• FINANSE I PRAWO FINANSOWE •
• Journal of Finance and Financial Law •

marzec/March 2023 • vol. 1(37): 7–31

THE IMPACT OF COVID-19 CASES ON STOCK PRICES OF SELECTED COMPANIES REPRESENTING TOURISM AND BANKING SECTORS

Volkan Dayan[*] Monika Bolek[**] Juan E. Trinidad-Segovia[***]

C O P E Member since 2021 JM15102

https://doi.org/10.18778/2391-6478.1.37.01

THE IMPACT OF COVID-19 CASES ON STOCK PRICES OF SELECTED COMPANIES REPRESENTING TOURISM AND BANKING SECTORS

Abstract

The purpose of the article/hypothesis: The purpose of the article is to analyse the relationship between stock prices of selected companies and COVID-19 cases in those countries where the tourism and banking sectors have a high share of national income, such as Croatia, Italy and Spain.

Methodology: The methods used are Breakpoint Unit Root Tests to determine whether a time series is stationary or not, and ARDL cointegration technique for cointegration testing.

Results of the research: It was found that the number of COVID-19 cases negatively impacted the tourism and banking market in surveyed EU countries.

Keywords: COVID-19, Coronavirus, Stock Prices, EU Countries, ARDL.

JEL Class: I5, G15, N24, C32.

[*] Assoc. Prof., Department of Banking and Insurance, Uzunkopru School of Applied Sciences Trakya University, Edirne-Turkey, e-mail: volkandayan@trakya.edu.tr, https://orcid.org/0000-0002-4297-4212

[**] Assoc. Prof., Department of Corporate Finance, Faculty of Economics and Sociology, University of Lodz, Lodz-Poland, e-mail: monika.bolek@uni.lodz.pl, https://orcid.org/0000-0001-9376-1105

[***] Prof., Department of Accounting and Financial, Faculty of Economics and Business, Universidad de Almeria, Almeria-Spain, e-mail: jetrini@ual.es, https://orcid.org/0000-0002-5017-2615

INTRODUCTION

COVID-19 not only harmed human health but also threatened the global markets causing economic recession across the world. China is of great importance in the COVID-19 pandemic as the country where the virus developed, but it is also here that the process of supply chain collapse began as many common products were made there and stopped reaching other economies. Moreover, the world's most crowded tourist group, the Chinese, couldn't go out of the country and visit popular touristic places. COVID-19 affected tourism sector radically due to travel restrictions and prohibitions.

During the first phases of COVID-19 pandemic, borders were closed as well as restaurants, museums, theatres, theme parks and airports, even Tokyo Olympics was postponed. International tourist arrivals were down by a global average of –44% in the months January–April 2020. Reduced revenues from tourism had a broader impact and reduced global GDP by 1.5% to 2.8% in 2021. Nowadays a more resilient and inclusive tourism model built on the principles of sustainability for people, planet, and prosperity is needed (UNWTO, 2021).

On the other hand, financial markets were also affected by COVID-19. According to International Financial Corporation, the impact of the pandemic on new loan disbursements was most significant for the riskier micro, small, and medium-sized enterprises and retail segments. Diversification of funding sources, client liquidity, digital transformation and risk management have become strategic for many business entities. The pandemic and associated economic crisis led to a short-term drop in demand for credit causing the financial problems in banking sector (IFC, 2021). Credit risk of corporate and retail clients of the banks have increased and management and operational systems have changed. Digital transformation, robotics solutions, artificial intelligence, mobility, FinTech, cloud technologies have become essential concepts. Finally, high volatility in stock markets negatively influenced banks' valuation reflecting the poor condition of this sector (Latorre, 2020: 8).

The aim of this study is to determine the effects of the number of COVID-19 cases on the tourism and banking sectors and to compare both dynamic processes. For this purpose, the stock prices of some companies representing these sectors were used in the analysis. Breakpoint Unit Root Tests and ARDL analysis are applied in this study, and the applications of dynamic models are related to testing the process of achieving long-term equilibrium and the existence of such a balance. The hypothesis states that COVID-19 had a significant impact on rates of return of selected companies representing the tourism and banking sectors and there was a difference between recovering processes related to the sector and the country the companies were operating on.

The paper is organized as follows: Section 1 is the literature review, after that data and methods are presented in Section 2 and then empirical results are presented in Section 3. Finally, conclusions of the study are presented.

1. LITERATURE REVIEW

There are some studies related to other pandemics published before the COVID-19 outbreak. Haacker (2004: 198–200) analyzed the impact of HIV/AIDS on Government Finance and Public Services. Moreover, Yach et al. (2006: 62–64) presented economic consequences of the global epidemics of obesity and diabetes. COVID-19 has been more severe in the consequences and there are many new studies presenting its influence in the fields of economy, socio-economy, economic policies, stock prices, trade, health care and environment. Some of them are presented below in a brief overview illustrating the issue we would like to discuss.

Pata (2020: 105) investigated the effects of the COVID-19 pandemic on economic policy uncertainty in the US and the UK. Lau (2020: 3) investigated the impacts of the trade war and the COVID-19 epidemic on China-United States economic relations. Goswami et al. (2021: 462–463) found that states with a better containment strategy, higher healthcare capabilities, and a relatively larger employment share of the primary sector have experienced smaller economic losses. Beyer et al. (2021: 10) stated that without effectively reducing the risk of a COVID-19 infection, voluntary mobility reductions would prevent a return to full economic potential, even when restrictions are relaxed. Wang and Han (2021: 8) found that the internal and external carbon emission indexes of most countries have decreased, which indicates that most countries are affected by the carbon reduction and energy consumption caused by the pandemic in the US. Acikgoz and Gunay (2020: 520) stated that COVID-19 had severe adverse effects on the employees, customers, supply chains and financial markets. De la Fuente (2021: 90) explained a comprehensive policy strategy and specific proposals were needed to protect the effects of COVID-19. Yoon (2021: 5) focused on the unequal distribution of output and employment shocks across businesses, workers, and households, through which the macroeconomic implications of the pandemic crisis were derived for the Korean economy. As can be noticed there is a large variety of issues discussed in the papers related to COVID-19, and most of them focus on the influence of the pandemic on the markets.

Socio-economic impact of COVID-19 was investigated in some studies. Paprottka et al. (2021: 1877) found, for example, that low GDP per capita countries experienced a more significant negative economic impact. Measurable differences in the socio-economic impact and the adaptation of safety protocols between high and low GDP per capita subgroups and between different world regions were observed. Rasheed et al. (2021: 19926) analysed the short-long-term effects of COVID-19 peak on the socio-economic and environmental aspects of Pakistan.

