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Role of tourism and hotel accommodation in house prices

Blanka Škrabić Perić [a], Ana Rimac Smiljanić [b,*], Iva Kežić [a]

[a] University of Split, Faculty of Economics, Business and Tourism, Croatia
[b] University of Split, Faculty of Economics, Business and Tourism, Cvite Fiskovica 5, 21000 Split, Croatia

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ABSTRACT

This paper investigates the influence of tourism and hotel accommodation on housing prices in 27 EU countries over the period from 2005 to 2018. The results of dynamic panel data confirmed the significant influence of standard housing prices determinants: economic growth, unemployment and credit to the private sector, whilst the population does not play a significant role. Our results empirically confirmed that tourism significantly increases housing prices regardless of used indicators. However, our main finding was that hotel accommodation plays a role as a buffer of the growth in housing prices caused by tourism. Obtained results provided evidence of interconnections among tourism, hotel accommodation and housing prices at a national level.

1. Introduction

Over the last decades, prior to the COVID-19 outbreak, global travel demand increased faster than economic growth (ETC, 2019). One of the factors that makes such travel possible is affordable, cheaper and diverse accommodation around the world. A variety of Internet companies, by promoting sharing economy in tourism, facilitate accommodation in homes of local residences (peer-to-peer accommodation). There is no doubt that Airbnb and similar internet platforms have shaken up the tourism accommodation structure and have been the focus of research (Dolnicar, 2019; Núñez-Tabales, Solano-Sanchez, & Caridad-y-López-del-Río, 2020). Research identifies paid online peer-to-peer accommodation as the force that has "distributive effects on tourism industry and society as whole" (Dolnicar, 2019, p. 248).

Previous research finds evidence that Airbnb as a distributive innovation to the hotel industry because tourists use it as a substitution to hotels and decrease hotel revenues, especially hotels with middle and lower star ratings (Guttentag, 2015; Guttentag & Smith, 2017; Hajibaba & Dolnicar, 2018a; Zervas, Proserpio, & Byers, 2017). The growing supply of these types of alternative accommodation is a force, which could take a significant market share from the hotel segment in EU counties (ETC, 2019).

The effects of peer-to-peer accommodation significantly affect other parts of the economy, especially the housing market. Rising house prices (Bakker & Twining-Ward, 2018; Benítez-Aurioles & Tussyadiah, 2020; Bivens, 2019; Garcia-López, Jofre-Monseny, Martínez-Mazza, & Segú, 2020), reduced real estate supply for long-term rentals in favor of short-term rent (Barron, Kung, & Proserpio, 2020; Shabrina, Arcaute, & Batty, 2019) and the growing dislike of permanent housing in an area attractive to tourists (Gurran, 2018; Koster, van Ommeren, & Volkhausen, 2019) are some of the negative effects on the housing market. According to fact that one third of Airbnb listings exist in big cities while another one third is near seacoasts (Adamiak, 2019), it is not surprising that the most recent research, which investigates the role of peer-to-peer accommodation, is concentrated on these areas. Results of these research confirm negative consequences of tourism on the local housing market (Bakker & Twining-Ward, 2018; Barron et al., 2020; Benítez-Aurioles & Tussyadiah, 2020; Biagi, Brandano, & Caudill, 2016; Biagi, Brandano, & Lambiri, 2015; Biagi, Lambiri, & Faggian, 2012; Franco, Santos, & Longo, 2019).

To limit the negative effects of peer-to-peer accommodation on housing markets, regulators take some actions (Nieuwland & Van Melik, 2020). Most existing regulatory measures attempt to minimize effects on the housing market in a specific area and they neglect its effect on the broader geographic area. We doubt that consequences of peer-to-peer accommodation affect the much broader geographical area. Namely, in real estate literature, the spillover effect in house prices is evident between different geographical markets. The effect of spillover of houses prices exists in the nearest geographic area (DeFuscoa, Ding, Ferreirac, & Gyourko, 2018; Ismail, Warsame, & Wilhelmsson, 2021) and at regional and national levels (Case & Shiller, 1989; Nneji, Brooks, & Ward, 2015; Pellényi, 2019; Tomal, 2021; Tsai, 2014). This effect does

* Corresponding author.
E-mail addresses: blanka.skrabic.peric@efst.hr (B.Š. Perić), ana.rimac.smiljanic@efst.hr (A.R. Smiljanić), iva.kezic@live.efst.hr (I. Kežić).

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not depend on contiguity or distance between real estate markets (Nneji et al., 2015) and fundamental determinants such as income, migration patterns, or changes on credit markets (DeFuscoa et al., 2018). Therefore, in this paper, we move the focus on the tourism effect on the housing market at a macroeconomic level. Research into this phenomenon at the macro level is rare. However, Paramati and Roca (2019) find evidence that tourism has a positive effect on house prices growth at a macro level in OECD countries.

