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Effects of COVID-19 on Adriatic and Continental Croatia tourism: a regional input-output perspective

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ABSTRACT

The purpose of this article is to estimate regional economic impact of tourism in Croatia. Rich cultural heritage and natural resources are factors which have contributed to the rapid increase in tourist arrivals in Adriatic Croatia, especially after the removal of all barriers to free movement following Croatia's admittance to the European Union. While tourism is one of the key sectors which has contributed to Adriatic Croatia's growth and development, a high share of tourism in gross value added and employment has increased the region's vulnerability to external shocks, such as the outbreak of COVID-19 pandemic in 2020. The estimation of tourism's role in Croatia's regions is based on the regional input–output model, which identifies total effects of tourist demand. Results of the study reveal structural differences in Croatia's regional growth path. While Continental Croatia specialises in more sophisticated industrial sectors, the economy of the Adriatic region is strongly dependent on tourism. The decrease in tourist arrivals due to COVID-19 travel restrictions resulted in a significant decline in economic activity in Adriatic Croatia. Economic activity in the hospitality sector was most affected by decreased demand, but other sectors which deliver inputs required for tourism services were also significantly impacted.

1. Introduction

During the last decade, tourism has been one of the world's most dynamic economic industries. In recipient countries, tourism has contributed to economic growth and development, an inflow of foreign exchange, and improvements in transportation and other infrastructure. It has also contributed to the development of local entrepreneurs' business and managerial skills, primarily in small- and medium-sized companies. This is especially important in underdeveloped regions where tourism can be a stimulus for economic development (Holzner, 2011; Rosentraub & Joo, 2009). Foreign tourist expenditures increase demand in the domestic economy, providing an

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opportunity for local companies to expand their activities and increase employment. In addition, growing tourist demand has indirect effects on entrepreneurs who deliver intermediate goods and services to the hospitality sector. Increased wages and salaries for employees who are directly or indirectly employed by tourism clusters induce additional demand and economic activity. However, the arrival of large numbers of tourists can generate negative externalities related to the depletion of natural resources and bottlenecks in key network infrastructure if the communal infrastructure does not keep pace with tourism development. Because of its importance, both the positive and negative aspects of tourism should be taken into account when formulating strategic goals for local and regional development.

Historical and cultural heritage, a favourable climate and natural beauty make Croatia one of Europe's most popular destinations and one of the economies with the highest share of tourism revenues in GDP. In terms of the Nomenclature of Territorial Units for Statistics (NUTS 2), Croatia is divided into two regions: Continental and Adriatic. The number of foreign tourists visiting Adriatic Croatia (15.4 million in 2019) was 11 times greater than the size of the regional population (1.37 million) and this region recorded 86 million or 95% of total tourist nights spent in Croatia. Arrivals of foreign tourists grew at a rate of about 10% annually from 2010 to 2019 helping GDP at purchasing power prices in Adriatic Croatia to increase from 58% in 2011 to 64% in 2019 of the EU27 average. Economic growth in Continental Croatia, where tourism is less important industry, was slower increasing from 61% to 65% of the EU27 average over the same period.

The spread of COVID-19 in 2020 prompted policymakers in many countries to implement measures that limited human interaction and mobility. Social isolation and limitations on certain industries resulted in a strong economic downturn, and in 2020, GDP fell by 6.6% in the European Union and 8.4% in Croatia (Eurostat, 2021). The industries most affected by this crisis were tourism and transport. The UNWTO World Tourism Barometer concluded that global tourism suffered its worst year in 2020; international arrivals dropped by 74%, and destinations worldwide received 1 billion fewer international arrivals than the year before. International travel revenues collapsed by USD 1.3 trillion, causing the potential loss of 100 to 120 million direct tourism jobs (UNWTO, 2021).

Estimates representing the contribution of tourism to national employment and gross value added are available for many countries, including Croatia (Haddad et al., 2013; Ivandić & Šutalo, 2018; Orens & Seidl, 2009; Tian et al., 2013). For many economies, economic contributions of tourism are often estimated not only on national level, but also on the regional level, especially for regions where tourism is important economic industry. Regional variations in the importance of tourism are significant in the Croatia where tourist arrivals are mainly concentrated to Adriatic Croatia. While tourism contributed to economic growth in good times, its importance makes Adriatic region extremely vulnerable to exogenous shocks such as COVID-19 outbreak. Therefore, this paper aims to examine the role of tourism and economic effects of COVID-19 pandemic in Adriatic and Continental Croatia.

In previous literature economic effects of tourism on national economies are estimated by various methodological approaches, but most frequently panel data

econometric techniques, time series analyses and input-output (IO) analysis have been applied. Numerous authors have developed different methodological approaches for evaluating the economic effects of tourism and the advantages and limitations of different techniques are examined previously (Comerio & Strozzi, 2019; Kumar & Hussain, 2014; Song et al., 2012). To produce reliable and robust estimates panel data and time series techniques require availability of abundant data series for explanatory variables which are rarely available on a regional level. In addition, those techniques were more applicable for estimating coefficients in stable economic environment while their effectiveness is decreasing in the periods characterised by exogenous shocks. Regional input-output (RIO) modelling is less data demanding in comparison to econometric modelling and exogenous shocks are accounted for through their straightforward impact on the demand of tourists. The traditional IO model has been widely used because of its straightforwardness in interpretation, less demanding data requirements and its advantage over the simple demand model.

The methodological novelty of the study is in the development and application of a RIO model for Croatia which, for the first time, provides an estimation of the total economic effects of tourism in Croatian regions. Effects are estimated both in terms of the direct effects related to the decrease in tourism revenues and the indirect effects on all sectors included in the regional value chain of tourism. Practical implications of the study are related to provision of regional estimates of COVID-19 effects which could be used for assessment of effectiveness of fiscal and monetary policy measures introduced by Croatian government to limit negative effects of COVID-19. In addition, results could be significant for regional policymakers in formulating development goals and policy measures.

The paper is structured as follows: after the introduction, Section 1 presents a review of the literature on the effects of tourism with an emphasis on regional development. The research methodology and data sources are presented in Section 2. In Section 3, the empirical results of the economic effects of tourism induced in Continental and Adriatic Croatia are shared. In the conclusion, policy implications and suggestions for further research are discussed.

