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TOURISM BOOM, HOUSING DOOM: EXCESSIVE TOURISM AND INTERNATIONAL EMIGRATION

Josip Mikulić[1,2], Vanja Vitezić[3], Stjepan Srhoj[4,5] & Zvonimir Kulišić[4]

Abstract

Existing literature has largely overlooked the relationship between excessive tourism growth and international emigration. This study addresses this gap by analyzing Croatia, a country that experienced a significant population decline—losing 10% of its inhabitants between the 2011 and 2021 censuses—amid rapid and highly seasonal tourism growth. Coastal Croatia, in the later stage of the Tourism Area Life Cycle (TALC), contrasts with Continental Croatia, in its early stage. We first establish a positive association between rising housing prices and emigration across both regions. More critically, we demonstrate that tourism activity correlates with increased emigration in areas experiencing excessive tourism (late TALC stage), while it is negatively associated with emigration in regions with lower tourism levels (early TALC stage). Our findings shed light on the overlooked adverse effects of tourism growth in the later stages of the TALC, emphasizing the need for nuanced approaches to tourism development and public policy.

Keywords: overtourism, housing prices, emigration, brain drain
JEL: O15, R21, R23, L83

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Introduction[6]

The adverse environmental, economic and socio-cultural effects of excessive tourism growth, often characterized as overtourism, are well documented in the tourism literature (Mihalic, 2020).

Recently, using the case of Croatia and building on the literature dealing with the effects of tourism on real estate markets, Mikulić et al. (2021) showed that highly seasonal tourism, especially the one induced by a rapid increase in short-term rentals, can significantly decrease housing affordability for residents in popular tourist destinations.

Whereas decreased housing affordability could be characterized as an adverse economic impact induced by (too) high levels of tourism activity, it might also have a severe socio-cultural effect if it not only leads to the displacement of popular destinations' residents (e.g. Lee, 2016) but even their emigration to another country for economic reasons. Surprisingly, and to the authors' best knowledge, extant research has so far not addressed the potential critical social implication of excessive tourism growth on international emigration.

Building on the above-mentioned gap in the sustainability-oriented tourism literature, this study presents findings from an analysis conducted in Croatia, which lost 10% of its population between two censuses (2011-2021), declining from 4.28 million inhabitants in 2011 to 3.87 million in 2021 (CBS, 2024), while, at the same time, experiencing rapid growth of highly-seasonal tourism activity, measured both in terms of accommodation capacity and tourism overnights.

Study setting

This study investigates the relationship between tourism, housing prices, and international emigration in the Republic of Croatia. Croatia has the highest tourism GDP share in the European Union (EU; European Commission, 2024). Adriatic Croatia, one of two Croatian and 242 NUTS 2 EU regions, accounts for approximately 95% of arrivals and overnight stays in Croatia. Tourism here is dominated by foreign tourists and private accommodations (see Appendix).

Given the contrast in tourism development between Adriatic Croatia and other parts of Croatia, as well as the emigration challenges, this study divides Croatian local administrative units (LAUs) into two samples: LAUs on the Adriatic coast (Coastal Croatia) and other LAUs (Zagreb, North, and Pannonian

[6] Abbreviations: LAU (Local administrative unit), CBS (Croatian Bureau of Statistics), EU (European Union), NUTS (Nomenclature of territorial units for statistics)

Croatia, including the hinterland of Adriatic Croatia). The data covers the period from 2011 to 2022. The two samples include very different LAUs. While the Adriatic coast has excessive seasonal tourism, Continental Croatia characterizes underdeveloped tourism and deindustrialization.

With such large regional differences, Croatia entered the EU in July 2013, additionally facilitating emigration. In this context, Ivandić and Ivandić (2023) previously found that LAUs offering tourism opportunities had lower emigration than those, for example, in Continental Croatia. Indeed, some LAUs in Continental Croatia had low industry and low tourism – leading to people moving abroad. However, we do not question whether having tourism can decrease emigration; instead, we pose a new research question and ask whether excessive tourism can increase international emigration, which has so far been neglected in the literature.

