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THE MACROPRUDENTIAL MEASURES FOR MITIGATING THE EFFECTS OF THE PANDEMIC CRISIS IN TOURISM ECONOMIES

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Abstract. *Purpose* – The paper evaluates the applied macroprudential measures in selected countries by testing their efficiency in tourism and reducing the revenue gap in tourism sector during the pandemic crisis.

Research methodology – The effects of macroprudential policy were tested using the Granger causality test and PVAR model. The research used data from the period 2019 to 2022 by quarters. The impulse response function evaluated the long run impact of macroprudential policy on performance of tourism entities.

Findings – The results confirm the positive effect of systemically important institutions buffer (SIB) on reducing the losses in tourism. The impulse response showed the significant impact of SIB on revenue gap (RG) reduction.

Research limitations – The research has limitations regarding to the short period of observation. The additional variables can be entered into the model.

Practical implications – The results serve the policy makers for shaping the measures for recovery policies and maintaining long-term economic stability. The findings are useful as they can serve as a guide in designing measures to help the tourism recovery.

Originality/Value – The contribution of this study is reflected in providing scientific evidence of macroprudential measures effectiveness for several countries and routing policies for tourism recovery.

Keywords: macroprudential policy, pandemic, tourism economy.

JEL Classification: C33, E58, G21, Z33.

Introduction

The unexpected disturbance caused by pandemic crisis has caused shocks in economies all over the world. Disabling the flow of people influenced the tourism sector and caused huge losses. As the economies of tourism-oriented countries depend on revenues gained through taxes on tourism-related income and foreign exchange inflow (The Commonwealth, 2021),

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it is highly important for policy makers to design the efficient measures and instruments for helping the tourism sector recovery.

The main purpose of this paper is to test the applied measures at macroeconomic level in tourism-depended EU countries. The research question relates to verification whether the macroprudential policy is well designed to help the economy. The research tests the following hypothesis: The macroprudential tools positively affect the economic recovery in tourism-dependent countries.

When pandemic hit the world, the tourism economies in European union had still been recovering after the consequences that global financial crisis left. The problem of tourism dependent countries is the high sensitivity to shocks that cause a reduction of demand for non-essential goods such as travel and leisure use. According to their specifications in economy and industrial structure, several countries have been extremely affected by pandemic crisis. Countries in EU with the share of tourism in GDP higher than 10% that have experienced major shock caused by the pandemic crisis are Croatia, Greece, Italy, Cyprus, Malta, Portugal, and Spain. These are countries of comparable and similar characteristics regarding the dominant form of tourism that provide mostly tourism oriented to the sun, sea, and outdoor activities primarily in period of summer vacation (see Subsection 1.1).

According to the World Travel and Tourism Council (2021) the tourism sector faced a loss more than US$ 4.7 trillion in 2020 and 62 million jobs were lost. The global trade in services with travel and tourism sector included, for EU area, in November 2020 remained at 27% below its level at the end of 2019 (European Central Bank, 2021a).

Due to the pandemic crisis, most touristic facilities were closed and still they are not yet operating in full profile. The tourism sector has experienced a restructure of demand and some forms of tourism have become more attractive than before crisis. The new trends in tourism refer to increase in preference of domestic destinations and individual forms of tourism that include areas not affected by mass tourism (Niestadt, 2020).

Huge scale of losses for economies required application of all measures and instruments available, in fiscal, monetary and macroprudential domains. As macroprudential policy is complementary to prudential supervision of the financial system, macroprudential policy tools should be used in coordination with monetary and fiscal policy (Popek Biškupec & Bilal Zorić, 2017). The macroprudential policy is specially designed for decreasing the effects of crisis by providing the necessary liquidity for financial system. The central banks have been applying variety of macroprudential tools for helping the financial and real sector through encouraging credit activity and boosting the credit and business cycle. Although macroprudential instruments contribute to the overall financial stability it could cause the deterioration of bank' credit activity if the regulators do not provide appropriate framework and coordination with other public policies (Popek Biškupec & Herman, 2021). Andries et al. (2021), De Schryder and Opitz (2021), conducted studies referring to banks' credit activity, and their studies confirmed the positive impact of macroprudential tools on stability of financial and banking sector.

The pandemic has proven that the application of macroprudential measures can be broader and have positive effects if it is applied selectively to targeted stakeholders in the economy. The holistic character of macroprudential policy enables a wider range of actions and makes

it easier to achieve balance at the macroeconomic level. Most research has dealt with a limited sample or tested impacts on a smaller number of countries. This study covers seven countries with similar characteristics and proves the effect of macroprudential policy in a wider range of instrument applications for the tourism sector recovery.