2. Literature review

The interest in research on the role of tourism in economic development has grown since the 1980s. In addition to studies on national economies, studies on the economic contributions of tourism are often conducted on the regional level, or even the city or island level. Seminal regional studies in the 1980s analysed the economic impact of tourism in the Okanagan Region in Canada (Var & Quayson, 1985) and the Port of Miami (Mescon & Vozikis, 1985). In the last 40 years, numerous papers have analysed the role of tourism in the economic development of the most popular tourist regions in the world. The most exhaustive list of studies on the economic impact of tourism on national and regional economies worldwide can be found in Artal-Tur et al. (2020). The following is a review of some recent studies whose implications are important for the effects of regional tourism.

Tourism is not a homogenous industry classified as an individual economic sector; it includes many sectors as defined in the International Classification of Activities (Frechtling, 2010; United Nations, 2010). Some studies have focussed on the examination of the multiplicative effects of the most typical tourism sectors, such as hotels, restaurants and travel agencies, while others have included all sectors which provide goods and services for tourists' consumption. Surugiu et al. (2009) explored the effects of changes in final demand for Romanian hotels, restaurants and travel agencies. The role of the sector was assessed by calculating the backward and forward linkage coefficients for the most important economic indicators: output, earnings, GVA and employment. The authors found more intensive effects on industries which supply hotels and restaurants with intermediate products (backward effects), while forward linkage coefficients were low due to the orientation of tourism to final demand. Cai et al. (2006) combined intersectoral flow data from national, regional and local IO tables and arrived at a similar conclusion for the more important backward multipliers in the Hawaiian economy. In comparison to other economic sectors, tourism has an above-average backward multiplier. More intensive backward linkages have been found for the manufacturing, construction and agriculture industries, while tourism has a higher backward multiplier in comparison to other services (Cai et al., 2006; Surugiu et al., 2009). In many studies, tourism was assessed as a key economic sector. Atan and Arslanturk (2012) classified hotels and restaurants as key sectors for the Turkish economy. The authors concluded that tourism directly or indirectly affects the output of many other industries which supply products demanded by tourists. In another study, the regional IO modelling system was employed by Frechtling and Horvath (1999) to estimate regional multiplier effects of visitor expenditures in Washington, D.C. In comparison to other regions, the multipliers for tourism in Washington were found to be lower.

Artal-Tur et al. (2020) presented a methodological discussion on the different approaches to estimating the economic impact of tourism and highlighted the importance of using the RIO model when available. Empirical tests based on the three major Mediterranean destinations in Spain (Barcelona, Palma de Mallorca and Alicante) showed significant differences in the estimated effects when a regional approach was employed rather than a national IO table. Kronenberg et al. (2019) regionalised national IO tables for the Swedish economy to estimate the direct and indirect economic effects of tourism. They found strong linkages of air transport, restaurants, hotels, and creative services with the rest of the regional economy. On the other hand, trade, entertainment, recreation, and travel agencies showed a trend of decreasing intensity in intersectoral linkages with other industries. Murillo et al. (2013) found that visitors to the city of Barcelona had a significant effect on the Catalan economy and directly and indirectly induced 2.4% of the region's GDP and 4.1% of the jobs. A higher share of employment over GDP effects indicates below-average productivity of the tourism sector.

Studies on the economic impact of tourism in Croatia are available only for the total economy. Šutalo et al. (2011) estimated that tourism generated 14.7% of Croatian GVA in 2005, while in updated analyses for the period 2010–2013 (Ivandić & Šutalo, 2018), tourism's contribution has been estimated to range from 14.2% to

16.3% of GVA. Mikulić et al. (2017) estimated that foreign tourist expenditures in Croatia generated 13.1% of GVA in 2010 and 16.2% of GVA in 2014.

In contrast to previous literature which deals primarily with the positive effects of tourism on economic growth, most recent studies focus on the negative effects of the COVID-19 outbreak on tourism in 2020. Beckman and Morse (2020) stressed the vulnerability of tourism to natural, economic, political or health crises. There have been several events in this century which have disrupted the smooth growth trend of global tourism: the terrorist attacks of September 11, 2001; the SARS outbreak of 2002–2003; the global recession of 2008–2009; the Ebola outbreak of 2013–2014; and the Zika outbreak of 2017. The economic impact of a global infectious disease pandemic has been investigated by Keogh-Brown et al. (2010). Using a multi-sector single-country CGE model of the United Kingdom, France, Belgium and the Netherlands, they estimated the impact of disease on GDP to be in the range of 0.5%–2%. Smith et al. (2011) used a CGE model to determine that the economic impact of an influenza pandemic could be as much as 3.7% of GDP in the United Kingdom, according to the most severe scenario. Interestingly, both studies concluded that disease-mitigation policies could induce a more severe economic impact than the direct health impact of the pandemic. Verikios et al. (2016) found that economic impacts are expected to be more severe during a pandemic.

Unlike the previously mentioned crises, which only locally or temporarily disrupted tourism activity, the intensity and duration of the COVID-19 crisis are much more pronounced. However, tourism is a resilient industry which rapidly rebounds after negative shocks (Gössling et al., 2021). In order to reduce the negative effects of the COVID-19 pandemic, the tourism industry is financially supported in terms of credit and liquidity, followed by tax breaks and low interest rates for investments in tourism (Şengel et al, 2022). Economies with a high share of tourism and other service-related industries are expected to suffer the most severe consequences of the COVID-19 outbreak. Economic losses have been estimated at approximately 2.5%–3% of GDP for each month of severe COVID-related restrictions (Fernandes, 2020), triggering negative economic effects related to the spillover from health measures implemented in other economic sectors, which directly affect all other industries due to intersectoral relations. Although the spread of COVID-19 first caused a decrease in demand, this was followed by spiral effects on output (Fornaro & Wolf, 2020). Baldwin and Di Mauro (2020) noted that travel restrictions affect not only productivity and employment but also the income and personal consumption of the local population. In the light of the COVID-19 pandemic, the reduced number of tourist arrivals had a significant impact on the decline in revenue of the gaming industry in Macau, the gambling depended destination (Lim & To, 2022). Fotiadis et al. (2021) forecast the drop in international tourist arrivals ranging between 30.8% and 76.3%.

