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RESEARCH ARTICLE

Spillover Effects of Stock Markets in the COVID-19 Pandemic Period: Evidence From Central and East European Countries

COVID-19 Pandemi Döneminde Hisse Senedi Piyasalarının Yayılma Etkileri: Orta ve Doğu Avrupa Ülkeleri Kanıtları

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ABSTRACT
This study aims to investigate the correlation and the spillover effects between Central and East European (CEE) Countries' stock markets during the Covid-19 Pandemic Period. CEE countries are listed as Bulgaria, Croatia, the Czech Republic, Hungary, Poland, Romania, the Slovak Republic, Slovenia, Estonia, Latvia, and Lithuania by OECD. The data set was obtained from the Bloomberg data services and includes 308 observations of daily returns between March 11th, 2020 and August 1st, 2021. As a result of the empirical analysis using the Pearson Correlation, the Multivariate VAR Model, and the Granger Causality Test, a high correlation was found between the stock markets of CEE countries, and 15 causality relationships were determined. The analysis also revealed bidirectional relationships between the Bulgaria Stock Exchange Index and Romania Bucharest Stock Exchange Index, the Polish Warsaw Stock Exchange Index and Croatia Zagreb Stock Exchange Index, the Romania Bucharest Stock Exchange Index and Bulgaria Stock Exchange Index, and the Croatia Zagreb Stock Exchange Index and Polish Warsaw Stock Exchange Index. High correlation and causality relationships, which are also supported by impulse-response and variance decomposition test results, reveal that there is a spillover effect between the stock markets of CEE countries.

Keywords: Stock markets, Pearson correlation, Granger causality test, COVID-19 pandemic period, CEE countries
JEL Classification: C58, F30, F31

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1. Introduction

Globalization and the development of technology have facilitated the portfolio allocation transactions of international investors. International financial markets have become more globalized and so more open to capital inflows and outflows (Beji & Xiii, 2007). Thereby, international capital may solve developing countries' economic and social problems (Balcerzak & Zurek, 2011). However, this integration also creates spillover effects between stock markets and this situation may affect the returns and risks faced by international investors (Silvia, Zulpahmi & Sumardi, 2019).

Central and East European countries cover Central and Eastern Europe, the Baltics, Eastern Europe, and Southeast Europe (Balkans) and refer to the former communist states in Europe from the Eastern Bloc and Warsaw Pact. The academic literature often uses the abbreviations CEE or CEEc for this term. The Organization for Economic Cooperation and Development (OECD) also uses the term "Central and Eastern European Countries (CEECs)" for a group of countries including Albania, Bulgaria, Croatia, Czech Republic, Hungary, Poland, Romania, the Slovak Republic, Slovenia, Estonia, Latvia, and Lithuania. In this study, all of these countries, except Albania, for which we could not obtain reliable data, were included.

Within the framework of monetary expansions during the pandemic period, the aim of this study is to answer the following research questions:

- √ Is there any correlation between the stock markets of CEECs?
- √ Is there a spillover effect between the stock markets of CEECs?

The spillover effect study was conducted using a Multivariate VAR Model and the Granger Causality Test. As the first step, we used the Pearson Correlation Coefficient analysis and observed a high correlation (a correlation above 0.50) between many of the stock market indices. Afterward, the shock effects of all stock indices on volatility in other market returns were analyzed by using the Impulse Response Function Variance Decomposition analysis over 10 days. According to the results of the analysis, in all stock markets, except Romania

Bucharest Stock Exchange, first-day shocks have an effect on stock index returns. These shocks increased from the second day to the tenth day. Finally, the Granger Causality Test was used to determine the causality relationships and their directions. This analysis reveals bidirectional relationships between the Bulgaria Stock Exchange Index and Romania Bucharest Stock Exchange Index, the Polish Warsaw Stock Exchange Index and Croatia Zagreb Stock Exchange Index, the Romania Bucharest Stock Exchange Index and Bulgaria Stock Exchange Index, and the Croatia Zagreb Stock Exchange Index and Polish Warsaw Stock Exchange Index. Thereby, the empirical analysis of our study reveals that there is a spillover effect between the stock markets of CEE countries COVID-19 Pandemic Period.

The findings of this study regarding the correlation and spillover effect observed between the stock markets of CEE countries can guide the academicians who work on the economies of these countries and for the investors who are at the stage of investing in the stock markets of CEE countries. Considering the spillover effect between markets can reduce the market risk of investments.