The aim of this paper is to analyse macroprudential measures (see Table 1) for helping the selected tourism-oriented countries in EU to decrease the pandemic shock and to revive tourism. Given that Covid-19 pandemic is a new phenomenon, this research greatly contributes to new knowledge about the effectiveness of measures to help the economy. It is especially important for each country to implement the policies, measures and activities that achieve high efficiency in the shortest possible time and without high costs. The importance of this paper is reflected in the fact that due to the relatively short period of pandemic; the effectiveness of policies has not yet been sufficiently researched at the professional and scientific level.

This research confirmed the effectiveness of macroprudential mechanisms and its scientific significance is reflected in testing measures at the international level and conducting research for EU countries that have similar macroeconomic policies. The panel VAR model confirmed that macroprudential instrument (Systemically Important Institutions Buffer – SIB) reduce the revenue gap of entities in touristic sector. The Revenue Gap (RG) was obtained according to the losses caused by corona crisis. The impulse response function confirmed that macroprudential policy diminish RG and in the long run it can diminish losses in touristic sector. The findings are useful for future macroeconomic policies to mitigate effects of future possible crisis.

1. Literate review and macroprudential framework for the tourism and revenue gaps recovery

The macroprudential policy framework encompasses a comprehensive approach to the economy and is aimed at preserving overall macroeconomic stability.

The main research question of this study deals with evaluation of the efficiency of applied macroprudential measures on tourism recovery during pandemic crisis. Although macroprudential policy is putting huge accent to the system stability, the easing of macroprudential measures, such as lowering SIB, are proved to be an effective tool in improving the economic recovery, especially for tourism-dependent countries.

1.1. Macroprudential policy for recovery tourism economies

Monetary and fiscal policies are the most dominant in designing measures and instruments for real sector, both to ensure the optimal amount of money in circulation as well as to provide an adequate framework for the efficient operation of the enterprise. After last global financial crisis, many countries have felt the limited effects of monetary policy tools. To preserve macroeconomic stability, monetary and fiscal policy needed to be strengthened by introducing additional prudential measures and instruments. For this reason, many countries, especially southern and south-eastern Europe, have introduced macroprudential

policies to preserve financial and overall economic stability. Due to the limited efficiency of monetary policy, central banks had started to use macroprudential crisis management tools. Macroprudential policy measures and instruments serve to reduce the procyclicality of the financial system and they are very effective in reducing the amplitudes of ups and downs of credit and business cycles in times of crisis (Popek Biškupec, 2015). Latest research shows that macroprudential measures have effects on real GDP, the price level and credit that are very similar to those of monetary policy impacts, but the transmission of these two policies is different. Macroprudential policy aims to the broad spectrum of entities and monetary policy is focused to the credit institutions (Kim & Mehrotra, 2019).

Cao et al. (2021) analysed the interaction of monetary and macroprudential policy for reducing the impact of foreign monetary shocks. The results confirmed that macroprudential policy helped to mitigate the effects of foreign monetary shocks. After global pandemic had aroused, countries were adopting policies of quantitative easing. Takats and Temesvary (2021) tested the impact of macroprudential easing on macroeconomic balance. The study showed that macroprudential easing in UK caused the negative impact of US monetary policy restrictions on USD-denominated cross-border that provided UK banks as lending outflows.

The macroprudential policy response of European Central Bank (2021b) to corona crisis include mostly banks' lending channel. Macroprudential easing allowed banks to use capital to absorb losses and provide credit activity, specially to the most vulnerable sectors, as tourism. The macroprudential policy of European Central Bank (European Central Bank, 2021b) is divided in several main fields targeting banks; a) Capital and liquidity buffer relief, b) The additional flexibility of treatment of non-performing loans (NPLs), c) The emergency purchase programme, d) Long-term loans at favourable conditions and collateral easing, e) Remaining dividends in banks below 15% of cumulated 2019-20 profits. The detailed specification is presented in Table 1.