In Greece, the COVID-19 pandemic, coupled with a decrease in tourism receipts, induced a drop in GDP ranging from 2% to 6% (Mariolis et al., 2020), while the employment effects are even more pronounced. The most significant decline is expected in the hotel and restaurant sectors, but other sectors such as land transport, agriculture and real estate could also suffer significant losses. In the structure of economic losses, it is estimated that hotels and restaurants will suffer a 31% total

decrease in employment. Rodousakis and Soklis (2021) estimated that the decline in revenues from international travel, due to COVID-19 restrictions, induced a decrease in GDP of about 0.58% in Germany and 4.54% in Spain. Labour requirements in Malaysia were reduced by 11.4% due to the decrease in Chinese tourists' expenditure during the COVID-19 outbreak in 2020 (Mohd Suib & Salleh, 2021). In Italy, Giammetti et al. (2020) combined the IO model with complex network analysis to identify the economic sectors most affected by the COVID-19 crisis. Strict lockdowns halted production in some sectors, resulting in a decrease of 52% of total value added, of which 30% represents indirect effects along the value chains of industries which were forced to stop production. Even sectors not subjected to any restrictions, like financial and professional services, agriculture, information and communication technology sector and communal utilities, were significantly affected by the lockdown. In a Brazilian study, Ribeiro et al. (2020) used the partial hypothetical extraction method, which resulted in a potential 31% decline in GDP from tourist activities due to demand contraction. Because of the lockdown, real GDP in New Zealand could be reduced by 7.1% on the national level, but the highest negative effects are estimated for Queenstown-Lakes (–16.7%), which is the region most oriented to tourism (de Morel et al., 2020).

According to Butler (2021), many factors can affect the development of a tourist destination. In crisis and unforeseen times, one of the most important factors is stage of the development cycle reached by any specific destination. Consequences for tourist destinations caused by COVID-19 may range from a short term and temporary loss of tourists to a permanent departure of the destination from tourism. Crucial factor in the development of the tourism destination is local government, especially in terms of managing the attractiveness and fostering the community (Kusnadi, 2021). Sengel (2021) emphasises the importance of "tourism reconstruction" and highlights the most important factors influencing successful reconstruction. These include location, climate, attractions and facilities, characteristics of the pre-COVID-19 market, the rate and scale of resumption of means of access by markets, government policies on restrictions and level of support given to tourism. UNWTO (2020) states that responses to COVID-19 vary significantly from country to country depending on the degree of tourism importance and the scale of its contribution to national and regional economies. Developed countries are more capable to support tourism financially and logistically, and supporting of critical services is more likely to be given high priority in such countries, which affect the ability of destinations to recover from the effects COVID-19. Neshat et al. (2021) concluded that COVID-19 pandemic can be seen as the two sides of the same coin for the tourism industry. One side is implementing inappropriate policies which could bring an environmental catastrophe, and the other side is to move towards sustainable tourism development by adopting policies such as prospering domestic tourism and virtual tourism which turns the global crisis into an opportunity. In an attempt to address above issues, authors suggested solutions like having separate plans for domestic and foreign tourists, planning development of rural tourism in small and large towns and metropolitan areas for sustainable domestic tourism development, designing creative and more attractive rural tourism and ecotourism packages in the COVID-19 pandemic, developing

sanitary protocols for domestic flights, designing safe tourism package for local tourists, and giving information and promoting them, designing low-cost economical packages to increase demands.

3. Research methodology and data sources

The contribution of tourism in the Continental and Adriatic Croatia is assessed using the RIO model. IO tables present sales and purchases of products among producers and consumers within an economy. In IO table total economy is divided in n economic sectors. Relationships among economic sectors in a production process are depicted by a set of technical coefficients which describe the requirements of each sector for intermediate inputs from other sectors. Increase in production of certain sector induces increase in production of other sectors which deliver intermediate inputs required in production process. Numerous factors, such as availability of natural resources or differences in regional market conditions and preferences, could result in deviation of regional technical coefficients from national average. National statistical offices usually publish IO tables only on the level of total economy and appropriate statistical and mathematical methods should be applied to adjust the national technical coefficients to the regional level. A theoretical background and procedures inherent to those methods are broadly discussed previously (Bonfiglio & Chelli, 2008; Flegg & Tohmo, 2013a; Miller & Blair, 2009).

Statistical approaches use the structure of gross output and employment on the national and regional levels to capture the regional capacity of local producers to deliver demanded products (Boero et al., 2018). If a region specialises in the production of a certain product (i.e., if it records an above-average share of that industry in GVA or employment), it is assumed that regional demand is fully satisfied by local producers. Contrary, a below-average share of a certain industry indicates that a proportion of local demand is imported from other regions. Different approaches regarding the selection of appropriate location quotients (LQs), along with their advantages and disadvantages are discussed previously (Miller & Blair, 2009; Sixta, 2017; Szabó, 2015). The main disadvantage of LQs is the assumption of the same productive technologies in region and in the country (Lampiris et al., 2020) as well as the tendency to underestimate imports from other regions and consequently to overestimate regional multipliers (Flegg & Tohmo, 2013b). The method applied in RIO tables compilation largely depends on the data availability and quality. The least complex and most popular way to regionalise national IO tables is a simple location quotients (SLQ) approach (Flegg & Tohmo, 2013b). SLQ assumes that regions specialised in the production of certain product (the share of output of sector i in the region is higher than the share of the same sector on the national level) have the same technical coefficients as recorded on national level, while regional technical coefficients for sectors where region is not specialised are corrected by a ratio of the share of output of a sector i in regional and national economy. Application of this approach requires only data on the regional and national output of each economic sector which are usually available.

Unlike SQL which is focused only on the regional specialisation of producers, cross-industry location quotient (CILQ) method assumes that both the structure of regional supply and regional demand are equally important. Thus, to estimate regional coefficients national technical coefficients are adjusted both by rows (deliveries) but also by columns (uses of intermediate inputs). The advantage of CILQ approach, which is slightly more complex than SLQ, is in provision of more realistic regional technical coefficients which capture differences in regional supply and demand. CILQ approach, as described in continuation, is therefore applied in this study.

