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ASSESMENT OF STATIC PANEL MODEL OF TOURIST DEMAND IN CROATIA

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Croatia is an important and widely recognizable tourist destination. The importance of tourism in Croatia is manifested in many aspects, and the share of income from tourism in BDP in Croatia is around 20%. The most numerous guests in Croatia are foreign guests, mostly from Germany, Austria, Slovenia, Italy and Poland. In this paper, foreign tourism demand in the Republic of Croatia was analyzed and impact of five selected variables on foreign tourism demand is estimated: gross domestic product of countries from which tourists come from, prices in Croatia, prices in competing countries, distance between countries and accommodation capacities. The analysis was carried out for the nine-year time period from 2010 to 2018 based on data for 32 countries from which tourists come, and OLS model, a panel model with fixed effects and a panel model with random effects were estimated. The adequacy of the model was tested with the Hausman test, Breusch-Pagan Lagrange test and F-test. A panel model with Driscoll-Kraay standard errors was estimated. The estimated model showed that the gross domestic product of the countries from which the tourists arrive has a statistically significant and positive influence on the foreign tourism demand in Croatia, while at a significance level of 10% the accommodation capacity in Croatia has a positive and statistically significant influence. The impact of other variables taken into account was not statistically significant.

Keywords: *foreign tourism demand, panels, Croatia.*

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1 Introduction

Due to its natural beauties, numerous national parks, nature parks and rich cultural heritage, as well as its geographic position, Croatia is an important European mediterranean tourist destination. Croatia's tourism history can be dated as far as the 19th century, when first travelers were rich aristocrats visiting various health resorts,spas and cultural centers (1845-1875). Later on, the bourgeoisie started travelling and the first tourist destinations (1875-1910) began to develop, and with the strengthening of workers' rights, an increasing number of people began to travel (1910-1954) that was followed by a strong development of tourism after World War II and becoming a significant economic and social factor (Petrić, 2003). Today, the Croatian economy is characterized by a high share of tourism. Namely, tourism is Croatia's largest service export activity (it accounts for about 70% of total exports of services) which contributes about a fifth of the value of GDP. Thus, in 2019, it contributed 19.4% of Croatian GDP (Croatian Chamber of Economy, 2021). Croatian tourism is reliant on foreign tourist demand since the guests are mainly foreign guests (approximately about 90%), and is characterized by a distinct seasonality during the summer months. Namely, July and August have the largest share of overnight stays, accounting for about 60% of overnight stays throughout the year, which is a significant share compared to other European Mediterranean tourist destinations (the average of six Mediterranean countries is 34.6%). In 2019, the growth of the tourism sector in Croatia amounted to 4.1%, while the total growth of the Croatian economy amounted to 2.9% (Croatian Chamber of Economy, 2021). According to data obtained from the World Travel & Tourism Council (2021), 25.1% of total employment in Croatia refers to jobs in tourism, total foreign spending was realized in the amount of HRK 80.2 billion, which makes 38.6% of total exports or 89% of total tourist spending. In 2019, almost half of foreign tourists came from Germany, Austria, Slovenia, Italy and Poland.

Conducting this research resulted in scientific and empirical contribution. The scientific contribution consists in the assessment of a static panel model of foreign tourist demand and the analysis of the impact of selected variables on tourist demand. In an empirical sense, the assessment of the model of foreign tourist demand resulted in a framework that can serve the makers of strategic decisions in quality planning of the further development of the tourism sector since it gives insight into the behavior of tourists when deciding on travel which would ultimately have a positive impact on the economy of the country and the life of its inhabitants and allows comparison of the results obtained for the selected period with other countries. This paper analyzes foreign tourist demand in the Republic of Croatia and assesses the impact of five selected variables on foreign tourist demand. The paper consists of 5 chapters. In the first introductory chapter, introductory considerations on tourism in Croatia are presented, the second chapter presents a literature overview, e.i., previous research. In the third chapter, the data used in the research and the selected methodology are described, while the fourth chapter presents the results of the conducted empirical research. The fifth chapter isthe concluding chapter, and contains concluding considerations, limitations and proposals for improving the research.