Table 1. The macroprudential tools of European Central Bank for euro area countries during corona crisis (source: authors according to European Central Bank, 2021b)

Macroprudential tools	Description	Measures and instruments
Capital and liquidity buffer relief	The main characteristic of macroprudential policy is the principle of countercyclicality. During the period of welfare, the macroprudential policy is restrictive, while during the recessions and crises period, the macroprudential policy allows quantitative easing.	Banks can use capital buffers up to €1.8 trillion in new loans to households and businesses
The additional flexibility of treatment of non-performing loans (NPLs)	The pandemic crisis has caused a deterioration in the credit image of debtors. For non-performing loans, bank needs to ensure additional money for the protentional losses and decrease new credit activity.	Banks have been given more flexibility when they are classifying loans that are backed by public guarantees

End of Table 1

Macroprudential tools	Description	Measures and instruments
The emergency purchase programme	Due to the ensuring enough funds, central bank is buying bonds from banks for boosting spending, investments and supporting economies.	ECB is buying several kinds of assets under the €1,850 billion pandemic emergency purchase programme until at least the end of March 2022
Long-term loans at favourable conditions and collateral easing	Banks can ask for long-term loans at very favourable conditions from centra bank to keep up their lending to most needed sectors.	ECB is applying less strict rules on the assets banks must give as insurance
Remaining dividends in banks below 15% of cumulated 2019-20 profits	Banks are asked to remain dividends below 15% of cumulated 2019-20 profits.	ECB requested banks not to pay out dividends or buy back stocks

Due to the characteristics of bank-centric system for all selected countries, monetary and macroprudential measures and instruments have a strong impact on the tourism sector through the credit channel. In the period of pandemic, it is predicted that domestic tourism will have a share of 75% of the tourism economy in OECD countries. (Bhuiyan et al., 2021) Strengthening the share of domestic tourism contributes to the effectiveness of domestic public policies, which will strengthen the impact of domestic macroprudential instruments.

1.2. Key-characteristics of selected countries related to the tourism sector

Macroeconomic characteristics of the country define policy measures and instruments to achieve the main strategic goals and development plans. Selected Mediterranean countries have similar tourist characteristics, which are also the main carriers of their economies. Each country combines macroprudential instruments (see Table 1) according to its characteristics. The key-characteristics of the selected countries are presented below.

Croatia implements a classic tourist model of "sun and sea" with a seasonal concentration on coastal areas. Before the pandemic caused by COVID 19 the share of foreign exchange income of tourism activities was approximately 24% of the country's GDP, and after the pandemic shock, it fell to 10% of GDP (see Table 2). The World Bank (2022) shows that 60.021.000 international tourists visited Croatia in 2019, while in 2020 the figure fell to approximately 21.608.000.

Greek tourism is a growing economy-leading service sector offering sun, sea, and sand (Papatheodorou & Arvanitis, 2014). The contribution of the Greek tourism industry in total GDP in 2019 was 20% while in 2020 this percentage fell to 8.7% (see Table 2). International arrivals of tourists according to The World Bank (2022) in 2019 amounted 34.005 000, while in 2020 arrivals fell drastically to 7.406.000 international arrivals.

Italy's tourism activities represent an important contribution to the Italian economy and are one of the world's leading cultural destinations, following a significant number of unique UNESCO World Heritage Sites (OECD, 2011). Italy's tourism sector generated 13% of the country's GDP in 2019, while in a pandemic year this percentage dropped to 7% (see

Table 2). According to the World Bank (2022), international tourist visits to Italy in 2019 amounted 60.021,000, while in 2020 that number dropped to 38.419.000 visits.

The key pillar of Cyprus's economy is tourism where tourism supply focuses on the "sun and sea" policy. Dependence on tourism is also evident in the share of foreign exchange income of the country where Cyprus recorded a total of 14% in 2019, and in the following pandemic year this percentage fell to 3.7% (see Table 2).

International tourist arrivals in 2019 for Cyprus were record-breaking, amounting to 4.117.000 according to The World Bank (2022), while the following year that number dropped dramatically to approximately 632.000 international arrivals.

Malta's tourism sector is the main driver of its economy (National Tourism Policy, 2015). The focus of tourist activities is "the sun and sea" concept. According to The World Bank (2022), the islands of Malta recorded 3.519.000 international arrivals in 2019, while in 2020 only 718.000 were recorded. The contribution of tourism to state GDP in 2019 was 15.9% while in 2020 Maltese tourism recorded a 5.4% (see Table 2).

One of Portugal's main social-economic activities is tourism. The strong link between Portuguese culture, the country's geographical location and history is positively reflected through international tourist arrivals (OECD, 2020a). In 2019, the share of foreign exchange income generated from tourism was 17% of GDP, while in 2020 this percentage fell by more than half (see Table 2). According to the World Bank (2022), international arrivals of tourists in 2019 recorded 17.283.000 while this figure fell to 4.208.000 arrivals in the following 2020.

