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ABSTRACT

This article expounds one of the first attempts to explore the relationship between tourist arrivals and gross domestic product (GDP) in Montenegro and Slovenia. Both countries are newcomers on the tourist destinations map, derived from what was previously Yugoslav republics existing as a singular emerging tourist destination. Data vector for empirical analysis covers quarterly change of GDP at constant prices and monthly data for tourist arrivals during January 2010 – December 2019 as an endogenous variable. The cointegration is used in the modelling structure. The empirical results confirm research hypothesis of uni-causal relationship of economic growth-led domestic tourism growth in Montenegro and one cointegrated vector. No cointegration vector was confirmed for Slovenia. These results are important for research, policymakers and tourism practice. Considering that, tourism and economic growth have a different distribution of causalities during the expansion period with a boost of tourist arrivals and vice versa during the economic downturn.

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1. Introduction

As an intrinsic part of economics, tourism plays an important role throughout Mediterranean countries (Malec & Abrhám, 2016; Ribaudo et al., 2020). In a time of overwhelmed economic activity measured by growth in gross domestic product (GDP) following 2015, this consequently induced rapid economic growth. In medium-and-long-term, tourism can play an important role in most countries globally, not excluding Montenegro. Tourism with tourist arrivals generates revenue from tourist consumption of products and services, from taxes collected by the tourism industry, as well as employment opportunities in the service public and private industry.

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Slovenia and Montenegro have built tourism on natural, cultural and other attractions. Thus, such potential should be exploited in a rational way, to encourage advantageous stimulus to economic growth. Tourist arrivals-led economic growth nexus could be justified in various channels as motivation for this study. Therefore, given the importance of the tourism industry, the mission statement of the article is that tourism-led growth can be an important economic driver for former Yugoslav countries situated on the Adriatic coast.

The tourism-led economic growth is relevant towards research, policy and practice. The purpose is to discuss this relevant topic for two East Adriatic countries. The main goal of the research is to investigate wheatear tourism generates economic growth in the analysed countries and vice versa. For small open economies, such as Montenegro and Slovenia, possible market regulation and information flows can have major trade and economic policy repercussions (Škare et al., 2012). Primarily, this applies to the spread of policy and prices by business players of the tourism value chain as it is important for international tourism market competitiveness. Ordinary (economic crisis (2008/2009) and extraordinary shocks (health crisis 2019/2020) utilize a vector of measurements for distances between volatility (Coshall, 2009) in tourist arrivals. These two breaks were therefore omitted from the analysis.

The contributions to literature are threefold. Firstly, the study adds Montenegro to a tourism-research map as an important tourist destination, alongside historical data. Secondly, it provides accurate tourism-led economic growth results and comparisons between Montenegro and Slovenia. In conjunction, it also provides data vector exclusively for the recovery period. Finally, it implements methodological steps in one well-defined econometric bubble, whilst previous research did not combine them.

The rest of this paper is organized as follows: the Literature Review section is presented as a theoretical background on possible integration between Slovenian and Montenegrin tourism markets. After describing the data used, we proceed with an individual visual inspection. Natural logarithms were obtained for this visual test. The functional form of time series dependence is predetermined. The subsequent section focuses on estimation of the econometric model, presentation and discussion of the results. Following a review of estimation techniques, we present the cointegration tests. The estimated impact, rules and implications for tourism policy, economists and management of tourist destinations are discussed. The final section concludes with an assessment of the used model and its significance for tourism economics.

2. Literature review

Montenegro has been widely excluded from empirical researches (Crnogorac & Lago-Peñas, 2019; Tashevska et al., 2020). For example, Mitra (2019) analysed tourism for former Yugoslav republics (Slovenia, Croatia, Bosnia and Herzegovina, Serbia and North Macedonia), but excluded Montenegro. Therefore, the prominent style of the article is to introduce time series data in tourism research, particularly for Montenegro. Whilst Montenegro follows Slovenian experiences, Slovenia is a comparative part of the research. These non-neighbours, non-confrontational and amicable Adriatic countries on the Balkan Peninsula, with six and a half million tourist

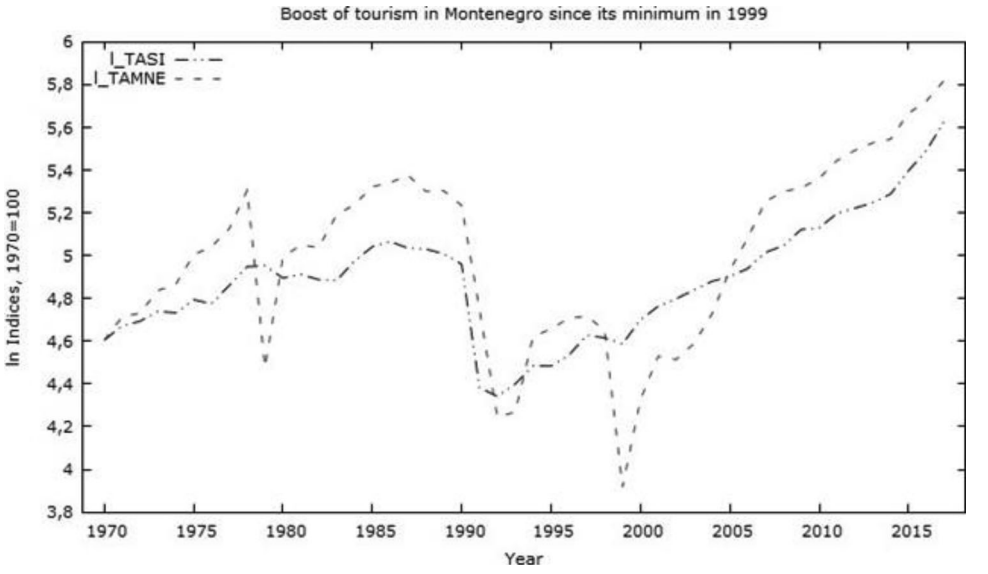

Figure 1. Tourist arrivals in Montenegro and Slovenia, 1970-2019, 1970 = 100, yearly data.
Note: see Tables 2 and 3.
Source: see Table 2.

arrivals in 2018 (The World Bank, 2020), are worth of the specific comparative empirical analysis (Vrana & Zafiropoulos, 2011). These countries are of research interest owing to their historical background proximity (Gričar et al., 2016; Tashevska et al., 2020). Moreover, due to the pandemic crisis Slovenia and Montenegro are the most possible incoming tourist destinations in 2020.