In this paper, we focus on EU countries. Tourism in EU countries has a long history, and a large number of global tourist attractions are located in these countries. The number of tourists in these countries is continuously increasing and tourism makes up a significant part of the GDP (WTTC, 2020). At the same time, in the EU, the housing prices and the number of tourist bed places in residential real estates are rising. Growth in house prices is evident in all EU countries, not just in tourist attractive areas (Barnett, Ganzerla, Couti, & Molard, 2020; Martin & Domitille, 2020). Sharing economy platforms for short-time accommodation are one of negative factors that decreased housing affordability in the EU area (Kowalik, Lewandowski, Barcevičius, Caturianas, & Sokołowski, 2020).

We suspect that new hotel accommodation can reduce rise in housing prices caused by tourism in EU countries. Namely, areas with strong infrastructure of formal tourist accommodation and planned tourist economy are not facing such negative effects of short-term rental on real estate markets (Gurran, Zhang, & Shrestha, 2020). Prior to the COVID-19 crisis, Europe was the region with the best all key hotel performance indicators in the world (ETC, 2019). However, the COVID-19 crisis endangers them significantly (Polemis, 2021). This can indicate that the capacity of that sector is lower than market demand. In the EU, approximately 60% of available bed places are in housing rental accommodation (ETC, 2019). Large fraction of Europe's housing rental market is fulfilling supply for tourist accommodation. We find additional support for our research in studies which prove that tourists used Airbnb as a substitute for hotels (Guttentag & Smith, 2017; Sainaghi & Baggio, 2020). The reason for the high prevalence of housing rental market in tourist accommodation can be a consequence of fast growth of destination popularity. House renting by online platform services can fulfill, most quickly and cheaply, the new increase in tourist demand. They have more flexibility and minimal margin costs than hotels (Cocola-Gant & Gago, 2019; Dolnicar, 2018; Fairley & Dolnicar, 2018; Zervas et al., 2017).

On the other hand, building new hotels requires significant time and money and depends on the country's business climate. New investment in hotels implies the estimation of long-term tourist desirability of location due to the long-term profitability of the hotel investment (Newell & Seabrook, 2006). This is not easy to assess in a short period. These problems do not affect the growth of tourist accommodation in the housing sector. Housing properties already exist, and owners can easily convert them into tourist accommodation or vice versa for long-term housing of the local population. All of the above points to our research question of whether the lack of hotel accommodation in EU is increasing house prices.

This paper contributes to the existing literature by considering more deeply the relationship between tourism and house prices at the macro level. We identify the hotel industry, precisely, the lack of hotel capacity in the EU as the force that puts pressure on national housing prices growth. In that way, we upgrade the existing model of house prices in the EU by investigating more deeply the role of tourism and by adding hotels as new variable.

Our findings additionally give new insights into house prices determinants. First, we confirm the hotel industry as a buffer of housing prices growth caused by tourism. Second, we provide evidence that population growth is not a significant determinant of the housing prices in EU countries while tourists, as temporary residents, are becoming an important force. Our results indicate the need for the development of unique policy measures that stimulate the creation of new capacity in the hotel industry in the EU which consequently relieve the pressure from the rising housing prices.

This paper consists of five sections. The next section presents the data. Section 3 discuses empirical model and methodology are section 4 presents and discuses empirical results. Section 5 provides the major conclusions and policy recommendations.

2. Data

Our data set consists of annual data from 2005 to 2018 for the 27 EU member countries - Austria, Belgium, Bulgaria, Cyprus, Croatia, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Poland, Portugal, Romania, Slovakia, Slovenia, Spain and Sweden. Our research follows numerus research into EU housing markets (Gupta, André, & Gil-Alana, 2015; Maynou, Monfort, Morley, & Ordóñez, 2021; Merikas, Merika, Laopodis, & Triantafyllou, 2012; Miles, 2020; Philiponnet & Turrini, 2017). Increasing linkages in trade, financial markets, economic policies and general economic conditions exist between these countries, which directly influence housing markets (Vansteenkiste & Hieber, 2009). Consequently, European housing markets synchronize over time (Corradin & Fontana, 2013; Gupta et al., 2015).

We examine the effects of tourism on the house prices index by using two groups of variables: indicators of tourism demand and indicators of hotel accommodation. Before the COVID-19 crisis, scientific literature recognizes international tourism as the key driver of economic growth (Brida, Cortes-Jimenez, & Pulina, 2016). International tourist arrivals are the key indicator of tourism demand (Kester, 2016) and are the most popular proxy for tourism demand in the tourism literature (Yang, Xue, & Jones, 2019). Therefore, we use international arrivals at a tourist accommodation establishment in millions to capture tourist demand in a country, as the main indicator. To ensure the robustness of results, we use two additional tourism indicators: total nights spent at tourist accommodation establishments in millions by foreign tourists and international tourism receipts in billions of USA dollars.

We use two indicators of hotel accommodation. The first indicator is growth in the number of establishments, hotels and similar accommodation and the second indicator is growth in the number of bed places in hotels and similar accommodation. Based on previous literature on housing prices, we include in model gross domestic product per capita growth, growth of domestic credit to the private sector by banks as a percentage of GDP, population annual growth and unemployment as a percentage of active population, as controlled variables (Égert & Mihaljek, 2007; Paramati & Roca, 2019; Sutton, Mihaljek, & Subelyte, 2017).