The driver of Spain's economic and social development is tourism (OECD, 2020b), with using heritage as new proximity tourism routes (Martínez-Hernández et al., 2021). The share of foreign exchange income generated from tourism in 2019 amounted 14% of GDP, while the following year it recorded a big drop to only 5% (see Table 2). According to The World Bank (2022), in 2019, the international tourist recorded 126.170.000, while in 2020, recorded only 36.410.000 visitors.

The tourism-oriented countries designed various models to mitigate the negative impact of pandemic. Motevalli-Taher and Paydar (2021) proposed model for minimizing the number of tourist patients by closing the entry points of specific region. They used multi-objective model for decreasing total costs and minimizing the tourist patients. This approach could serve to encourage the tourism. To cope with the crisis, each country should apply several key methods; efficient, coordinated and not fragmented crisis management and appropriate communication between all relevant institutions in the tourism sector (Mikac & Kravaršćan, 2021). As neoliberalism became inefficient to face unexpected shocks and crisis, Robina-Ramírez et al. (2021) propose sustainable model of tourist governance which includes coordinated effects for reducing the unexpected effects of the pandemic crisis in tourism sector. The proposed model consists of collaboration of private and public plans for local tourism communities, promoting the common goods and healthy environment. The answer of economy to the pandemic could be designing resilience model as a crisis management tool to address disruptive events affecting tourism-sector developed by Aldao et al. (2021) and applying operational crisis management practices of small and medium enterprises in tourism sector proposed by Kukanja et al. (2020). One of the prior suggestions is to focus on increasing revenues instead on reducing operational costs.

1.3. Performance indicators in tourism for selected countries

It is evident that tourism contributes in south and southern-eastern European countries in a significant way and provides a significant number of beneficial economic impacts on the country. The selected EU countries have been putting huge effort to increase tourism supply and they are focused on increasing the flow of visitors (Đorđević et al., 2017). According to the World Travel and Tourism Council Annual research (2021) selected analysed countries have suffered huge losses due to the pandemic crisis. Both, total contribution of Travel and Tourism to GDP and total contribution of Travel and Tourism to Employment show decrease due to the year 2019. Table 2 presents data for selected countries.

Table 2. Total contribution of Travel and Tourism to GDP (source: authors according to World Travel and Tourism Council, 2021)

	Total contribution of Travel and Tourism to GDP (%)		Total contribution of Traveland& Tourism to Employment (% of total employment)	
	2019	2020	2019	2020
Croatia	24.3	10.2	22.2	19.0
Cyprus	13.4	3.7	13.4	13.1
Greece	20.3	8.7	21.1	19.8
Italy	13.1	7.0	15.0	13.8
Malta	15.9	5.4	21.3	18.1
Portugal	17.1	8.1	20.7	17.7
Spain	14.1	5.9	14.4	13.3

2. Data

The analysis was performed for 7 European countries (Croatia, Greece, Italy, Cyprus, Malta, Portugal and Spain) with similar economic and tourism characteristics in which the pandemic caused similar disturbances. The analysed period refers to the period 2019 to 2021 on quarterly basis. Data were collected from central banks of selected countries, European Central Bank (2021d) and Eurostat Database (2021). The selected countries have used macroprudential measures and instruments regarding the structure of the economy. During the application of the macroprudential instruments, all selected countries have in common monetary and macroprudential easing. All analysed countries put the biggest accent to the capital-based measures as Countercyclical capital buffer, Systemic risk buffer, Other systemically important institutions buffer and Combined buffer requirement. Macroprudential easing could approximated as reducing the Systemically Important Institutions Buffer. SIB refers to capital buffer whose purpose was to create a protective layer that could be used in future crisis periods (European Central Bank, 2021c). The detailed specification of used tools is presented in Table 3.

Table 3. Implemented macroprudential measures in selected EU (source: European Central Bank, 2021c and central banks of selected countries, 2021)

Country	Countercyclical capital buffer	Other systemically important institutions buffer	Systemic risk buffer	Combined buffer requirement
Croatia	0%	7 banks: 0.5–2%	All banks: 1.5%	4–6%
Cyprus	0%	6 banks: 0.25–1%	–	2.5–3.5%
Greece	0%	4 banks: 0.5%	–	2.5–3%
Italy	0%	4 banks: 0.19–1%	–	2.5–3.5%
Malta	0%	4 banks: 0.06–2%	–	2.5–4.5%
Portugal	0%	6 banks: 0.19–0.75%	–	2.5–3.25%
Spain	0%	4 banks: 0.25–1%	–	2.5–3.5%

Most of the countries have been relaxing macroprudential liquidity requirements and set the capital-based macroprudential requirements at lowest point. Also, most of the countries have decreased buffer rates for some systemically important institutions (Eller at al., 2021). Systemically important institutions are defined as institutions of great importance in relation to the whole economy. Due to their share in the domestic economy, they could trigger negative trends into the system and contribute to market distortions if they experience bad business performance. From that point of view, the whole macroeconomic stability could be jeopardized (European Banking Authority, 2021).

