



Portuguese Tourism Demand: A Dynamic Panel Data Analysis

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ABSTRACT

This article considers the determinants of Portuguese tourism demand for the period 2004-2013. The econometric methodology uses a panel unit root test and the dynamic panel data (GMM-system estimator). The different techniques of panel unit root (Levin, Lin and Chu; Im, Pesaran and Shin W-stat and augmented Dickey-Fuller - Fisher Chi-square) show that the variables used in this panel are stationary. The dynamic model proves that tourism demand is a dynamic process. The variables relative prices, income *per capita*, human capital and government spending encourage international tourism demand for Portugal.

Keywords: Tourism demand, dynamic panel data, panel unit root test, Portugal.

JEL Classifications: C33, F10, H62

1. INTRODUCTION

The determinants of the Portuguese tourism demand have had attention of the academic community in recent years (Correia et al., 2008; Leitão, 2010; Daniel and Rodrigues, 2011; Serra et al., 2014). Actually the empirical studies use the arguments of the gravity model. This study aims to analyse the international tourism demand for the Portuguese economy using different proxies. We examined the tourism demand using as explanatory factors the government spending, income *per capita*, the index of consumer price (ICP) and the human capital. According to the data provided by the INE (National Institute of Statistics) in 2013 in terms of overnight stays in hotels, the United Kingdom is located in first place in terms of rankings, followed by Germany, Spain, France, and Netherlands. The sixth and seventh places are occupied by Brazil and Ireland, followed by Italy, USA and Belgium.

In this study, the sample includes the 26 main partners in tourism demand in Portugal for the period 2003-2013. The results presented in this study are consistent with the expectations of tourism demand studies. This research is organized as follows: Section 2 focuses the literature review; Section 3 presents the econometric model. In section 4, we present the econometric results and their interpretation, while the last section concludes.

2. LITERATURE REVIEW

Usually the empirical studies of tourism demand determinants use such as independent variables the relative prices, openness trade, geographical distance, tourist income *per capita*, migration, population and exchange rate (Eilat and Einav, 2004; Leitão, 2010; Surugiu et al., 2011; Seetaram, 2012; Serra et al., 2014; Zhang, 2015).

Zhang (2015) considers that tourism demand determinants are a dynamic process. This idea is shared by Munoz (2007); Phakdisoth and Kim (2007); Leitão (2010); Serra et al. (2014). The empirical study of Seetaram (2012) evaluates the relationship between immigration and tourism demand. The author concluded that immigration contributed to tourism demand process in Australia.

The determinants of tourism demand using a three-dimension panel data were investigated by Eilat and Einav (2004). The authors applied a multinomial logit regression for the period 1985-1998 (Eilat and Einav, 2004. p. 1323). The econometric results demonstrate that bilateral trade and common language have a positive effect on tourism arrivals. The variables destinations costs and geographical distance present a negative impact on tourism demand. Thailand's exports of tourism were analysed by Vogt and Wittayakorn (1998). This article demonstrates that the lagged

dependent variable and exchange rate are the main determinants of tourism exports.

Munoz (2007) studied the impact of Germany tourism demand in Spain for the period 1991-2003. Using a dynamic panel data, the author proves that lagged tourism arrivals present a positive effect on a long run. The coefficients of prices and taxes present a negative effect on tourism demand. These results are according with expected signs (Munoz, 2007. p. 19). In this context, Skrinjaric (2011) analyses the Croatian tourism demand for the period 1994-2009. The author utilizes a GMM-system and considers 19 partners; the research demonstrated that bilateral trade, the ICP and income *per capita* are essential to explain tourism demand.

The impact of trade on Portuguese demand was analyzed by Leitão (2010). The GMM-system estimator demonstrated that lagged dependent variable (tourism demand), income *per capita*, bilateral trade and population presented a positive sign, showing the significance of the tourism travel sector for the Portuguese economy. In this context, Surugiu et al. (2011) demonstrates that tourism demand in Romania is influenced by income *per capita*, openness trade, and population and relative's prices. The results obtained are according to empirical studies. The authors applied a fixed effects estimator and Tobit model.