The impact of COVID-19 on financial sector was examined in some studies. For instance, Gormsen and Koijen (2020: 574–575) analysed the impact of coronavirus on stock prices and growth expectations. Ramelli and Wagner (2020: 622–655) explored feverish stock price reactions to COVID-19, the same as Just and Echaust (2021: 1) who examined how the data on new cases and death announcements from 12 countries affected the US stock market. Ganie et al. (2022: 1) analysed impact of COVID-19 on stock prices from selected economies, Kordestani et al. (2022: 3206) investigated effects of the COVID-19 on blockchain based companies. Al-Mughairi et al. (2021: 1), Liu et al. (2022: 1), Carter et al. (2022: 1), Henseler et al. (2022: 1) and Korinth (2022: 1) analyzed the impact of COVID-19 on tourism sector in various countries.

The effect of COVID-19 on environment was also investigated in the financial literature. Fezzi and Fanghella (2020: 885) demonstrated that high-frequency electricity market data can estimate the causal, short-run impact of COVID-19 on the economy. Wang and Zhang (2021: 2) found that generally, the spillover effect of China's economic recovery on other countries' economic growth is much more than other countries' energy consumption. Mele and Magazzino (2021: 2669) explored the relationship between pollution emissions, economic growth and COVID-19 deaths in India.

Other aspect treated by the literature is the impact of COVID-19 on the health sector. Wang (2020: 177604) managed the cross-border risk efficiently during the epidemic prevention and control. Ogundepo et al. (2020: 1–2) assessed multidimensional healthcare and economic data on COVID-19 in Nigeria. Lasaulce et al. (2021: 1–2), analyzed the tradeoff between health and economic impacts of the COVID-19.

According to studies in literature it has been documented that COVID-19 negatively affects many sectors. Our analysis is designed to support the findings presented in the literature from a different point of view.

2. DATA AND METHOD

In this section, definitions of Breakpoint Unit Root Tests and Autoregressive Distributed Lag Cointegration Technique are presented.

2.1. Breakpoint unit root tests

The first unit root to consider structural breaks analysis began with Perron (1989: 1361). This method has been developed (Zivot and Andrews, 1992: 25–44; Lumsdaine and Papell, 1997: 212–218; Perron, 1997: 355–385; Bai and Perron, 1998: 47–78; Ng and Perron, 2001: 1519–1554; Lee and Strazicich, 2003: 1082–1089; Lee and Strazicich, 2004; Kapetanios, 2005: 123–133; Carrion-i-Silvestre et al., 2009: 1754–1792) and currently alternative tests that can perform unit root analysis in the presence of structural breaks can be applied (Altay and Yilmaz, 2016: 78)

These tests, also called new generation or second-generation unit root tests, are divided into two groups. One can perform unit root analysis under multiple structural breaks in series, while in other test methods, unit root analysis can be performed up to one or at most two structural breaks (Bai and Perron, 1998: 47–78; Kapetanios, 2005: 123–133; Carrion-i-Silvestre et al., 2009: 1754–1792).

2.2. Autoregressive distributed lag (ARDL) cointegration technique

The ARDL multifunctional model developed by Pesaran and Shin (1998: 371–413), Pesaran et al. (2001: 289–326) can be used as an alternative to the cointegration tests that examine other long-term relationships (Belloumi, 2014: 269–287). ARDL is related to cointegration or bound procedure in a long-run, irrespective of whether the underlying variables are I(0), I(1) or a combination of both (Nkoro and Uko, 2016: 76). In the ARDL model, long-term prediction results are more important than other methods (Harris and Sollis, 2003: 80–81). In addition, one of the important advantages of this test is that even when the number of observations is small, the results can be significant (Duasa, 2007: 91).

For ARDL model can be presented as follows:

$$Y_t = \partial_0 + \partial_1 X_t + \partial_2 Z_t + e_t \tag{1}$$

A model equation in the form of:

$$\Delta y_t = \partial_0 + \sum_{i=1}^{p} \beta_i \Delta y_{t-i} + \sum_{i=0}^{p} \delta_i \Delta x_{t-i} + \sum_{i=0}^{p} \lambda_i \Delta z_{t-i} + a_1 y_{t-1} + a_2 x_{t-1} + a_3 z_{t-1} + u_t \tag{2}$$

$$\Delta y_t = \partial_0 + \sum_{i=1}^{p} \beta_i \Delta y_{t-i} + \sum_{i=0}^{p} \delta_i \Delta x_{t-i} + \sum_{i=0}^{p} \lambda_i \Delta z_{t-i} + u_t \tag{3}$$

is tested.

In equations (2) and (3) ∂, β, α and λ represent the parameters, while *u* represents the error. In this method, the best model should first be found among all ARDL models (Pesaran et al., 2001: 289–326; Erdogan and Dayan, 2019: 508).

ARDL models help to identify the dependent variables (endogenous) and the independent variables (exogenous) (Shakil et al., 2018: 65). These models focus on the exogenous variables and the selection of the correct lag structure from both endogenous and the exogenous variables. In this study, the number of COVID-19 cases was defined as the exogenous variable and the relative changes of stock prices as the endogenous variable.

There are several tests of ARDL that can be implemented. Ramsey Reset Test, Breusch-Godfrey Serial Correlation LM Test, Heteroskedasticity Test, Bounds Test, CUSUM Tests, cointegrating form and long-run coefficients is the basic conditions of the model (Nkoro and Uko, 2016: 63–91). After making necessary transformations in ARDL model equivalents, unlimited and limited ARDL model equations, also called Bounds test, are estimated. H0: α1 = α2 = α3 = 0. Estimated F account value (Pesaran et al., 2001: 289–326) the null hypothesis (H0) is rejected and the alternative hypothesis (H1) is accepted. In this case, it is assumed that there is a long-term co-integrated relationship between the variables y, x, z, and so, it is decided that a regression model can be created with variables that are stationary at different levels (Shrestha, 2006; Erdogan and Tatar, 2021).

This bound F-statistic is carried out on each of the variables as they stand as endogenous variable while others are assumed as exogenous variables (Nkoro and Uko, 2016: 63–91).

In ARDL analysis, the CUSUM test is used to determine the model's parameter stability and structural breaks (Brown et al.,1975: 154).

2.3. Causes of indebtedness

In the study, total cases of COVID-19 and stock prices of companies operating in the tourism and banking sectors are taken into consideration. The choice of these two sectors was considered appropriate because they were the most affected by a pandemic situation and in the countries taken into consideration tourism and banking sector plays an important role. Since ARDL is an appropriate model for the analysis of time series, stock prices are used as data.

The selection has been made according to the European Union members' financing and tourism contribution to GDP.

These countries include Greece, Portugal, Netherlands, Luxembourg, Austria, Slovenia, Croatia, Italy and Spain.