3. Research methodology

The paper tests the effectiveness of macroprudential policy in selected EU countries through a panel vector autoregressive model (PVAR). This study tests the following panel VAR: The macroprudential tools positively affect the economic recovery in tourism-dependent countries. The research was conducted using PVAR model, Granger causality test and impulse reaction function.

Based on the panel analysis, the effectiveness of the measures used in countries with similar characteristics was observed and the effect of macroprudential easing on the performance of entities in the tourism sector was tested. The paper provides the Granger causality test for macroprudential measures and revenue indicator of subjects in tourism. Finally, the impulse response function tested the long run positive impact of macroprudential policy on business performance of tourism entities.

This study uses the panel VAR data method developed by Love and Zicchino (2006). The panel VAR was selected to examine the impact and effectiveness of the central bank's

macroprudential measures in closing the tourism revenue gap. The specificity of the panel VAR model is that two components are combined. The traditional VAR approach and the panel data method, treats the variables in the system as endogenous. The research provides undetected individual heterogeneity by introducing fixed effects resulting in better consistency of the Love and Zicchino (2006) assessment. The key benefit of this method is to exploit individual time series and variations of cross-sectional data and to avoid bias related to cross-sectional regressions considering a country-specific fixed effect (Traoré, 2018). The research is carried out using STATA program. The dependent variable in the model represents revenue gap (lnRG) while an independent variable is Systemically Important Institutions Buffer (SIB), control variable of the model is gross domestic product (lnGDP). Logarithmic transformations represent a convenient means of converting a highly distorted variable into one that is approximately normal (Benoit, 2011). For determination of the distribution data, a histogram was created for each variable. Logarithm is applied both to the dependent variable (lnRG), and control variable that refers to lnGDP. Variable SIB belongs to the string variable category. In case of a string variable (SIB), it is necessary to make transformation into a numerical number. The transformation was provided using the help of encode in STATA. The variables used in the model and their descriptive statistics are shown in Table 4.

Table 4. Description Statistics for variables (source: author's calculation, 2021)

Variables		Mean	Std. Dev.	Min	Max	Observations
lnRG	overall	–.0223288	.9029781	–3.497192	3.813526	62
	between		.294906	–.5051116	.3489366	
	within		.8594729	–3.014409	3.44226	
SIB	overall	5.84127	1.393607	1	7	63
	between		.8792466	4.222222	6.888889	
	within		1.126418	.952381	7.619048	
lnGDP	overall	10.45921	1.751801	7.984054	13.07121	63
	between		1.875663	8.094944	12.96418	
	within		.0681486	10.30259	10.63832	

First, the unit root tests were conducted. The non-stationaryness of data is very common in economic data, that is, the situation that the variable does not have a clear tendency to return to a constant value or linear trend (Atems & Jones, 2014). There are several tests to examine the presence of unit root tests in the panel data: (1) Fischer test with extended Dickey-Fuller (ADF), (Choi, 2001); (2) test Levin-Lin-Chu (Levin et al., 2002); (3) Im, Pesaran and Shin (2003); (4) Harris-Tzavalis (Harris & Tzavalis, 1999); (5) Hadri (2000) LM test. The test that was applied in this study was a Harris-Tzavalis test (see Table 5) because it is designed to be applied to data that are fixed and relatively short over a period. To provide accurate corrections for low values, the Harris-Tzavalis test strictly limits the model to exclude an increase in lag. If the panel data is balanced it will remain according to the calculation. Table 5 shows the results of the Harris Tzavalis test.