Let x_i^r be the output of sector i in region r and x_i^n be an output of sector i of the national economy. The CILQ is defined as follows:

$$\text{CILQ}_{ij}^r = \frac{x_i^r / x_i^n}{x_j^r / x_j^n} \tag{1}$$

Let a_{ij}^{rr} be the regional technical coefficient representing the input of sector i in region r per monetary term of output of sector j in region r. Let a_{ij}^n represent the national technical coefficient calculated from the national IO table. The regional technical coefficient a_{ij}^{rr} is equal to:

$$a_{ij}^{rr} = \begin{cases} \text{CILQ}_{ij}^r \cdot a_{ij}^n, & if \ \text{CILQ}_{ij}^r < 1 \\ a_{ij}^n, & if \ \text{CILQ}_{ij}^r \geq 1 \end{cases} \tag{2}$$

In other words, if the output of sector i in region r in relation to output of sector i of the national economy is higher than output of sector j in region r in relation to output sector j of the national economy, i.e., if $\text{CILQ}_{ij}^r > 1$, then all needs of sector j for the inputs of sector i can be met within the region r. On the other hand, if $\text{CILQ}_{ij}^r < 1$, then region r is not able to cover requirements of sector j for intermediate inputs from sector i and certain inputs need to be imported from other regions. For $i = j$, $\text{CILQ}_{ii}^r = 1$.

Based on estimated regional technological coefficients calculated according to (1) and (2), techniques of classical IO analysis are applied in the total effects calculation. If two regions are analysed, the regional technological coefficients matrix A is a $2n$-by-$2n$ matrix, where n is the number of economic sectors in the two regions. Two types of multipliers are essential. Type I multipliers include direct and indirect effects generated by the domestic producers involved in the value-added chain of the tourism sector. For the type I multipliers calculation, the Leontief inverse matrix $L = (I-A)^{-1}$ is applied. Beside indirect effects, type II multipliers include induced effects that are related to increase of labour income of employees involved in the production chain of the tourism sector and consequently increase in personal consumption. Type II multipliers are estimated based on the matrix $\overline{L} = (I-\overline{A})^{-1} = \begin{bmatrix} \overline{L_{11}} & \overline{L_{12}} \\ \overline{L_{21}} & \overline{L_{22}} \end{bmatrix}$, where matrix $\overline{A}$ is the expanded matrix of regional technical coefficients A with two more rows representing employee compensation coefficients per region and two more columns representing household consumption coefficients per observed region. If one is

Table 1. Average daily expenditures of tourists in Croatia in 2019.

	Adriatic Croatia		Continental Croatia	
	Daily expenditures, in EUR	Structure, in %	Daily expenditures, in EUR	Structure
Average expenditures	93.0	100.0	99.0	100.0
Accommodation services (including food in the residence object)	50.4	54.2	49.1	49.6
Food and beverages in restaurants and bars outside accommodation service	16.1	17.3	17.0	17.2
Expenditures in retail trade	11.0	11.8	15.1	15.3
Other services	15.6	16.8	17.8	18.0

Source: Marušić et al. (2020).

interested in the calculation of the induced effects of n observed sectors in both regions, then matrix $\overline{L_{11}}$ is used. More of the above-mentioned matrices can be found in ten Raa (2005), Miller and Blair (2009) and Mikulić (2018).

The effects of tourists' final demand on GVA by Croatian regions are calculated from:

$$\overline{\text{VA}} = \text{V} \cdot \overline{L_{11}} \cdot \text{Y} \tag{3}$$

where vector Y presents tourists' final demand by Croatian regions and V is a diagonal matrix whose elements are the shares of value added in the output of each sector of a region (Miller & Blair, 2009). Employment effects are calculated from:

$$\overline{\text{EM}} = \text{E} \cdot \overline{L_{11}} \cdot \text{Y} \tag{4}$$

where E is a diagonal matrix consisting of employment coefficients, i.e., the ratios of the number of employees in the output of the individual sector per region (ten Rea, 2005).

Regional technological coefficients for Continental and Adriatic Croatia are derived from the national IO table published by the Croatian Bureau of Statistics and distributed to 64 economic sectors for the year 2017.

Data on foreign tourist expenditures are available from Balance of Payments statistics, which are published by the Croatian National Bank under the travel heading. The regional structure of tourist expenditures and the distribution of expenditures by product group are based on the Survey on attitudes and expenditures of tourists in Croatia (TOMAS survey) conducted by the Institute for Tourism (Marušić et al., 2020). The most recent TOMAS survey was conducted in 2019. Trends in total daily expenses according to the TOMAS survey are presented in Table 1. Accommodation services represent the largest share of total expenditures—over 50% –followed by expenditures on food and beverages consumed in bars and restaurants. TOMAS disaggregates other services into sport and recreation, culture, entertainment services and trips taken during holidays, which is useful for the application of the IO model at a more detailed level (Marušić et al., 2020).

Table 2. Economic effects of domestic and foreign tourists' expenditures to Croatian GVA by region, in mil. HRK.

Economic effects by region		Domestic tourists effects from:		Total domestic effects	Foreign tourists effects	Total effects
		Continental	Adriatic			
Continental	Direct	1,143	456	1,599	7,308	8,907
	Indirect	936	415	1,351	11,148	12,499
	Induced	1,060	488	1,547	11,867	13,415
	Total	3,138	1,359	4,497	30,323	34,820
Adriatic	Direct	1,838	707	2,546	21,644	24,190
	Indirect	450	213	663	4,907	5,570
	Induced	718	331	1,048	9,796	10,844
	Total	3,006	1,251	4,257	36,347	40,604
Croatia, total effects		6,144	2,610	8,754	66,670	75,424
Croatia, total effects, in mil. EUR		829	352	1,181	8,993	10,174

[a]The average annual exchange rate of the HRK versus the EUR in 2019 was 7.4136 (Croatian National Bank, 2020).
Source: Authors' calculation.