2 Literature review

There are numerous studies of the impact of various macroeconomic and social phenomena on tourism demand. Most often, the impact of macroeconomic, sociological and social phenomena on the demand for tourist resources of a country is examined using different methodologies (Devčić et al., 2021, p. 267). The authors use various methodologies in their research, but in the last ten years, due to a large number of advantages, panel methodology has been increasingly used. Eilat & Einav (2004) explored tourism demand using panel models, using data for every world countryby considering arrivals of foreign tourists from every country to all destination countries in their analysis of foreign tourism demand. The forementioned authors observed the destination countries with high and low gross domestic product separately, while considering the countries of origin of tourists they observed only countries with high gross domestic product. The impact of the GDP of the countries of origin of tourists has been foundto be statistically significant and positive. In their research, Proenca & Soukiazis (2005) analyzed foreign tourist demand of Portugal. For countries of origin of tourists, they observed countries that account for 90% of total tourist arrivals (Spain, France, United Kingdom, Germany). In the analysis, they estimated an annual panel data model for the period 1977 - 2001. As an approximation of foreign tourist demand, the authors used the share of costs of each country of origin in total tourism revenues, as independent variables in the model they looked at real prices, real income of tourists per capita, number of accommodation capacities and public investments. The number of accommodation capacities proved to have the most significant impact in the model, while public investments were not statistically significant in foreign tourist demand. Khoshnevis et al. (2017) analyzed the determinants of international tourism demand for the period 1995-2014 in the U.S.A. using a gravity panel model based on the number of tourist arrivals in 14 countries and showed that real gross domestic product, consumer price index, real exchange rate and individual specific events have a significant impact on international tourism demand. Income elasticity suggests that tourism is a non-luxury commodity, and prices and the real exchange rate exhibit a negative relation to tourist arrivals. Furthermore, the authors reach the conclusion that tourist transportation infrastructure is a significant determinant of tourist arrivals to the U.S.A. Aforementioned implies that strengthening the infrastructure is important for attracting more international tourists to the U.S.A. Muryani et al. (2020) explored the determinants of incoming tourism from the nine largest countries of origin of tourists to Indonesia for the period from 2000 to 2014 by assessing a dynamic panel model. The results indicated that tourist income per capita, relative price and accommodation infrastructure have a positive effect on tourist consumption in Indonesia, while distance has a negative effect. Income has a positive but small impact on tourism demand compared to other countries. The positive effect of prices indicates Indonesia's advantage in competitive tourism prices. Nevertheless, low price levels also signify the low value of tourist services. Ulucak et al. (2020) investigated factors of demand that influence the number of international tourist arrivals to Turkey by assessing a gravity panel model from the 25 largest countries they come from in the period from 1998 to 2017. Per capita income from the country of origin and Turkey, relative exchange rate and globalization have a positive impact on demand for tourism, while it is negatively affected by the consumer price index, violence/terrorism, household debt levels and bilateral distance between Turkey and the countries from which tourists come.

