



Investigating the influence of tourism on economic growth and carbon emissions: Evidence from panel analysis of the European Union

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H I G H L I G H T S

- ▶ Tourism and FDI have high significant positive effect on economic growth in the EU.
- ▶ Economic growth shows a high significant positive effect on CO₂ emissions in the EU.
- ▶ Tourism is inversely related to CO₂ emissions in the EU.
- ▶ FDI incurs a high significant negative impact on CO₂ emissions in the EU.
- ▶ A long-run equilibrium relationship exists among tourism, CO₂ emissions, economic growth and FDI in the EU.

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The study investigates the influence of tourism on economic growth and CO₂ emissions. In the empirical analysis, unit root and cointegration tests using panel data of European Union countries from 1988 to 2009 are performed to examine the long-run equilibrium relationship among tourism, CO₂ emissions, economic growth and foreign direct investment (FDI). Results from panel cointegration techniques and fixed-effects models indicate that a long-run equilibrium relationship exists among these variables. Furthermore, tourism, CO₂ emissions and FDI have high significant positive effect on economic growth. Economic growth, in turn, shows a high significant positive impact on CO₂ emissions while tourism and FDI incur a high significant negative impact on CO₂ emissions.

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1. Introduction

In the 21st century, the globalization of capitalism, the movement of populations and advances in transportation and communications technology have helped develop the travel and tourism sector into one of the world's largest. Tourism has made a significant contribution to the economies of many communities around the world because of its ability to create income, taxes, hard currency and jobs (Choi & Sirakaya, 2006; Dwyer & Forsyth, 2008). Bramwell and Lane (1993) reported that tourism can contribute to sustainable development when it operates within natural capacities for the regeneration and future productivity of natural resources.

According to a tourism report (Blanke, Chiesa, & Herrera, 2009), four European Union (EU) member countries – Austria, Germany, France, and Spain – are ranked among the top countries that are

continuing to lead the way in the travel and tourism competitiveness global index in the overall rankings of 133 countries. The governments prioritize the tourism sector with very supportive policymaking, make strong efforts to attract international tourists through strong tourism destination marketing campaigns, and showcase the country's presence at many international tourism exhibitions, fairs, and forums.

As a result, the tourism industry has become a key sector of the European economy. The travel and tourism sector contributes US\$1248 billion to the EU gross domestic product (GDP) or 7.8 percent of the total (World Travel and Tourism Council, 2011). The council estimates that the travel and tourism sector contributes to creating over 9.7 million jobs in the EU, 8.4 percent of the total employment in 2011. This information is useful to define the relationship between economic growth and tourism development because the tourism sector in the EU is prioritized as a significant source of revenue, employment and economic growth.

The main sources of carbon dioxide (CO₂) are burning of fossil fuels. The EU has experienced steady increase in fossil fuel CO₂ emissions with an average growth rate of 6 percent annually during

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1990–2008 (Boden, Marland, & Andres, 2011). Among the top 20 national fossil fuel CO₂ emitters, the United Kingdom, Italy, France, and Spain lead in CO₂ fossil fuel emissions. In 2008 the total CO₂ emissions of the EU reached 712 million metric tons. Emissions from all fuel sources have grown in the EU region over time, with gas fuels now accounting for approximately 28.1 percent of the regional total (Boden et al., 2011). Table 1 presents some context for the CO₂ emissions. From 1988 to 2009, the average CO₂ per capita among 27 EU members is 8.58 metric tons with the range of 3.50 in Latvia to 22.71 metric tons in Luxembourg.

Participating in a global market has consequences for a country's economic evolution, both for the value of the output produced and the resulting consumption. The question here is whether the economic growth and, social and environmental indicators improve over time or whether they decline. Recently, CO₂ emissions levels have been growing at varying degrees throughout the EU. Environmental issues are complex in nature and transcend national boundaries. In order to optimize healthy economic growth, policy responses must consider current environmental problems, climate change and CO₂ emissions from industries while promoting sustainable growth. The increased economic importance of tourism raises new questions for policy makers regarding the best practice to promote economic growth and reduce CO₂ emissions.

There has not been a time series approach to analyze the relationship among tourism, CO₂ emissions and economic growth for EU countries. This research questions whether tourism induces an increase in the CO₂ emissions and economic growth of the region. The questions are vital to disentangle the effect of tourism on both

environment and economic growth in the region, where governments often make legislative responses to current environmental issues.

2. Literature review

The literature review section summarizes and pulls together the relevant literature in relation to the objectives of the paper as stated above. Besides the influence of tourism on economic growth and CO₂ emissions, foreign direct investment (FDI) is included to eliminate the omitted variable bias. Cointegration concept is reviewed in order to construct the last hypothesis related to the long-run relationships among these time series variables.

2.1. Tourism and economic growth

Previous studies have reported that tourism positively affects economic growth in the EU countries (Albalade & Bel, 2010; Holzner, 2011), in Eastern Europe (Hall, 1998), in Austria (Falk, 2010), in Greece (Dritsakis, 2004a,b), in Italy (Bernini, 2009), in Spain (Balaguer & Cantavella-Jordá, 2002) and in the United Kingdom (Blackstock, White, McCrum, Scott, & Hunter, 2008). They propose a tourism-led economic growth hypothesis that assumes tourism to be a major factor in overall long-run economic growth. Mihalic (2002) discussed several advantages of tourism as a growth strategy compared with the export of goods and services. In this regard, Sahli and Nowak (2007) reported that many governments have engaged in tourism development for the purpose of economic growth.