4. Research results

4.1. GVA and employment effects in 2019

The economic effects of tourism induced in Croatian regions in 2019 are expressed in terms of GVA and employment. Effects are divided into economic activity induced by foreign and domestic tourist consumption, and effects related to domestic tourists are further disaggregated by the tourists' place of residence. Direct effects are related to the revenues realised by local producers who sell goods and services to tourists. These revenues are comprised of income generated in the hospitality sector as well as the income of other local establishments which deliver goods and services to tourists, such as restaurants and shops that sell food, transport services, entertainment, or other products and services demanded by tourists. Indirect effects include indirect GVA and employment generated in industries which do not deliver final goods and services directly to tourists but produce intermediate inputs required in the value-added chain of tourism. The most important intermediate inputs include agricultural or processed food products delivered to restaurants, energy or water consumed in hotels and oil derivatives used by transport companies, but the full list of intermediate inputs demanded by the tourism sector includes thousands of products. While direct effects are generally limited to local units which host tourists, indirect and induced effects can be distributed to other regions, or even abroad, depending on the type of intermediate input required. Induced effects are related to an increase in wages and personal consumption of employees who are directly and indirectly engaged in the tourism sector. Increased consumption financed by income generated from the tourism sector stimulates economic activity in other sectors which produce goods and services for personal consumption.

The distribution of direct, indirect and induced GVA related to tourism in Continental and Adriatic Croatia is shown in Table 2. The columns in Table 2 present the regional distribution of GVA related to the expenditures of tourism sub-groups. Total GVA induced by the consumption of domestic tourists originating from Continental Croatia (third column) is Croatian kuna (HRK) 6.1 billion, or EUR 830 million. The regional distribution of the effects induced by tourists from
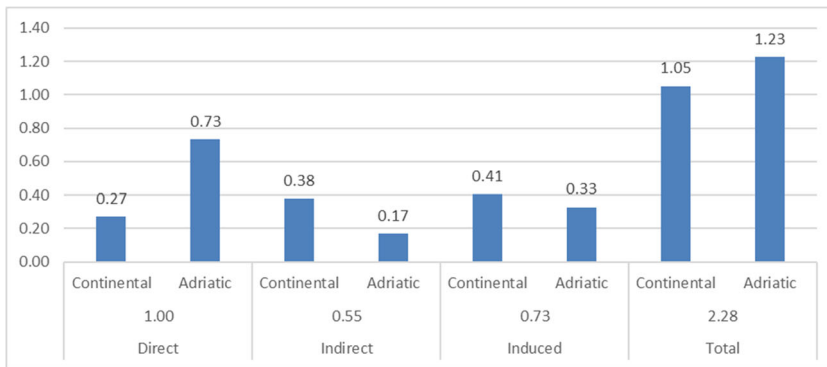
Figure 1. Output multipliers induced by tourism.
Source: Authors' calculation.

Continental Croatia points to the conclusion that both regions contribute to the total effects at approximately the same magnitude (slightly over HRK 3 billion of GVA induced in both regions). However, direct effects reveal that visitors from Continental Croatia spend almost twice as much in the Adriatic region (HRK 1.8 billion of direct GVA in Adriatic Croatia vs. HRK 1.1 billion of GVA in Continental Croatia). On the other hand, significantly higher indirect and induced effects in Continental Croatia are the result of better integration of Continental Croatian producers of intermediate products into the tourism value-added chain. This is primarily related to producers of agricultural and food products which are indirectly incorporated into the total touristic supply. GVA induced by tourists from Adriatic Croatia is lower than that of Continental Croatia, but the structure is not significantly different.

While direct GVA related to foreign tourist expenditures is almost three times higher in Adriatic Croatia, the regional ratio of total effects points to a more equal distribution of regional benefits (HRK 36.3 billion of GVA in Adriatic Croatia compared to HRK 30.3 billion in Continental Croatia). The total effects of domestic and foreign tourist consumption on Croatian GVA amounted to HRK 75.4 billion (EUR 10.2 billion), more than 88% of which relates to foreign tourist consumption. Direct effects of tourist consumption are significantly higher in the Adriatic region, but this value-added chain also benefits Continental Croatia. Indirect effects, which include suppliers for hotels and restaurants in both Adriatic and Continental Croatia, are more dominant in the Continental region.

Figure 1 presents the regional distribution of total output in the Croatian economy induced by the unit value of tourism revenues. The total output multiplier is estimated at 2.28, meaning that each HRK 1 of direct tourist expenditures in the hospitality sector induced an additional HRK 1.28 in revenue for other domestic producers included in the value-added chain. It is interesting to note that almost three quarters of direct output (more precisely, 73%) is effective in Adriatic Croatia, while the distribution of total effects is far more balanced (HRK 1.23 in Adriatic Croatia vs. HRK 1.05 in Continental Croatia). The manufacturing industry in Adriatic Croatia is poorly integrated into the hospitality value-added chain, thus missing the opportunity to increase economic activity through the production of intermediate products required by the tourism sector. Indirect and induced effects are substantially higher for Continental Croatia and
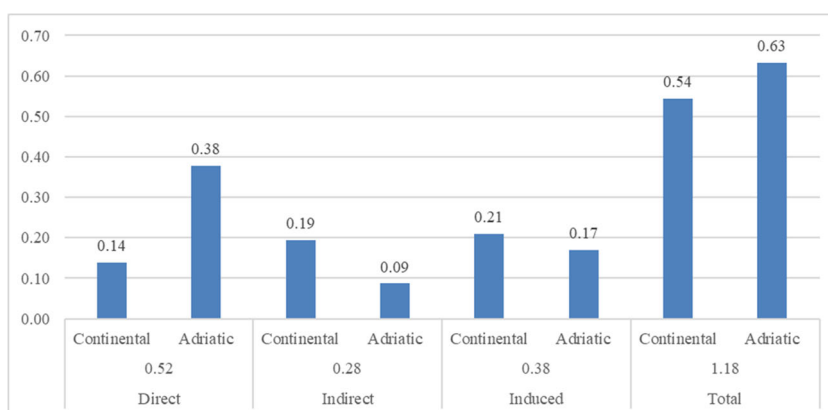
Figure 2. GVA effects induced by tourism per unit value of output.
Source: Authors' calculation.