Australian international travel arrivals were investigated by Zhang (2015). The author applies a dynamic panel (GMM-system) and static panel (random effects) for the period 2009-2013. The sample covers 40 countries (Zhang, 2015. p. 22). However, Zhang (2015) uses a random effects estimator with the lagged dependent variable. This study shows that income *per capita*, openness trade, common language and immigration have a positive effect on tourism demand. A regional study of tourism demand for Portugal was realized by Serra et al. (2014). The authors consider the period 2000-2011 for seven Portuguese regions (Algarve, Alentejo, Lisbon, Centre, North, Azores and Madeira). In a long run, this research demonstrates that tourism demand present a positive sign. The coefficient of income *per capita* presents a positive sign and it is according to previous studies (Eilat and Einav, 2004; Leitão, 2010; Surugiu et al., 2011). The study also demonstrates that unemployment rate decrease with tourism activities.

Görmüs and Göçer (2010) studied the economic and social determinants of Turkey tourism demand. The author's formulated 11 equations to explain tourism demand, and they use random effects model (Görmüs and Göçer, 2010. p. 95). The econometric models show that relative prices and exchange rates present a positive sign, this correlation are not according to the literature. However, Leitão (2009), and Surugiu et al. (2011) also found a positive sign for Portugal and Romania. Görmüs and Göçer (2010. p. 96) refer that visitors to seek Turkey has high incomes and to pass over promotions. The income *per capita* and trade values present a positive association with tourism demand.

Rodríguez et al. (2015) consider the effect of academic tourism demand in Galicia using a dynamic panel data for the period

2001-2009. The dependent variable is foreign students demand. This empirical study demonstrates that Erasmus programme, and lagged dependent variable present a positive sign. However, the income and costs are negatively correlated with foreign students demand (2015:1588). Chasapopoulos et al. (2014) use the arguments of the gravity model to explain the Greece tourism demand. The authors select 31 countries for the period 201-2010. The econometric strategy is a dynamic panel data. Chasapopoulos et al. (2014) formulated eight equations; the results do not have problems of serial correlations and the endogeneity. The authors introduced such as explanatory variables geographical distance, income, relative prices and political stability. All explanatory variables verify the expected signs discussed in the literature.

3. ECONOMETRIC MODEL

This section presents the variables used and the hypotheses formulated in this research. Based on the empirical literature on tourism demand, the following hypotheses are considered.

Hypothesis 1: The origin of tourist income stimulates Portuguese tourism demand.

According to empirical studies (Serra et al., 2014; Zhang, 2015; Chasapopoulos et al., 2014) a positive effect is expected.

Gross domestic product (GDP) is the income *per capita* of tourist countries, i.e., measured by GDP divided midyear population (constant 2005 USD). This variable is collected by the World Bank, World Development Indicators (WDI).

Hypothesis 2: The ICP is negatively associated with tourism demand.

This hypothesis permits to analyze the macroeconomic stability (Leitão, 2010; Chasapopoulos et al., 2014). In fact, if the consumer price index is low there is the likelihood of attracting more tourists. Chasapopoulos et al. (2014); Serra et al. (2014) found a negative sign. However, the literature cannot always support this argument (Görmüs and Göçer, 2010; Leitão, 2009; Surugiu et al., 2011). The ICP is explained by inflation, consumer price (annual percentage) and the variable source is WDIs.

Hypothesis 3: Tourism increases if the government expenditures increase.

GOVSP is the general government final consumption expenditure (constant LCU). The variable is collected in WDI. According to previous studies, a positive sign is expected.

Hypothesis 4: There is a positive correlation between human capital and tourism demand.

TourHC - Number of workers in the tourism sector. The data is collected from INE - National Institute of Statistics.