Methodology

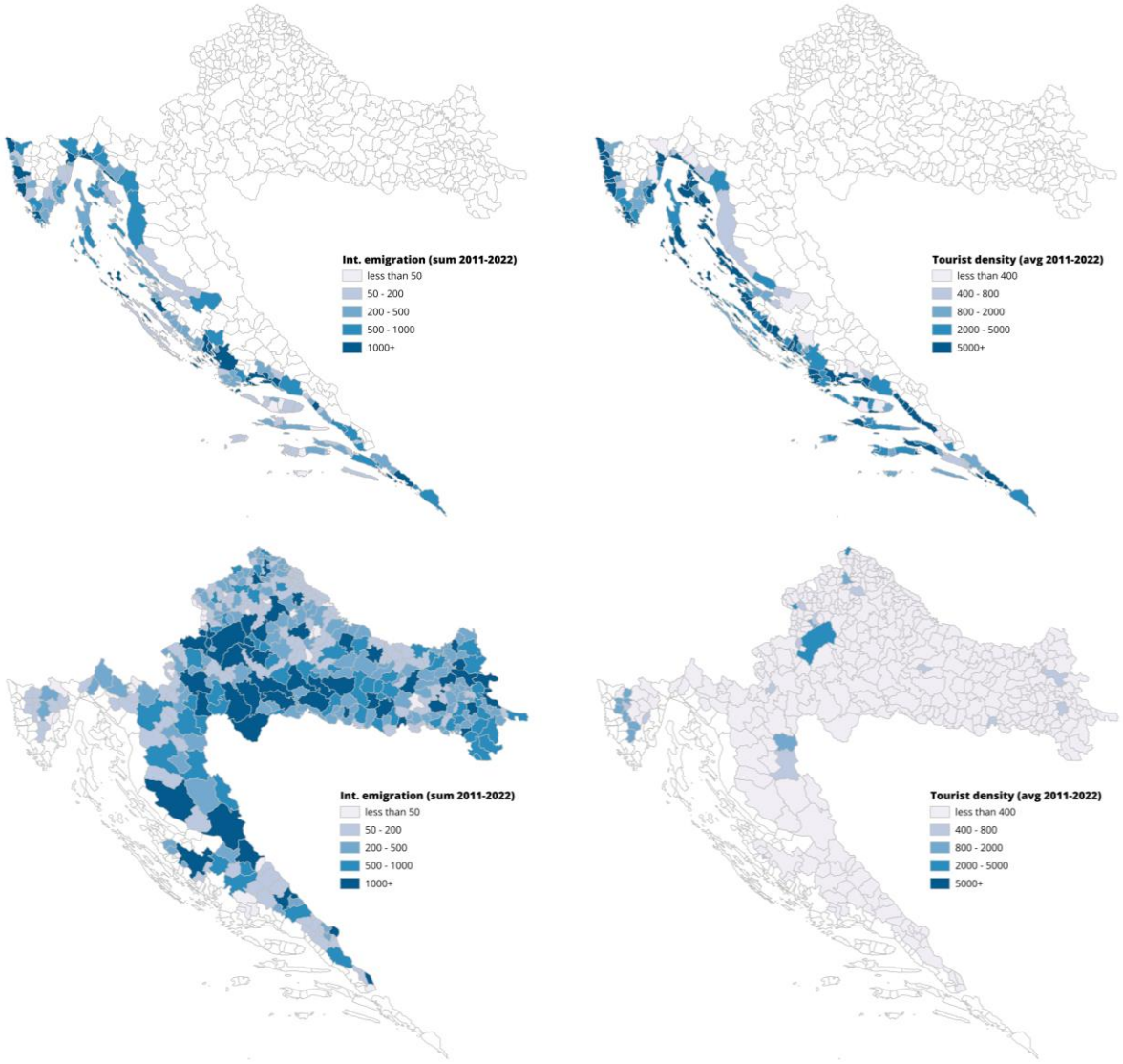
Given the study's objective to investigate the nexus between tourism growth, housing prices, and international emigration, the dependent variable is the number of emigrants. Key predictors are tourist density and housing prices. Tourist density serves as an indicator of overtourism (Peeters et al., 2018), with high values potentially highlighting issues of crowding and excessive strain on resources, infrastructure, and the environment.

Table 1 presents all variables, their descriptions, labels, and respective data sources. Figure 1 shows the values of emigrations and the number of tourist nights spent in LAUs of Coastal and Continental Croatia. All data are at the LAU level. The results of descriptive statistics are detailed in Annex Tables A3-A5.

Table 1. Variable definitions

Variable	Label	Description	Source
International emigration (log)	EMG	Number of international emigrations (logarithm)	Croatian Bureau of Statistics (CBS)
Tourist density (log)	TOUR	Number of total tourist nights spent at tourist accommodation establishments per km^2 of land (logarithm)	CBS
Housing prices in EUR (log)	HOUS	The median price of a m^2 for an apartment (logarithm)	The Institute of Economics, Zagreb
Population density	DENS	The number of people per square kilometre (km^2)	CBS
Tertiary education (%)	EDU	The number of individuals who have accomplished any level of higher education according to the Census 2021, divided by the total population (percentage)	CBS
Original budget revenues of local government per capita	REV	The total budget, reduced by decentralization, own and earmarked revenues, and borrowing receipts, per capita (in EUR)	Ministry of Finance
Unemployment rate (%)	UNE	Share of unemployed persons divided by the sum of employed and unemployed persons (percentage)	CBS and Croatian Employment Services
H and I sectors emp. share (%)	HI	Sum of employed persons in NACE Rev. 2 sectors H (Transportation) and I (Accommodation) as a percentage of total employed persons in the LAU	CBS
Coastal (dummy)	ADR	Dummy variable: 1 if the LAU is located in Coastal Croatia, 0 otherwise	CBS
Urban (dummy)	URB	Dummy variable: 1 if the LAU is located in one of the four largest urban agglomerations (Zagreb, Split, Rijeka, Osijek)	Ministry of Regional Development and European Funds

Figure 1. Coastal and Continental Croatia: Emigration and tourist density



A panel analysis is used. The model is defined as follows:

$$EMG_{it} = \mu + \gamma EMG_{i,t-1} + X_{it}\beta + \alpha_i + \varepsilon_{it}$$
$$i = 1, 2, 3 \ldots n; \quad t = 2011, 2012, \ldots 2021, 2022 \qquad (1)$$

where i refers to LAUs and t to the time period. Moreover, μ denotes the intercept, γ the lagged dependent variable, X_{it} is the vector of control variables detailed in Table 1, and β is the vector of coefficients of interest. It is assumed that ε_{it} are IID $(0,\sigma_\varepsilon^2)$. α_i represents the unobservable, time-invariant individual-specific effect.

