism}_{i,t}$ captures a tourism variable, $X_{i,t}$ denotes a set of other explanatory variables and $\epsilon_{i,t}$ is the error term. In all models, we include year dummies to capture all time-varying effects (δ_t) and the unobserved country-specific effect (η_i).

Since our objective is to incorporate the heterogeneous effects of tourism across EU countries with different growth levels, we employed panel quantile regression for EU growth-tourism analysis.

Panel quantile regression for EU growth-tourism analysis captures the distributional heterogeneity of EU countries with divergent growth paths (e.g., Southern vs. Northern EU). It

Tab. 1: Description of data and data sources

Variable label	Description	Data source
Dependent variables		
EG	Growth rate of real GDP per capita	World Development Indicators of the World Bank
EGnet	Growth rate of real GDP per capita net of tourism. Variable GDP net of tourism is obtained by subtracting travel expenditure from GDP.	World Development Indicators of the World Bank
Independent variables		
lagGDPpc	Lagged value of the log of GDP per capita	World Development Indicators of the World Bank
Tourism development	Travel expenditure per capita in US$ Millions	UNWTO Tourism Statistics Database
Tourism specialisation	Travel expenditure as a percentage of GDP	World Development Indicators and World Tourism Organization
GDPpcNet	Real GDP per capita net of tourism. Variable GDP net of tourism is obtained by subtracting travel expenditure from GDP.	World Development Indicators of the World Bank
Control variables		
Capital formation	Gross capital formation as a percentage of GDP (a measure of the stock of physical capital and a proxy for infrastructure)	World Development Indicators of the World Bank
Openness	Trade openness (measured by the sum of international exports and imports as a percentage of GDP)	World Development Indicators of the World Bank
Expenditure	Government's size (measured as government expenditure as a percentage of GDP)	World Development Indicators of the World Bank
Corruption	The level of corruption (measured by the Bayesian Corruption Index, bci index)	Quality of Government Dataset (Teorell et al., 2020)
Human capital	Human capital index based on average schooling years and return-to-education rates (pwt_hci index)	Barro and Lee (2013), Penn World Tables 9.0 (Feenstra et al., 2015)

Note: All variables, except the indices of the human capital and corruption, are ln-transformed.

helps us determine whether tourism affects high-growth economies (e.g., Ireland) and low-growth economies (e.g., Greece) differently. Hence, it answers whether tourism is a "catch-up" driver, which would manifest with a stronger impact of tourism in low-growth quantiles.

Some advantages of using quantile regression include mitigating EU-specific issues related to non-normal growth distributions, such as the skewness of EU growth rates (e.g., following the 2008 crisis), and outlier resilience, as quantile regression is robust to shocks (e.g., Brexit and COVID-19).

The results of our study are obtained using the method of moments proposed by Machado and Silva (2019). The analysis is based on the location-scale model

$$y_{i,t} = \alpha_i + X'_{i,t}\beta + \left(\eta_i + H'_{i,t}\gamma\right)\epsilon_{i,t}, \quad i = 1, 2, \ldots, N, \quad t = 1, 2, \ldots, T, \tag{2}$$

where parameters α_i and η_i represent individual effects of the i-th country, $X_{i,t}$ is a k-vector of covariates, $H_{i,t}$ is a k-vector of known differentiable transformations of the components of X and $P(\eta_i + H'_{i,t}\gamma > 0) = 1$, $\epsilon_{i,t}$ is the error term, which is independent and identically distributed for each i and t, independent of X, satisfying the moment conditions.

Model (2) implies that conditional quantiles simplify to

$$Q_y(\theta|X) = \big(\alpha_i + \eta_{iq}(\theta)\big) + X'_{i,t}\beta + H'_{i,t}\gamma q(\theta), \quad i = 1, 2, \ldots, N, \quad t = 1, 2, \ldots, T \tag{3}$$

and are estimated sequentially using the method of moments as described in Machado and Santos Silva (2019).

For each country $i = 1, 2, \ldots, N$, the scalar coefficient $\alpha_i(\theta) = \big(\alpha_i + \eta_{iq}(\theta)\big)$ is a quantile-θ fixed effect for country i, or the distributional effect at θ. Unlike a standard fixed effect, which is considered constant, it can affect the entire distribution of the outcome variable.

For comparison, we additionally estimated two panel regression models, which focus on the conditional mean: fixed-effect regression and two-stage least-squares regression.