In that case, historical data could predict (|) future segments in tourism in two touristic countries (please observe Figure 1) $y_{t-1}|y_0|y_{t+1}$, where y_0 is initial value, y_{t-1} is historical data, and y_{t+1} are future segments, (|) is conditional process of normally distributed random variables on the available information set (I_{t-1}) that contains both past dependent variable Y and independent variable X corresponding to causality process (Song & Taamouti, 2020). Conditional process $(x_t|x_{t-1,\ldots,}x_T;X_0)$ has a parameterization that corresponds to the vector autoregressive (VAR) model where x_t is $(p \cdot 1)$ vector of variables p of past values x_{t-1}, and observations x_T, with time frame T on initial value X_0 of the data matrix X and of a realization of stochastic process θ for a given probability $(P(X|X_0;\theta))$ (Juselius, 2009).

There is rare quantitative scientific research using secondary tourism data for both countries. To understand the idea of historical data in the next section the first two sub-sections provide an overview of the empirical time series vectors and relevant literature.

2.1. Overview of tourism time series in Montenegro and Slovenia

Tourism industries are an important source of income for many developed and developing countries. Thus, most governments actively support the tourism industry (Chi, 2020; Khoshnevis Yazdi, 2019; Mitra, 2019). In 2010, international tourism receipts in

current prices in Slovenia were 2,096 million euros, whilst in 2018 they accumulated to 3,099 million euros. Montenegro achieved a better performance in rise of the international tourism receipts. In 2018, there were 1,123 million euros and 571 million euros in 2010 with a rise of 97%, while in Slovenia they rose by 47% (The World Bank, 2020). The exchange rate of euro to US dollar was used of 1.09 in 2018 and 1.34 in 2010.

Yalçinkaya et al. (2018) discuss a sample of twenty countries on tourism receipts. Moreover, Simionescu et al. (2016) discuss panel data application exclusively for Slovenia and Croatia, Petrevska (2017) for North Macedonia on autoregressive integrated moving average model (ARIMA) and Bezić and Nikšić Radić (2017) on Granger Causality for Croatia.

Only a small amount of recent literature describes tourism in Slovenia and Montenegro (Gričar et al., 2016; Mitra, 2019; Raspor et al., 2017). However, there are no recent studies on Granger Causalities and cointegration regarding Montenegro and Slovenia, especially concerning time series. Can and Gozgor (2018) indicated a panel Granger Causality for Mediterranean countries. The results of economic growth and tourist arrivals on tourism-growth nexus between 1995 and 2014 were conducted for the following countries: Egypt, France, Greece, Italy, Morocco, Spain, Tunisia, and Turkey. The authors found the causality from market diversification to economic growth in Egypt and Greece and observe the causality from economic growth to market diversification in France, Morocco, and Turkey. They also find bi-directional causality in Italy, Spain and Tunisia.

Ana (2018) found that Europe was the most important continent for tourism, regarding both outbound and inbound flow perspective. Additionally, Ana (2018) discerned that less attention has been paid to tourism in Central-Eastern Europe. Moreover, Southern Europe has received even less attention surrounding its importance towards tourism, especially Montenegro. Croatia, however, exhibits recent concerns from scholars (Gil-Alana et al., 2015), where Dogru and Bulut (2018) found that economic growth and tourism development are strongly dependent; at least for Croatia (Kyophilavong et al., 2018).

Mitra (2019) divided analysed countries into three categories: A, B and C. The groups are in accordance with the intensity of tourism contribution to GDP. Slovenia is listed in category C, whilst Montenegro was omitted from the analysis. Other recent researches are presented in Table 1.

3. Historical data

3.1. Overview of tourism time series in Montenegro and Slovenia before 1991

Since the early days of modern and seasonal lifestyles, tourism has been a fundamental part of people's lives (Salzar & Zhang, 2013). Tourists were visiting various tourist places before even the 19th century, but following World War II tourism developed into a mass phenomenon (Cigale, 2012). The statistics pertinent to the number of foreign, domestic and outgoing tourists and tourist arrivals in the former Yugoslavia and its republics have been developed since 1948 (Stanković, 1990). Tourism in most former Yugoslav republics, including Montenegro and Slovenia, have a long-standing

Table 1. Causalities in previous empirical findings.

Autor(s)	Country / Countries	Main findings
Alola et al., 2020	G4 countries	Migration-related fear → tourism, tourism → economic growth
Eyuboglu & Eyuboglu, 2020	9 emerging countries	Positive shocks of tourism development → economic growth
Pérez-Rodríguez et al., 2020	7 European countries	Restricted cases of tourism-led growth
Tang, 2020	61 countries	Educational tourism → Economic growth
Khoshnevis Yazdi, 2019	Iran	International tourism → Economic Growth
Lin et al., 2019	China	10 regions experienced tourism-led growth 9 regions experienced economy-driven tourism growth
Ferrari et al., 2018	Tuscany	Tourists' expenditure → agriculture and industry products, an increase in regional value added, and institutional sector activity
Ghalia & Fidrmuc, 2018	133 countries	Tourism → economic growth (no effect, or a lower one)
Mohapatra, 2018	South Asian Association for Regional Cooperation countries	Growth ↔ tourism expenditure, tourism receipts → growth
Pascariu & Ibanescu, 2018	EU countries	Tourism → GDP growth and job creation
Bezić & Nikšić Radić, 2017	Croatia	Foreign direct investment ↔ gross value added
Gričar et al., 2016	Montenegro, Slovenia	Montenegro: Tourist Arrivals ↔ GDP Slovenia: GDP → Tourist Arrivals
Malec & Abrhám, 2016	Central European countries	Countries tourism is sensitive to worldwide and locale shocks → lagged economy situation
Ivanov & Webster, 2013	174 countries	Tourism → economic growth
Surugiu et al., 2011	Romania	Relative prices, geographical distance, income, trade → tourism demand
Katircioglu et al., 2010	North Cyprus	International tourism → real income growth