We use the growth of banks' domestic credit to the private sector and not interest rates to demonstrate conditions in credit markets. We exclude interest rates because BIS (2020) finds that interest rates were not robust to different housing prices model specification. As an indicator of construction activity, we include the building permits for residential buildings in model. The expected sign can be positive or negative. Its positive sign reflects new construction as supply reaction to new demand for housing while negative sign reflects increase of supply relative to demand to new construction (Belke & Keil, 2017).

The data was collected from the database Eurostat (2020a, 2020b, 2020c) and from the World Bank Database (2020). Table 1 gives the definition of all variables, data source and expected sign of variables.

Table 2 presents descriptive statistics while Table 3 presents correlation coefficients of dependent and independent variables from model.

According to the correlation matrix (Table 3), correlation coefficients between independent variables show there is no possible multicollinearity in the model specifications. Correlation coefficients indicate strong correlation only between three different indicators of tourism (0.875, 0.958, 0.774). Therefore, we introduce them in the different model specifications one by one.

Table 1
Variables' definition and sources.

l	Definition	Source	Expected sign
House prices	House price index – annual data (2015 = 100)	Eurostat database	Dep. variable
GDP per capita	Gross domestic product per capita growth (%)	World Bank Database	+
Population	Population annual growth (%)	World Bank Database	+
Unemployment	Unemployment, total, percentage of active population (15–74 years old)	World Bank Database	−
Credit	Growth of domestic credit to private sector by banks growth (% of GDP)	World Bank Database	+
Receipts	International tourism, receipts in billions USA dollars	Eurostat database	+
Overnights	Nights spent at tourist accommodation establishments, total, in millions, foreign tourists	Eurostat database	+
Tourist arrivals	Arrivals at tourist accommodation establishment, total, in millions, foreign tourists	Eurostat database	+
Hotels-growth	Growth of number of establishments, hotels and similar accommodation, difference between current and previous value in the hundreds	Eurostat database	−
Beds-growth	Growth of number of bed places in hotels and similar accommodation, difference between current and previous value in the thousands	Eurostat database	−
Permits	Building permits for residential buildings - number of dwellings (2015 = 100)	Eurostat database	+/−

Table 2
Descriptive statistics.

	Obs	Mean	Std. Dev.	Min value	Max value
House prices	372	101.9783	18.82257	52.04	169.64
GDP per capita	378	1.869101	3.875435	−14.27	23.99
Population	378	0.2303439	0.8394208	−2.26	3.26
Unemployment	378	8.886243	4.355164	2.2	27.5
Credit	340	−0.2437059	7.623704	−54.76001	31.53
Receipts	378	14.69532	18.54083	0.45	81.25
Overnights	375	38.73459	58.66658	1.4	305.91
Tourist arrivals	371	28.5096	42.91214	0	179.24
Beds-growth	348	5.185431	11.55417	−40.29001	59.05005
Hotels-growth	348	−0.0093391	2.316754	−23.96	17.38
Permits	378	197.0148	287.0459	34.3	3184

Source: authors' calculations.

3. Model and methodology

Empirical analysis starts with basic model which follows theoretical and empirical findings of Égert and Mihaljek (2007) for conventional fundamentals of house prices. Additionally it includes tourism variable because Paramati and Roca (2019) empirically confirmed importance of tourism on the house prices. Eq. (1) presents all variables included in our basic model:

$$\begin{aligned} &\mathit{House}\ \text{prices}_{it} = \mu + \gamma \mathit{House}\ \text{prices}_{i,t-1} + \beta_1 \text{GDP per capita}_{it} + \beta_2 \mathit{Population}_{it} + \\ &+ \beta_3 \mathit{Unemployment}_{it} + \beta_4 \mathit{Credit}_{it} + \beta_5 \mathit{Permits}_{it} + \\ &+ \beta_6 \mathit{Tourism}_{it} + \alpha_i + \varepsilon_{it}; i = 1, \dots, 27; t = 1, \dots, 14; \end{aligned} \quad (1)$$

where *House Prices*$_{it}$ is the value of house prices index for country *i* in year *t*. Lagged value of house prices index for country *i* in year *t-1* is *House Prices*$_{i,t-1}$. *GDP* per capita$_{it}$ is value of GDP per capita growth for country *i* in year *t*. *Population*$_{it}$ is population annual growth for country *i* in year *t*. *Unemployment*$_{it}$ is value of unemployment for country *i* in year *t*. *Credit*$_{it}$ is value of domestic credit growth for country *i* in year *t*. *Permits*$_{it}$ is value of building permits for country *i* in year *t*. *Tourism*$_{it}$ is one of tourism demand indicators: *Tourist arrivals*$_{it}$, *Overgnights*$_{it}$ and *Receipts*$_{it}$. μ is constant term, $\beta_1 - \beta_6$ and γ are parameters for estimation. α_i is individual effect for each country *i* and ε_{it} error term of the country *i* in the period *t*.