The two-stage least-squares method deals with possible endogeneity by including instrumental variables to obtain unbiased and consistent estimates of regression parameters when one or more independent variables are correlated with the error term. In the first stage, endogenous variables $Y_{i,t-1}$ (lagged outcome variable) and $\text{Tourism}_{i,t}$ (Tourism development variable) are regressed on instruments $W_{i,t}$ and (exogenous) control variables:

$$Y_{i,t-1} = f(W_{i,t}, X_{i,t}), \quad i = 1, 2, \ldots, N, \quad t = 1, 2, \ldots, T, \tag{4}$$

$$\text{Tourism}_{i,t} = f(W_{i,t}, X_{i,t}), \quad i = 1, 2, \ldots, N, \quad t = 1, 2, \ldots, T. \tag{5}$$

Internal instruments are used in both equations. Namely, two lags of each endogenous variable. In the second stage, the growth rate of real GDP per capita is regressed on the predicted values of the endogenous variables from the first stage and the control variables.

$$y_{i,t} = f(\widehat{Y}_{i,t}, \widehat{\text{Tourism}}_{i,t}, X_{i,t}, \epsilon_{i,t}), \quad i = 1, 2, \ldots, N, \quad t = 1, 2, \ldots, T. \tag{6}$$

4 EMPIRICAL RESULTS

The results for tourism development are presented in Tab. 2, and those for tourism specialisation are presented in Tab. 3. In each table, we report the estimates of the fixed effects model, the 2SLS model and the estimates of the 10th to 90th quantile regression models. Instead of focusing on the conditional mean (fixed effects and 2SLS models), we analyse the potential heterogeneous effects of tourism across different quantiles of growth distributions, accounting for unobserved heterogeneity and potential endogeneity (Q10–Q90 models).

The lag of the log of GDP per capita (lagGDPpc), which represents the rate of conditional convergence, is negative and statistically significant in all models. This finding supports the theory of conditional convergence, meaning that weaker EU economies with a lower initial level of GDP per capita tend to grow faster than countries with a higher initial level of GDP per capita, holding other factors constant. The effect is stronger in 2SLS, suggesting that omitted variable bias (e.g., institutional quality) may slightly understate convergence in the FE model. The convergence effect is the strongest in high-growth countries (Q90), possibly because they face steeper diminishing returns.

Tourism development has a positive effect in all models, indicating that tourism significantly boosts growth, especially in low- to medium-growth economies (Q10–Q50), with diminishing returns in high-growth economies (Q70–Q90). This finding suggests that tourism's role as a growth driver may be more pronounced where other economic alternatives are limited. That is empirical support for the tourism-led growth hypothesis, especially for less developed countries. This pattern shows that tourism disproportionately acts as an effective catch-up mechanism.

Tab. 2: Tourism development and growth: dependent variable growth rate of real GDP per capita (EG)

Variable	mFE	m2SLS	mQ10	mQ30	mQ50	mQ70	mQ90
lagGDPpc	−0.2450***	−0.2700***	−0.2174***	−0.2337***	−0.2458***	−0.2565***	−0.2730***
Tourism development	0.0784**	0.0775***	0.0798**	0.0790**	0.0784*	0.0778*	0.0770
Capital formation	0.1184***	0.1284***	0.1332***	0.1245***	0.1180***	0.1122***	0.1033***
Openness	0.0249	0.0139	0.1339*	0.0694	0.0217	−0.0206	−0.0859**
Expenditure	−0.1031	−0.1235*	−0.0339	−0.0748	−0.1052	−0.1320	−0.1735
Corruption	−0.0014***	−0.0016***	−0.0013*	−0.0013***	−0.0014***	−0.0014**	−0.0015*
Human capital	−0.0348	−0.0083	−0.0050	−0.0226	−0.0357	−0.0472	−0.0650
Observation	539	485	539	539	539	539	539
Countries	27	27	27	27	27	27	27
R-squared	0.8897	0.8878					
Pseudo R-squared			0.8427	0.8838	0.8930	0.8828	0.8335

Note: Column mFE reports the results of the Fixed Effects model. Column m2SLS reports the results of the 2SLS model where lagGDPpc and tourism variables are instrumented using both the first and second lags as instruments, respectively. Robust standard errors clustered at the country level are calculated for mFE and m2SLS. The results of Method of moments quantile regression (MMQR models) with jackknife standard errors clustered at the country level are in columns Q10 to Q90. All regressions include time dummies and a constant term; ***, **, * denote statistical significance at the 1%, 5% and 10% level, respectively.