Note: → univariate causality, ↔ bivariate causality.
Source: Compiled by the authors.

tradition and provide a basis for direct and indirect effects on the economy, particularly with a consequence to the balance of payments (Đuranović & Radunović, 2011) and for economic revitalisation (Njegomir & Stojić, 2010).

Hall (2002) pointed out: "pre-1989 Yugoslavia appeared to have developed a successful tourism industry which projected a particularly welcoming and positive image of the country to the West (or at least Western mass tourist markets). The emergent newly independent states had to put their Yugoslav and communist pasts behind them, establish a new national identity (albeit based on historical elements) and inspire confidence for investment in economic reconstruction." According to Stanković (1990), in the 1980s Slovenia and Montenegro contributed 16.9% to the foreign tourist arrivals of former Yugoslavia. Moreover, both countries contributed to 20.0% of overall domestic overnights. Alternatively, Croatia doubled its domestic overnights.

The indicator of tourist arrivals provides all data referring to arrivals and not to actual number of people travelling (Table 2). One person visiting the same country several times during the year is counted each time as a new arrival. Likewise, the same person visiting several countries during the same trip is counted each time as a new arrival (UNWTO, 2020).

Steenbruggen (2014) argues that the role of tourism in relation to the economy is increasing. Many countries depend on income generated by the tourism sector and related businesses. Đuranović and Radunović (2011) argue that tourism is a highly

Table 2. Number of tourist arrivals in the analysed countries (in thousands), 2010-2019; summary statistics, 2010 = 100, January 2010 – December 2019.

Year	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
TAMNE	1,263	1,373	1,440	1,492	1,517	1,713	1,814	2,000	2,000	2,205
TASI	3,006	3,218	3,298	3,384	3,524	3,928	4,318	4,948	5,503	5,933
Spread	Min	Max	Mean	Ske.	Kur.	Med.	Std.		Wald *F* test	
Montenegro										
DTA_t	61.5	347.1	174.6	0.2	−1.3	156.0	72.5	$253.3^{(0.00)}$	dep.	$9.0^{(0.00)}$
FTA_t	93.5	2,580	748.3	0.8	−0.4	479.6	631.1	dep.	$249.3^{(0.00)}$	$9.0^{(0.00)}$
GDP_t	100.0	298.9	166.0	1.0	−0.3	142.9	56.3	$253.3^{(0.00)}$	$249.3^{(0.00)}$	dep.
Slovenia										
DTA_t	91.6	232.5	137.2	1.1	0.5	129.4	33.7	$132.9^{(0.00)}$	dep.	$15.1^{(0.00)}$
FTA_t	80.6	800.4	238.0	1.6	2.4	183.2	150.0	dep.	$112.2^{(0.00)}$	$15.1^{(0.00)}$
GDP_t	91.7	202.5	125.8	1.1	−0.2	109.5	33.4	$132.9^{(0.00)}$	$112.2^{(0.00)}$	dep.

Note: TASI – tourist arrivals in Slovenia, TAMNE – tourist arrivals in Montenegro, Ske. – Skewness, Kur. – Kurtosis, Med. – Median, Std. – Standard Deviation, GDP_t – gross domestic product at constant prices, DTA_t – domestic tourist arrivals; FTA_t – foreign tourist arrivals, dep. – dependent variable, *p* values in brackets.
Sources: Authors calculations based on http://monstat.org/cg/pxweb.php and https://pxweb.stat.si/SiStatDb/pxweb/sl/20_Ekonomsko/20_Ekonomsko__21_gostinstvo_turizem__01_nastanitev__02_21645_nastanitev_letno/2164518S.px/table/tableViewLayout2/.

important sector in the Montenegrin economy. Moreover, they also demonstrate that tourism prior to the 2010 did not achieve the best results of modern tourism history in Montenegro. The best results were shown in the year 1987 with almost 1.3 million tourist arrivals. In the same year, Slovenia more than doubled in tourist arrivals of Montenegrin tourist arrivals. The number of tourist arrivals, lightly more than 2.7 million, was achieved by Slovenia 21 years later in 2008. Slovenia became independent from the former Yugoslavia in 1991, whereas Montenegrin disintegration and its independence lasted up to 2006.

3.2. GDP growth

Between GDP growth and tourism growth can exist significant causalities (Katircioglu, 2011; Weerathunga et al., 2020). Stiperski and Lončar (2008) report that Slovenia and Montenegro had primarily different economic growth. Following the break of common Yugoslav market during the 1990s and in the early 2000s, Slovenian GDP increased, whilst Montenegrin GDP decreased with negative implication on tourism. Since 2006, Montenegrin GDP has increased. Tourist arrivals can be strongly linked to GDP growth (Weerathunga et al., 2020).

Between 2010 and 2019, Slovenian GDP doubled, whilst Montenegrin GDP tripled. Tourist arrivals in Montenegro increased by around 80% domestically and 300% for foreign tourist arrivals. Slovenia saw a slighter lower increase where domestic tourists made 30% more arrivals and foreign ones about 100% more after 2010. The GDP value of Slovenia represents 0.05% of the world economy and of Montenegro less than 0.01% (The Trading Economics, 2020).