Table 3. Economic effects of domestic and foreign tourists' expenditures on Croatian employment by regions, in FTE jobs.

Economic effects by region		Domestic tourists effects from:		Total effects of domestic tourists	Foreign tourists effects	Total tourism effects
		Continental	Adriatic			
Continental	Direct	5,014	2,320	7,334	43,514	50,848
	Indirect	4,704	2,062	6,766	102,394	109,160
	Induced	4,933	2,270	7,203	12,126	19,329
	Total	14,652	6,651	21,303	158,033	179,337
Adriatic	Direct	7,410	3,367	10,777	111,284	122,061
	Indirect	2,252	1,068	3,321	24,508	27,829
	Induced	2,905	1,338	4,243	40,013	44,256
	Total	12,566	5,774	18,340	175,805	194,145
Croatia, total effects		27,218	12,425	39,644	333,838	373,482

Source: Authors' calculation.

surprisingly, producers from Continental Croatia are much more integrated into the tourism value chain than local Adriatic Croatian producers.

Figure 2 presents GVA effects induced by the unit value of tourism output. Direct revenues of the hospitality sector valued at HRK 1 generate total effects of HRK 1.18 in increase in GVA (HRK 0.63 in Adriatic Croatia and HRK 0.54 in Continental Croatia). For each HRK 1 of tourism revenue in Croatia, direct GVA increases by HRK 0.38 in Adriatic Croatia and HRK 0.14 in Continental Croatia, while indirect and induced effects are more dominant in Continental Croatia.

In addition to GVA, tourism is important for Croatia as an employment generator, especially in the Adriatic region. Tourism has generated over 373,000 jobs (Table 3), expressed as full-time equivalent (FTE). Employment effects induced by foreign tourist expenditures accounted for 90% of all employment benefits. As in the case of GVA, direct effects are more pronounced in Adriatic Croatia, while indirect effects are higher in Continental Croatia.

Figure 3 reveals that the Adriatic region is primarily oriented towards offering direct services for tourists, such as accommodation, food and beverages served in restaurants, entertainment and similar services (direct effects account for almost 60% of
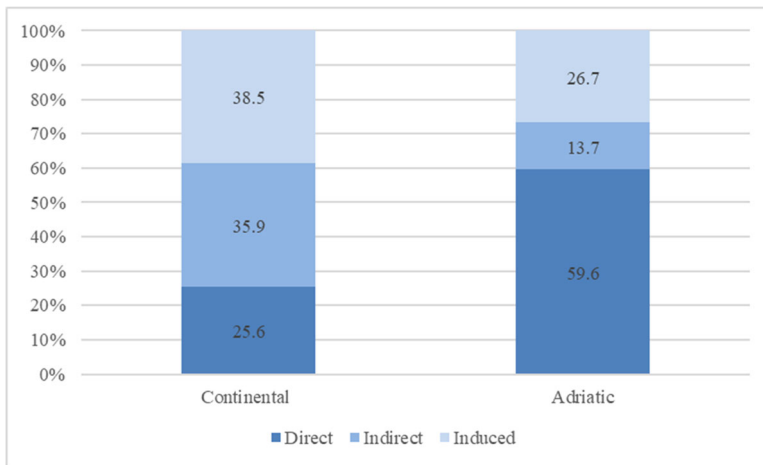
Figure 3. The structure of GVA effects induced by tourism, by region.
Source: Authors' calculation.

Table 4. Sectoral effects of domestic and foreign tourists' expenditures to Croatian GVA, in mil. HRK.

Effects, by economic sector and region		Domestic tourists effects	Foreign tourists effects	Total effects	Structure of total effects, in %
Continental	Hotels and restaurants; Trade; Transport	1,365	10,309	11,674	15.5
	Agriculture, industry, construction	1,045	8,750	9,795	13.0
	Other services	2,087	11,264	13,351	17.7
	Total	4,497	30,323	34,820	46.2
Adriatic	Hotels and restaurants; Trade; Transport	1,685	21,295	22,980	30.5
	Agriculture, industry, construction	591	5,213	5,804	7.7
	Other services	1,981	9,839	11,820	15.7
	Total	4,257	36,347	40,604	83.8
Croatia, total effects		8,754	66,670	75,424	100.0

Source: Authors' calculation.

total effects). Production of intermediate goods which could be used in the provision of tourism services is underdeveloped, and the share of indirect effects in total effects is limited. On the other hand, the share of direct effects in total GVA effects induced by tourism is significantly lower in Continental Croatia, but producers in this region specialise in providing intermediate goods and services which are incorporated into the tourism goods and services destined for final consumption and purchased by wages and salaries received in the tourism value-added chain.

Sectoral distribution indicates that 46% of total GVA effects are present in sectors including hotels, restaurants, trade and transport (15.5% in Continental Croatia and 30.5% in Adriatic Croatia), as presented in Table 4. In Continental Croatia, the variance in the contribution of other aggregate sectors (agriculture, industry and construction, and other services) is not significant. In Adriatic Croatia, however, effects are more concentrated in the hospitality sector, while shares of the agriculture and
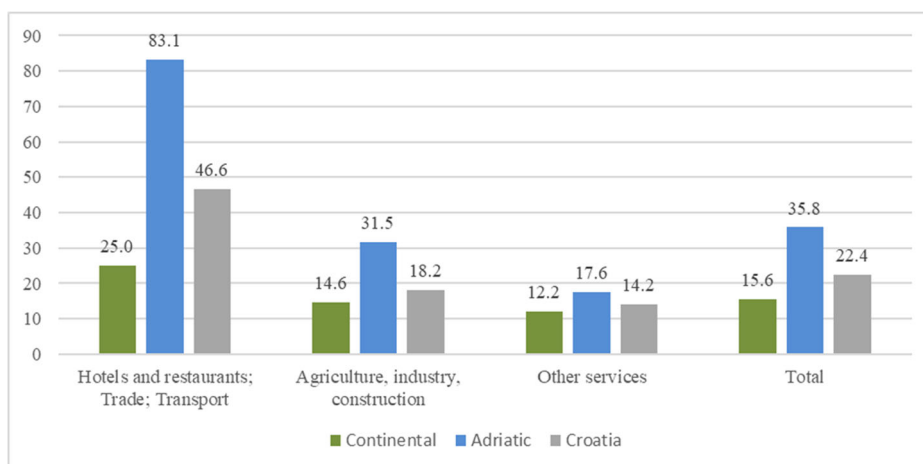
Figure 4. Share of regional GVA induced by tourism, in % by aggregate sectors.
Source: Authors' calculation.

manufacturing industries are limited. The pattern of employment effects is similar to that of GVA effects.