In the next step we extend the model of housing price with indicators of hotel accommodation (*Hotels*$_{it}$). It is written by following equation:

$$\begin{aligned} &\mathit{House}\ \text{prices}_{it} = \mu + \gamma \mathit{House}\ \text{prices}_{i,t-1} + \beta_1 \text{GDP per capita}_{it} + \beta_2 \mathit{Population}_{it} + \\ &+ \beta_3 \mathit{Unemployment}_{it} + \beta_4 \mathit{Credit}_{it} + \beta_5 \mathit{Permits}_{it} + \\ &\beta_6 \mathit{Tourism}_{it} + \beta_7 \mathit{Hotels}_{it} + \alpha_i + \varepsilon_{it}; \quad i = 1, \dots, 27; t = 1, \dots, 14; \end{aligned} \quad (2)$$

where *Hotels*$_{it}$ is one of hotel accommodation indicators *Beds-growth*$_{it}$ or *Hotels-growth*$_{it}$ and β_7 is parameter to estimate. All other notations follow abbreviation from Eq. (1). To estimate Eqs. (1) and (2), it is necessary to select one panel data estimator.

According to the dynamic behavior of house prices (previous value of house prices influences its current value) and characteristics of our data set which consists of 27 countries and 14 time periods, we need to apply one of the dynamic panel data estimators. By including lagged dependent variable *House prices*$_{i,t-1}$ in the model, standard estimators Least Squares Dummy Variables and Generalized Least Squares become biased because of the correlation between *House prices*$_{i,t-1}$ and α_i. In the recent literature, the differenced generalized method of moments (GMM) estimator (Arellano & Bond, 1991) and system GMM (Blundell & Bond, 1998) have proven to be most appropriate for estimation dynamic panel models. Both estimators use instrumental variables to remove

Table 3
Correlation matrix of variables.

Variable	House prices	GDP per capita	Population	Unemployment	Credit	Receipts	Overnights	Tourist arrivals	Hotels-growth	Beds-growth	Permits
House prices	1.000										
GDP per capita	−0.043	1.000									
Population	0.055	−0.193*	1.000								
Unemployment	−0.067	−0.183*	−0.343*	1.000							
Credit	0.202*	−0.224*	0.172*	−0.311*	1.000						
Receipts	0.120*	−0.169*	0.108*	0.218*	−0.0487	1.000					
Overnights	0.196*	−0.169*	0.074	0.374*	−0.074	0.875*	1.000				
Tourist arrivals	0.077	−0.136*	0.080	0.108*	−0.026	0.958*	0.774*	1.000			
Hotels-growth	0.123	0.029	−0.064	0.086	0.081	−0.089	−0.008	−0.154*	1.000		
Beds-growth	0.218*	−0.080	0.002	0.095	0.080	0.433*	0.420*	0.387*	0.508*	1.000	
Permits	0.482*	−0.007	0.173	−0.052	0.354*	0.109*	0.196*	0.039	0.104	0.235*	1.000

Notes: * indicate significance at 5%.
Source: authors' calculations.

mentioned correlation. Additionally, both estimators allow introduction instrumental variables when the problem of endogenity of "independent" variables in model exists.

In this paper we employ differenced GMM estimator regardless of the fact that system GMM has somewhat better properties in simulation studies (Bond, 2002; Blundell & Bond, 2000; Bun & Windmeijer, 2010). Namely, the number of cross sections in this research is moderate 27 and practice is that the number of instruments used must be less than the number of cross sections in the data set. In the case that we choose system GMM estimator, the number of instruments will be larger than number of cross sections. Minimal number of instruments in the basic model would be 29. By using too many instruments, bias of estimation can be higher in regard to estimators which neglect the problem of endogeneity. Additionally, in the case of numerous instruments, the Sargan test, which investigates the validity of instruments, does not give realistic results (Roodman, 2009). To avoid the above mentioned problems, we apply the differenced GMM in this research. To solve the problem of endogeneity between dependent variable $House\ prices_{i,t-1}$ and country specific part of error term α_i, instead equation in the levels, this estimator uses equation in the first differences. To better explain Arellano and Bond (1991) procedure we use Eq. (1). The same procedure can be done for Eq. (2). Eq. (1) of our model in first differences can be written as:

$$\Delta House\,\text{prices}_{it} = \gamma \Delta House\,\text{prices}_{i,t-1} + \beta_1 \Delta \text{GDP per capita}_{it} + \beta_2 \Delta Population_{it} + \\ + \beta_3 \Delta Unemployment_{it} + \beta_4 \Delta Credit_{it} + \beta_5 Permits_{it} + \\ + \beta_6 \Delta Tourism_{it} + \Delta \varepsilon_{it}; i = 1, \ldots, 27; t = 1, \ldots, 14; \tag{3}$$