This study employs the two-step system GMM estimator. A lagged dependent variable is included due to the dynamic nature of emigration.

Results

Before estimating the results, we assessed potential multicollinearity, which was not confirmed (Tables A6-A8). Each model is tested on the whole Croatia sample as well as on subsamples of Coastal and Continental Croatia. When testing the full sample model with the *TOUR* variable, an interaction term alongside the *ADR* dummy is also included.

Diagnostic tests support the appropriateness of the dynamic model specification. The Hansen test *p*-values suggest no endogeneity issues. Additionally, the *p*-values of the AR(2) test confirmed the absence of second-order autocorrelation.

As expected, model 1 shows that emigration is stronger in Continental than in Coastal Croatia. However, the interaction term (tourism density x coastal Croatia) shows that having higher tourism density in Coastal Croatia is robustly associated with higher emigration. A separate model for Coastal Croatia (model 2) confirms the statistically significant relationship between higher tourism density and emigration, even after controlling for other relevant covariates (i.e. Table 1).

Conversely, in Continental Croatia, which receives only a minimal share of tourist arrivals and overnights, tourism has a significant and negative relationship with emigration, suggesting that early-stage tourism development may help prevent emigration or at least do no harm. In general, rising housing prices and having high employment concentration in tourism sectors are also associated with emigration. The statistical significance of population density suggests that emigration is more prevalent in areas with higher population concentration. Likewise, the higher the share of the population with tertiary education, the higher the number of emigrants, suggesting the potential presence of brain drain effects.

Table 2. Main results

	(1) Croatia	(2) Coastal	(3) Continental
Number of international emigrations			
Lagged dependent variable	0.434***	0.291***	0.343***
	(0.0279)	(0.0278)	(0.0172)
Tourist density (log)	0.00727	0.0744***	-0.0733***
	(0.0273)	(0.0228)	(0.0147)
Coastal (dummy)	-1.000***		
	(0.214)		
Tourist density × Coastal	0.0659**		
	(0.0332)		
Housing prices in EUR (log)	0.228**	0.369***	0.197***
	(0.104)	(0.139)	(0.0395)
Population density	0.000717***	0.00129***	0.00152***
	(0.000146)	(0.000255)	(0.0000782)
Tertiary education (%)	0.0273***	0.0234**	0.0430***
	(0.00925)	(0.0115)	(0.00817)
Budgetary revenues per capita in EUR	-0.0000586	-0.0000302	0.000148
	(0.0000582)	(0.0000587)	(0.0000933)
Unemployment rate (%)	0.000519	0.0341**	0.0206***
	(0.00953)	(0.0157)	(0.00581)
H and I sectors emp. share (%)	0.00555***	0.00426***	0.00300
	(0.00177)	(0.00148)	(0.00322)
Urban (dummy)	0.331	-1.237**	0.533***
	(0.296)	(0.594)	(0.159)
Cons	0.823	-1.124	1.270***
	(0.623)	(0.939)	(0.281)
Year dummies	Yes	Yes	Yes
Number of observations	1421	883	538
Number of groups	199	113	86
Number of instruments	79	77	77
Hansen test – p-value	0.382	0.282	0.457
AR(2) test – p-value	0.138	0.094	0.530
Standard errors in parentheses, * p < 0.1, ** p < 0.05, *** p < 0.01			

Supporting robustness checks are detailed in the Appendix. Table A9 displays the results with the inclusion of natality and mortality rates. Tables A10-A12 feature alternative tourism indicators, such as the logarithm of tourism territorial pressure, adapted from De Siano and Canale (2022), calculated as

the number of nights divided by population density, the logarithm of nights spent, and the logarithm of bed-places in private households.

Conclusions

This study extends previous research on overtourism and tourism specialization (e.g. Mikulić et al., 2021; Capó et al., 2007). In our study, Coastal Croatia is in a later stage of the Tourism Area Life Cycle (TALC, Butler, 1980), while Continental Croatia is in its early stage.

Firstly, we show that higher housing prices are associated with international emigration in the context of both the early and late stages of the TALC. Secondly, and most importantly, we find that tourism activity is robustly related to increased emigration in the context of excessive tourism (i.e. later stage) but is negatively related to emigration in the context of low tourism (i.e. early stage). The relationship between tourism activity and international emigration survives even after controlling for housing prices, income level or tourism concentration in a municipality, among other covariates. Multiple robustness checks further support the strength of the relationship between tourism activity and international emigration.

This study has several important implications.