In total, nine countries and 54 companies were chosen, but most of them are not included in this study according to the test results.

Finally, Croatia, Italy and Spain and the companies representing these economies were chosen for the analysis with the GDP impact as presented in Table 1.

Table 1. The share of selected countries from GDP on a sectoral basis

Country	Tourism Sector			Banking Sector		
Year	2019	2020	2021	2019	2020	2021
Croatia	24.8%	13.2%	16.1%	75.23%	86.08%	77.79%
Italy	10.6%	6.1%	9.1%	108.7%	123%	115.5%
Spain	14.0%	5.9%	8.5%	113.4%	131.8&	119.65%

Source: www2.

Selected tourism and banking companies traded on the stock markets are surveyed.

The following companies (as presented in Table 2) are included in the study. Data comes from Yahoo Finance (www1) and Our World in Data (www2) services.

Table 2. Variable information and data sources

Names of Variables	Definition of Variables	Country	Sector	Date	Number of Observa-tions	Source
IKBA	Istarska Kreditna Banka Umag	Croatia	Banking	02/25/2020-06/17/2021	83	www1
PLAG	Plava Laguna D.D.	Croatia	Tourism	02/25/2020-06/18/2021	131	www1
GVI	I Grandi Viaggi	Italy	Tourism	01/31/2020-06/23/2021	355	www1
AMS	Amadeus	Spain	Tourism	01/31/2020-06/23/2021	357	www1
BBVA	BBVA Bank	Spain	Banking	01/31/2020-06/23/2021	357	www1

Source: own study.

The number of daily COVID-19 cases was matched with the stock release days.

Weekends and holidays could not be taken into consideration because there was no stock market data for these days.

The recovery period is not the same for the several stocks/countries. It is due to the number of stock data published by stock exchanges.

3. EMPIRICAL RESULTS

Below empirical results of the research are presented. Breakpoint unit root tests and ARDL results of this study are shown in this section. Table 3 includes unit root tests of variables.

Table 3. Breakpoint unit root tests of variables

Variable	Break Type	ADF test	Lag Length	Max Lag	Breakdate	t -statistic	p -value	Remark
Total_Cases_ IKBA	Innovational outlier	1st Difference	0	11	08/04/2020	-6.802998	< 0.01	I(1)
IKBA	Innovational outlier	Level	0	11	03/27/2020	-6.310382	< 0.01	I(0)
Total_Cases_ PLAG	Innovational outlier	Level	0	12	10/22/2020	-4.536807	0.0391	I(0)
PLAG	Innovational outlier	Level	3	12	05/20/2021	-5.241619	0.0155	I(0)

Total_Cases_GVI	Innovational outlier	Level	9	16	10/16/2020	-4.542700	0.0385	I(0)
GVI	Innovational outlier	1st Difference	0	16	06/08/2020	-20.13912	< 0.01	I(1)
Total_Cases AMS_BBVA	Innovational outlier	1st Difference	14	16	03/15/2021	-4.936055	0.0396	I(1)
AMS	Innovational outlier	Level	0	16	03/03/2020	-4.931381	0.0402	I(0)
BBVA	Innovational outlier	Level	0	16	03/09/2020	-4.540269	0.0483	I(0)

Source: own study.

According to Table 3 all prices and total cases are stationary at level "I(0)" or 1st Difference "I(1)".

Unit roots are present and all p-values are less than 5% indicating the significance.

A stationary time series does not depend on the time at which the series is observed (Hyndman and Athanasopoulos, 2018).

In this part each company's stock prices and total cases of COVID-19 will be analyzed separately, and the results are presented in Tables 4–8.

Table 4. Main results of ARDL and short-run coefficients of IKBA and total cases of COVID-19

Dependent Variable: IKBA, Selected Model: ARDL(7, 0)				
Variable	Coefficient	Std. Error	t-Statistic	Prob.*
IKBA(-1)	0.398911	0.116937	3.411336	0.0011
IKBA(-2)	0.087572	0.126012	0.694953	0.4895
IKBA(-3)	0.287205	0.131597	2.182465	0.0326
IKBA(-4)	0.139184	0.137883	1.009437	0.3165
IKBA(-5)	-0.029100	0.124782	-0.233205	0.8163
IKBA(-6)	-0.076536	0.113322	-0.675381	0.5018
IKBA(-7)	-0.231634	0.100664	-2.301056	0.0246
TOTAL_CASES	3.41E-05	7.44E-06	4.583966	0.0000
C	539.7817	111.3400	4.848050	0.0000
R-squared	0.914309	Akaike info criterion		10.25702
Adjusted R-squared	0.903922	Schwarz criterion		10.53512
F-statistic	88.02560	Hannan-Quinn criter		10.36806
Prob(F-statistic)	0.000000	Durbin-Watson stat		1.841356

Source: own study.

Table 5. Main results of ARDL and short-run coefficients of PLAG and total cases of COVID-19

Dependent Variable: PLAG, Selected Model: ARDL(4, 0)				
Variable	Coefficient	Std. Error	t-Statistic	Prob.*
PLAG(-1)	0.601021	0.085422	7.035933	0.0000
PLAG(-2)	0.341428	0.100727	3.389620	0.0009
PLAG(-3)	0.148735	0.100958	1.473231	0.1433
PLAG(-4)	-0.300383	0.084413	-3.558489	0.0005
TOTAL_CASES	1.44E-05	3.49E-06	4.136170	0.0001
C	286.4877	63.42658	4.516840	0.0000
R-squared	0.899780	Akaike info criterion		9.980362
Adjusted R-squared	0.895639	Schwarz criterion		10.11473

F-statistic	217.2694	Hannan-Quinn criter.	10.03496
Prob(F-statistic)	0.000000	Durbin-Watson stat	2.026600

Source: own study.

Table 6. Main results of ARDL and short-run coefficients of GVI and total cases of COVID-19

Dependent Variable: GVI, Selected Model: ARDL(3, 0)				
Variable	Coefficient	Std. Error	t-Statistic	Prob.*
GVI(-1)	0.981779	0.053332	18.40875	0.0000
GVI(-2)	0.068252	0.075043	0.909509	0.3637
GVI(-3)	-0.101552	0.052429	-1.936932	0.0536
TOTAL_CASES	5.54E-10	1.47E-10	3.773558	0.0002
C	0.041228	0.010914	3.777496	0.0002
R-squared	0.970199	Akaike info criterion		-4.100067
Adjusted R-squared	0.969855	Schwarz criterion		-4.045186
F-statistic	2824.200	Hannan-Quinn criter.		-4.078227
Prob(F-statistic)	0.000000	Durbin-Watson stat		2.000729

Source: own study.