In Eq. (3) α_i does not exist, but the problem of endogeneity has not disappeared. The problem of correlation between lagged dependent variable $\Delta House\ \text{prices}_{i,\ t-1} = House\ \text{prices}_{i,\ t-1} - House\ \text{prices}_{i,\ t-2}$ and $\Delta\varepsilon_{it} = \varepsilon_{it} - \varepsilon_{i,\ t-1}$appears. Precisely, $\varepsilon_{i,\ t-1}$ is part of $House\ \text{prices}_{i,\ t-1}$but in Eq. (3) they are both on the right side of equation. To solve this problem, estimator introduces instrumental variables for $\Delta House\ \text{prices}_{i,\ t-1}$. Valid instruments for this variable are lagged value of $House\ Prices_{it}$ starting with second lag ($House\ Prices_{i,t\text{-}2}$, $House\ Prices_{i,t\text{-}3}$, …). Namely, these lagged values of $House\ Prices_{it}$ are not correlated with $\Delta\varepsilon_{it}$and at the same time there are correlated with $\Delta House\ \text{prices}_{i,\ t-1}$. In the research, it is not necessary to use all available instruments, especially in sample with moderate number of cross sections (Soto, 2009). Therefore, in our research we use only $House\ prices_{i,t\text{-}2}$ as an instrument to avoid the problem of endogeneity. At same time, we keep the number of instruments smaller than the number of cross sections in our model specifications. To control the possible problem of heteroscedasticity, we apply a two-step differenced GMM estimator to estimate different model specifications from Eqs. (1) and (2). Standard errors of two-step estimator underestimated standard errors of parameters in small samples, but Windmeijer (2005) corrected standard errors and removed the afore-mentioned problem.

Table 4
Empirical results of house prices model with tourism demand indicators.

	Model (1)	Model (2)	Model (3)
L. House prices	0.687***	0.619***	0.678***
	(0.0557)	(0.0620)	(0.0705)
GDP per capita	0.812***	0.902***	0.875***
	(0.154)	(0.153)	(0.176)
Population	0.0503	0.0351	0.663
	(0.545)	(0.663)	(0.534)
Unemployment	−1.194***	−1.630***	−1.389***
	(0.168)	(0.217)	(0.226)
Credit	0.00733	0.0104	0.0503*
	(0.0213)	(0.0230)	(0.0285)
Permits	0.00426*	0.00176	0.00740***
	(0.00254)	(0.00210)	(0.00270)
Tourist arrivals	0.303**		
	(0.123)		
Receipts		0.325***	
		(0.119)	
Overnights			0.222***
			(0.085)
constant	34.48***	49.50***	35.47***
	(6.979)	(8.020)	(9.656)
Number of observations	301	308	305
Number of countries	27	27	27
Number of instruments	19	19	19
Sargan test (*p* value)	0.1196	0.0597	0.0808
AR (1)	0.0360	0.0572	0.0645
AR (2)	0.0956	0.1148	0.1072

Notes: Standard errors in parentheses, significance levels at 10%, 5% and 1% are denoted by *,**,***.
Source: authors' calculations.

4. Empirical results and discussion

Table 4 presents the results of three model specifications from Eq. (1) with different indicators of tourism.

Results of all diagnostic tests (Sargan test, AR (1) and AR (2) test) confirm validity of Models (1)–(3) from Table 4. The results of the Sargan test indicate that in the model there is no problem of endogeneity. The AR (2) confirms that the problem of autocorrelation in equation in levels does not exist in model while AR (1) test confirms the existence of autocorrelation of first order of differenced residuals. However, existence of this correlation is expected.

Models (1)–(3) test the impact of tourism on housing prices. In all estimated models, tourism variables have a positive and significant effect on housing prices. In Model (1), tourist arrivals (*Tourist arrivals*), in Model (2) international tourism receipts *(Receipts)* and in Model (3) nights spent at tourist accommodation establishments (*Overnights)* have a significant and positive effect. Also, the results from Table 4 indicate that lagged house prices index, GDP per capita growth, unemployment and private bank credit growth statistically significantly affect housing prices. A variable permits has positive impact on house prices but its statistical significance varies by different model specification. From other standard determinants of housing prices, only population growth does not have a statistically significant influence in any model.

The model from Eq. (2) is extension of model from Eq. (1) with the additional variable of hotel accommodation. We use two different indicators, growth of number of establishments, hotels, and similar accommodation *(Hotels-growth)* and growth of number of bed places in hotels and similar accommodation in thousands (*Beds-growth*). Table 5 presents the obtained results.

Sargan tests for endogeneity and two autocorrelation tests AR (1) and AR (2) confirm that all models in Table 5 are well specified. The results for standard determinants of housing prices and tourism indicators from Table 5, Models (4)–(9), confirm results from Table 4, Models (1)–(3). All tourism indicators from Models (1)–(9) have a positive statistically significant sign. This confirms the importance of tourism on housing prices. Obtained results confirm results presented in Paramati and Roca (2019) for OECD countries. In extended Models (4)–(9), we include indicators from hotel accommodation and results confirm its negative and statistically significant influence in all models except in Model (6). By including these variables in the model, other tourism indicators and housing price determinants remain statistically significant with the same sign.