First, excess growth of tourism activity, especially when primarily driven by short-term rentals like in Croatia[7], should be accompanied by effective housing policies to avoid economically forced emigration due to increased unaffordability of housing. Such a crowding-out effect can occur in attractive destinations or regions characterized by a relatively highly competitive tourism industry, like coastal Croatia, in the absence of proper or effective housing market regulation. In such a situation, if short-term renting to tourists becomes more attractive or profitable than long-term renting to residents, residents who do not directly benefit economically from tourism are likely to suffer from increasingly expensive housing due to rising property prices.

Second, tourism-induced emigration can have severe societal and economic consequences for destinations in the medium and longer term, far beyond the scope of tourism and in direct collision with the UNWTO sustainable development goals (UNWTO, 2017). Highly seasonal tourism based on short-term rentals certainly benefits the economy and contributes to the well-being of those involved, especially property owners, retailers and the construction industry. However, those who are not involved

[7] Private accommodation accounts for almost 61.3% of all bed-places. In the period between 2016 and 2021 alone, private accommodation capacities rose by 25.9% (Croatian National Tourist Board, 2022).

are seriously affected by the "long arm of short-term rentals", which inconspicuously widens the "scissors between rich and poor". Those who can no longer afford to live in their place (have to) leave, and some even move abroad.

As the case of Croatia illustrates, failure to recognize and address this lagged externality through timely and effective policies in the areas of housing, spatial planning, urban development and/or taxation can lead to demographic decline that may be difficult to revert or is potentially irreversible. A period of unregulated tourism-led economic growth has been mistakenly equated with a state of economic sustainability. However, this is a rather naive conclusion, as it is only a false sustainability; the negative effects only become apparent in the longer term.

Third, the higher the share of the population with higher education, the higher the emigration rate. This suggests a potential brain drain, likely due to a lack of better-paid jobs in highly tourism-specialized areas, paired with rising housing prices. Educated people thus might be seeking better career opportunities abroad due to the lack of suitable high-skilled jobs available locally. This stirs a possible deterioration of human capital because of intensified tourism development (Kožić, 2019). At the same time, attracting younger professionals and workers of all profiles is a critical strategic goal and challenge for many cities and destinations worldwide. Accordingly, not taking effective policy measures to warrant housing affordability (e.g. Kunovac & Žilić, 2022) for the most critical generational cohort responsible for the long-term survival of societies, but for the sake of uncontrolled and excess tourism growth can create a dangerous, irreversible rebound effect with far-reaching social and economic implications.

To provide further insight into the tourism-emigration nexus and the potential presence of brain-drain effects, future research could focus on other countries and regions with large tourism GDP shares and those characterized by strong presence of short-term rentals, like, e.g., Spain (Capó et al., 2007). Moreover, future research could examine the role of seasonality by contrasting findings from popular city destinations, which attract tourists all year long, versus rural, and in particular, coastal tourism destinations that have a more pronounced seasonal tourism activity pattern. Along these lines, future studies could extend the understanding of patterns for continental parts in the early stages of TALC. Finally, it would be worthwhile to contrast cases with different degrees of short-term rental presence and approaches to taxation and housing policy aimed at discouraging short-term rentals and encouraging long-term rentals in highly tourism-oriented areas.

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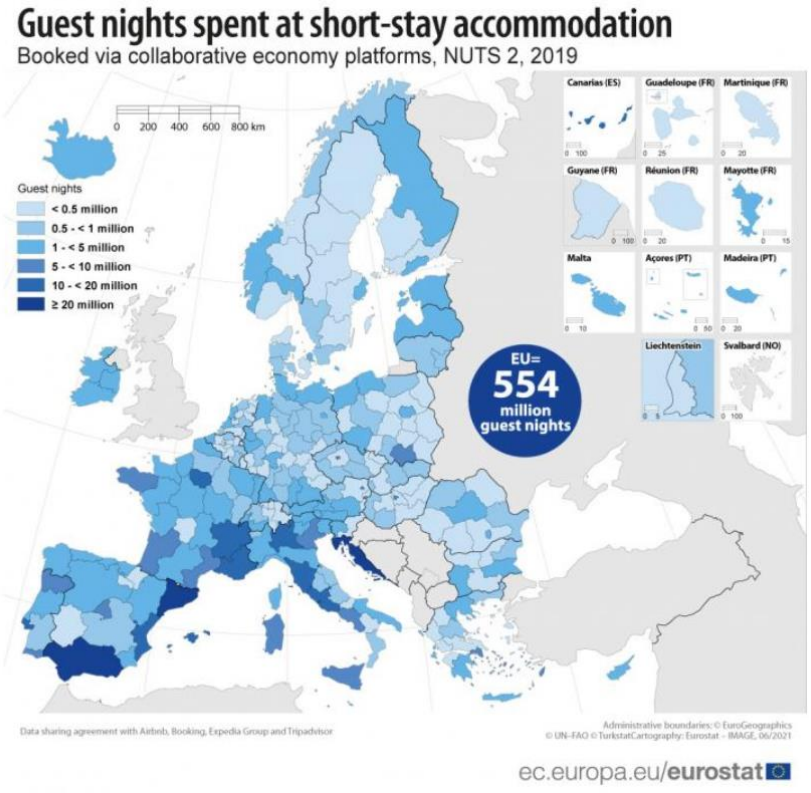
APPENDIX