Tab. 3: Tourism specialisation and growth: dependent variable growth rate of real GDP per capita (EG)

Variable	mFE	m2SLS	mQ10	mQ30	mQ50	mQ70	mQ90
lagGDPpc	−0.1801***	−0.2072***	−0.1696***	−0.1761***	−0.1804***	−0.1842***	−0.1902***
Tourism specialisation	0.0360	0.0607**	0.0491	0.0410	0.0358	0.0309	0.0236
Capital formation	0.1173***	0.1323***	0.1446***	0.1277***	0.1167***	0.1066***	0.0912***
Openness	0.0625**	0.0283	0.1767**	0.1063*	0.0602*	0.0180	−0.0466
Expenditure	−0.1140*	−0.1321**	−0.0452	−0.0876	−0.1154	−0.1408	−0.1797
Corruption	−0.0013***	−0.0017***	−0.0016*	−0.0014**	−0.0013***	−0.0013**	−0.0011
Human capital	−0.0230	−0.0071	−0.0050	−0.0226	−0.0357	−0.0472	−0.0650
Observation	539	485	539	539	539	539	539
Countries	27	27	27	27	27	27	27
R-squared	0.8760	0.8720					
Pseudo R-squared			0.8109	0.8683	0.8797	0.8669	0.8050

Note: Column mFE reports the results of the Fixed Effects model. Column m2SLS reports the results of the 2SLS model where lagGDPpc and tourism variables are instrumented using both the first and second lags as instruments, respectively. Robust standard errors clustered at the country level are calculated for mFE and m2SLS. The results of MMQR models with jackknife standard errors clustered at the country level are in columns Q10 to mQ90. All regressions include time dummies and a constant term; ***, **, * denote statistical significance at the 1%, 5% and 10% level, respectively.

Tourism specialisation (Tab. 3) also has a positive effect on economic growth. However, the effect is only significant under the 2SLS specification.

Regarding the control variables, the findings suggest that the coefficients have the expected signs and are statistically significant in most cases in both specifications.

Capital Formation (physical capital) is positive and highly significant in all models, highlighting the critical role of investment in driving growth. Effects are the strongest for lower-growth economies due to their capital scarcity, meaning that each unit of investment yields high returns. Oppositely, the effects are weaker for higher-growth economies, suggesting diminishing returns to

Tab. 4: Tourism and net growth: dependent variable growth rate of real GDP per capita net of tourism (EGnet)

Variable	mFE	m2SLS	mQ10	mQ30	mQ50	mQ70	mQ90
lagGDPpcNet	−0.3134***	−0.2967***	−0.2807***	−0.2987***	−0.3132***	−0.3289**	−0.3486**
Tourism development	0.0876**	0.0554***	0.0796**	0.0840*	0.0876*	0.0914	0.0963
Capital formation	0.1231***	0.1100***	0.1405***	0.1309***	0.1232***	0.1149***	0.1044***
Openness	0.0321	0.0038	0.1646*	0.0918	0.0328	−0.0306	−0.1103*
Expenditure	−0.1279*	−0.1452**	−0.0685	−0.1011	−0.1276	−0.1560	−0.1917
Corruption	−0.0019**	−0.0018***	−0.0020*	−0.0019**	−0.0019**	−0.0018**	−0.0017
Human capital	−0.0384	−0.0112	−0.0114	−0.0263	−0.0383	−0.0512	−0.0675
Observation	539	485	539	539	539	539	539
Countries	27	27	27	27	27	27	27
R-squared	0.8760	0.8720					
Pseudo R-squared			0.8003	0.8733	0.8847	0.8392	0.7174

Note: Column mFE reports the results of the Fixed Effects model. Column m2SLS reports the results of the 2SLS model where lagGDPpcNet and tourism variables are instrumented using both the first and second lags as instruments, respectively. Robust standard errors clustered at the country level are calculated for mFE and m2SLS. The results of MMQR models with jackknife standard errors clustered at the country level are in columns Q10 to mQ90. All regressions include time dummies and a constant term; ***, **, * denote statistical significance at the 1%, 5% and 10% level, respectively.

capital. Physical capital investment is one of the strongest growth drivers, consistent with Solow's growth theory.

As expected, corruption (bci) is negative and significant in all models. Corruption reduces growth by discouraging investment (uncertainty, bribes) and misallocating resources (cronyism).

Trade Openness (Openness) shows mixed effects, strongly positive for low-growth economies but negative for high-growth ones. It could reflect varying capacities to benefit from trade. Low-growth economies (Q10) benefit from market access, technology, and investment. High-growth economies (Q90) may suffer (possible deindustrialisation-manufacturing shifts to cheaper countries) and vulnerability to global shocks (e.g., financial crises).

Government Size (Expenditure) is negative and significant only in the traditional panel regression models (FE and 2SLS). Hence, on average, larger governments hurt economic growth.