The importance of tourism in regional economic activity is most visible in its share of GVA (Figure 4). Over 20% of Croatian GVA was induced by domestic and foreign tourist expenditures in 2019. Dependence on tourism is especially pronounced in Adriatic Croatia, where more than one third of GVA is related to tourism, but the share of tourism in GVA in the Continental region is also high (15% of GVA). The economic sectors most dependent on domestic and foreign tourism in both regions are hotels, restaurants, trade and transport. In Adriatic Croatia, domestic and foreign tourists induced 83% of GVA in those sectors.

4.2. Effects of tourism on regional economic activity related to COVID-19 restrictions in 2020

In 2020, economic activity in the hospitality industry was impacted by the COVID-19 outbreak and the implementation of a broad set of policy responses to combat the spread of the virus. As in most countries, policy measures in Croatia were altered throughout the year in accordance with the epidemiological situation. In March 2020, the government suspended all cultural activities, including cinemas, theatres, concerts, sporting events—inclusive of sports centres and gyms—restaurants and bars (with the exception of food preparation and delivery services) and various personal services. Beginning in July 2020, third-country nationals could enter the country under certain conditions for business- or tourism-related reasons. It was necessary to present a reservation confirmation for paid accommodation at an approved property in Croatia. From November 2020, outdoor and public gatherings were restricted to 25 people and private parties to 10, weddings were suspended, limitations on working hours were introduced and the sale of alcohol was banned from midnight to 6 a.m. Restrictions in Croatia, coupled with measures introduced in countries with a high

Table 5. Impact of COVID-19 outbreak on tourist arrivals and expenditures in Croatia.

	2019	2020	Change, in %
	Tourist arrivals (in thousands)		
Croatia	19,566	7,001	−64.2
Domestic tourists	2,213	1,456	−34.2
Foreign tourists	17,353	5,545	−68.0
	Tourist expenditures (in mil. EUR)		
Travel receipts, foreigners (BoP)	10,539	4,814	−54.3
Expenditures of domestic tourists	1,648	714	−56.7
	Nights spent		
Croatia	91,243	40,794	−55.3
Domestic tourists	7,095	5,415	−23.7
Foreign tourists	84,148	35,379	−58.0
Continental	4,965	1,716	−65.4
Domestic tourists	1,414	769	−45.6
Foreign tourists	3,551	947	−73.3
Adriatic	86,278	39,078	−54.7
Domestic tourists	5,681	4,646	−18.2
Foreign tourists	80,596	34,432	−57.3

Source: CBS (https://www.dzs.hr/), Croatian National Bank (https://www.hnb.hr/).

Table 6. Impact of COVID-19 outbreak on regional GVA.

	Continental Croatia				Adriatic Croatia			Croatia
Effects	GVA, in mil. HRK	Share, in %	GVA, in %	GVA, in mil. HRK	Share, in %	GVA, in %	Impact on GVA, in %	
Direct	−4,730	26	−2.1	−12,619	60	−11.1	−5.1
Indirect	−6,595	36	−2.9	−2,905	14	−2.6	−2.8
Induced	−7,073	38	−3.2	−5,682	27	−5.0	−3.8
Total	−18,398	100	−8.2	−21,206	100	−18.7	−11.8

Source: Authors' calculation.

share of outbound tourism to Croatia, such as Slovenia, Germany and Italy, resulted in a significant reduction in arrivals and nights spent in Croatia.

Tourist arrivals in Croatia in 2020 dropped to one third of pre-pandemic levels, while the number of tourist nights decreased by 55.3% (Table 5). Foreign tourist arrivals and nights spent decreased more than those of domestic tourists, although, in terms of expenditures, the percentage change in both categories was similar. Continental Croatia suffered a more significant reduction in the percentage change of tourist nights spent in comparison to Adriatic Croatia. Restrictions on social contacts and operations in the hospitality sector resulted in reduced tourism receipts, and the hospitality sector was more strongly affected than other economic sectors. Due to the relationship of the tourism industry to the rest of the economy, the negative effects spread to suppliers of intermediate inputs.

Restrictions related to COVID-19 induced a strong reduction in Croatian economic activity, which decreased by 11.8%, or approximately HRK 40 billion (Table 6). GVA reduction due to COVID-19 is estimated to be HRK 21.2 billion in the Adriatic region and HRK 18.4 billion in the Continental region. The vulnerability of the Adriatic region to external shocks is more visible in relative terms, with the reduction in tourist expenditures leading to a decrease in economic activity of 18.7%. In addition, the regional distribution of negative effects differs significantly. Indirect and induced effects in Continental Croatia are higher than the value-added reduction in units which directly receive income from tourists. In contrast, direct effects represent the majority of total negative effects in Adriatic Croatia (60%).
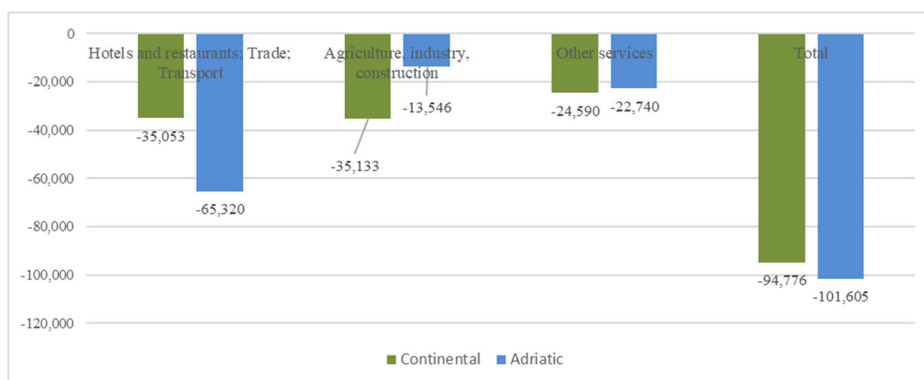
Figure 5. Effects of the COVID-19 outbreak on regional employment by economic sectors, in FTE jobs.
Source: Authors' calculation.