2. Literature Review

Diebold and Yılmaz (2010) investigated the spillover effect between stock market, bond market, foreign exchange market, and commodity market in the US between January 1999 and January 2010. In their study, they produced ever-changing indices for the spillover effect and found that the volatility spread in each of the four markets is not much different. However, their results showed the importance of spreading volatility from the US stock market to other markets during and after the subprime crisis.

Li and Giles (2015) examined the volatility spillover across the US, Japan, China, India, Indonesia, Malaysia, the Philippines, and Thailand stock markets for the period between January 1st, 1993 and December 31st, 2012. They observed a volatility spillover from the US to Asian developing economies and Japan. Bidirectional volatility spillover between the US and Asian markets is also observed during the Asian financial crisis.

Bajo-Rubio, Berke, and McMillan (2017) examined the spread of returns and volatility between the Turkish stock market and the international stock, exchange rate and commodity markets. They analyzed the data belonging to the 1999-2015 period. The key finding of their analysis is that there is a spillover effect across all markets and this effect has strengthened as a result of the 2008 financial crisis.

Kang, Eom, and Ok (2017) investigated spillover across nine emerging Credit Default Swap (CDS) markets (Brazil, China, Indonesia, Korea, Malaysia, Philippines, Russia, South Africa, and Thailand) using the multivariate DECO-GARCH Model. The data includes weekly CDS data from January 7th, 2005 to July 15th, 2016. Their results showed that the volatility spillover effect increased since the last global financial crisis. Therefore, their results supported the contagion effect during market turmoil.

Bozma and Başar (2018) analyzed the volatility transmission between the stock markets of Turkiye, Romania, Poland, Hungary, and Ukraine, using daily data from January 2011 to December 2016. The econometric analysis was carried out by using the BEKK-GARCH model. Their findings showed that the Turkish BIST100 Index was affected by the volatilities in the Polish and Hungarian stock markets.

Silvia et al. (2019) investigated the spillover effect and correlation between stock indices in Indonesia, Malaysia, Thailand, India, China, and Taiwan. They used Pearson Correlation, Multivariate VAR Model, and Granger Causality Test in their analysis. The data includes daily returns from May 13th, 2011 to October 17th, 2017. According to the results of the study, there is a low correlation between markets. The fluctuations of the Indonesian stock index have a spillover effect on all markets in Asia. It also revealed that there is a bidirectional relationship between the Indonesian market and the Thai, Indian, and Taiwanese markets, but only a one-way relationship between the Indonesian market and the Malaysian and Chinese markets.

Gulzar, Kayani, Xiaofeng, Ayub, and Rafique (2019) investigated the spillover effect of the global financial crisis in India, China, Pakistan, Malaysia, Russia, and Korea with data from July 1st, 2005 to June 30th, 2015. Johansen and Juselius

Cointegration Test, VECM, and GARCH-BEKK Model were used in the study. According to the results, the level of cointegration between the US market and the emerging stock markets increased after the crisis. VECM and the impulse response function revealed that a shock in the US financial market had a short-term effect on the returns of emerging financial markets.

Alkan and Çiçek (2020) examine the spillover effect between global economies and Turkiye, using BEKK and GARCH models. Their findings showed that there is a strong average spread from the global markets to the domestic stock and bond markets; from the stock and foreign exchange markets to the bond market; the return of the dollar to the stock market. These results indicated that Turkiye is tightly integrated into the global markets.

Berberoğlu (2020) examined the volatility and spillover effects between the stock markets of Turkiye, Italy, Russia, and Greece from January 1st, 2010 to December 31st, 2018, by using cointegration, ARCH-LM, VAR, and VAR-MGARCH models. The results of the study showed that the volatility spillover effect is effective in all stock markets.

Yousaf, Ali, and Wong (2020) used the VAR-AGARCH Model to examine stock index returns and volatility transfers from the US and China to India, Indonesia, Korea, Malaysia, Pakistan, Philippines, and Taiwan. Their comprehensive analysis revealed that both returns and volatility spreads differ between different stock pairs during financial crises. Their findings showed a significant spillover from the US to Asian stock markets during the US financial crisis and the Chinese stock market crash. This indicates that US stock prices play an important role in predicting the prices of the majority of Asian stock markets over the entire period and all sub-periods.