Table 5. Harris-Tzavalis unit-roots test (source: author's calculation STATA program, 2021)

Stationary at	Variables	Statistics	Z values	P value(s)
Level with time trend included	LnRG	0.0193	–2.0625	0.0196
Level with time trend included	SIB	–0.0147	–2.2970	0.0108
Level with time trend included	lnGDP	0.0675	–1.7295	0.0419

The autoregressive parameter in the model is common, as well as the time trend. According to this, they both were included as panel elements. The null hypothesis of the selected test is *Panels contain unit-roots*. The results of the applied test shown in Table 5 are similar to research conducted by Simionescu (2015) and show that all variables included in the model are stationary. Due to the test, the null hypothesis could be rejected, and it could be concluded that SIB (see Table 1), RG and GDP were not auto-correlated at the significant level 1%.

The next step was the assessment of lags. To choose the appropriate model, the test for lags determination provided an answer to the question of how many lags would be optimized for panel VAR. The applied test, according to the Hansen's (1982) J statistics, corresponding p-value, and the criteria for selecting the model developed by Andrews and Lu (2001) based on J statistics, gives the information on the overall model determination coefficient. Criteria based on Hansen J statistics require the number of moments conditions to be higher than the number of endogenous variables in the model. Code *pvarsoc* uses the estimation sample of the least restrictive panel vector autoregressive model.

Table 6. Panel VAR optimal moment and model selection criteria (varsoc) (source: author's calculation STATA program, 2021)

Lag	CD	J	J p-value	MBIC	MAIC	MQIC
1	.9999229	15.18316	.6493543	-48.8131	–20.81684	–30.48114
2	.9999555	6.067474	.7331467	–25.93066	–11.93253	–16.76468
3	.9999172	.	.	.	.	.

Note: MQIC – modified Hannan–Quinn information criteria; MAIC – modified Akaike information criteria; MBIC – modified Bayesian criteria.

The first-order panel VAR model was fitted by using the first three lags of endogenous variables (Andrews & Lu, 2001). Based on the selection criteria of the three models (Andrews & Lu, 2001) and the total coefficient of determination, a first lag PVAR model was selected. The reason of selecting the first lag model is the lowest values of MBIC, MAIC and MQIC (Abrigo & Love, 2016), the first order lag minimizes MBIC, MAIC and MQIC to the greatest extent. The results of this testing shown in Table 6, together with post-assessment testing, confirm that the first lag model is more stable than the models of other potential systems. Panel VAR model was selected for three reasons (Bayraktar-Sağlam & Sayek Böke, 2017): (1) panel VAR approach allows the investigation of endogenous interaction between RG and SIB, allows to highlight the residual effects of SIB on RG, both as to check if feedback is

generated from the SIB on the RG; (2) panel Granger causation analysis allows to identify the direction of involution between SIB and RG, which provides a discussion on a possible two-way relationship; (3) impulse response function (IRF) helps to assess dynamic links between SIB and RG. The equation for the applied model is (Abrigo & Love, 2016):

$$Y_{it} = Y_{it-1}A_1 + Y_{it-2}A_2 + \ldots + Y_{it-p+1} + A_{p-1} + Y_{it-p} + X_{it}B + u_i + e_{it};$$
$$i \in \{1,2,\ldots,N\}, t \in \{1,2,\ldots,T_i\}, \quad (1)$$

where is Y_{it} $(1xk)$ dependent variable vector, X_{it} $(1xk)$ vector of exogenous coquetries, $u_i\, i\, e_{it}$ are $(1xk)$ vectors of dependent variables of specific panels of fixed effects and errors, (kxk) matrix A_2, $A_2,\ldots A_{p-1}\, i(Ixk)$ matrix B are the parameters to be assessed.

According to the previous tests, the panel VAR regression model was defined. The panel VAR model is determined by one lag due to the Helmert transformation (the default) and with the first tree lags as instrument using GMM-style estimation. For this purpose the code *pvar lnRG SIB lnGDP, instlags(1/4) gmmstyle* were used. Results of regression were shown in Table 7.

Table 7. Panel vector autoregression – GMM Estimation (source: author's calculation using STATA programme, 2021)

		Coef.	Std. Err.	z	p>|z|	[95% Conf. Interval]	
lnRG	lnRG L1.	.4784958	.103002	4.65	0.000	.2766156	.6803759
	SIB L1.	–.5873236	.1593696	–3.69	0.000	–.8996823	–.2749649
	lnGDP L1	5.762813	1.815889	3.17	0.002	2.203736	9.32189
SIB	lnRG L1.	–.7669388	.1307822	–5.86	0.000	–1.023267	–.5106105
	SIB L1.	3.216131	.507109	6.34	0.000	2.222216	4.210046
	lnGDP L1	–10.7574	5.38105	–2.00	0.046	–21.30407	–.2107396
LnGDP	lnRG L1.	.0678922	.0194434	3.49	0.000	.0297839	.1060006
	SIB L1.	.0210669	.0181445	1.16	0.246	–.0144956	.0566294
	lnGDP L1	.9242046	.2200633	4.20	0.000	.4928884	1.355521

Note: Instruments: 1(1/4). (lnRG SIB lnGDP).