Additionally, an increasing number of empirical research is being of foreign tourist demand for Croatia is being conducted. Consequently, the panel model of foreign tourist demand in Croatia was estimated by Škuflić & Štoković (2011). In their analysis they evaluated the annual panel data model for the period from 1998 to 2008, for the dependent variable they observed the number of overnightstays in hotels, while as independent variables they observed the average number of stars a hotel holds, the average price of overnight stays in hotels, GDP per capita of the countries from which tourists come, the average age of hotels and the percentage of online reservations. After assessing the model, it was concluded that the gross domestic product per capita of the countries from which tourists come had a positive impact on foreign tourist demand, while the average price of overnight stays in hotels had a negative impact on foreign tourist demand. Šergo et al. (2005) conducted an analysis of tourist demand in Croatia in their research when they observed the changes of long-term tourist demand from the countries of origin of tourists such as Austria, Italy, Germany, the Netherlands and Great Britain. Furthermore, Šergo et al. (2014) investigated determinants of the length of stay of tourists and the number of tourist arrivals for twenty countries of origin of tourists for the post-war period (1996 - 2010). Short-term and long-term panel models of foreign tourist demand in Croatia and comparatively in competing countries were evaluated by Devčić (2019) and indicated that the dynamic model was superior to the static and gravitational models. Additionally, the largest impact on foreign tourist demand in Croatia have been shown to have the previous values of the dependent variable, tourist income, relative prices, prices in competing countries and travel costs to the Republic of Croatia. The economic crisis had not proven to be a significant determinant of foreign tourist demand in the Republic of Croatia. The impact of the economic crisis proved to be negative, although not statistically significant. The impact of the threat from terrorism proved to be statistically significant and negative for Italy and Syria. Increasing security in Italy and Syria, i.e. reducing the threat of terrorism would reduce the number of overnight stays of foreign tourists in the Republic of Croatia. Although increasing security in Greece and Turkey also expectedlyhad a negative impact, it had not proven to be statistically significant. Furthermore, Erjavec & Devčić (2022) explored the determinants of international tourism demand in Croatia. A particular focus was placed on the role of accommodation capacity and openness of trade, two drivers of demand that were rarely examined in combination. They evaluated the dynamic panel model using annual data for 16 countries generated in tourism from 2007 to 2019 and indicated that the lagged dependent variable, income, accommodation capacity and exchange rate exhibited a positive effect on international tourism demand, while the impact of relative prices and trade openness proved irrelevant in the Croatian context.

Generalizing and summarizing the results of previous research on tourism demand is a continuous process that helps destinations, tourism organizations and strategic decision-makers to better understand the market and adapt their strategies to meet the needs of tourists and achieve sustainable growth of the country. Due to the importance of the tourism sector and its impact on the economy, there is a great interest of the scientific community in researching the determinants of tourism demand in the world. By reviewing the available scientific literature, it can be noted that the most important determinant of foreign tourist demand is the disposable income of tourists, which is mainly approximated in research by GDP or GDP per capita and whose impact is significant and positive (Eilat & Einav, 2004; Khoshnevis Yazdi & Khanalizadeh, 2017; Muryani et al., 2020; Yücel & İlkay, 2020; Škuflić & Štoković, 2011; Devčić, 2019; Erjavec & Devčić, 2022). The second determinant of prices can be

distinguished in a destination whose impact in research is shown to be significant and negative (Khoshnevis Yazdi & Khanalizadeh, 2017; Muryani et al., 2020; Yücel & İlkay, 2020; Škuflić & Štoković, 2011; Devčić, 2019). Furthermore, the available accommodation infrastructure can have a positive impact on the increase in demand in a destination (Proenca & Soukiazis, 2005; Permatasari & Padilla, 2020). Out of other variables found in the literature, the influence of distance to destination, the impact of globalization, household debt and prices in competing countries were investigated.

3 Empirical Research

The time period from 2010 to 2018 was selected for the implementation of the empirical part of the research. The research aims to assess the model of total foreign tourist demand, and 32 of the most represented countries from which tourists come to Croatia were included in the analysis, in accordancewith the data from the Croatian Bureau of Statistics (Austria, Belgium, Bulgaria, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Greece, Ireland, Iceland, Italy, Lithuania, Latvia, Luxembourg, Hungary, Malta, Netherlands, Norway, Germany, Poland, Portugal, Romania, North Macedonia, Slovakia, Slovenia, Serbia, Spain, Sweden, Switzerland, Turkey). According to the analyzed scientific literature (Mervar & Payne, 2007; Škuflić & Štoković, 2011; Devčić, 2019; Erjavec & Devčić, 2022), the number of overnight stays of foreign tourists in Croatia was selectedas an approximation of foreign tourist demand. Several main determinants of foreign tourism demand were selected and included in the research. The research examined the existence and the direction of the impact of the following variables: tourist income, the relationship between prices in Croatia and prices in the countries from which tourists come, available accommodation infrastructure suitable for renting in Croatia, distance from the country from which tourists come to Croatia and prices in competing destinations.