Following the literature (Leitão, 2010; Surugiu et al., 2011; Serra et al., 2014; Zhang, 2015), we formulate the following equation:

$$\begin{aligned} \text{LnTourism} = & \alpha_0 + \alpha_1 \text{LnTourism}_{t-1} + \alpha_2 \text{LnGDP} \\ & + \alpha_3 \text{LnICP} + \alpha_4 \text{LnGOVSP} + \alpha_5 \text{LnTourHC} + \varepsilon_{it} \end{aligned}$$

All variables are expressed in logarithm forms. The constant term is α_0 . The coefficients for each variable take α_x . The error term is expressed by ε_{it} . This research covers the period 2004-2013. The dependent variable is Tourism (number of stays in hotels, villages and tourist apartments). The data for dependent variable are collected from INE. The explanatory variables introduced in the equation are income *per capita* (GDP), the ICP, the government spending (GOVSP) and human capital (TourHC).

Table 1 reports the partners used in this study.

Table 2 presents the description of independent variables and the expected signs.

4. EMPIRICAL RESULTS AND DISCUSSION

Table 3 presents the correlation between variables used in the regression. The ICP (LnICP) is negatively correlated with tourism demand and positively correlated with income *per capita*. The variable of government spending (LnGOVSP) presents a negative association with tourism demand (LnTourism), income *per capita* (LnGDP), and the ICP (LnICP). The human capital (LnTourHC) is negatively correlated with tourism demand (LnTourism), income *per capita* (LnGDP) and government spending (LnGOVSP). However, human capital (LnTourHC) presents a positive correlation with the ICP (LnICP).

Table 4 presents the unit root test for each variable used in this research, considering the following methodologies: Levin, Lin and Chu, Im, Pesaran and Shin W-stat and augmented Dickey-Fuller - Fisher Chi-square with intercept. The results demonstrate that we can conclude that the variables presented in this panel are stationary.

The distribution of the dependent variable (tourism demand) can be observed in Figure 1.

Table 5 reports the determinants of Portuguese tourism demand using a GMM-system estimator proposed by Blundell and Bond (1998; 2000). This econometric technic is very common in tourism demand studies (Munoz, 2007; Leitão, 2010; Serra et al., 2014; Rodríguez et al., 2015). Faustino and Leitão (2007); Faustino and Vali (2013); Thorpe and Leitão (2014) demonstrate that GMM-system permit solve the endogeneity between variables. The regression permits to conclude that we have not problems with serial correlation (Ar2); this test was proposed by Arellano and Bond (1991).

The Sargan test demonstrates that the instruments used in this regression are correct. The coefficient of lagged dependent variable (tourism demand) presents a positive sign, showing that tourism demand is a dynamic process, and the variable is statistically significant at 1% level. The empirical studies of Leitão (2010);

Serra et al. (2014); Rodríguez et al. (2015) also found a positive effect.

The variable of income *per capita* presents a positive impact on tourism demand, and the variable is statistically significant at 1% level. This result is according to previous studies (Leitão, 2010;

Table 1: Portuguese partners used in this study

Australia	Austria	Belgium
Brazil	Canada	Cyprus
Czech Republic	Denmark	Finland
France	Germany	Hungary
Ireland	Italy	Japan
Luxembourg	Netherlands	Norway
Poland	Romania	Russia
Switzerland	Spain	Sweden
United Kingdom	United States	

Table 2: Description of explanatory variables

Variables	Description	Source	Expected signs
GDP	GDP divided midyear population (constant 2005 USD)	World Bank	+
ICP	Inflation, consumer price (annual percentage)	World Bank	-
GOVSP	General government final consumption expenditure (constant LCU)	World Bank	-
TourHC	Number of workers in the tourism sector	INE	+

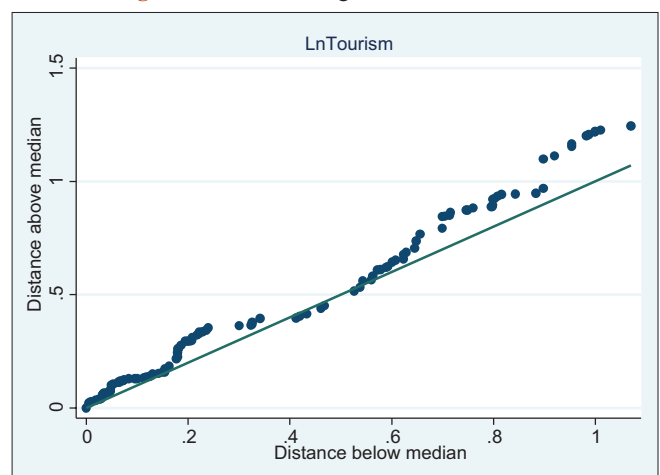
Source: Own composition. ICP: Index of consumer price, GOVSP: Government spending, GDP: Gross domestic product, HC: Human capital