Labour requirements in sectors such as hotels, restaurants, trade and transport have decreased by approximately 100,000 FTE jobs, 65,000 of which are in Adriatic Croatia (Figure 5). Labour requirements in sectors delivering the highest share of inputs used by the hospitality sector (agriculture, industry and construction) experienced a greater reduction in Continental Croatia, while labour effects in the other services sector were similar in both regions. Government measures which subsidised employers who retained employees during the pandemic reduced the negative effects on the Croatian labour market. Without these measures, the decline in tourism revenue in 2020 could have caused the loss of approximately 200,000 jobs.

5. Conclusion and policy implications

A unique natural and cultural–historical heritage, developed infrastructure which supports tourist services, and ecological sustainability are all factors which attract tourists and make Croatia one of Europe's most popular tourist destinations. Croatia is a country with one of the highest shares of tourism revenue in GDP, making tourism one of the key sectors and strategically important components of the national economy. On a national level, the estimates presented in this paper of tourism's economic contribution in Croatia (19% of GVA in 2019) are higher than the previous estimates of 13% to 16% of GVA for 2013 and 2014 (Ivandić & Šutalo, 2018; Mikulić et al., 2017). Tourism's greater contribution in recent years can be attributed to the continuous increase in tourist arrivals and revenues during the period following EU accession. In addition to previous studies which estimate the role of tourism solely on a national level, this paper also includes the regional distribution of the total effects. The share of GVA and employment induced by tourism is significantly higher in the Adriatic region. Direct GVA effects induced by tourists are more significant in Adriatic Croatia, but substantial indirect and induced effects in the Continental region indicate that producers from Continental Croatia, who provide intermediate goods and services, are more integrated into the overall value chain. The results also show that international tourism is critical; foreign tourist expenditures accounted for approximately 88% of the realised GVA and 90% of employment induced by total

tourist expenditures. In addition to hotels and restaurants, the total effects of domestic and foreign tourism demand in both regions are significant for trade and transport services and manufacturing producers of intermediate inputs required by the hospitality sector.

The COVID-19 pandemic has jeopardised tourism in Croatia and, consequently, other economic sectors in the value-added chain of tourism. Total effects results illustrate Adriatic Croatia's high degree of vulnerability to exogenous shocks. A decrease in tourism revenues due to the COVID-19 pandemic in 2020 resulted in an approximate 20% reduction in GVA in Adriatic Croatia, reversing the cumulated economic growth of the last decade and placing Adriatic Croatia on the list of least developed European Union regions. Impact of COVID-19 outbreak induced decrease in total Croatian GVA by 11.8%, even twice as much as estimated for Greece in Mariolis et al. (2021) or Germany and Spain (Rodousakis & Soklis, 2021). It indicates strong vulnerability of the Croatian economy, especially Adriatic region, to exogenous shocks affecting tourism. Variation of regional effects of COVID-19 are in line with results found for New Zealand where decrease in economic activity in the Queenstown-Lakes is significantly higher than national average (de Morel et al., 2020).

Practical implications of the study are based on the provision of empirical evidence on the vulnerability of Croatian regions on the exogenous shocks affecting global tourism. Regional estimates of COVID-19 economic effects are important for assessment of effectiveness of fiscal and monetary policy measures introduced to limit negative effects. Croatian government tried to support tourism industry by direct subsidies and tax reliefs as many other countries (Şengel et al., 2022). The economic stimulus has shown as ineffective in Croatia in terms of maintaining economic activity but should be viewed only as income support for population which depend on tourism revenues. Government funds are limited, especially in the process of Euro adoption, which require Croatia to follow the strict rules on the size of public debt and deficit. Therefore, the prolongation of pandemic or other global shock which affect global tourism, would result in permanent reduction in the living standard in Adriatic Croatia and nullify the economic progress achieved in the last decade. As concluded for some other regions (Lim & To, 2022), local government and entrepreneurs in Adriatic region should realise that tourism may not easily recover to pre-COVID-19 period and they should find solutions to transform themselves into less destination-dependent areas. In addition, results could be significant for regional policymakers in formulating development goals and policy measures. Hospitality sector will need to reconsider appropriateness of current business models to be more flexible to deal with unexpected reduction in demand. Sector should be reshaped, and new products need to emerge cause changes in demand could persist even after COVID-19 crisis (Fotiadis et al., 2021).

This estimation of tourism's regional economic impact in Croatia provides a guideline for formulating regional strategies and adequate policy responses to accelerate post-pandemic tourism recovery. Stronger integration of the hospitality sector with local producers and the development of other industries which are more resistant to exogenous factors could decrease economic vulnerability of Adriatic Croatia. Taxation policies and public support should be reformed to prioritise high-quality tourism

services over the simple renting of apartments and homes without providing additional services. The direct revenues and multiplicative effects of tourism based on the renting of apartments are relatively low and result in evident social costs related to the excessive use of communal infrastructure, tourism congestion and environmental impact. Future policies should aim to shift the focus of tourism services from quantity to quality, which could result in higher multiplicative effects. Due to the limited growth of labour productivity in the tourism sector, especially in low-quality market segments, along with the continuous growth in tourist arrivals in both the period leading up to 2019 and again in the post-COVID period, the hospitality sector has faced shortages in the labour supply. Reorientation towards higher quality accommodation and the provision of high value-added tourism services requires improvements in the formal and informal education of current and future employees in the tourism sector.

The general limitations of the IO model are related to the assumptions of the fixed technological coefficients and the unlimited availability of inputs (Miller & Blair, 2009). A potential future research may include application of other LQs for regionalisation of the national IO table to obtain more relevant estimation of regional economic effects of tourism in Croatia. Future research could test the stability of regional technological coefficients in Croatia over longer periods.

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