4. Data and methodology

4.1. Methods implemented

In a recent study, cointegration methodologies have been applied to the research of relationships between tourist arrivals and economic growth. In the article, as first descriptive statistics, second Granger representation theorem (Gričar et al., 2020; Johansen & Tabor, 2017):

$$\Delta y_t = \alpha\beta' y_{t-1} + \sum_{i=1}^{\infty} \Gamma_i \Delta y_{t-i} + \nu_t, \tag{1}$$

of $I(1)$ condition of VAR:

$$\Pi = \alpha\beta', \tag{2}$$

cointegrated regression in error correction model (ECM) form with $m = 1$ (Juselius, 2009):

$$\Delta x_t = \Gamma_1 \Delta x_{t-1} + \Pi x_{t-1} + \mu + \varepsilon_t, \tag{3}$$

and vector ECM (VECM) (Juselius, 2009):

$$\Delta x_t = \emptyset + \alpha\beta' x_{t-1} + \sum_{i=1}^{p-1} \Phi_i^* \Delta x_{t-i} + \varepsilon_t, \tag{4}$$

are performed. For Slovenian and Montenegrin data we shall assume the lag length $k = 12$ and report the unrestricted parameter for that choice. Additionally, the value of the likelihood function, some multivariate measures and F-tests of the significance of the regressors will be reported. The p is the number of time series and is three, $\emptyset$ is deterministic part (constant and/or trend), Δx_t is dependent variable with restriction on β, x_{t-1} is independent variable, Φ_i^* are extraordinary events (seasonal dummies, transitory, blip and permanent dummy), Πx_{t-1} is level matrix and called error correction form, $\Gamma_1 \Delta x_{t-1}$ is matrix that describes pure transitory effects measured by lagged changes of the variables, μ is intercept of deterministic part, ϵ_t white-noise process, i dimension of integration, Δy_t cointegrated vector autoregressive form, and Δy_{t-i} long-term causality process y_t of collected observations in the matrices Y_n of prediction error v_t.

Much of the information relevant to tourism industries could be ascertained in the eminent secondary sources as statistical offices, macroeconomic offices and other public services data. Using cointegration appropriately (Katircioglu, 2009a), the results, using time series, can predict the situation in the next period (Juselius, 2017, 2017). This can be important for the prediction of tourist flows and adjustments in tourism policy. Historical policies obtained in the analysis can show important steps needed for the tourism managers and tourism economics.

Data sources for the analysed variables presented in data vector are Statistical Office of Republic of Slovenia (SORS, 2020), the Statistical Office of Montenegro (MONSTAT, 2020). Data is used with an econometric approach calculated from chain indices to indices with a constant base in 2010 = 100. Both countries adopted the euro (which is related to practical euroization), Slovenia did so on 1st January 2007, whereas Montenegro as a de-facto currency on 1st January 2002. In 2019, the peak in tourist arrivals was achieved when Slovenia experienced more than five million tourist arrivals, whereas Montenegro received more than two million tourist arrivals. This is further investigated using information in time series (Table 2). The collected variables are monthly data in collective accommodations for domestic (D) and for foreign (F) number of tourist arrivals (TA) and quarterly change of GDP at constant prices (GDP_{CP}).

Both variables are treated as an endogenous variable. The data vector for empirical analysis of Montenegro and Slovenia is taken from January 2010 - December 2019. To become familiar with the data we have plotted descriptive statistics. In Figure 1 we see high volatility in tourist arrivals. This is further investigated using information in the time series.

There is a stub in reliable data sources before Montenegro declared independence in 2006 for GDP_{CP}. Moreover, monthly data for TA is publicly available from January 2010. Therefore, the data vector for the empirical research contains 120 observations. Namely, we do not possess quarterly data for GDP_{CP} before 2006. The

compiled data vector of tourist arrivals-led economic growth hypothesis can be written as:

$$\underset{SI}{\overset{MNE}{}}[DTA_t \;\; FTA_t \;\; GDP_{CP\ t}\;]_T^I, \;\; T \;\; = 1, 2, \ldots, N \tag{5}$$

where *MNE* is the abbreviation for Montenegro, *SI* represents Slovenia, *t* for time series, *I* for order of integration, *T* for time horizon, *TA* for tourist arrivals, *GDP growth*, *CP* for constant prices, and *N* for number of observations. The model is estimated in natural logarithm form:

$$\Delta_{SI}^{MNE}\left[dta_t \;\; fta_t \;\; gdp_{CP\ t}\;\right]_T^I \; . \tag{6}$$

where the data of variables in natural logarithms are abbreviated with small letters of original variables that are abbreviated with capital letters. For simplicity and methodological correctness, hereafter we have used the following form: dta_t for natural logarithm domestic tourist arrivals, fta_t for natural logarithm foreign tourist arrivals and gdp_t for natural logarithm gross domestic product in current prices.

5. Empirical settings with/and hypotheses

In the literature, there is an increased interest for application of comparative framework to analyse possible heterogeneities and similarities between countries on time series econometrics (Tashevska et al., 2020). Moreover, when analysing comparisons between a pair of countries the Granger Causality test is applied (Katircioglu, 2009). A connection between tourist arrivals and economic growth can be analysed by testing four hypotheses following recent study for Iran of Khoshnevis Yazdi (2019) and Weerathunga et al. (2020) for Sri Lanka. These four adjusted hypotheses are the following:

H1: tourist arrivals produce GDP growth in both analysed countries, i.e. Slovenia and Montenegro;

H2: GDP growth drives tourist arrivals;

H3: mutual causality hypothesis between GDP growth and tourism arrivals;

H4: the alternative hypothesis that there is no statistically significant relationship between tourist arrivals and GDP growth, and vice versa.