Table 7. Main results of ARDL and short-run coefficients of AMS and total cases of COVID-19

Dependent Variable: AMS, Selected Model: ARDL(8, 0)				
Variable	Coefficient	Std. Error	t-Statistic	Prob.*
AMS(-1)	0.951255	0.053768	17.69177	0.0000
AMS(-2)	0.096144	0.074403	1.292202	0.1972
AMS(-3)	-0.175470	0.074383	-2.358993	0.0189
AMS(-4)	0.156755	0.074383	2.107395	0.0358
AMS(-5)	-0.170456	0.074381	-2.291677	0.0225
AMS(-6)	0.091842	0.074205	1.237681	0.2167
AMS(-7)	0.108321	0.074189	1.460071	0.1452
AMS(-8)	-0.118963	0.052377	-2.271295	0.0238

TOTAL_CASES	2.77E-08	7.65E-09	3.616110	0.0003
C	2.779551	0.655672	4.239241	0.0000
R-squared	0.961328	Akaike info criterion		3.749381
Adjusted R-squared	0.960301	Schwarz criterion		3.859842
F-statistic	936.3290	Hannan-Quinn criter.		3.793353
Prob(F-statistic)	0.000000	Durbin-Watson stat		2.001614

Source: own study.

Table 8. Main results of ARDL and short-run coefficients of BBVA and total cases of COVID-19

Dependent Variable: BBVA, Selected Model: ARDL(8, 0)				
Variable	Coefficient	Std. Error	t-Statistic	Prob.*
BBVA(-1)	0.950548	0.053578	17.74123	0.0000
BBVA(-2)	0.070370	0.073192	0.961448	0.3370
BBVA(-3)	-0.078378	0.072525	-1.080700	0.2806
BBVA(-4)	0.063731	0.072747	0.876068	0.3816
BBVA(-5)	0.051546	0.073024	0.705878	0.4807
BBVA(-6)	-0.191403	0.072988	-2.622402	0.0091
BBVA(-7)	0.250146	0.073607	3.398381	0.0008
BBVA(-8)	-0.155189	0.052120	-2.977553	0.0031
TOTAL_CASES	2.79E-09	6.44E-10	4.332096	0.0000
C	0.097914	0.026977	3.629478	0.0003
R-squared	0.987974	Akaike info criterion		-1.606044
Adjusted R-squared	0.987655	Schwarz criterion		-1.495584
F-statistic	3094.389	Hannan-Quinn criter.		-1.562073
Prob(F-statistic)	0.000000	Durbin-Watson stat		1.983012

*Note: p-values and any subsequent tests do not account for model selection.

Source: own study.

As shown in the Tables 4–8 coefficients are statistically significant.

The effect of IKBA variable 1, 3 and 7 times delayed on total cases is statistically significant. The R^2 value is 0.914309, which means that 91.43% of the variation in IKBA can be explained by total cases jointly. This value is very high for estimation. The effect of PLAG variable 1, 2 and 4 delayed on total cases is statistically significant. The R^2 value is 0.899780. It means 89.97% of the variation in PLAG can be explained by Total Cases jointly. This value is very high for estimation. The effect of GVI variable 1 and 3 delayed on total cases is statistically significant. The R^2 value is 0.970199, which means that 97.01% of the variation in GVI can be explained by Total Cases jointly. This value is very high for estimation. The effect of AMS variable 1, 3, 4,5 and 8 delayed on total cases is statistically significant. The R^2 value is 0.961328, which means that 96.13% of the variation in AMS can be explained by total cases jointly. This value is very high for estimation. The effect of BBVA variable 1, 6, 7 and 8 delayed on total cases is statistically significant. The R^2 value is 0.987974, which means that 98.79% of the variation in BBVA can be explained by Total Cases jointly. This value is very high for estimation. All the P-values of F-statistics is 0.0000, which indicates that all models are fit.

The diagnostic test results of variables are presented in Table 9.

Table 9. Diagnostic test results of variables

Variable	Ramsey Reset Test			Breusch-Godfrey Serial Correlation LM Test		Heteroskedasticity Test: Breusch-Pagan-Godfrey	
	F tests	df	p-value	F tests	p-value	F tests	Prob. F
IKBA	3.858557	1, 65	0.06	1.169502	0.3171	1.850886	0.0831
				Obs R-squ.	Prob. Chi-Squ.	Obs R-squ.	Prob. Chi-Squ.
				2.644376	0.2666	13.74300	0.0887
PLAG	0.686408	1, 120	0.4090	1.631227	0.20	1.613454	0.1615
				Obs R-squ.	Prob. Chi-Squ.	Obs R-squ.	Prob. Chi-Squ.
				3.388871	0.1837	7.938055	0.1597
GVI	0.057257	1, 346	0.8110	0.226611	0.7973	0.968291	0.4249
				Obs R-squ.	Prob. Chi-Squ.	Obs R-squ.	Prob. Chi-Squ
				0.461811	0.7938	3.885604	0.4217

AMS	3.618658	1, 338	0.0580	0.481663	0.6182	1.117716	0.3493
				Obs R-squ.	Prob. Chi-Squ.	Obs R-squ.	Prob. Chi-Squ.
				0.994785	0.6081	10.05773	0.3458
BBVA	.010253	1, 338	0.9194	1.680137	0.1879	1.005626	0.4351
				Obs R-squ.	Prob. Chi-Squ.	Obs R-squ.	Prob. Chi-Squ.
				3.445571	0.1786	9.075317	0.4304

Source: own study.

According to results presented in Table 9, Ramsey Reset Test's P-Value of IKBA is 0.06, P-Value of PLAG is 0.4090, P-Value of GVI is 0.8110, P-Value of AMS is 0.0580, P-Value of BBVA is 0.9194. These values are more than the critical significance level (5%). Therefore, this ARDL models are properly specified.

Breusch-Godfrey Serial Correlation LM Test's P-values for IKBA are 0.3171 and 0.2666, P-values for PLAG are 0.20 and 0.1837, P-values for GVI are 0.7973 and 0.7938, P-values for AMS are 0.6182 and 0.6081, P-values for BBVA are 0.1879 and 0.1786. These values are more than 0.05. Therefore, it proves the residual obtained from the ARDL models are free from serial correlation.

Heteroskedasticity Test: Breusch-Pagan-Godfrey's P-values for IKBA are 0.0831 and 0.0887, P-values for PLAG are 0.1615 and 0.1597, P-values for GVI are 0.4249 and 0.4217, P-values for AMS are 0.3493 and 0.3458, P-values for BBVA are 0.4351 and 0.4304. These values are more than 0.05. Therefore, there is no Heteroscedasticity problem for all these models.