This study aims to guide academics who work on the economies of CEE countries and investors who are at the stage of deciding to invest in these markets by using the current data of the COVID-19 Pandemic Period. In this process, where volatility is high in stock markets, taking into account the spillover effect between the markets will reduce the market risk of investments.

3. Empirical Methods

We used the time series data, including daily closing prices of the stock markets, of Central and Eastern European countries which were obtained from the Bloomberg data services, and the E-views 9 econometric analysis program in order to perform the empirical analysis.

The data covers the period from March 11th, 2020, which was the declaration date of the global epidemic by the World Health Organization, to August 1st, 2021, and includes 308 observations. These are the observations of the days when all markets were open at the same time.

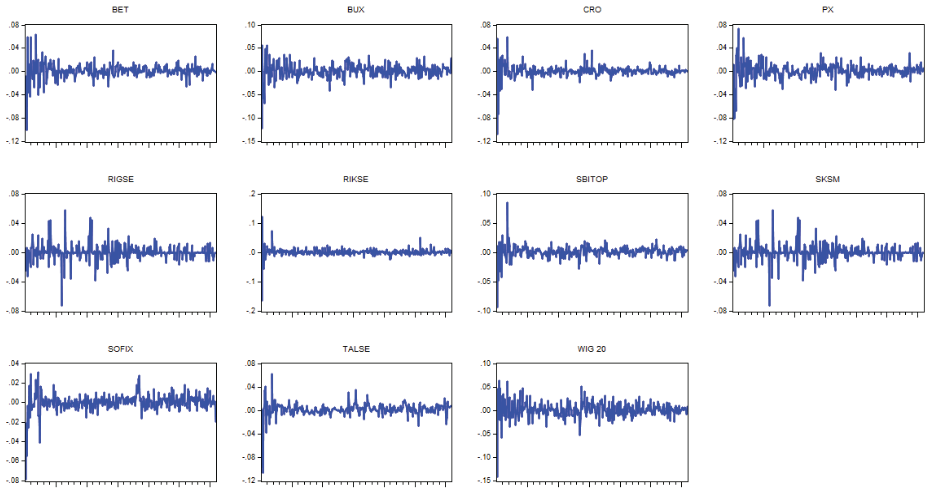
Table 1 contains the stock market indices of the Central and East European countries to which the observations belong.

Table 1. Variables

BET	Romania Bucharest Stock Exchange Index
BUX	Hungary Budapest Stock Exchange Index
CRO	Croatia Zagreb Stock Exchange Index
PX	The Czech Republic Stock Exchange Index
RIGSE	Latvia Stock Market Index (OMX Riga)
RIKSE	Lithuania Stock Market Index (OMX Vilnius)
SBITOP	Slovenia Ljubljana Stock Exchange Index
SKSM	Slovakia Stock Exchange Index
SOFIX	Bulgaria Stock Exchange Index
TALSE	Estonia Tallinn Stock Exchange Index
WIG20	Polish Warsaw Stock Exchange Index

Financial time series, such as currencies, stock indices, etc., are generally not stationary. Therefore, it is useful to analyze the root test of the series. In this study, we used Augmented Dickey-Fuller (ADF) (Dickey & Fuller, 1979, 1981) and Phillips-Perron (PP) unit root tests (Philips & Perron, 1988, pp. 335-346) to analyze the time series. According to the findings of ADF and PP unit root tests, t-statistics (probability values) were compared with the 5% MacKinnon critical values. Then, it was determined whether the series was stationary or not. The results of the analysis were tested against null and alternative hypotheses for stationarity (MacKinnon, 1996).

Figure 1. Daily Returns for Central and East European Countries' (CEEc) Stock Markets, March 11th, 2020 – August 1st, 2021