The results for all tourism indicators confirm that the growth of tourism unquestionably increases housing prices in the EU countries at the macro level. These results provide empirical evidence that the impact of tourism is not only in tourist attractive areas, moreover it is spilling over into housing prices all over the country. This raises the question about redistributions of benefits and cost in society of tourism development. Namely, most benefits are visible in tourist areas but the negative ones, such as rise in housing prices are evident in the whole country. Hajibaba and Dolnicar (2018b) point out those regulatory measures have to take into account the geographical variation of peer-

Table 5
Empirical results of house prices model with tourism demand and hotel accommodation indicators.

	Model (4)	Model (5)	Model (6)	Model (7)	Model (8)	Model (9)
L. House prices	0.706***	0.601***	0.684***	0.715***	0.614***	0.684***
	(0.0610)	(0.0648)	(0.0713)	(0.0619)	(0.0677)	(0.0709)
GDP per capita	0.851***	0.872***	0.899***	0.860***	0.890***	0.894***
	(0.162)	(0.156)	(0.177)	(0.165)	(0.159)	(0.178)
Population	−0.0336	0.242	0.618	−0.0577	0.148	0.554
	(0.540)	(0.647)	(0.527)	(0.524)	(0.633)	(0.528)
Unemployment	−1.146***	−1.647***	−1.360***	−1.157***	−1.649***	−1.378***
	(0.188)	(0.212)	(0.230)	(0.191)	(0.211)	(0.227)
Credit	0.0135	0.00885	0.0536*	0.0176	0.0191	0.0564**
	(0.0227)	(0.0228)	(0.0285)	(0.0223)	(0.0227)	(0.0286)
Permits	0.00542**	0.00178	0.00731***	0.00543**	0.00183	0.00712***
	(0.00242)	(0.00215)	(0.00270)	(0.00236)	(0.00210)	(0.00263)
Tourist arrivals	0.303**			0.294**		
	(0.123)			(0.124)		
Receipts		0.301***			0.295**	
		(0.112)			(0.119)	
Overnights			0.212**			0.215**
			(0.0848)			(0.0842)
Hotels-growth	−0.0676**	−0.0778**	−0.0503			
	(0.0330)	(0.0320)	(0.0374)			
Beds-growth				−0.0225*	−0.0419***	−0.0292***
				(0.0125)	(0.0121)	(0.00998)
constant	31.94***	51.58***	35.07***	31.34***	50.40***	35.21***
	(7.662)	(8.327)	(9.717)	(7.710)	(8.382)	(9.539)
Number of observations	300	305	305	300	305	305
Number of countries	27	27	27	27	27	27
Number of instruments	20	20	20	20	20	20
Sargan test (p value)	0.1065	0.0589	0.0884	0.1048	0.0627	0.0955
AR (1)	0.0298	0.0718	0.0580	0.0301	0.0691	0.0634
AR (2)	0.0806	0.1007	0.1032	0.0773	0.0825	0.0901

Notes: Standard errors in parentheses, significance levels at 10%, 5% and 1% are denoted by *,**,***.
Source: authors' calculations.

to-peer accommodation regarding costs/benefits of these measures. We propose that these regulations have to consider a wider area than only attractive tourist centers where tourism directly increases house prices.

Obtained results for hotel accommodation provide additional empirical evidence for supporting the development of this sector. Although the performance of the hotel sector in the EU is better than in the rest of the world (ETC, 2019), it is necessary to encourage further investment in hotel sector. Empirical results prove that the growth in the number of hotels and hotel beds lowers the prices of housing prices in the country. Therefore, it is necessary to create measures for the sustainable development of hotel accommodation because the effects are double.

EU institutions and EU member governments are trying to stimulate tourism development and housing affordability with separate actions. We provide evidence that it is possible to develop support for these two, at first unconnected sectors, with the same action – supporting new hotel accommodation. First, it encourages the development of the hotel industry and increases employment, which contributes to economic development. On the other hand, it indirectly decreases housing prices in the county. This improves the affordability of housing in the country and reduces the need for direct measures in the housing sector.

To ensure relevance of our results, we conduct two additional robustness check. First, to ensure that the negative influence of hotel sector indicators are not consequences of multicollinearity with other tourism indicators, we estimate models without tourism indicators (presented in Table 6, Model (10) and Model (11)). Results of both model specifications confirm the statistically significant and negative influence of hotel accommodation.

Finally, we provide the results of control variables of our model. For all model specifications in Table 4 and Table 5, Models (1)–(9), we can conclude that standard determinates of housing prices: lagged value of housing prices, GDP per capita growth and unemployment have an expected sign and statistically significantly affect housing prices. The growth in domestic credit to the private sector by banks have a positive sign in all models but its statistical significance varies. These results additionally confirm results of existing literature on housing prices determinates (BIS, 2020; Paramati & Roca, 2019; Sutton, Mihaljek and Subelyte, 2017). The variable number of permits has a positive sign in all model specification while its statistical significance also varies. These

Table 6
Empirical results of house prices model extended with hotel accommodation indicators.