It is becoming increasingly important to measure, monitor, analyse and predict the detailed associations between human dynamics with tourist arrivals and growth of the economy. Weerathunga et al. (2020) report that tourism sub-industry developed with an increased number of tourist arrivals. Furthermore, tourist arrivals and economic growth are interrelated. That is, an improved economic environment creates an auspicious environment for tourists and thus increases the number of tourist arrivals. In turn, this boosts economic growth through increased revenues, particularly in foreign exchange earnings. However, the existing studies (Table 1) have failed to differentiate between the effects of tourist arrivals-led economic growth throughout former Yugoslav countries, except for Montenegro, which so far has not been analysed.

6. Empirical results and discussion

6.1. Results testing

Implementing summary statistics (Table 2) to the non-logarithm data vector in equation (5), the maximum value for the time series of Montenegrin GDP is of almost 300 (Table 2). On the other hand, the maximum value of Slovenian GDP was a slightly more than 200. Montenegrin GDP did not *weaken* below the base value in 2010, whereas GDP Slovenian did. The lowest index of Slovenian GDP was 91.7. When struggling with time series idea of foreign tourist arrivals, Montenegro has made progress and the perspective index is of 2,580, whereas for Slovenia the same index is of 800. Time series have shown enormous results in a standard deviation. Consequently, this information leads to the examination of autocorrelation with applied Dickey Fuller test (ADF) and normality test with applied Jarque–Bera test (J-B), presented in Table 3 for the data of variables in natural logarithm form, in levels and first differences. Additionally, the Wald test is used. The latter inferred that explanatory variables in a model are significant. Significant means that they add a relevant explanation to the framework. Wald test in Table 2 demonstrates that the parameters of explanatory variables are different from zero.

As can be seen in Figure 2, GDP in Slovenia and in Montenegro has explosive roots, while foreign tourist arrivals do not follow the same trend (Figure 3). Therefore, other values and events disrupt driving forces that are pertained to foreign tourist arrivals and GDP growth.

Therefore, the first important implication is that any break in the economy could have a substantial impact on tourist arrivals, therefore, blip dummies occur in the data vector. Shocks are quoted over the serial autocorrelation in the data set on an unstable variable. In Table 3 we can overview that all variables do not process any autocorrelation in the first differences. Moreover, all variables are integrated nearly of the second order of integration.

6.2. Granger causality

The Granger Causality Test does not confirm any source of relation between studied variables for Slovenia and does confirm one relation for Montenegro. In Montenegro, there is statistically significant cause in a relation from GDP growth to domestic tourist arrivals. This finding confirms hypothesis one, whereas hypotheses two and three are rejected. Hypothesis four is confirmed for Slovenia since there is no cause in relation. This finding is interesting when researching economic boosts, while tourist arrivals do not have any direct relation to GDP growth, even on 12 lags (one-year recursion). This finding is not yet widely supported in literature.

Numerous researchers previously found uni- and bi-directional causality between tourism and economic growth (Brida et al., 2016; Katircioglu, 2011). On the other hand, there are some contemporary findings that support our results of sever and low causalities between tourist arrivals and economic growth. The relevant issues of researches are for emerging and developing countries (Eyuboglu & Eyuboglu, 2020; Phiri, 2016), and for developed countries (Kónya, 2006). Mitra (2019) reported that

Table 3. Misspecification test and empirical analyses of time series (January 2010–December 2019); VAR, Granger Causality, and ECM[1].

T-S	ADF	J-B	T-S	ADF *First difference*	J-B	∅	Montenegro
dta_t	$-1.27^{0.66)}$	$8.34^{(0.02)}$	dta_{t-1}	$-4.34^{(0.00)}$	$1.68^{(0.05)}$	constant	VAR
fta_t	$4.01^{(0.99)}$	$10.14^{(0.01)}$	fta_{t-1}	$-6.31^{(0.00)}$	$6.51^{(0.04)}$	constant	
gdp_t	$3.09^{(0.93)}$	$12.46^{(0.00)}$	gdp_{t-1}	$-4.86^{(0.00)}$	$54.43^{(0.00)}$	constant	
Causality direction		Lags	*F* value	D – W	Decision	C OLS τ	
$\Delta(dta_t \rightarrow gdp_t)$		12	$1.45^{(0.17)}$	1.96	Reject	$2.43^{(0.31)}$	Granger
$\Delta(fta_t \rightarrow gdp_t)$		12	$0.97^{(0.48)}$	1.96	Reject	$-2.68^{(0.21)}$	Causality
$\Delta(gdp_t \rightarrow dta_t)$		12	$3.21^{(0.00)}$	1.95	No reject	$-3.03^{(0.10)}$	
$\Delta(gdp_t \rightarrow fta_t)$		12	$1.46^{(0.16)}$	1.95	Reject	$-1.50^{(0.76)}$	
$\chi^2 = -3.04^{(0.10)}$; $\Delta dta_t^{MNE} = 0.83 \cdot gdp^{MNE}_{t-1}$			(0.45)	$+0.32 \cdot dta^{MNE}_{t-1}$ (0.00)	$-0.14 \cdot \varepsilon_{t-1}$ $(-0.00)^{***}$		ECM

T-S	ADF	J-B	T-S	ADF First difference	J-B	∅	Slovenia
dta_t	$2.73^{(0.45)}$	$9.30^{(0.01)}$	dta_{t-1}	$-5.08^{(0.00)}$	$6.29^{(0.04)}$	constant	VAR
fta_t	$1.15^{(0.99)}$	$5.24^{(0.07)}$	fta_{t-1}	$-2.15^{(0.02)}$	$11.00^{(0.01)}$	constant	
gdp_t	$0.89^{(0.87)}$	$16.71^{(0.00)}$	gdp_{t-1}	$-2.05^{(0.03)}$	$21.92^{(0.00)}$	constant	
Causality direction		Lags	*F* value	D – W	Decision	C OLS τ	
$\Delta(dta_t \rightarrow gdp_t)$		12	$1.17^{(0.32)}$	2.08	Reject	$0.23^{(0.99)}$	Granger
$\Delta(fta_t \rightarrow gdp_t)$		12	$1.15^{(0.34)}$	2.08	Reject	$-0.65^{(0.95)}$	causality
$\Delta(gdp_t \rightarrow dta_t)$		12	$1.02^{(0.44)}$	2.09	Reject	$-0.72^{(0.94)}$	
$\Delta(gdp_t \rightarrow fta_t)$		12	$1.18^{(0.32)}$	2.00	Reject	$-1.07^{(0.89)}$	
:*no cointegration*							ECM

Note: [1] – data in natural logarithm form, gdp_t – gross domestic product in constant prices, dta_t – domestic tourist arrivals; fta_t – foreign tourist arrivals, C OLS – Engel-Granger cointegrating regression, τ – Kendall rank correlation coefficient, ADF – Dickey Fuller test, J-B – Jarque–Bera test, T-S – time series, Δ – differenced variables, *p* values in brackets, ∅ – deterministic coefficient.
Source: Authors calculations.