Afterwards, the Vector Autoregressive (VAR) Model developed by Sims (1980) was used to explore the dynamic linkage among the volatility of CEE Countries. Sims states that in the case of simultaneity among the variables, all variables should be treated equally and no distinction should be made in terms of internal and external variables (Gujarati, 2001, pp. 746-747). In addition, the use of the Least Squares method makes the estimation of the VAR Model easier (Maddala, 2001, p. 544). The VAR Model was analyzed by the following two equations:

$$y_{1t}=\alpha_{10}+\beta_{11}y_{1t\text{-}1}+\beta_{12}y_{2t\text{-}1}+\gamma_{11}y_{1t\text{-}1}+\gamma_{12}y_{2t\text{-}2}+\delta_{11}y_{1t\text{-}3}+\delta_{12}y_{2t\text{-}3}+u_{1t} \quad (1)$$

$$y_{2t}=\alpha_{20}+\beta_{21}y_{1t\text{-}1}+\beta_{22}y_{2t\text{-}1}+\gamma_{21}y_{1t\text{-}1}+\gamma_{22}y_{2t\text{-}2}+\delta_{21}y_{1t\text{-}3}+\delta_{22}y_{2t\text{-}3}+u_{2t} \quad (2)$$

Finally, since the number of lags of the variables in the VAR Model was high, making it difficult to determine the variable groups affecting the dependent variables, the Granger Causality Tests were used (Granger 1969; Granger & Newbold, 1974).

Causality tests seek an answer to the question "Do changes in cause changes in ?". In Granger causality, there may be a one-way or two-way causal relationship

Table 2. Descriptive Statistics of Daily Index Returns in CEE Countries

	BET	BUX	CRO	PX	RIGSE	RIKSE	SBITOP	SKSM	SOFIX	TALSE	WIG_20
Mean	0.0012	0.0011	0.0007	0.0012	0.0002	0.0009	0.0012	0.0001	0.0005	0.0015	0.0014
Median	0.0010	0.0011	0.0007	0.0014	0.0001	0.0004	0.0015	1.0005	0.0006	0.0014	0.0008
Maximum	0.0636	0.0563	0.0593	0.0737	0.0582	0.1209	0.0856	0.0582	0.0312	0.0616	0.0633
Minimum	-0.1007	-0.1227	-0.1073	-0.0816	-0.0723	-0.1634	-0.0938	-0.0723	-0.0788	-0.1060	-0.1425
Std. Dev.	0.0135	0.0162	0.0117	0.0141	0.0118	0.0155	0.0115	0.0118	0.0096	0.0123	0.0180
Skewness	-1.0720	-1.4234	-2.5633	-0.9465	-0.0543	-2.0945	-1.0415	-0.0465	-2.3605	-3.3115	-1.3290
Kurtosis	17.1892	15.2074	34.5928	13.8891	11.6099	56.1960	27.9817	11.6084	21.9191	35.6334	16.5004
Jarque-Bera	2642.78	2016.431	13146.26	1567.670	951.4971	36541.16	8064.786	951.1167	4879.502	14229.61	2429.684
Probability	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Sum	0.3696	0.3457	0.2145	0.3718	0.0519	0.2655	0.3688	0.0425	0.1442	0.4518	0.4237
Observation	308	308	308	308	308	308	308	308	308	308	308

Table 3. Analysis of Pearson Correlation Coefficients Among Stock Index Returns in CEE Countries

	BET	BUX	CRO	PX	RIGSE	RIKSE	SBITOP	SKSM	SOFIX	TALSE	WIG 20
BET	1.0000	0.4893	0.6190	0.5979	-0.0283	0.2064	0.5926	-0.0283	0.4826	0.5270	0.5155
BUX		1.0000	0.5821	0.6842	-0.0727	0.3521	0.5134	-0.0727	0.4367	0.4225	0.6177
CRO			1.0000	0.5798	-0.0109	0.5390	0.6751	-0.0109	0.4850	0.6177	0.5888
PX				1.0000	-0.0447	0.3414	0.5690	-0.0447	0.4754	0.5435	0.5774
RIGSE					1.0000	0.0489	0.0199	0.4454	0.0223	0.0393	-0.0868
RIKSE						1.0000	0.4450	0.0489	0.3037	0.4518	0.3344
SBITOP							1.0000	0.0199	0.5451	0.5923	0.5415
SKSM								1.0000	0.0223	0.0393	-0.0868
SOFIX									1.0000	0.4995	0.3221
TALSE										1.0000	0.4577
WIG 20											1.0000

between and , or there may be no relationship between these variables. This study investigates the causality relationship between CEE Countries' stock markets instead of the variables of and in the model.

4. Empirical Analyses and Discussions

It is useful to know the common trends of the series before the Granger Causality Test analysis. For this reason, it was necessary to examine the statistical information of the series. Table 2 shows the descriptive statistics of these series.