Table 10. Bounds test results of variables and total cases of COVID-19

Test Statistic	Value	k
F-statistic (IKBA)	11.34667	1
F-statistic (PLAG)	11.04567	1
F-statistic (GVI)	9.206990	1
F-statistic (AMS)	11.34667	1
F-statistic (BBVA)	11.02968	1

Critical Value Bounds		
Significance	I(0) Bound	I(I) Bound
10%	4.04	4.78
5%	4.94	5.73
2.5%	5.77	6.68
1%	6.84	7.84

Source: own study.

According to Table 10, bounds test coefficients of all variables were above the upper limit of critical values. This suggests that there is a long-term mutual cointegration between all variables and total cases.

Table 11. Cointegrating and long run form results of IKBA and total cases of COVID-19

Dependent Variable: IKBA, Selected Model: ARDL(7, 0)				
Cointegrating Form				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(IKBA(-1))	-0.176692	0.110506	-1.598934	0.1146
D(IKBA(-2))	-0.089120	0.111694	-0.797894	0.4278
D(IKBA(-3))	0.198085	0.113276	1.748689	0.0850
D(IKBA(-4))	0.337270	0.115406	2.922452	0.0048
D(IKBA(-5))	0.308170	0.105100	2.932166	0.0046
D(IKBA(-6))	0.231634	0.100664	2.301056	0.0246
D(TOTAL_CASES)	0.000034	0.000007	4.583966	0.0000
CointEq(-1)	-0.424397	0.087291	-4.861870	0.0000
Cointeq = IKBA - (0.0001*TOTAL_CASES + 1271.8788)				
Long Run Coefficients				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
TOTAL_CASES	0.000080	0.000008	9.716401	0.0000
C	1271.878825	14.352448	88.617553	0.0000

Source: own study.

Table 12. Cointegrating and long run form results of PLAG and total cases of COVID-19

Dependent Variable: PLAG, Selected Model: ARDL(4, 0)				
Cointegrating Form				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(PLAG(-1))	-0.189780	0.083924	-2.261337	0.0255
D(PLAG(-2))	0.151648	0.086065	1.762014	0.0806
D(PLAG(-3))	0.300383	0.084413	3.558489	0.0005
D(TOTAL_CASES)	0.000014	0.000003	4.136170	0.0001
CointEq(-1)	-0.209199	0.045754	-4.572307	0.0000
Cointeq = PLAG - (0.0001*TOTAL_CASES + 1369.4491)				
Long Run Coefficients				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
TOTAL_CASES	0.000069	0.000012	5.887912	0.0000
C	1369.449108	20.016058	68.417523	0.0000

Source: own study.

Table 13. Cointegrating and long run form results of GVI and total cases of COVID-19

Dependent Variable: GVI, Selected Model: ARDL(3, 0)				
Cointegrating Form				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(GVI(-1))	0.033300	0.052254	0.637262	0.5244
D(GVI(-2))	0.101552	0.052429	1.936932	0.0536
D(TOTAL_CASES)	0.000000	0.000000	3.773558	0.0002
CointEq(-1)	-0.051520	0.012629	-4.079428	0.0001
Cointeq = GVI - (0.0000*TOTAL_CASES + 0.8002)				
Long Run Coefficients				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
TOTAL_CASES	0.000000	0.000000	4.837670	0.0000
C	0.800224	0.045733	17.497829	0.0000

Source: own study.

Table 14. Cointegrating and long run form results of AMS and total cases of COVID-19.

Dependent Variable: AMS, Selected Model: ARDL(8, 0)				
Cointegrating Form				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(AMS(-1))	0.011828	0.052475	0.225401	0.8218
D(AMS(-2))	0.107972	0.052491	2.056935	0.0405
D(AMS(-3))	-0.067498	0.052523	-1.285122	0.1996
D(AMS(-4))	0.089256	0.052525	1.699313	0.0902
D(AMS(-5))	-0.081200	0.052540	-1.545482	0.1232
D(AMS(-6))	0.010642	0.052384	0.203157	0.8391
D(AMS(-7))	0.118963	0.052377	2.271295	0.0238
D(TOTAL_CASES)	0.000000	0.000000	3.616110	0.0003
CointEq(-1)	-0.060573	0.013359	-4.534062	0.0000
Cointeq = AMS - (0.0000*TOTAL_CASES + 45.8880)				
Long Run Coefficients				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
TOTAL_CASES	0.000000	0.000000	4.320044	0.0000
C	45.887952	2.127706	21.566870	0.0000

Source: own study.

Table 15. Cointegrating and long run form results of BBVA and total cases of COVID-19

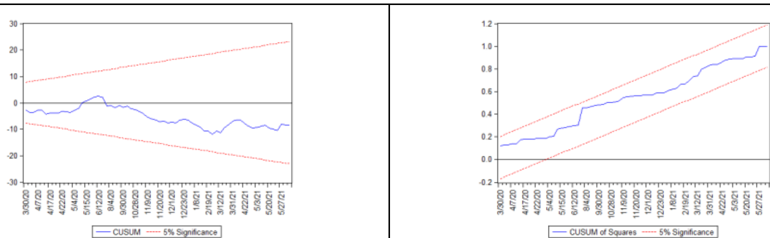
Dependent Variable: BBVA, Selected Model: ARDL(8, 0)				
Cointegrating Form				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(BBVA(-1))	-0.010823	0.052386	-0.206603	0.8364
D(BBVA(-2))	0.059547	0.052112	1.142678	0.2540
D(BBVA(-3))	-0.018831	0.051859	-0.363119	0.7167
D(BBVA(-4))	0.044900	0.051830	0.866301	0.3869
D(BBVA(-5))	0.096446	0.051793	1.862143	0.0634
D(BBVA(-6))	-0.094957	0.051877	-1.830419	0.0681

D(BBVA(-7))	0.155189	0.052120	2.977553	0.0031
D(TOTAL_CASES)	0.000000	0.000000	4.332096	0.0000
CointEq(-1)	-0.038628	0.009022	-4.281707	0.0000
Cointeq = BBVA - (0.0000*TOTAL_CASES + 2.5348)				
Long Run Coefficients				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
TOTAL_CASES	0.000000	0.000000	5.937586	0.0000
C	2.534762	0.234462	10.810972	0.0000

Source: own study.