For the estimation of the PVAR model the involving rebound effects had to be applied, especially in the case of conclusive samples. For that reason, the assessment process of GMM (Holtz-Eakin et al., 1988) was used. Results of panel vector autoregression model with GMM Estimation are shown in Table 7. These results confirmed the impact of SIB to RG. Results showed that the first lag (L1.) of SIB has the negative impact on variable RG at the significant

level of 5% (p>|z| = 0.000). Also, the first lag of control variable GDP has positive impact on variable RG at the significant level of 5% (p>|z| = 0.002).

After applying the panel VAR, it was necessary to check whether past values of variables e.g., x are useful in predicting the value of another variable y, depending on past values of variable y, or whether x "Granger cause" y (Granger, 1969). The Chi-squared statistics, which was obtained from Granger and Wald tests, indicated the short run causal effects. This was done via the pvargranger command using the Wald test with the null hypothesis stating that the coefficients on all residues of the endogenous variable together are equal to zero, so the coefficients can be excluded from the equations of the panel VAR model. The results of the test are shown in Table 8.

Table 8. Panel VAR-Granger causality Wald test (source: author's calculation using STATA programme, 2021)

Equation \ Excluded		chi2	df	prob >chi2
lnRG	SIB	13.581	1	0.000
	lnGDP	10.071	1	0.002
	ALL	14.783	2	0.001
SIB	lnRG	34.389	1	0.000
	lnGDP	3.997	1	0.046
	ALL	34.390	2	0.000
lnGDP	lnRG	12.193	1	0.000
	SIB	1.348	1	0.246
	ALL	13.897	2	0.001

The null hypothesis of Wald test is that SIB does not Granger-cause of RG. Looking at results, prob >chi2 = 0.000, the null hypothesis can be rejected, and it could be concluded that SIB does Granger-cause RG. The same conclusion refers to GDP, so it could be concluded that GDP does Granger-cause RG. The test of overidentifying restriction shows that the J statistic is significant at the 5% significance level (*Hansen's J chi2(27) = 37.940173* (*p = 0.079*)), so it could be concluded that the model is misspecified.

In panel VAR models, insight into dynamic relationships between variables is provided by methods of innovation analysis: impulse response function and variance decomposition (DVC) (Bahovec & Erjavec, 2009). The impulse response method measures the reaction of each variable to the unit shock of another variable. The decomposition of the variance determines the level of the variability of a particular variable due to the shock in the variable itself. Also, it shows the level of shock in another variable in the model. Impulse response functions monitors the dynamic impact of a "shock" system or a change on input. Although impulse response functions are used in many fields, they are particularly useful in economics and finance for several reasons: they allow aggregate supply shocks to have lasting effects on output. For example, Blanchard and Quah (1989) demonstrated the use of long-run constraints in structural VAR to monitor the impact of aggregate supply and aggregate demand shocks on output and unemployment.

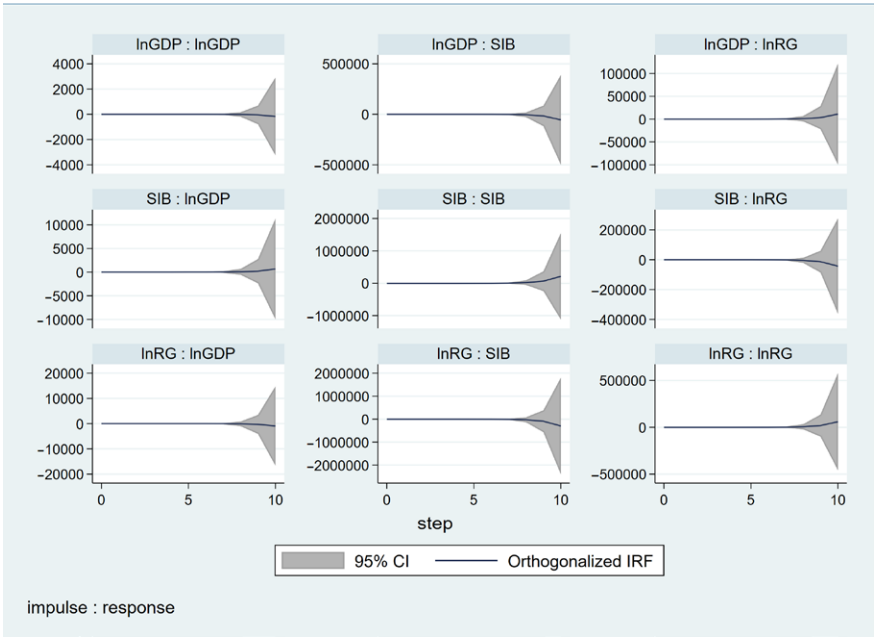

Figure 1. Estimate impulse-response functions (source: author's calculation STATA program, 2021)