Contents

A1. Research setting

Croatia is one of the most touristified countries in the World. Croatia has the highest tourism GDP share in the European Union (EU; EU Tourism Dashboard, 2024) and among the highest shares in the World (#5; UN Tourism Dashboard, 2024). Adriatic Croatia, one of 242 NUTS 2 regions in the EU, accounts for approximately 95% of arrivals and overnight stays in Croatia, reflecting the extreme disbalance in tourism development between these two regions (Croatia has two NUTS 2 regions). Moreover, it is among the top EU regions in tourism density, intensity, and seasonality (Batista e Silva et al., 2018; EU; EU Tourism Dashboard, 2024). Croatian tourism can be described as dominated by inbound tourism (92% of all overnights; Croatian Statistical Bureau, CBS, 2020) and high private accommodations share (64%; CBS, 2020). Below, we provide a map of the European Union NUTS-2 regions and the number of guest nights spent at short-term accommodation in 2019. As it is evident from the map, Adriatic Croatia has more than 20 million nights and is one of the few regions in this category (20 million and more). These stays are in the vast majority on the Croatian coast, which is why our study focuses on Coastal Croatia, as this is where "excessive" tourism occurs in the EU context.

Figure A1. Guest nights spent at short-stay accommodation, 2019, NUTS 2 regions, Eurostat



Secondly, we provide a table from 2022 showing the top 20 NUTS 2 regions in terms of the annual number of guest nights at short-stay accommodation offered via collaborative economy platforms. As

can be seen from the table, Adriatic Croatia is the number 1 region in the EU. In addition, the majority of tourists in Adriatic Croatia come from international markets.

Table A1. Top 20 regions in terms of annual number of guest nights at short-stay accommodation, 2022, Eurostat

Top 20 regions (NUTS 2 level) in terms of annual number of guest nights at short-stay accommodation offered via collaborative economy platforms, 2022

NUTS 2 level regions	Total	Domestic	International	% in EU total
EU	596 546 896	239 294 430	357 252 466	100.0%
Jadranska Hrvatska	29 273 016	1 199 660	28 073 356	4.9%
Andalucía	28 783 258	12 373 643	16 409 615	4.8%
Provence-Alpes-Côte d'Azur	22 645 768	12 299 170	10 346 598	3.8%
Cataluña	19 160 306	4 514 855	14 645 451	3.2%
Canarias	19 015 266	4 959 800	14 055 466	3.2%
Comunitat Valenciana	17 216 154	6 859 983	10 356 171	2.9%
Île de France	16 071 286	4 730 588	11 340 698	2.7%
Rhône-Alpes	16 053 108	10 602 801	5 450 307	2.7%
Toscana	11 311 222	2 750 598	8 560 624	1.9%
Aquitaine	10 362 384	7 402 057	2 960 327	1.7%
Languedoc-Roussillon	10 336 711	7 538 875	2 797 836	1.7%
Área Metropolitana de Lisboa	10 140 283	588 522	9 551 761	1.7%
Lazio	10 056 096	1 813 900	8 242 196	1.7%
Lombardia	10 018 565	2 056 481	7 962 084	1.7%
Illes Balears	9 483 086	1 556 517	7 926 569	1.6%
Algarve	9 136 418	1 464 793	7 671 625	1.5%
Bretagne	8 802 543	6 794 677	2 007 866	1.5%
Sicilia	8 338 218	2 951 679	5 386 539	1.4%
Veneto	7 944 549	1 432 789	6 511 760	1.3%
Comunidad de Madrid	7 570 801	2 365 154	5 205 647	1.3%

Source: Eurostat (online data code: tour_ce_omn12)

eurostat

A2. Supplementary Analyses and Data Descriptions

Table A2. Definitions of additional variables

Variable	Label	Description	Source
Tourism territorial pressure (log)	TTP	Number of total tourist nights spent at tourist accommodation establishments divided by population density (population per km^2 of land) (logarithm)	Croatian Bureau of Statistics (CBS)
Tourist nights (log)	NIGHTS	Number of total tourist nights spent at tourist accommodation establishments (logarithm)	CBS
Bed-places in private households (log)	BEDS	Number of total bed-places in private households (logarithm)*	eVisitor
Natality rate	NATAL	Natality (or birth rate), the total number of live births per 1,000 population	CBS
Mortality rate	MORTAL	Mortality (or death rate) the total number of deaths per 1,000 population	CBS
*Available from 2016 to 2022			

Table A3. Descriptive statistics, Croatia

Variable	Mean	Std. dev.	Min	Max	N
EMIG	58.57065	262.4007	0	9026	6412
TOUR	3707.535	12913.49	0	248230.9	4817
TTP	2915.213	8024.001	0	99487.53	4817
NIGHTS	169060.9	434818.9	0	4295071	4817
BEDS	1250.004	2789.041	0	23039	3199
HOUS	1055.934	435.1991	0.002621	2690.44	1644
DENS	93.5988	196.6293	1.556039	2945.082	6672
EDU	11.78073	5.586696	2.532041	35.65873	6672
REV	271.0463	281.1206	-2242.65	2547.693	6672
UNE	6.810054	4.423035	0.141343	26.72786	6672
HI	17.46151	11.63476	0.25641	89.38356	6559
NATAL	8.781899	2.590891	0	26.93603	6672
MORTAL	15.72433	5.820123	3.30033	74.62687	6672