Tables 11–15 show ARDL Cointegrating and Long Run Coefficients. The term represented as CointEq(-1) is negative for all variables with an associated coefficient estimate of -0.424397 for IKBA, -0.209199 for PLAG, -0.051520 for GVI, -0.060573 for AMS and -0.038628 for BBVA. All coefficients range from 0 to 1 and they are statistically significant at 5%. This implies that for IKBA about 42.43% of any movements into disequilibrium are corrected for within one period. Thus, deviations in the short run will be balanced after 2.38 periods. This value implies that for PLAG the speed of adjustment towards long-run equilibrium is 20.91%. Deviations in the short run will be balanced after 5 periods. This implies that for GVI about 5.15% of any movements into disequilibrium are corrected for within one period. Deviations in the short run will be balanced after 20 periods. This value implies that for AMS the speed of adjustment towards long-run equilibrium is 6.05%. Deviations in the short run will be balanced after 16 periods. This implies that for BBVA about 3.86% of any movements into disequilibrium are corrected for within one period. Thus, deviations in the short run will be balanced after 33 periods. According to Long Run Coefficients table, all variables of total cases are statistically significant at 5%.

Variable: IKBA



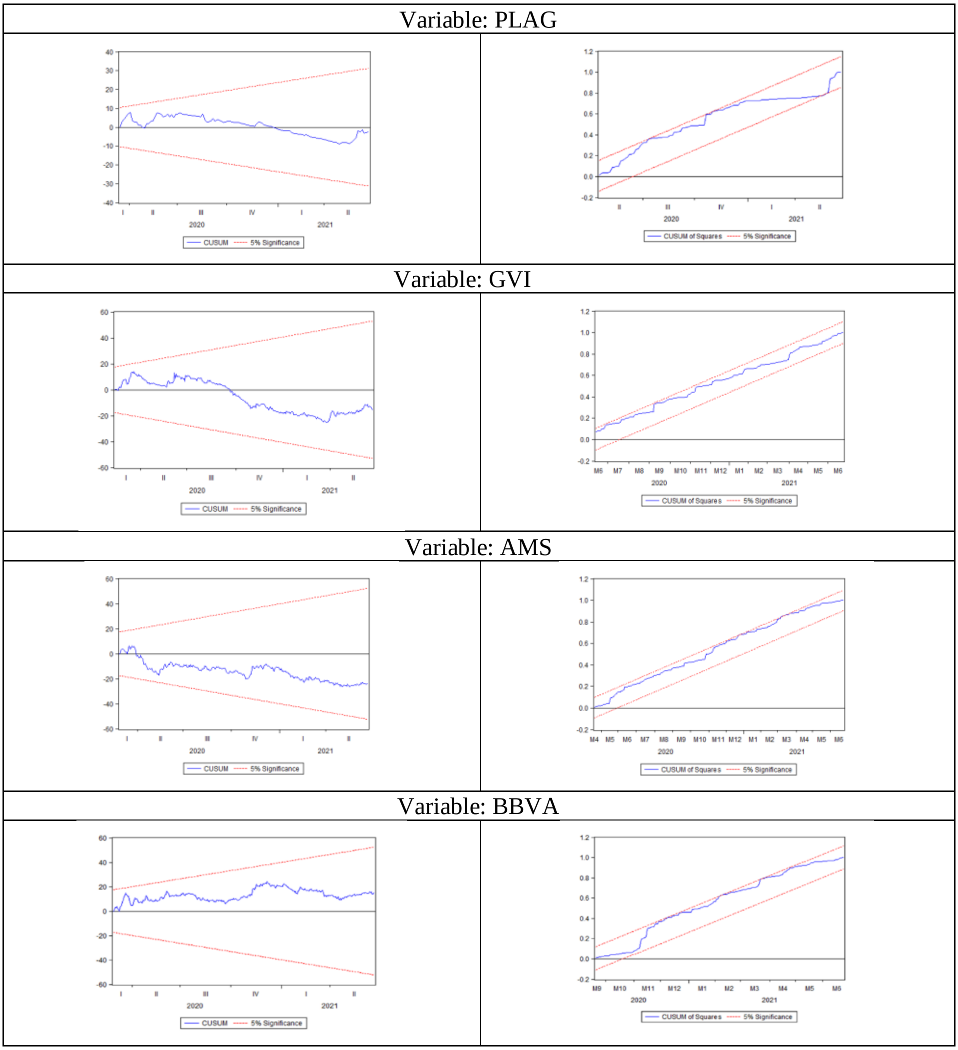


Figure 1. CUSUM and CUSUM of squares tests of variables and total cases of COVID-19

Source: own study.

The Figure 1 shows that the blue line runs between the red lines in the CUSUM and the CUSUM of squares graphs. Therefore, it means all models are stable at a 5% significance level.

The results indicate that COVID-19 affected both tourism and banking sectors.

Table 16. Deviation Balance of Variables

Variable	Periods	Country	Sector
IKBA	2.38	Croatia	Banking
PLAG	5	Croatia	Tourism
GVI	20	Italy	Tourism
AMS	16	Spain	Tourism
BBVA	33	Spain	Banking

Source: own study.

According to Table 16, deviations in the short run will be balanced after 2.38 periods in IKBA variable and 5 periods in PLAG variable. These periods are short for other companies in Italy and Spain. This result shows that the tourism sector in Croatia recovers longer than the banking sector.

The only one variable GVI analyzed in Italy is in the tourism sector. Deviations in the short run will be balanced after 20 periods. This period is also quite long by other companies in Croatia and but short in AMS variable in Spain.

On the other side, deviations in the short run will be balanced after 16 periods in AMS variable and 33 periods in BBVA variable. AMS variable recovers shorter than GVI in Italy but longer than IKBA and PLAG variables in Croatia. Contrary to the results in Croatia this result shows that the banking sector in Spain recovers longer than the tourism sector. BBVA variable recovers itself in the longest time according to market recovery time.

The dynamic models can examine the equilibrium of the market and the time that is necessary to achieve the balance after the information, like the number of new COVID-19 cases announcement, influence the market. According to this study five companies representing touristic and banking sectors in Croatia, Italy and Spain were selected. The findings show that the number of total cases impacted the tourism and banking markets.

According to main results of ARDL and short-run coefficients all models are fit. Diagnostic test results of variables are more than the critical significance level and ARDL models are properly specified, free from serial correlation. There is no heteroscedasticity problem for all. Bounds test coefficients of all variables were above the upper limit of critical values. Stability tests, short-run and long-run forecasts are fixed for all countries and sectors. Changes of total cases have a significant short-run impact on variables.

Based on the results of cointegrating and long run, short-run effects of total cases persist on long-term.

There was a difference in the recovery time between sectors and countries recognized. The results indicate that the short-term deviations in the ARDL model with Bounds coefficient and Error Mode values were balanced after minimum 2.38 and maximum 33 periods, and there was a difference in the recovery time between sectors and countries.

According to results of CUSUM and CUSUM of squares tests of variables all models are stable at a 5% significance level.

In line with the data from the stock prices, the results show that COVID-19 has affected both the tourism and banking sectors.