Estimation of impulse-response function (see Figure 1) confirmed that SIB reduces RG. The impulse-response function presents the behaviour of economic variables RG in response to shocks of introducing SIB for the time from 2019 till 2021, assuming no further shocks. The direct effect of the SIB initial shock is comparable for all selected countries. The initial impact on RG is negative for selected countries.

4. Discussion

This paper presents the macroprudential measures that tourism-dependent countries with similar characteristics (Croatia, Italy, Spain, Greece, Malta, Portugal, and Cyprus) have used to reduce negative shocks and help the tourism sector. The panel VAR analysis tested the effect of the macroprudential instrument SIB on reducing the losses of tourism entities. The results confirmed the hypothesis that the macroprudential tools positively affect the economic recovery in tourism-dependent countries. Results of panel VAR model with GMM Estimation (see Table 7) confirmed the impact of SIB to RG. The analysis confirmed that first lag (L1.) of SIB has the negative impact on variable RG at the significant level of 5% ($p>|z| = 0.000$). According to the expectation, the first lag of control variable GDP has positive impact on variable RG at the significant level of 5% ($p>|z| = 0.002$).

Every selected country applied similar intensity of macroprudential level using similar macroprudential tools. The results confirm the high impact of SIB for stabilizing the tourism-dependent economies. The results confirm the positive effect of SIB and the hypothesis that the macroprudential tools positively affect the economic recovery in tourism-dependent

countries. The macroprudential instruments ensured the adequate level of liquidity of the financial sector that supported the financing the tourism sector by minimizing the illiquidity gap. The impulse response function confirms the effect of SIB on RG reduction. The results confirmed the positive impact of macroprudential instruments to decrease the amplitude in tourism performance of entities in economies that have significant share of tourism in GDP. The analysis of the macroprudential measures speaks in favor of the effectiveness of the macroprudential approach and holistic approach to economic stability. In bank-oriented systems, such as the European Union's bank-centric system, monetary and macroprudential policies have a strong impact on the real sector using credit institutions channel. Macroprudential policy, unlike monetary policy, combines broader economic effects. Due to the interconnectedness of entities, cross-border spill overs and business integration, all public policies have to be coordinated to stimulate credit cycles and rise in the business cycle. The findings in this paper confirmed the thesis that macroprudential policy can stabilize economy and has positive effect on the tourism sector. Although the model has limitations regarding to the short period of observation, covering nine quarters, the results are extremely useful, and they can serve as a guide for further strategies to design measures to help the economy. The paper contribution is reflected in the testing of current measures and instruments using scientific methods, which have proven the effectiveness of macroprudential tools. It is recommended to test the effectiveness of the tools in further periods when more observations will be available. Also, additional variables can be entered into the model, and their effectiveness can be tested according to the same principles. In the coming periods, the results will be even more robust, as more time will pass in the application of certain macroprudential measures and instruments.

Conclusions

The pandemic has caused a stalemate in global economic flows. Due to the cessation of all physical contacts and the introduction of social distance, all sectors that involve human physical interaction stopped to operate. After restricting travel for business and private purposes, the tourism sector experienced a huge business collapse. Negative shocks have particularly affected tourism-dependent countries. In such countries, the failure of the tourist season has had a negative impact on the overall economy. After economies were already exhausted by the global financial crisis, the pandemic crisis caused even greater structural difficulties. By introducing macroprudential instruments, countries have tried to act to reduce negative shocks and help the tourism sector through various macroprudential support measures. Central banks, through monetary impulses, acted on financial institutions for the purpose of tourism recovery. The results of this study may serve the policy makers for shaping the measures in the adoption of recovery policies and maintaining long-term economic stability. The findings are extremely useful as they can serve as a guide for further designing measures to help the tourism recovery. The contribution of this study is reflected in providing scientific evidence of macroprudential measures effectiveness for several countries and routing policies for recovery of tourism sector.

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