Table A4. Descriptive statistics, Coastal Croatia

Variable	Mean	Std. dev.	Min	Max	N
EMIG	56.89341	121.8711	1	1244	1623
TOUR	11805.7	21189.68	0	248230.9	1477
TTP	8493.394	12031.52	0	99487.53	1477
NIGHTS	516196	643323.7	0	4295071	1477
BEDS	3875.518	3910.4	14	23039	973
HOUS	1311.6	338.2427	76.6225	2690.44	965
DENS	156.0173	337.0368	2.706273	2945.082	1668
EDU	18.03368	4.405248	8.025512	35.65873	1668
REV	447.2775	373.2734	-1706.475	2547.693	1668
UNE	5.044107	2.528599	0.6405124	17.66667	1668
HI	20.32696	11.42823	0.6944444	82.30769	1665
NATAL	8.499166	2.483817	0	26.93603	1668
MORTAL	13.1581	4.30611	3.30033	39.47368	1668

Table A5. Descriptive statistics, Continental Croatia

Variable	Mean	Std. dev.	Min	Max	N
EMIG	59.13907	295.2304	1	9026	4779
TOUR	126.3993	452.8039	0	6984.091	3340
TTP	448.4543	3004.048	0	65219.52	3340
NIGHTS	15552.43	113474.3	0	2638962	3340
BEDS	102.3742	410.2052	0	7436	2226
HOUS	692.5792	266.542	0.002621	1929.19	679
DENS	72.79262	109.4164	1.556039	1261.963	5004
EDU	9.696417	4.21543	2.532041	33.13955	5004
REV	212.3026	212.474	-2242.65	2400.548	5004
UNE	7.398703	4.750673	0.141343	26.72786	5004
HI	16.48665	11.54429	0.25641	89.38356	4894
NATAL	8.876143	2.619079	0	25.64103	5004
MORTAL	16.57974	6.005121	3.717472	74.62687	5004

Table A6. Correlation matrix, Croatia

	TOUR	TTP	NIGHT	BEDS	HOUS	DENS	EDU	REV	UNE	HI	NAT	MORT
TOUR	1.0000											
TTP	0.7402*	1.0000										
NIGHT	0.9400*	0.8626*	1.0000									
BEDS	0.8512*	0.8325*	0.9139*	1.0000								
HOUS	0.6476*	0.4598*	0.6173*	0.5528*	1.0000							
DENS	0.2468*	-0.1559*	0.2071*	0.1940*	0.1206*	1.0000						
EDU	0.6381*	0.3749*	0.6447*	0.6600*	0.4292*	0.4337*	1.0000					
REV	0.4044*	0.3778*	0.4125*	0.3890*	0.2570*	0.0710*	0.3985*	1.0000				
UNE	-0.2925*	-0.1985*	-0.2331*	-0.1607*	-0.1204*	-0.0953*	-0.3744*	-0.3003*	1.0000			
HI	0.1053*	-0.0053	0.0865*	0.0939*	0.1052*	0.1258*	0.1357*	0.0508*	-0.0626*	1.0000		
NAT	-0.0073	-0.1440*	-0.0289	-0.0620*	0.0025	0.0581*	-0.0708*	-0.0804*	0.0434*	0.0421*	1.0000	
MORT	-0.3910*	-0.0483*	-0.3428*	-0.2438*	-0.2235*	-0.2525*	-0.3228*	-0.0342*	0.1239*	-0.1434*	-0.2220*	1.0000

Note: *Significance at 5%

Table A7. Correlation matrix, Coastal Croatia

	TOUR	TTP	NIGHT	BEDS	HOUS	DENS	EDU	REV	UNE	HI	NAT	MORT
TOUR	1.0000											
TTP	0.3614*	1.0000										
NIGHT	0.8341*	0.6926*	1.0000									
BEDS	0.6806*	0.5661*	0.8763*	1.0000								
HOUS	0.4618*	0.1530*	0.4161*	0.3592*	1.0000							
DENS	0.2158*	-0.4505*	0.1109*	0.1596*	0.1045*	1.0000						
EDU	0.3142*	-0.0947*	0.2579*	0.2313*	0.3985*	0.3870*	1.0000					
REV	0.3263*	0.2732*	0.3011*	0.2086*	0.3244*	-0.0580*	0.1770*	1.0000				
UNE	-0.1856*	-0.1656*	-0.1498*	-0.1142*	-0.1641*	0.0870*	-0.0296	-0.3606*	1.0000			
HI	-0.1310*	-0.3413*	-0.1896*	-0.1525*	-0.0941*	0.1407*	0.0078	-0.0661*	0.1536*	1.0000		
NAT	-0.0120	-0.1736*	-0.0511	-0.0664*	0.1617*	0.0673*	-0.0444	-0.1036*	0.0781*	0.1200*	1.0000	
MORT	-0.2598*	0.1936*	-0.1601*	-0.0441	-0.0070	-0.2006*	-0.0921*	0.0756*	-0.1132*	-0.2039*	-0.2362*	1.0000