The income of tourists in this survey is approximated by the gross domestic income of the countries from which tourists come (GDP). Previous research shows that income is an important determinant of demand and that tourists make decisions based on their own revenues by planning costs. Furthermore, prices are also an important determinant since nowadays tourists are very knowledgeable about prices in the selected destination and can easily compare them with prices in their own countries. The Harmonized Index of Consumer Prices (HICP) was used as an approximation of prices in this study. Demand may depend on the built infrastructure or accommodation capacities of the destination. The available accommodation infrastructure suitable for renting is taken into account and is approximated by the number of beds in Croatia (ACCOMMODATION). Furthermore, a relevant factor when tourists choose a destinationcan be the distance that needs to be traveled to reach the destination, so the distance variable in this research is also taken into account. The spatial distance was calculated as the distance of the capitals of the countries to Zagreb based on data from Google Maps (DISTANCE). The tourist market, like any market, is determined by the prices that on the market. Prices in competitive tourist destinations in relation to Croatia are approximated by the average harmonized consumer price indices of Italy, Spain, Portugal, Greece and Turkey (COMPETITION). All used indices were calculated using 2015 as base. The data are downloaded from the websites of Eurostat and the Croatian Bureau of Statistics. All the data used in the analysis are expressed annually in order to avoid the problem of seasonality that is considerable for Croatia as a destination.

In this empirical study, the panel methodology was used. Panel methodology implies data that have a spatial and temporal component in which the spatial dimension is greater than the temporal one. Panel models can be divided into two basic groups, static and dynamic models. In static panel models, only variables at the moment t are used as explanatory variables, while in dynamic models, the variable of the previous values of the dependent variable is used as an explanatory variable (at the moment t-1), (Devčić et al., 2022, p. 213). Static models can be evaluated as models with fixed and models with random effects. A simplified, general record of a static model with fixed effects reads

$$y_{it} = X'_{it}\beta + a_i + u_{it} \quad (1)$$

where i = 1,..., N, t = 1,..., T, and the variable a_i contains individual effects specific to the unit of observation *i* constant in time, while the X_{it} contains all the variables included in the research, while β is a vector of estimated parameters (for more detailed explanations see Devčić et al., 2022, p. 213).

4 Results and discussion

In this paper static models were evaluated: a combined model, a model with fixed effects and a model with random effects. The results of the estimated models are shown in Table 1.

Table 1 Results of assessed models

	(1)	(2)	(3)
	Joint model	Fixed effects	Random effects
Variables	Overnight stays	Overnight stays	Overnight stays
GDP	81.52***	76.20***	77.92***
	(1.458)	(4.021)	(3.126)
HICP	9,358	412,871***	370,112***
	(194,625)	(97,993)	(96,932)
ACCOMODATION	17.99***	16.03***	19.18***
	(1.161)	(4.285)	(1.764)
DISTANCE	997.4**		1,061
	(481.1)		(1,929)
COMPETITION	-91,101	-184,229***	-191,975***
	(167,806)	(68,557)	(63,153)
CONSTANT	895,238	-2.458e+07***	-2.555e+07***
	(1.185e+07)	(6.042e+06)	(6.664e+06)
Observations	239	239	239
R^2	0.987	0.743	
Number of Units		32	32

Robust standard errors in brackets, *** p<0.01, ** p<0.05, * p<0.1

Source: authors' calculations.

After obtaining the results, several diagnostic tests were carried out. When testing or the appropriateness of the model, the Hausman test is carried (Hausman, 1978). The null hypothesis inHausman's test assumes that a more appropriate estimator is the one with random effects, while the alternative hypothesis assumes that a more appropriate estimator is the one with fixed effects. Hausman's test indicates the suitability of a fixed effects model. Furthermore, in analyzing which of the estimated models (the combined OLS model and the panel fixed effects model are compared) is more appropriate in the analysis, the F test was used. The F-test also points to the evaluation of the fixed effects panel models. The Breusch Pagan Lagrange test (Breusch & Pagan, 1980) was also used to examine whether a joint model or the random effects panel model was more appropriate. The conducted test indicates that the fixed effects panel model is more suitable. The results of the tests are presented in Table 2.