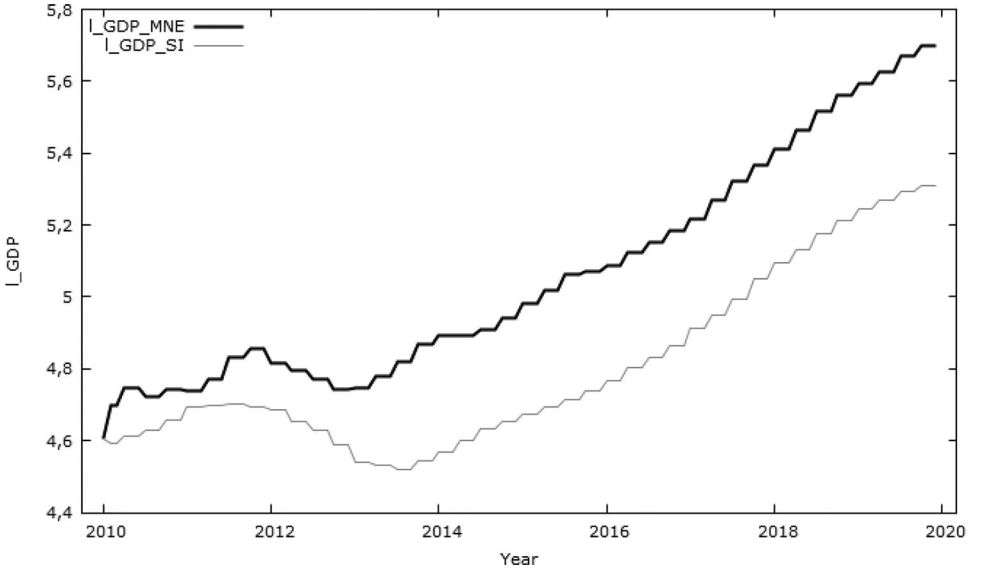

Figure 2. Comparison of logarithm chain indices of GDP, January 2010-December 2019, 2010 = 100.
Note: GDP – gross domestic product in constant prices, l – natural logarithm, SI – Slovenia, MNE – Montenegro.
Source: Authors calculations based on http://monstat.org/eng/pxweb.php and https://pxweb.stat.si/SiStatDb/pxweb/en/20_Ekonomsko/.

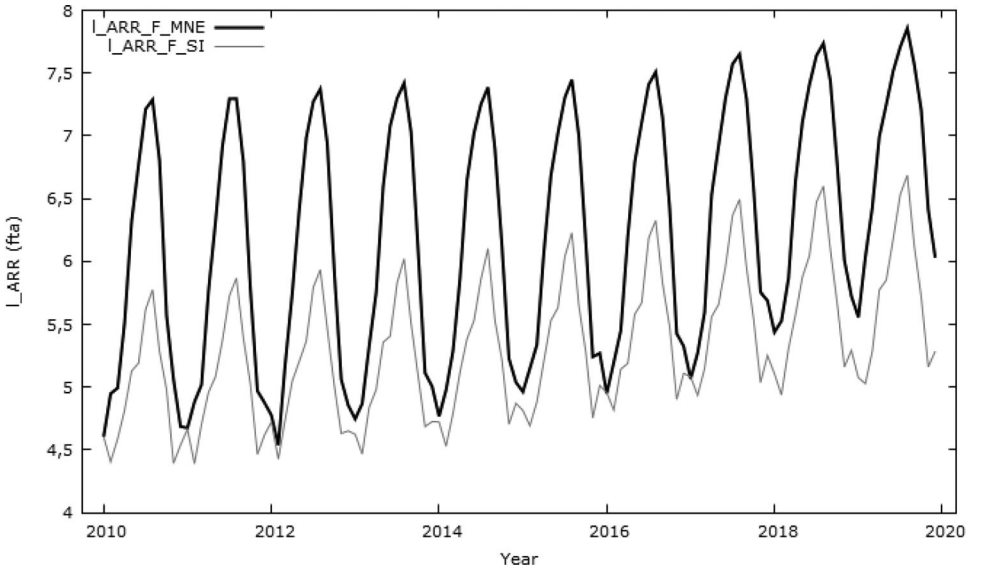

Figure 3. Comparison of natural logarithm indices of foreign tourist arrivals, January 2010-December 2019, 2010 = 100.
Note: ARR (*fta*) – foreign tourist arrivals, l – natural logarithm, SI – Slovenia, MNE – Montenegro.
Source: see Figure 2.

the bivariate causal relationship has remained consistent across three subsamples when tourism growth is measured in terms of international tourism receipt and related to the GDP. Mitra (2019) found uni-directional dimension for Slovenia from GDP growth to tourist arrivals.

Gričar et al. (2016) demonstrate that there was a cause of relation in Montenegro during the economic slump in 2008/2009. Whereas they did not find any statistically significant relation for Slovenia at 1%. Weerathunga et al. (2020) provide an important result for tourism managers and economists concerning our discoveries. As international tourist arrivals have dropped in late 2019, promotion and advertising campaigns should be launched targeting local tourists. Managers can introduce different discount schemes for local tourists.