Note: *Significance at 5%

Table A8. Correlation matrix, Continental Croatia

	TOUR	TTP	NIGHT	BEDS	HOUS	DENS	EDU	REV	UNE	HI	NAT	MORT
TOUR	1.0000											
TTP	0.5209*	1.0000										
NIGHT	0.8705*	0.7485*	1.0000									
BEDS	0.5332*	0.7056*	0.7174*	1.0000								
HOUS	0.2209*	-0.0881*	0.1905*	0.2495*	1.0000							
DENS	0.3678*	-0.1926*	0.3419*	0.1253*	0.2118*	1.0000						
EDU	0.5436*	0.1458*	0.6076*	0.4614*	0.3981*	0.5859*	1.0000					
REV	0.2094*	0.2036*	0.2770*	0.1584*	0.1078*	0.1195*	0.2765*	1.0000				
UNE	-0.2901*	-0.0859*	-0.1615*	-0.0426	0.0233	-0.1659*	-0.3654*	-0.2438*	1.0000			
HI	0.0201	-0.0256	0.0338	0.0128	0.0830*	0.0973*	0.0738*	0.0354*	-0.0644*	1.0000		
NAT	0.1063*	-0.1296*	0.0681*	0.0049	0.0607	0.0996*	-0.0379*	-0.0429*	0.0223	0.0304*	1.0000	
MORT	-0.3356*	0.1840*	-0.2635*	-0.0475*	-0.2641*	-0.3305*	-0.2481*	0.0674*	0.0928*	-0.0874*	-0.2508*	1.0000

Note: *Significance at 5%

Comment on correlation matrices

Regarding the correlation matrices, as expected, the tourism indicators (TOUR, TTP, NIGHTS) are highly correlated with one another, but these indicators are introduced in separate models (i.e. these are different main independent variables): tourist density (TOUR) is used in the main analysis, while tourism territorial pressure (TTP) and tourist nights spent (NIGHTS) are included as robustness checks. According to Gujarati and Porter (2009), multicollinearity becomes a significant concern when the pairwise correlation coefficient between two regressors exceeds 0.8. In our analysis, whether in the full sample or subsamples, the coefficients generally remain below 0.5. Although some tourism indicators show correlations above 0.6 with certain independent variables in the full sample, the robustness checks using alternative tourism indicators (such as TTP), which do not have pairwise correlations above 0.5, reinforce the main findings of the study.

Table A9. Robustness check: main results with natality and mortality rates included in the model

	(1) Croatia	(2) Coastal	(3) Continental
Number of international emigrations			
Lagged dependent variable	0.408***	0.260***	0.353***
	(0.0290)	(0.0279)	(0.0163)
Tourist density (log)	-0.00248	0.0509**	-0.0773***
	(0.0281)	(0.0225)	(0.0149)
Coastal (dummy)	-0.965***		
	(0.214)		
Tourist density × Coastal	0.0656**		
	(0.0335)		
Housing prices in EUR (log)	0.198*	0.480***	0.183***
	(0.104)	(0.151)	(0.0434)
Population density	0.000639***	0.00120***	0.00139***
	(0.000149)	(0.000276)	(0.0000917)
Tertiary education (%)	0.0285***	0.0232**	0.0377***
	(0.00934)	(0.0113)	(0.00831)
Budgetary revenues per capita in EUR	-0.0000322	-0.0000358	0.000237***
	(0.0000584)	(0.0000606)	(0.0000907)
Unemployment rate (%)	0.00153	0.0390**	0.0148**
	(0.00943)	(0.0163)	(0.00636)
H and I sectors emp. share (%)	0.00447**	0.00313**	-0.000480
	(0.00176)	(0.00151)	(0.00321)
Natality rate	0.00530	-0.00917	0.00953
	(0.00767)	(0.00646)	(0.00777)
Mortality rate	-0.0262***	-0.0296***	-0.0255***
	(0.00538)	(0.00527)	(0.00456)
Urban (dummy)	0.511*	-0.983	0.604***
	(0.298)	(0.635)	(0.139)
Cons	1.267**	-1.116	1.813***
	(0.619)	(0.995)	(0.320)
Number of observations	1421	883	538
Number of groups	199	113	86
Number of instruments	81	79	79
Hansen test – p-value	0.444	0.320	0.456
AR(2) test – p-value	0.131	0.110	0.558

Standard errors in parentheses, * p < 0.1, ** p < 0.05, *** p < 0.01

Table A10. Robustness check: Tourism territorial pressure (log) as the indicator of tourism