Table 2 Tests results

Test	**p-value**	**joint OLS model**	**Fixed effects panel model**	**Random effects panel model**
F test	0,0000		+	
Breusch Pagan Lagrange test	0,0000			+
Hausman's test	0,0001		+	

Source: authors' calculations.

Based on the obtained results, the fixed effects panel model was selected. By applying Wald's test in a fixed effects panel model, the problem of heteroskedasticity is present and the application of the Wooldridge test revealed the presence of autocorrelation problem. Further assessment of the adequacy of the model ascertained that there is a problem of spatial dependence. Due to all of the above, a panel model with Driscoll-Kraay standard errors was evaluated. The results of the estimated model are presented in Table 3.

Table 3 Results of the evaluated panel model with Driscoll-Kraay standard errors

Variables	**Coefficients**	**Driscoll-Kraay standard errors**	**t-statistic**	**p-value**
BDP	76.19635	2.846115	26.77	0.000***
HICP	412871.4	295533.9	1.40	0.205
ACCOMODATION	16.03159	7.741483	2.07	0.077*
DISTANCE	-18266.96	17808.19	-1.03	0.339
COMPETITION	-184229.5	119762.9	-1.54	0.168
Number of Observations	239			
Number of Groups	32			
F-test	10672.88 (0.0000)***			

Robust standard errors are in brackets, *** p<0.01, ** p<0.05, * p<0.1.

Source: authors' calculations.

The estimated panel model showed that the gross domestic product of the countries from which tourists come exhibits a statistically significant and positive impact on the arrival of tourists to Croatia, while at the level of significance of 10% the variable of accommodation capacityhas a positive and statistically significant impact. Meanwhile, the impact of other variables has not proved to be statistically significant. The obtained results are in accordance with expectations, since similar research has also pointed to the importance of disposable income and accommodation infrastructure as a determinant of foreign tourist demand. Increasing GDP in the countries from which tourists come increases the purchasing power of the population, which means that people from these countries have higher incomes and greater ability to travel and spend money abroad and an increasing number of people will decide to travel. Countries where GDP is at a high level are usually more economically stable and residents are stimulated by such an economic situation and also their propensity towards travel is increased. The accommodation offer of the destination can increase the tourist demand for this destination and by increasing the quality, diversity and availability of accommodation capacities, tourists can be encouraged to choose a specific destination. Quality accommodation infrastructure increases the competitiveness of a destination and can attract richer guests who will spend more, while a diversified offer of accommodation in the form of hotels, holiday homes, private accommodation of high quality, will attract different target groups of guests. Also, a well-balanced price policy of accommodation capacities can increase the number of incoming guests. Although in many studies (Khoshnevis Yazdi & Khanalizadeh, 2017; Muryani et al., 2020; Yücel & İlkay, 2020; Škuflić & Štoković, 2011; Devčić, 2019) prices of accommodation and services play a key role, in this research prices have not proved to be a significant factor in creating the volume of tourist demand (as with Devčić & Erjavec, 2022) which can be interpreted by tourists' willingness to pay for the desired experience and thatprice is not the primary factor to them. In Croatia, tourism is extremely seasonal and tourists are willing to pay to visit the destination during the summer months regardless of the price, and for a large number of tourists who come to Croatia this is not their first visit and they will remain loyal to the destination regardless of the price. Although in relevant research the distance to the destination is often used as a determinant, in this research the impact of distance to Croatia has not proven to be significant. Croatia is an extremely attractive destination and many tourists are willing to spend as much as needed to get to Croatia regardless of distance, and due to a positive impact of previous positive experiences the people will decide to travel. On the other hand, Croatia is extremely well connected to emissive countries, so the distance is easier traversed because the journey is faster and more comfortable than to other destinations. In addition, prices in competing destinations were proven to not affect the decisions of tourists to visit Croatia in this research, which can be explained by the uniqueness of the tourist offer in Croatia in the form of natural beauty, clean sea, islands, historical and cultural heritage, gastronomy, and a possible reason is the loyalty of tourists to Croatia as a destination while other competing destinations do not have these advantages.