Table 3: Correlation between variables

Variables	LnTourism	LnGDP	LnICP	LnGOVSP	LnTourHC
LnTourism	1.00				
LnGDP	0.395	1.00			
LnICP	-0.02	0.00	1.00		
LnGOVSP	-0.00	-0.03	-0.03	1.00	
LnTourHC	-0.03	-0.07	0.00	-0.06	1.00

Source: Own estimation. ICP: Index of consumer price, GOVSP: Government spending, GDP: Gross domestic product, HC: Human capital

Figure 1: Plot of Portuguese tourism demand



Source: Own estimation base on INE

Table 4: Panel unit root test

Test	LnTourism	LnGDP	LnICP	LnGOVSP	LnTourHC
Levin, Lin and Chu	-6.040 (0.00)	-6.54 (0.00)	-5.30 (0.00)	-0.052 (0.47)	-5.93 (0.00)
Im, Pesaran and Shin W-stat	-2.50 (0.00)	-2.579 (0.00)	-4.58 (0.00)	0.98 (0.84)	-2.46 (0.00)
ADF - Fisher Chi-square	86.15 (0.00)	80.75 (0.00)	108.85 (0.00)	34.88 (0.93)	78.17 (0.00)

Source: Own estimation, () is the *P* value. ADF: Augmented Dickey-Fuller, ICP: Index of consumer price, GOVSP: Government spending, GDP: Gross domestic product, HC: Human capital

Table 5: Portuguese tourism demand using dynamic panel data

Dependent variable: Tourism demand (LnTourism)		
Variables	GMM-System	Excepted signs
LnTourism _{t-1}	0.403*** (0.00)	[+]
LnGDP	2.29*** (0.00)	[+]
LnICP	0.05* (0.07)	[-;+]
LnGOVSP	1.19*** (0.00)	[+]
LnTourHC	0.97*** (0.00)	[+]
C	-29.61*** (0.00)	
Observations	189	
Ar ₂	0.43	
Sargan	0.98	

Source: Own estimation, () *P* value ***/*/* significant at 1%, and 10% levels. ICP: Index of consumer price, GOVSP: Government spending, GDP: Gross domestic product, HC: Human capital

Surugiu et al., 2011; Rodríguez et al., 2015). The ICP presents a positive effect on tourism demand. The variable is statistically significant at 10% level. According to the literature, the expected sign is a negative relationship between this proxy and tourism demand. However, Görmüs and Göçer (2010) found a positive effect on Turkey economy. The empirical studies of Leitão (2009); Surugiu et al. (2011) also found a positive correlation between the ICP and tourism demand. The result shows that the Portuguese economy charges higher prices, and these are associated with high quality products (Leitão, 2011; Surugiu et al., 2011). The coefficient of government spending (GOVSP) is statistically significant at 1% level. Government expenditures are important for the attracting tourist for a destination. Public spending on infrastructure, international logistics and access to airports are vital to explain the determinants of tourist demand promoting the countries.

In this regression, we also introduced the variable of human capital (LnTouHC - number of workers in the sector). The result is according to the hypothesis formulated. In fact, specialized workers can promote tourism demand.

5. CONCLUSIONS

The article investigated tourism demand between Portugal and 26 countries in 2003-2013. Econometric results demonstrate that Portuguese tourism demand is explained by high-quality services. The relative prices are positively related to tourism demand, showing that quality developments raise tourism demand in Portugal. Human capital justifies high-quality tourism services in Portugal. Our results also demonstrate that government spending is essential to promote the tourism sector. In fact, in Portugal has developed a brand in tourism market. In terms of recommendations for economic policy, Portugal should be continued to promote the tourism sector. The tourism sector is a strategic sector to the Portuguese economy.