	(1) Croatia	(2) Coastal	(3) Continental
Number of international emigrations			
Lagged dependent variable	0.354***	0.319***	0.389***
	(0.0286)	(0.0248)	(0.0160)
Tourism territorial pressure (log)	0.0517*	0.176***	0.0169
	(0.0279)	(0.0246)	(0.0118)
Coastal (dummy)	-1.351***		
	(0.221)		
Tourism territorial pressure × Coastal	0.0882**		
	(0.0345)		
Housing prices in EUR (log)	0.260**	0.383***	0.0969***
	(0.106)	(0.135)	(0.0367)
Population density	0.00129***	0.00209***	0.00132***
	(0.000208)	(0.000243)	(0.0000724)
Tertiary education (%)	0.0320***	0.0231***	0.0346***
	(0.0101)	(0.00894)	(0.00571)
Budgetary revenues per capita in EUR	-0.0000550	-0.0000454	0.000101
	(0.0000716)	(0.0000576)	(0.0000863)
Unemployment rate (%)	0.00701	0.0260*	0.0119*
	(0.0117)	(0.0141)	(0.00714)
H and I sectors emp. share (%)	0.00777***	0.00690***	0.00224
	(0.00206)	(0.00123)	(0.00460)
Urban (dummy)	-0.171	-2.563***	0.546***
	(0.402)	(0.562)	(0.155)
Cons	0.483	-2.258**	0.983***
	(0.701)	(0.915)	(0.313)
Year dummies	Yes	Yes	Yes
Number of observations	1421	883	538
Number of groups	199	113	86
Number of instruments	79	77	77
Hansen test – p-value	0.367	0.280	0.398
AR(2) test – p-value	0.194	0.067	0.570
Standard errors in parentheses, * p < 0.1, ** p < 0.05, *** p < 0.01			

Table A11. Robustness check: Tourist nights spent (log) as the indicator of tourism

	(1) Croatia	(2) Coastal	(3) Continental
Number of international emigrations			
Lagged dependent variable	0.365***	0.274***	0.426***
	(0.0293)	(0.0236)	(0.0152)
Tourist nights (log)	0.139***	0.280***	0.0311
	(0.0359)	(0.0273)	(0.0192)
Coastal (dummy)	-2.033***		
	(0.471)		
Tourist nights × Coastal	0.0898**		
	(0.0437)		
Housing prices in EUR (log)	0.248**	0.360**	0.135***
	(0.104)	(0.143)	(0.0255)
Population density	0.000949***	0.00162***	0.00120***
	(0.000152)	(0.000196)	(0.0000806)
Tertiary education (%)	0.0196**	0.0134*	0.0226***
	(0.00823)	(0.00787)	(0.00632)
Budgetary revenues per capita in EUR	-0.000109*	-0.0000887	-0.0000146
	(0.0000648)	(0.0000606)	(0.0000902)
Unemployment rate (%)	0.00608	0.0382***	0.0111**
	(0.0104)	(0.0139)	(0.00476)
H and I sectors emp. share (%)	0.00887***	0.00925***	0.00221
	(0.00199)	(0.00128)	(0.00353)
Urban (dummy)	-0.0390	-2.020***	0.589***
	(0.316)	(0.463)	(0.0922)
Cons	-0.267	-3.771***	0.650**
	(0.694)	(0.985)	(0.250)
Year dummies	Yes	Yes	Yes
Number of observations	1421	883	538
Number of groups	199	113	86
Number of instruments	79	77	77
Hansen test – p-value	0.363	0.424	0.691
AR(2) test – p-value	0.169	0.082	0.606

Standard errors in parentheses, * p < 0.1, ** p < 0.05, *** p < 0.01

Table A12. Robustness check: Bed-places in private households (log) as the indicator of tourism, 2016-2022

	(1) Croatia	(2) Coastal	(3) Continental
Number of international emigrations			
Lagged dependent variable	0.474***	0.515***	0.438***
	(0.0392)	(0.0431)	(0.0426)
Bed-places in private households (log)	0.0447	0.144***	0.0171
	(0.0325)	(0.0365)	(0.0223)
Coastal (dummy)	-1.529***		
	(0.345)		
Bed-places in private households × Coastal	0.119**		
	(0.0480)		
Housing prices in EUR (log)	0.242**	0.510***	0.441***
	(0.115)	(0.189)	(0.0739)
Population density	0.000731***	0.000948***	0.00132***
	(0.000162)	(0.000181)	(0.000189)
Tertiary education (%)	0.0199**	-0.000141	-0.00401
	(0.00924)	(0.00812)	(0.0132)
Budgetary revenues per capita in EUR	-0.0000413	-0.0000800	0.000182
	(0.0000605)	(0.0000566)	(0.000193)
Unemployment rate (%)	-0.0161	-0.00300	0.00253
	(0.0107)	(0.0158)	(0.0123)
H and I sectors emp. share (%)	0.00341*	0.000723	-0.00256
	(0.00205)	(0.00171)	(0.00408)
Urban (dummy)	0.119	-0.967***	0.525***
	(0.328)	(0.373)	(0.157)
Cons	0.107	-2.974**	-0.615
	(0.597)	(1.186)	(0.404)
Year dummies	Yes	Yes	Yes
Number of observations	1110	669	441
Number of groups	209	112	97
Number of instruments	50	48	48
Hansen test – p-value	0.597	0.087	0.513
AR(2) test – p-value	0.375	0.105	0.354
Standard errors in parentheses, * p < 0.1, ** p < 0.05, *** p < 0.01			