	Model (10)	Model (11)
L. House prices	0.673***	0.649***
	(0.0696)	(0.0676)
GDP per capita	0.992***	0.963***
	(0.164)	(0.160)
Population	0.330	0.529
	(0.546)	(0.533)
Unemployment	−1.605***	−1.625***
	(0.243)	(0.239)
Credit	0.0102	0.00131
	(0.0269)	(0.0271)
Permits	0.00161	0.00142
	(0.00216)	(0.00218)
Beds-growth	−0.0342***	
	(0.0109)	
Hotels-growth		−0.09***
		(0.0332)
constant	48.36***	50.68***
	(9.179)	(8.990)
Number of observations	305	305
Number of countries	27	27
Number of instruments	19	19
Sargan test (p value)	0.0705	0.0619
AR (1)	0.0305	0.0427
AR (2)	0.0742	0.0960

Notes: [a] Standard errors in parentheses, significance levels at 10%, 5% and 1% are denoted by *,**,***.
Source: authors' calculations.

results indicate that new supply is insufficient for existing demand.

Unexpected, not significant results for population growth are the same in all model specifications in Table 4 and Table 5, Models (1)–(9). BIS (2020) and Poghosyan (2016) find similar non-significant results for population. BIS (2020) argues that population is no longer a significant house price determinant because of global factors (international investors in foreign real estate markets and they measure it with international capital inflows). Currently, residential real estates are not only used for permanent housing but also for short time rental and second home usage. Doling and Ronald (2019) call this phenomenon "Not for Housing" Housing. They divide housing in two segments. The first segment are homes for permanent living and second segment are homes that are used for other than main residence: such as Airbnb rent and foreign investment tool. Today, housing is becoming an "investment asset". We provide evidence that the effect of global factors on growth of houses prices is not only through international buyers of real estates, but it is visible also indirectly via usage of residential real estate in tourism. Due to increased demand for tourist accommodation, there is an increase in the demand and growth in houses prices (Dredge & Gyimóthy, 2017) because the formal accommodation sector does not follow the development of tourism.

As additionally robustness check, we split the sample into "rich" and "poor" EU countries by standard of living in EU countries by using GDP per inhabitant in the purchasing power standard (PPS) (Eurostat, 2020d). We collected the data form the European Union statistics on income and living conditions. Table 7, Models (12)–(17) and Table 8, Models (18)–(23) present results for "rich" and "poor" countries.

In Table 7 and Table 8 hotel accommodation variables have a negative sign in all model specifications except Model (23) and in nine model specifications have a statistically significant influence. Obtained results give additional confirmation of the negative influence of hotel accommodation indicators on housing prices in EU countries.

5. Conclusion

This paper investigates the effect of tourism and hotel accommodation on housing price dynamics in 27 EU countries from 2005 to 2018 using panel data techniques. Obtained results confirm that tourism raises housing prices in EU countries. We provide evidence of spillover effect in the growth of housing prices from tourism attracted geographical area at a national level. Moreover, the results are robust regardless of the used indicator of tourism and different model specifications.

The main finding of this paper is the negative impact of hotel accommodation on housing prices. We identify the growth of hotel accommodation as a buffer of housing prices growth at country level. Precisely, we confirm that the growth in the number of hotels and growth in the number of hotel beds decreased housing prices in EU countries. These results are robust on different specifications of model. At the same time, our results confirm GDP per capita growth, unemployment and private credit as significant determinants of house prices. Obtained results are in the line with recent literature on housing prices. On the other hand, our empirical findings indicate that population growth is not a significant determinant of the housing prices in EU

Table 7
Empirical results of house prices model for EU "rich" counties.

	Model (12)	Model (13)	Model (14)	Model (15)	Model (16)	Model (17)
L. House prices	0.834***	1.017***	0.794***	0.850***	1.076***	0.820***
	(0.120)	(0.165)	(0.160)	(0.116)	(0.149)	(0.158)
GDP per capita	0.355**	0.788***	0.482***	0.319**	0.786***	0.466***
	(0.144)	(0.136)	(0.133)	(0.150)	(0.152)	(0.130)
Unemployment	−1.144*	−2.304***	−2.377***	−1.291*	−1.981***	−2.373***
	(0.660)	(0.755)	(0.855)	(0.673)	(0.732)	(0.826)
Credit	−0.106**	−0.0389	−0.101	−0.108**	−0.0427	−0.107
	(0.0530)	(0.0542)	(0.0986)	(0.0522)	(0.0553)	(0.101)
Permits	0.0173	−0.0162	0.00467	0.0108	−0.0154	0.00129
	(0.0228)	(0.0197)	(0.0208)	(0.0225)	(0.0217)	(0.0213)
Tourist arrivals	0.320**			0.321**		
	(0.154)			(0.150)		
Receipts		−0.170			−0.187	
		(0.150)			(0.147)	
Overnights			0.143**			0.146***
			(0.0641)			(0.0534)
Hotels-growth	−0.0817**	−0.123***	−0.0617*			
	(0.0349)	(0.0393)	(0.0346)			
Beds-growth				−0.0333***	−0.0361**	−0.0220
				(0.0120)	(0.0158)	(0.0150)
constant	9.364	24.05	30.86	9.393	15.88	28.77
	(12.91)	(20.45)	(20.51)	(12.46)	(18.64)	(19.70)
Number of observations	122	124	124	122	124	124
Number of countries	14	14	14	14	14	14
Number of instruments	16	16	16	16	16	16
Sargan test (p value)	0.2326	0.5836	0.2669	0.2201	0.546	0.2415
AR (1)	0.1735	0.2585	0.3078	0.2242	0.3115	0.3884
AR (2)	0.5360	0.0250	0.1834	0.5048	0.0612	0.1810