6.3. Cointegrating regression

For the empirical analysis, the next results are calculated to conduct cointegrated regression analysis using ECM form. Table 3 presents the equations of the cointegrating regression analysis estimated in ECM.

The results of cointegration regression at a 10% significance level for Montenegro suggest one configuration. When dependent variable is domestic tourist arrivals and GDP is independent variable it is discernible that domestic tourist arrivals are contingent on its own. Moreover, domestic tourist arrivals are in a steady state position after one and a half month. On the other hand, GDP growth does not provide a statistically significant impact on domestic tourist arrivals in Montenegro.

Based on Table 3 and the specified results for Slovenia, it can be deduced that there is no cointegration between tourist arrivals and GDP growth as a measurement

of tourist arrivals-led economic growth. Therefore, the ECM for Slovenia could not be specified.

6.4. Discussion

6.4.1. Extrapolation of the results on Johansen cointegration and VECM

The situation is marginally different when we move beyond estimation of the cointegrating regression model via ordinary least square methods. While there are more than two variables in the data vector, the Johansen cointegration test with trace test statistics on reduced rank ($r < p$) is imposed. The unrestricted matrices of equation $\Pi = \alpha\grave{\beta}$ are presented in equation (7), and further the results attempt cointegration vectors on an unrestricted constant and normalization on β. The estimation of unrestricted matrix Π, for the Montenegrin and Slovenian data on singular matrix of $r = 2$ of data vector, is presented in equation (5) for data in (X) and in equation (6) for data in (x). The choice of configuration rank is likely to influence all subsequent inference and is therefore a crucial step in the empirical analyses. Unfortunately, it is also a difficult decision between stationary and non-stationary directions of the vector process and is often far from simple. We argue for the choice of rank that should be based on other information's as (x_{t-1}), i.e. on the first integration and blip dummies.

First, the Π for Montenegrin data is:

$$\Pi x_t = \begin{bmatrix} \Delta dta_t \\ \Delta fta_t \\ \Delta gdp_{CP\ t} \end{bmatrix} = \begin{bmatrix} -5.59 & 0 \\ 0 & -6.12 \\ 0 & 0 \end{bmatrix} \begin{bmatrix} \{dta - 1.48fta + 0.04gdp_{CP}\}_{t-1} \\ \{1.4dta + fta - 0.03gdp_{CP}\}_{t-1} \end{bmatrix}, \quad (7)$$

where trace test statistic is 7.26, eigenvalue is 0.07 and the chosen rank is statistically significant at 1% (0.007). Based on a relevant data vector from equation (6) and restrictions on beta there are two statistically significant cointegration relations and one common trend. Based on Akaike criterion (AIC) $AIC = 5.7$ criteria the configuration vector has 12 lags, which is prominent to the monthly data. Such a model has no autocorrelation on the seventh lag $(p = 0.04)$ and has no heteroscedasticity on the first lag $(p = 0.02)$.

Second, for the Slovenian data on $r = 2$ Π is:

$$\Pi x_t = \begin{bmatrix} \Delta dta_t \\ \Delta fta_t \\ \Delta gdp_{CP\ t} \end{bmatrix} = \begin{bmatrix} -6.92 & 0 \\ 0 & -12.01 \\ 0 & 0 \end{bmatrix} \begin{bmatrix} \{dta - 25.06fta + 0.22gdp_{CP}\}_{t-1} \\ \{-2.03dta + fta - 0.01gdp_{CP}\}_{t-1} \end{bmatrix}, \quad (8)$$

where lag length base of AIC is 12 $AIC = \ -11,33$. Trace test statistic is 5.72, eigenvalue is 0.05 and the chosen rank is statistically significant at 1% (0.016). Such a model has no autocorrelation on the first lag $(p = 0.01)$ and has marginally no heteroscedasticity on the fourth lag $(p = 0.16)$.

The estimation via maximization of a likelihood function in a more awkward case of unrestricted vector autoregression model (VAR) is made in VECM form for long-term relationship between tourist arrivals and economic growth and restrictions on each β. Only significant vectors are rewritten, and they identified long-term

cointegration relations with common trends. The coefficient *ec* demonstrate the speed of adjustment in % from short-term to the long-term equilibrium. The cointegration spaces are posed below for Montenegro and Slovenia, regarding the hypotheses testing.

6.4.2. Montenegro

For Montenegro, H2 is confirmed independently of which restriction on β is made. Economic growth drives tourism growth. This result is consistent with the previous research finding for the Turkish Republic of Northern Cyprus (Katircioglu, 2010). Strong validation is between GDP growth and domestic tourist arrivals. The first cointegration vector is:

$$-0.37\Delta_{\rho=7}dta_{t-1} = -2.51 - 0.73\Delta_{\rho=1}fta_{t-1} - 2.31\Delta_{\rho=4}gdp_{CP\ t-1} - 0.69ec1 - 0.84ec2 + \varepsilon_t, \tag{9}$$

the result confirms that economic growth positively influences domestic tourist arrivals, and if GDP rises 1% the domestic tourist arrivals increase by 6.24%, while other conditions remain unchanged. Moreover, two error terms indicate speed of adjustment from short-term to long-term equilibrium, 0.69% and 0.89%, respectively. All coefficients are statistically significant at less than 5% level; constant has significance value of $p = 0.01$, matrix coefficients ($p = 0.00$ and $p = 0.03$, correspondingly), and both error terms ($p = 0.01$), where ρ is lag order.