International tourism is a prime source of foreign exchange earnings and generates export revenues. The principal economic benefits derived from tourism include foreign exchange earnings, employment, and income (Archer, 1995; West, 1993). Tang and Jang (2009) reported that there exists a temporal hierarchy among tourism-related industries and that tourism can ignite the development of other industries and the overall economy (Holzner, 2011; Sequeira & Nunes, 2008). Lee and Chang (2008) also reported that tourism development not only stimulates the growth of the sector, but also triggers the overall economic growth of countries. These studies substantiate that tourism positively affects the national economy.

Hypothesis 1: Tourism directly affects economic growth.

2.2. Economic growth and CO₂ emissions

Historically, there has been a close correlation between economic growth and CO₂ emissions. As economies grow, the environment declines (Adams & Jeanrenaud, 2008). This trend can be demonstrated on charts of human population, economic growth, and environmental indicators. Recent studies have examined the time series dynamics between economic growth and CO₂ emissions to infer the direction of causality (Akboostanci, Turut-Asik, & Tunc, 2009; Coondoo & Dinda, 2008; Lee & Lee, 2009; Luzzati & Orsini, 2009). The empirical results seem to be inconclusive. Therefore, the reliability of these estimates has been challenged on technical grounds (Harbaugh, Levinson, & Wilson, 2002; Millimet, List, & Stengos, 2003).

In addition, studies using time series at the country level have found less robust relationships between GDP per capita and CO₂ emissions per capita. Existing studies (Swart, Robinson, & Cohen, 2003; Wilbanks, 2003) have introduced the relationship between sustainable development and climate change with an emphasis on the degree to which climate change mitigation can have so-called co-benefits. Moomaw and Unruh (1997) reported that international oil price shocks, not per capita GDP growth, explain most of

Table 1
Summary statistics, European Union member countries, 1988–2009.

| Country | GDP ^a | Tourism receipts ^b | FDI ^c | CO ₂ emissions ^d | Tourism to GDP ^e |
|----------------|------------------|-------------------------------|------------------|--|-----------------------------|
| Austria | 29,470 | 1765 | 1178 | 7.96 | 5.03 |
| Belgium | 27,967 | 712 | 6223 | 10.84 | 2.56 |
| Bulgaria | 2604 | 206 | 320 | 6.81 | 4.89 |
| Cyprus | 16,173 | 1874 | 748 | 6.98 | 9.52 |
| Czech Rep. | 8647 | 336 | 449 | 12.11 | 3.23 |
| Denmark | 36,389 | 773 | 975 | 10.07 | 2.47 |
| Estonia | 7962 | 491 | 670 | 12.81 | 3.01 |
| Finland | 29,206 | 440 | 649 | 11.12 | 2.54 |
| France | 26,967 | 533 | 579 | 6.37 | 4.23 |
| Germany | 28,227 | 307 | 367 | 10.48 | 1.89 |
| Greece | 15,141 | 748 | 137 | 7.97 | 5.75 |
| Hungary | 6569 | 329 | 1084 | 5.89 | 3.96 |
| Ireland | 29,298 | 935 | 1189 | 9.82 | 2.12 |
| Italy | 23,885 | 483 | 174 | 7.64 | 3.50 |
| Latvia | 4788 | 125 | 245 | 3.50 | 1.47 |
| Lithuania | 5072 | 140 | 202 | 4.30 | 2.08 |
| Luxembourg | 57,456 | 1638 | 132,652 | 22.71 | 2.15 |
| Malta | 11,257 | 1954 | 1005 | 6.51 | 16.75 |
| Netherlands | 29,337 | 670 | 1538 | 10.85 | 2.25 |
| Poland | 5283 | 156 | 178 | 8.81 | 2.41 |
| Portugal | 13,255 | 626 | 299 | 5.36 | 4.86 |
| Romania | 2949 | 37 | 148 | 5.28 | 1.44 |
| Slovakia | 6999 | 148 | 289 | 7.45 | 1.98 |
| Slovenia | 13,191 | 608 | 239 | 7.59 | 2.96 |
| Spain | 18,626 | 774 | 496 | 6.87 | 5.68 |
| Sweden | 32,715 | 636 | 1536 | 6.04 | 1.64 |
| United Kingdom | 26,483 | 435 | 1019 | 9.43 | 2.85 |
| Consolidated | | | | | |
| Mean | 19,108 | 663 | 5725 | 8.58 | 2.83 |
| St. Deviation | 12,899 | 531 | 24,918 | 3.63 | 3.07 |
| Minimum | 2604 | 37 | 137 | 3.50 | 1.44 |
| Maximum | 57,456 | 1954 | 132,652 | 22.71 | 16.75 |

^a GDP per capita (current US\$).

^b International tourism real receipts per capita (current US\$).

^c Foreign direct investment net inflows per capita (current US\$).

^d CO₂ emissions per capita (metric tons).

^e Tourism direct contribution to GDP (% to GDP).

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