Notes: Standard errors in parentheses, significance levels at 10%, 5% and 1% are denoted by *,**,*** Due to the fact that we divided the sample in two subsamples, number of countries becomes equal or smaller than number of time periods. Therefore, number of instruments in estimated models specifications becomes larger than number of countries, which decreases reliability of estimation (Roodman, 2009). To decrease number of instruments we exclude population from the model. We chose that variable because it was not significant in any previous model specifications. Additionally, in some model specifications we have to shorten number of time periods to obtain valid results.
Source: authors' calculations.

Table 8
Empirical results of house prices model for EU "poor" countries.

	Model (18)	Model (19)	Model (20)	Model (21)	Model (22)	Model (23)
L. House prices	0.743***	0.593***	0.669***	0.753***	0.586***	0.970***
	(0.113)	(0.0717)	(0.0908)	(0.115)	(0.0738)	(0.0865)
GDP per capita	0.737**	0.519*	0.650**	0.797**	0.505*	0.554*
	(0.327)	(0.275)	(0.303)	(0.323)	(0.283)	(0.332)
Unemployment	−0.510	−1.029***	−1.262**	−0.398	−1.042***	−1.341**
	(0.828)	(0.394)	(0.625)	(0.809)	(0.391)	(0.543)
Credit	−0.367	−0.410	−0.530	−0.320	−0.411	−0.0213
	(0.407)	(0.326)	(0.376)	(0.408)	(0.337)	(0.0868)
Permits	0.0145	0.00903	0.00918	0.0147	0.00914	−0.0187**
	(0.00972)	(0.00889)	(0.00979)	(0.00964)	(0.00889)	(0.00731)
Tourist arrivals	1.440			1.527*		
	(0.926)			(0.920)		
Receipts		1.542***			1.558***	
		(0.294)			(0.301)	
Overnights			0.247			0.249*
			(0.345)			(0.148)
Hotels-growth	−0.102***	−0.072**	−0.1***			
	(0.0312)	(0.0347)	(0.0361)			
Beds-growth				−0.014	−0.005	0.034**
				(0.0211)	(0.0176)	(0.0141)
constant	15.93	40.87***	40.97**	12.79	41.59***	15.34
	(26.59)	(9.541)	(19.97)	(26.34)	(9.766)	(16.14)
Number of observations	112	112	112	112	112	101
Number of countries	13	13	13	13	13	13
Number of instruments	16	16	16	16	16	15
Sargan test (p value)	0.3612	0.6470	0.3242	0.3643	0.6537	0.3657
AR (1)	0.3867	0.678	0.5197	0.3729	0.6844	0.1969
AR (2)	0.2003	0.2741	0.0630	0.1044	0.2018	0.7896

Notes: Standard errors in parentheses, significance levels at 10%, 5% and 1% are denoted by *,**,*** Due to the fact that we divided the sample in two subsamples, number of countries becomes equal or smaller than number of time periods. Therefore, number of instruments in estimated models specifications becomes larger than number of countries, which decreases reliability of estimation (Roodman, 2009). To decrease number of instruments we exclude population from the model. We chose that variable because it was not significant in any previous model specifications. Additionally, in some model specifications we have to shorten number of time periods to obtain valid results.
Source: authors' calculations.

countries while tourists, as temporary residents, are becoming an important force.

According to our main finding, we provide new policy insights and practical implications for developing new policy action to promote the development of hotel accommodation and decreasing housing prices. We find evidence of the interconnections among tourism, hotel accommodation and housing price. These results indicate that affordability of housing in the EU can be improved by supporting hotel industry.

However, our research has several limitations. First, data for building space scarcity were not available for all countries in the considered period. Therefore, for supply indicator, we use number of building permits for residential buildings. By using difference GMM estimator, we could not obtain the effect of synchronizations between the European housing market and possible effect of spillovers between specific countries. In future, it will be interesting to observe intensity and directions of spillover effect between countries and within countries by considering regional level data.

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Blanka Škrabić Perić is associate professor. Her fields of interests are dynamic panel data and heterogeneous Granger causality tests. Her current research is focused on house prices and tourism resilience and sustainability.

Ana Rimac Smiljanić is associate professor. Her current research is focused on housing affability in tourist areas.

Iva Kežić is a Master of Economics, and her research interests are credit risks connected with residential real estate and tourism.

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