The second cointegrated vector is:

$$-0.73\Delta_{\rho=1}fta_{t-1} = 0.17\Delta_{\rho=11}dta_{t-1} - 1.99\Delta_{\rho=1}gdp_{CP\ t-1} + 2.41\Delta_{\rho=7}gdp_{CP\ t-1} + \mu_t + \varepsilon_t, \tag{10}$$

and all coefficients are statistically significant at less than 10% level; matrix coefficients ($p = 0.04$ and $p = 0.09$, correspondingly), and error terms ($p = 0.01$), respectively, and ρ is lag order. The error correction coefficient is not significant, while on lag seven there is positive matrix coefficient on GDP growth. This is a sign that GDP growth does not affect international tourist arrival growth in a long-term, and the coefficient values are similar and of opposite sign, i.e. $\Delta_{\rho=1}gdp_{CP\ t-1} = -1.99$ and $\Delta_{\rho=7}gdp_{CP\ t-1} = 2.41$. The latter has even higher significance of $p = 0.04$. Therefore, one can conclude that national GDP growth does not attract international tourist arrivals in Montenegro.

In summary, the results of the second cointegration for Montenegro suggest important implications that domestic tourist arrivals provide statistically significant declines in foreign tourist arrivals of 0.23%. This substitution effect can serve as a proposal to the hotel managers that they should do more to attract domestic travellers (marketing targets, dynamic price statements, language sustainability, and regional taste perfection).

6.4.3. Slovenia

The first cointegration vector is:

$$-0.26\Delta_{\rho=11}dta_{t-1} = -24.17 + 0.76\Delta_{\rho=1}fta_{t-1} + 1.72\Delta_{\rho=9}gdp_{CP\ t-1} - 1.93\Delta_{\rho=7}gdp_{CP\ t-1} - 1.37ec1 + 0.84ec2 + \varepsilon_t, \quad (11)$$

All coefficients are statistically significant at less than 10% level; constant ($p = 0.00$), matrix coefficient ($p_{fta} = 0.00$; $p_{gdp} = 0.07$ and 0.05), and error terms ($p = 0.01$), respectively, and ρ is lag order.

The second cointegrated vector is:

$$-0.95\Delta_{\rho=1}fta_{t-1} = 0.31\Delta_{\rho=11}dta_{t-1} - 1.58\Delta_{\rho=10}gdp_{CP\ t-1} + 0.80ec1 + \varepsilon_t, \quad (12)$$

All coefficients are statistically significant at less than 10% level; matrix coefficients ($p = 0.01$ and $p = 0.09$, correspondingly), and error term ($p = 0.05$), respectively, and ρ is lag order. The error correction coefficient is not significant.

Johansen cointegration analysis for Slovenia predicts marginally tourism-led economic growth, since the normalization on β for GDP, but the highest statistically significant matrix coefficients are of 0.03 and the significance is around 5%. This negligible result and the result of bordering heteroscedasticity ($p = 0.16$) lead us to the conclusion that there is no statistically significant relationship between tourist arrivals and GDP and vice versa. This is the most reliable and suitable results for Slovenia and therefore accepting H4. This finding can also correlate with the previous findings of Katircioglu (2009b) for Turkey.

Overall the results of the Johansen cointegration test and VECM recognize some properties in time series. The normality assumption of ε_t is not satisfied in empirical model since the reforms and interventions were not considered. For both countries, large residuals are foreseen since the p value of Doornik-Hansen normality test is 0.00. This could indicate that linear representations do not hold large (ordinary and extraordinary) shocks drawn from different distributions.

Some previous researches provide similar findings on non-tested normality. More specifically, tourist arrivals (and with them driven tourism-led economic growth) could not play a similar role in the economies as export-led growth (Trošt & Bojnec, 2015, 2016). Finally, the importance of tourism in a long-run economic growth and the validity of tourism-led economic growth hypothesis largely have not been rejected for well-known and branded global tourist destinations (Mitra, 2019), such as Spain (Balaguer & Cantavella-Jordá, 2002), Taiwan (Kim et al., 2006), South Africa (Akinboade & Braimoh, 2010), Malaysia and Singapore (Lean et al., 2014).

7. Conclusion

Debate on the relations between tourist arrivals as a measure of tourism industry attractiveness and economic growth measured by GDP growth have produced a broad amount of literature, but not for Montenegro. The latter has been largely neglected in previous researches. The results of VAR, Granger Causality test, ECM and Johansen

cointegration confirmed the importance of GDP growth on domestic tourist arrivals in the case of Montenegro. However, during the second decade in the 2000s, the number of tourist arrivals in both Slovenia and Montenegro have increased rapidly. Domestic tourists can also serve as a substitute for foreign tourist arrivals, particularly in periods of crisis and economic downturns.

Results for Slovenia indicate a mutual relationship between tourist arrivals and GDP growth. Alternatively, the proposed empirical model suffers on heteroscedasticity and normality test. Therefore, concerning Slovenia there is no apparent statistically significant relation between tourist arrivals and GDP growth.

Among policy and economic implications, both countries could further recognize networking and stronger partnerships, forming bilateral and multilateral freedom of movements and export/import of goods and services. However, in-depth time series analysis is needed to assist policymakers with accurate evidence that can better predict the events and make decisions. In our case, this applies to patterns in tourist arrivals-led economic growth and their connexions in the analysed countries.

There are some limitations to this research. Montenegro did not count data for quarterly GDP growth at constant prices before 2006. Monthly data on tourist arrivals were also not publicly available. Therefore, the value of collected variables based on the set hypotheses could not be empirically tested for 2010. Finally, future research should be extended to a cointegrated $I(2)$ VAR model with blip dummies inspected over Δx_t.

For further research, focus could be directed towards other cointegrated variables, mostly on tourism receipts. Additionally, links between regional and spatial time series tourism and national economic growth could be performed. Furthermore, in both analysed countries, tourism is crucial for contributing to national income. Therefore, policymakers in both countries could seek an over average tourism-outcome and at most marketing solutions. The medium-term scenario for Slovenia is a hot spot destination for the next two-to-three years. Whereas, Montenegro could follow such a solution and welcomes tourists. The rising importance of the tourism economy to the country's GDP is more evident in Montenegro than in Slovenia.

Disclosure statement

No potential conflict of interest was reported by the authors.

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