Human Capital (pwt_hci) is insignificant in all models, which is surprising, given that theory states that human capital should boost growth. A possible explanation for the counterintuitive result may be in measurement issues (index may not capture skills well, or nonlinearities (e.g., threshold effects) and long lags (effects take decades to materialise).

To assess the robustness of our results to endogeneity concerns, particularly the mechanical 'accounting effect' whereby tourism receipts directly inflate GDP, we create a measure of GDP net of tourism (GDPpcNet) by subtracting travel expenditure from total GDP. We then re-estimate our models using the growth rate of net GDP per capita (EGnet) as the dependent variable. The results are presented in Tab. 4 and 5.

Although there are some differences in the values of the corresponding coefficients compared to those in Tab. 2 and 3, the results confirm the importance of tourism development in growth. After controlling for potential endogeneity, the results again indicate that the effect of tourism is positive and statistically significant, particularly at lower quantiles of the conditional growth distribution. As in previous findings, tourism boosts non-tourism GDP growth, especially in low-growth economies. Therefore, this suggests that tourism has an important indirect role: tourism development boosts non-tourism GDP, indicating multiplier effects (e.g., infrastructure, labour mobility).

Tab. 5: Tourism specialisation and net growth: dependent variable growth rate of real GDP per capita net of tourism (EGnet)

Variable	mFE	m2SLS	mQ10	mQ30	mQ50	mQ70	mQ90
lagGDPpcNet	−0.2410***	−0.2587***	−0.2338***	−0.238***	−0.2411***	−0.2444***	−0.2484**
Tourism specialisation	0.0421	0.0388*	0.0491	0.0450	0.0420	0.0388	0.0349
Capital formation	0.1222***	0.1128***	0.1552***	0.1360***	0.1219***	0.1067***	0.0887***
Openness	0.0727**	0.0165	0.2009**	0.1265*	0.0715*	0.0124	−0.0576
Expenditure	−0.1400**	−0.1535**	−0.0712	−0.1111	−0.1407*	−0.1724*	−0.2100
Corruption	−0.0019**	−0.0019***	−0.0022**	−0.0020**	−0.0018**	−0.0017*	−0.0015
Human capital	−0.0258	−0.0097	−0.0004	−0.0151	−0.0260	−0.0378	−0.0517
Observation	539	485	539	539	539	539	539
Countries	27	27	27	27	27	27	27
R-squared	0.8760	0.8720					
Pseudo R-squared			0.7786	0.8606	0.8709	0.8216	0.7006

Note: Column mFE reports the results of the Fixed Effects model. Column m2SLS reports the results of the 2SLS model where lagGDPpcNet and tourism variables are instrumented using both the first and second lags as instruments, respectively. Robust standard errors clustered at the country level are calculated for mFE and m2SLS. The results of MMQR models with jackknife standard errors clustered at the country level are in columns Q10 to mQ90. All regressions include time dummies and a constant term; ***, **, * denote statistical significance at the 1%, 5% and 10% level, respectively.

A larger (absolute) negative coefficient for lagGDPpcNet indicates that the speed of convergence, when the direct tourism contribution is excluded, appears to be faster. This finding might indicate that catch-up is "more independent of tourism". A possible explanation is that the convergence mechanism is stronger in the part of the economy outside tourism. This result could indicate that although tourism helps, it is not the only, or the fastest channel of convergence for some countries, or that countries with strong non-tourism sectors are catching up faster.

Capital Formation (Physical capital) is positive and significant in both models, with the declining effect for higher quantiles. The strong and consistent positive effect of capital, even on GDP net of tourism, further confirms the fundamental role of investment in growth, regardless of the sectoral origin of that growth.

In this model, trade openness (Openness) is insignificant in almost all specifications, except for the 10th quantile (Q10 model), in which the effect is positive and statistically significant, indicating that openness matters only for low-growth economies when tourism is excluded. That means that trade boosts non-tourism GDP growth in low-growth economies, possibly via market access, technology, and investment.

In Tab. 4 and 5, government Size (Expenditure) is also negative and significant only in the traditional panel regression models (FE and 2SLS), indicating that fiscal expansion harms non-tourism growth. Human Capital (pwt_hci) is insignificant in all specifications.

Again, corruption (bci) is negative and significant in all specifications, with a decreasing effect from the lower to higher quantiles of growth distribution. Corruption growth drag persists even after isolating the tourism.

We also conduct a robustness test, using the tourism specialisation variable. Tourism specialisation is positive but statistically insignificant in all models and significant only at the 10% level in the 2SLS model.