CONCLUSIONS

COVID-19 number of cases influenced the exchanges and rates of return around the world. Most of the research results related to the beginning of pandemics reported the negative reaction of markets but within the time passing the situation has changed. There are sectors that gained on pandemics compared to others. For instance, Nasdaq Composite Index can be an example of a high growth in the time of pandemic. In the study presented in this paper, the influence of COVID-19 number of cases of selected companies' stocks returns representing tourism and banking sectors in countries with high tourism share in their GDP is analyzed.

These results corroborate the findings of a great deal of the previous works. This finding is consistent with that of Goswami et al. (2021) who found that larger employment dependence on secondary and tertiary sector have suffered significantly larger economic losses due to COVID-19. These results reflect those of Yoon (2021) who also found that in the financial and manufacturing sectors, output and employment have changed in an opposite direction during the COVID-19 pandemic. Additionally, Rasheed et al. (2021) reported that Pakistan's struggling tourism sector is likely to encounter an economic loss of approximately USD 6 million in 2020. According to Ramelli and Wagner (2020) the virus situation in China improved relative to the situation in Europe and in the United States, investors perceived those companies more favorably again. Just and Echaust (2021) found that the numbers of COVID-19 cases and deaths reported in China are negatively correlated with these reported in other countries.

In summary, during the period studied, COVID-19 has a deep impact for both tourism and banking sector in the short-run and long-run. In the investigation of the relationship between the total number of COVID-19 cases and the stock prices of banking and tourism companies of selected countries. They conclude that periodic differences are mean and significant, and that the values of dependent and independent variables in the model are also effective in determining stock prices.

It must be noted that in the literature there are few studies with the ARDL model applied, especially when the COVID-19 issue is taken into consideration. We expect that this study can influence future analysis in the field of dynamic analysis of market processes. Future study, with the same method, can be applied in different sectors and countries to recognize the recovery time of the systems.

FUNDING

This research received no specific grant from any funding agency in the public, commercial, or not-for-profit sectors.

DISCLOSURE STATEMENT

The authors report no conflicts of interest.

This study is the extended version of the paper presented orally in SCF International Conference on "Economic, Social, and Environmental Sustainability in the Post Covid-19 World", Istanbul, Türkiye. 2–3 December 2022.

BIBLIOGRAPHY

Acikgoz O. and Gunay A. (2020), The Early Impact of The COVID-19 Pandemic on the Global and Turkish Economy, *Turkish Journal of Medical Sciences*, 50(SI-1), pp. 520–526.

Al-Mughairi M. S. H., Bhaskar, P., Khalfan Hamood Alazri, A. (2021), The economic and social impact of COVID-19 on tourism and hospitality industry: A case study from Oman, *Journal of Public Affairs*, pp. 1–11.

Altay H. & Yilmaz A. (2016), Turkiye'de Ihracat Artislarinin Istihdam Uzerindeki Etkisinin Incelenmesi, *Finans Politik ve Ekonomik Yorumlar Dergisi*, pp. 75–86.

Bai J. and Perron P. (1998), Estimating and Testing Linear Models with Multiple Structural Changes, *Econometrica*, 66(1), pp. 47–78.

Belloumi M. (2014), The Relationship Between Trade, FDI and Economic Growth in Tunisia: An application of the autoregressive distributed lag model, *Economic Systems*, 38(2), pp. 269-287.

Beyer R. C., Franco-Bedoya S. Galdo V. (2021), Examining the Economic Impact Of COVID-19 in India Through Daily Electricity Consumption and Night Time Light Intensity, *World Development*, pp. 1–13.

Brown R. L., Durbin J., Evans J. M. (1975), Techniques for Testing the Constancy of Regression Relationships Over Time, *Journal of the Royal Statistical Society*, pp. 149-192.

Carrion-i-Silvestre J. L., Kim D., Perron P. (2009), GLS-Based Unit Root Tests with Multiple Structural Breaks Under Both the Null and the Alternative Hypotheses, *Econometric Theory*, pp. 1754–1792.
Carter D., Mazumder S., Simkins, B., Sisneros E. (2022), The Stock Price Reaction of The COVID-19 Pandemic On The Airline, Hotel, And Tourism Industries, *Finance Research Letters*, pp. 1–15.
De la Fuente A. (2021), The Economic Consequences of COVID in Spain and How to Deal With Them, *Applied Economic Analysis*, pp. 90–104.
Duasa J. (2007), Determinants of Malaysian Trade Balance: An ARDL Bound Testing Approach, *Global Economic Review*, 36(1), pp. 89-102.
Erdogan S. and Dayan V. (2019), Analysis of Relationship Between International Interest Rates and Cryptocurrency Prices: Case for Bitcoin and LIBOR, Blockchain Economics and Financial Market Innovation. Financial Innovations in the Digital Age. Editor: Umit Hacioglu, Springer, Switzerland.
Erdogan S. & Tatar H. E. (2021), Turkiye'de Uluslararasi Portföy Yatirimlarinin Icsel Faktorleri Uzerine Ardl Analizi. *Uluslararasi Ekonomi ve Siyaset Bilimleri Akademik Arastirmalar Dergisi*, 5(12), pp. 1–17.
Fezzi C. and Fanghella V. (2020), Real-time Estimation of The Short-Run Impact of COVID-19 on Economic Activity Using Electricity Market Data, *Environmental and Resource Economics*, 76(4), pp. 885–900.
Ganie I. R., Wani T. A., Yadav M. P. (2022), Impact Of COVID-19 Outbreak on the Stock Market: An Evidence From Select Economies, *Business Perspectives and Research*, pp. 1–15.
Gormsen N. J. and Koijen R. S. (2020), Coronavirus: Impact on Stock Prices and Growth Expectations, *The Review of Asset Pricing Studies*, 10(4), pp. 574–597.
Goswami B., Mandal R., Nath H. K. (2021), COVID-19 Pandemic and Economic Performances of the States in India, *Economic Analysis and Policy*, pp. 461–479.
Haacker M. (2004), The impact of HIV/AIDS on Government Finance and Public Services, *The Macroeconomics of HIV/AIDS*.
Harris R. and Sollis R. (2003), Applied Time Series Modelling And Forecasting, Wiley.
Henseler M., Maisonnave H., Maskaeva A. (2022), Economic impacts of COVID-19 on the tourism sector in Tanzania, *Annals of Tourism Research Empirical Insights*, pp. 1–12.
Hyndman R.J. and Athanasopoulos G. (2018), Forecasting: Principles and Practice, 2nd Edition, Otexts.
IFC (2021), The Early Impact of COVID-19 on Financial Institutions, International Financial Corporation.
Just M. and Echaust, K. (2021), Stock Market Returns, Volatility, Correlation and Liquidity During the COVID-19 Crisis: Evidence from the Markov switching approach, *Finance Research Letters*, pp. 1–8
Kapetanios G. (2005), Unit-Root Testing Against the Alternative Hypothesis of up to M Structural Breaks, *Journal of Time Series Analysis*, 26(1), pp. 123–133.
Kordestani A., Pashkevich, N., Oghazi, P., Sahamkhadam, M., Sohrabpour, V. (2022), Effects Of The COVID-19 Pandemic on Stock Price Performance Of Blockchain-

Based Companies, *Economic Research-Ekonomska Istraživ*anja, 35(1), pp. 3206–3224.