5 Conclusion

Due to its natural beauty, numerous national parks, nature parks and rich cultural heritage as well as its geographical position, Croatia is an important European Mediterranean tourist destination. The Croatian economy is characterized by a high share of tourism, about 70% of total exports are related to the service industry, which is realized at the level of about a fifth of

the value of GDP. The aim of this study was to analyze foreign tourist demand in Croatia using a panel methodology. Foreign tourist demand is approximated by the number of overnight stays of foreign tourists in Croatia, and variables were used as determinants of foreign tourist demand: gross domestic product, harmonized index of consumer prices HICP, number of beds for rent as accommodation infrastructure, spatial distance of countries from Croatia calculated as the distance of capitals and prices of competing destinations Italy, Spain, Portugal, Greece and Turkey calculated as the average of the harmonized index of consumer prices.

The estimated model showed that the statistically significant and positive impact on the arrival of tourists to Croatia has the gross domestic product of the countries from which tourists come, which is expected since disposable income is the most important variable on which the decision on travel depends and is in line with the results so far. Namely, when making a decision on travel, tourists will make this decision in accordance with disposable income. At the level of significance of 10% positive and statistically significant impact has a variable of accommodation infrastructure, which is expected and shows that investment in accommodation capacities, their quality, diversity and availability can attract an additional number of guests. Although there is an expectation that prices, distance to destination and prices in competing destinations will be determinants of foreign tourist demand, this research has not shown this. In this study, a static model was evaluated, by adding an additional variable of previous values, a dynamic model would be evaluated, which would be a recommendation for future research. Also, one could observe the impact of other variables on tourism demand such as investments, exchange rates, transport infrastructure, as well as investments in marketing activities.

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Sažetak

PROCJENA STATIČKOG PANEL MODELA TURISTIČKE POTRAŽNJE U HRVATSKOJ

Hrvatska je važna i nadaleko prepoznatljiva turistička destinacija. Važnost turizma u Hrvatskoj se očituje kroz mnoge aspekte, a udio prihoda od turizma u BDP-u Hrvatske se kreće oko 20%. Najbrojniji gosti u Hrvatskoj su inozemni gosti i to pretežito iz Njemačke, Austrije, Slovenije, Italije te Poljske. U ovom radu analizirana je inozemna turistička potražnja u Republici Hrvatskoj te je za pet odabranih varijabli procijenjen njihov utjecaj na inozemnu turističku potražnju: bruto domaći proizvod zemalja iz kojih turisti dolaze, cijene u Hrvatskoj, cijene u konkurentskim zemljama, udaljenost zemalja i smještajni kapaciteti. Analiza je provedena za devetogodišnje vremensko razdoblje od 2010. do 2018. godine na temelju podataka za 32 zemlje iz koji turisti dolaze u Hrvatsku, a procijenjeni su združeni OLS model te panel model s fiksnim efektima i panel model sa slučajnim efektima. Prikladnost modela ispitana je Hausmanovim testom, Breusch-Pagan Lagrangeovim testom te F-testom. Procijenjen je panel model s Driscoll-Kraay standardnim pogreškama. Procijenjenim modelom pokazalo se da statistički značajan i pozitivan utjecaj na dolazak inozemnih turista u Hrvatsku ima bruto domaći proizvod zemalja iz kojih turisti dolaze, dok na razini značajnosti od 10% pozitivan i statistički značajan utjecaj ima i varijabla smještajnog kapaciteta u Hrvatskoj. Utjecaj ostalih varijabli uzetih u obzir se nije pokazao statistički značajnim.

Ključne riječi: *inozemna turistička potražnja, paneli, Hrvatska.*