Trade Openness is positive and significant only in the FE specification, lower quantiles, and the median. Hence, openness policies should be tailored to growth levels, supporting weaker economies to leverage trade.

As opposed to other specifications, in this model, the results suggest fiscal caution. In other words, larger government expenditures may impede growth, necessitating efficiency improvements.

The results (Tab. 4 and 5) largely confirm findings from the baseline models. Tourism development continues to have a positive and statistically significant effect on non-tourism GDP growth, especially in lower-growth economies (Q10-Q50). This points to substantial multiplier effects, where tourism stimulates broader economic activity beyond its direct sectoral footprint.

Interestingly, the conditional convergence coefficient (lagGDPpcNet) is larger in magnitude than its counterpart in the baseline model (lagGDPpc). This result suggests that the convergence dynamics may be even stronger within the non-tourism segments of the economy, hinting at the multi-faceted nature of catch-up processes.

Overall, the results indicate that tourism and capital formation are key drivers of GDP per capita growth, particularly for lower-growth countries. The findings of the paper support the theory of conditional convergence, with poorer countries growing faster, conditional on other factors. The importance of investment-driven growth and governance reforms cannot be overstated, as policies promoting capital formation are universally beneficial. Moreover, corruption consistently harms growth, which is why reducing corruption is critical, especially for low-growth economies. Trade openness benefits are context-dependent, favouring lower-growth economies, while government size may have mixed effects.

The obtained results have important policy implications. If tourism boosts growth only in low-quantile countries, the EU could target structural funds for tourism infrastructure in lagging regions and regulatory harmonisation (e.g., Schengen visas) to amplify tourism spillovers. Weaker economies should focus on structural reforms (e.g., education, infrastructure) to sustain catch-up growth. On the other hand, advanced economies must rely on innovation rather than capital accumulation alone.

5 CONCLUDING REMARKS

This study provides evidence that tourism development is a significant driver of economic growth within the EU, particularly for countries with lower growth rates. Unlike traditional regression techniques, which focus only on conditional mean responses, we follow a panel quantile regression approach and model the entire distribution of growth rates. Considering that the EU comprises economies with vastly different characteristics (e.g., core vs. periphery, tourism-dependent vs. diversified), panel quantile regression proves to be a suitable tool for revealing where the impact of tourism on growth is more substantial relative to the level of economic growth—namely, whether it is greater in struggling economies compared to those that are booming. This method enables accounting for the heterogeneous effect of tourism at different levels of economic growth and quantifying the asymmetric effect of tourism on the conditional distribution of growth rates.

The results of quantile regression show a positive but declining effect of tourism development from lower to higher growth quantiles. It suggests that tourism acts as a disproportionately effective catch-up mechanism for lower-growth EU members (often peripheral). Therefore, in those economies where access to high-value-added sectors is limited, tourism can leverage comparative advantages and serve as a channel for realizing convergence potential (see Fayissa et al., 2011; Sahni et al., 2021).

In contrast, in core economies, tourism's marginal contribution to growth is smaller due to greater sectoral competition and diminishing returns. The weaker results for tourism specialization further highlight that broad-based sectoral development (not mere reliance on tourism) underpins convergence. This conclusion is reinforced by the persistent positive effect on GDP net of tourism, indicating significant multiplier effects that are more penetrating in less diversified economies.

Hence, the provided evidence is robust: after controlling for the direct contribution of tourism by analysing GDP net of tourism, tourism still has a positive influence on non-tourism sectors, indicating substantial multiplier effects throughout the economy. This indirect contribution, likely driven by investments in infrastructure, increased labour mobility, and a broader demand for goods and services, highlights tourism's role as a catalyst for wider economic development.

Moreover, our results confirmed several established determinants of growth. Physical capital emerged as a key growth driver, with its impact being most pronounced in capital-scarce, lower-growth economies. On the other hand, corruption consistently showed a negative and significant relationship with economic growth across all models, underscoring its disproportionate harm to weaker economies. While trade openness showed mixed effects, being positive for low-growth economies but negative for high-growth ones, surprisingly, the role of human capital was insignificant. This counterintuitive finding presents a potential avenue for further research, such as exploring alternative measures of human capital.

Overall, the findings support the notion that tourism can be an effective growth strategy in the absence of other competitive advantages for EU countries, particularly for the periphery countries. By making the most of their comparative advantages in the tourism sector, these economies can not only directly increase their GDP but also generate positive spillovers that foster broader economic resilience and convergence. That makes tourism a critical policy tool for achieving more balanced and inclusive growth across the EU.

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