REFERENCES

- Arellano, M., Bond, S. (1991), Some test of specification for panel data: Monte carlo evidence and an application to employment equations. *Review of Economic Studies*, 58(2), 277-297.
- Blundell, R., Bond, S. (1998), Initial conditions and moment restrictions in dynamic panel data models. *Journal of Econometrics*, 87,(1), 115-143.
- Blundell, R., Bond, S. (2000), GMM estimation with persistent panel data: An applications to production functions. *Econometric Reviews*, 19(3), 321-340.
- Correia, A., Pimpão, A., Crouch, G. (2008), Perceived risk and novelty – Seeking behavior: The case of tourists on low-cost travel in Algarve (Portugal). In: Woodside, A.G., editor. *Advances in Culture, Tourism and Hospitality Research*. Vol. 2. United Kingdom: Emerald Group Publishing Litmed. p1-16.
- Chasapopoulos, P., Butter, F.A.G., Mihaylov, E. (2014), Demand for tourism in Greece: A panel data analysis using the gravity model. *International Journal of Tourism Policy*, 3, 173-191.
- Daniel, A.C.M., Rodrigues, P.M.M. (2011), Modelling tourism demand in Portugal. In: Matias, A., Nijkamp, P., Sarmento, M. editors. *Tourism Economics*: 79-93. Berlin Heidelberg: Springer-Verlag.
- Eilat, Y., Einav, L. (2004), Determinants of international tourism: A three-dimensional panel data analysis. *Applied Economics*, 36, 1315-1327.
- Faustino, H.C, Leitão, N.C. (2007), Intra-industry trade: A static and dynamic panel data. *International Advances in Economic Research*, 13(3), 313-333.
- Faustino, H.C., Vali, C. (2013), The effects of globalization and economic growth on income inequality: Evidence for 24 OECD countries. *Argumenta Oeconomica*, 30(1), 13-31.
- Görmüs, S., Göçer, I. (2010), The socio-economic determinant of tourism demand in Turkey: A panel data approach. *International Research Journal of Finance and Economics*, 55, 87-98.
- Leitão, N.C. (2009), Portuguese tourism demand. *Journal of Global Business and Technology*, 5-2, 63-72.
- Leitão, N.C. (2010), Does trade help to explain tourism demand? The case of Portugal. *Theoretical and Applied Economics*, 3(544), 63-74.
- Munoz, G.T. (2007), German demand for tourism in Spain. *Tourism Management*, 28, 12-22.
- Phakdisoth, L., Kim, D. (2007), The determinants of inbound tourism in Laos. *Asean Economic Bulletin*, 24-2, 225-237.
- Rodríguez, A.X., Roget, M.F., Pawlowska, E. (2012), Academic tourism demand in Galicia, Spain. *Tourism Management*, 33(6), 1583-1590.
- Serra, J., Correia, A., Rodrigues, P.M.M. (2014), A comparative analysis of tourism destination demand in Portugal. *Journal of Destination Marketing & Management*, 2, 221-227.
- Seetaram, N. (2012), Immigration and international inbound tourism: Empirical evidence from Australia. *Tourism Management*, 33(6), 1535-1543.
- Skrinjaric, T. (2011), Investigation of foreign tourism demand in Croatia using panel data analysis. *Acta Turistica*, 23(2), 105-238.
- Surugiu, C., Leitão, N.C., Surugiu, M. (2011), A panel data modelling of international tourism demand: Evidences for Romania. *Economic Research*, 24(1), 134-145.
- Thorpe, M., Leitão, N.C. (2014), Economic growth in Australia:

Globalisation, trade and foreign direct investment. *Global Business and Economics Review*, 16(1), 75-86.

Vogt, M., Wittayakorn, C. (1998), Determinants of the demand for

Thailand's exports of tourism. *Applied Economics*, 30, 711-775.

Zhang, Y. (2015), International arrivals to Australia: Determinants and the role of air transport policy. *Journal of Air Management*, 44-45, 21-24.