Korinth B. (2022), Impact Of The COVID-19 Pandemic On International Tourism Income In Tourism Receiving Countries, *Sustainability*, pp. 1–12.

Lasaulce S., Zhang C., Varma V., Morărescz I. C. (2021), Analysis Of The Tradeoff Between Health and Economic Impacts of the COVID-19 Epidemic, *Frontiers in Public Health*, no. 9 pp. 1–13.

Latorre G. (2020), Standing Firm on Shifting Sands, Global banking *M&A Outlook H2 2020*, KPMG International.

Lau L. J.(2020), The Impacts of the Trade War and the COVID-19 Epidemic on China-US Economic Relations, *China Review*, 20(4), pp. 1–38.

Lee J., and Strazicich M. C. (2003), Minimum Lagrange Multiplier Unit Root Test with Two Structural Breaks, *Review of Economics and Statistics*, 85(4), pp, 1082–1089.

Lee J. & Strazicich M. C. (2004), Minimum Lagrange Multiplier Unit Root Test with One Structural Break, Department of Economics Working Papers, no. 04-17.

Liu Y., Cheng X., Liao S. S., Yang F. (2022), The Impact of COVID-19 on the Tourism and Hospitality Industry: Evidence From International Stock Markets, *The North American Journal of Economics and Finance*, pp. 1–23.

Lumsdaine R. L. and Papell D. H. (1997), Multiple Trend Breaks and the Unit-Root Hypothesis, *Review of economics and Statistics*, 79(2), pp. 212–218.

Mele M. and Magazzino C. (2021), Pollution, Economic Growth, And COVID-19 Deaths In India: Machine Learning Evidence, *Environmental Science and Pollution Research*, 28(3), pp. 2669–2677.

Ng S. and Perron P. (2001), Lag Length Selection and The Construction of Unit Root Tests with Good Size And Power, *Econometrica*, 69(6), pp. 1519–1554.

Nkoro E. and Uko A. K. (2016), Autoregressive Distributed Lag (ARDL) Cointegration Technique: Application and Interpretation, *Journal of Statistical and Econometric Methods*, vol. 5(4), pp. 63–91.

Ogundepo E., Folorunso S., Adekanmbi O., Akinsande O., Banjo O., Ogbuju E., Babajide O. (2020), An Exploratory Assessment of a Multidimensional Healthcare and Economic Data on COVID-19 In Nigeria, *Data in Brief*, pp. 1–14.

Paprottka F. J., Rolfes S. B., Richter D. F., Kaye K. O. (2021), COVID-19 Pandemic: Evaluation of Socio-Economic Impact on Aesthetic Plastic Surgery Providers, *Aesthetic Plastic Surgery*, pp. 1877–1887.

Pata U. K. (2020), COVID-19 Induced Economic Uncertainty: A Comparison Between the United Kingdom and the United States, *Ekonomika*, 99(2), pp. 104–115.

Perron P. (1989), The Great Crash, the Oil Price Shock, And the Unit Root Hypothesis, *Econometrica: Journal of the Econometric Society*, pp. 1361-1401.

Perron P. (1997), Further Evidence on Breaking Trend Functions in Macroeconomic Variables, *Journal of Econometrics*, 80(2), pp. 355–385.

Pesaran M. H. & Shin Y. (1998), An Autoregressive Distributed-Lag Modelling Approach to Cointegration Analysis, *Econometric Society Monographs*, pp. 371–413.

Pesaran M. H., Shin Y., Smith R. J. (2001), Bounds Testing Approaches to the Analysis Of Level Relationships, *Journal of Applied Econometrics*, 16(3), pp. 289–326.

Ramelli S. and Wagner A. F. (2020), Feverish Stock Price Reactions to COVID-19, *The Review of Corporate Finance Studies*, 9(3), pp. 622–655.
Rasheed R., Rizwan A., Javed H., Sharif F., Zaidi A. (2021), Socio-Economic and Environmental Impacts Of COVID-19 Pandemic in Pakistan an Integrated Analysis, *Environmental Science and Pollution Research*, 28(16), pp. 19926–19943.
Shakil M. H., Tasnia M., Saiti B. (2018), Is Gold A Hedge or a Safe Haven? An Application of ARDL Approach, *Journal of Economics, Finance and Administrative Science*, 23(44), pp. 60-76.
Shrestha M. B. (2006), ARDL Modelling Approach to Cointegration Test. University of Wollongong, New South Wales, Australia and Nepal Rastra Bank – the Central bank of Nepal.
UNWTO (2021), Recommendations for the Transition to a Green Travel and Tourism Economy, World Tourism Organization.
Wang C. H. (2020), A Three-Level Health Inspection Queue Based on Risk Screening Management Mechanism for Post-COVID Global Economic Recovery, *IEEE Access*, pp. 177604–177614.
Wang Q. and Han X. (2021), Spillover Effects of The United States Economic Slowdown Induced by COVID-19 Pandemic on Energy, Economy, And Environment In Other Countries, *Environmental Research*, pp. 1–10.
Wang Q. and Zhang F. (2021), What Does the China's Economic Recovery after COVID-19 Pandemic Mean for The Economic Growth and Energy Consumption of Other Countries?, *Journal of Cleaner Production*, pp. 1–20.
Yach D., Stuckler D., Brownell K. D. (2006), Epidemiologic and Economic Consequences of The Global Epidemics of Obesity and Diabetes, *Nature medicine*, 12(1), pp. 62–66.
Yoon Y. H. (2021), The Macroeconomic Implications of The COVID-19 Economic Crisis, *Investigación Económica*, 80(316), pp. 5–31.
Zivot E. and Andrews D. W. K. (1992), Further Evidence on the Great Crash, the Oil-Price Shock and the Unit-Root Hypothesis, *Journal of Business & Economic Statistics*, 20(1), pp. 25–44.
(www1) Yahoo Finance – *https://finance.yahoo.com/* [Accessed 24.06.2021].
(www2) Our World in Data – *https://ourworldindata.org/coronavirus* [Accessed 24.07.2021].

Zakończenie recenzji/ End of review: 19.03.2023
Przyjęto/Accepted: 20.03.2023
Opublikowano/Published: 27.03.2023