Because the negative skewness value and the kurtosis value were greater than 3, all return series did not follow the normal distribution. The skewness was negative for all variables; therefore, all stock index returns had a long left tail. A high kurtosis value means that series have heavy tails. In other words, all stock index returns have a leptokurtic distribution form that has a stronger peak and heavier tail compared to the normal distribution (Silvia et al., 2019).

Table 3 indicates The Pearson Correlation Coefficient among stock index returns. The correlation coefficient takes a range of values between -1 and +1. A value of 0 indicates that there is no relationship between the two variables. A value greater than 0 means a positive relationship between the two variables, that is, as the value of one variable increases, the value of the other variable also increases. A value less than 0 indicates a negative relationship between the two variables, that is, as the value of one variable increases, the value of the other variable decreases.

A correlation coefficient value between 0.10 and 0.30 indicates a low correlation, between 0.30 and 0.50 indicates a medium level correlation, and a correlation above 0.50 indicates a high level of correlation.

According to the results of the Pearson Correlation Coefficient analysis, a high correlation was observed between the following stock market indices:

- Romania Bucharest Stock Exchange Index-Croatia Zagreb Stock Exchange Index (0.6190)
- Romania Bucharest Stock Exchange Index-The Czech Republic Stock Exchange Index (0.598)
- Romania Bucharest Stock Exchange Index-Slovenia Ljubljana Stock Exchange Index (0.593)
- Romania Bucharest Stock Exchange Index-Estonia Tallinn Stock Exchange Index (0.527) Romania Bucharest Stock Exchange Index-Polish Warsaw Stock Exchange Index (0.515)
- Hungary Budapest Stock Exchange Index-Croatia Zagreb Stock Exchange Index (0.582)
- Hungary Budapest Stock Exchange Index-The Czech Republic Stock Exchange Index (0.684)
- Hungary Budapest Stock Exchange Index-The Czech Republic Stock Exchange Index (0.684)
- Hungary Budapest Stock Exchange Index-Slovenia Ljubljana Stock Exchange Index (0.513)
- Hungary Budapest Stock Exchange Index-Polish Warsaw Stock Exchange Index (0.618)
- Croatia Zagreb Stock Exchange Index-The Czech Republic Stock Exchange Index (0.580)
- Croatia Zagreb Stock Exchange Index-Lithuania Stock Market Index (0.539)
- Croatia Zagreb Stock Exchange Index-Estonia Tallinn Stock Exchange Index (0.618)
- Croatia Zagreb Stock Exchange Index-Slovenia Ljubljana Stock Exchange Index (0.675)
- Croatia Zagreb Stock Exchange Index-Polish Warsaw Stock Exchange Index (0.588)
- The Czech Republic Stock Exchange Index-Slovenia Ljubljana Stock Exchange Index (0.569)
- The Czech Republic Stock Exchange Index-Estonia Tallinn Stock Exchange Index (0.533)
- The Czech Republic Stock Exchange Index-Polish Warsaw Stock Exchange Index (0.577)
- Slovenia Ljubljana Stock Exchange Index-Bulgaria Stock Exchange Index (0.545)

- Slovenia Ljubljana Stock Exchange Index-Estonia Tallinn Stock Exchange Index (0.592)
- Slovenia Ljubljana Stock Exchange Index-Polish Warsaw Stock Exchange Index (0.542)

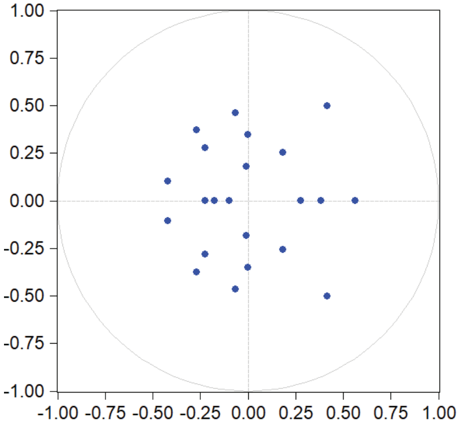
Table 4. Optimum Lag Length

Lag	LogL	LR	FPE (e-50)	AIC	SC	HQ
0	12490.26	NA	1.1700*	-83.7534*	-83.6169*	-83.6987*
1	12577.18	166.8365	1.4700	-83.5246	-81.8870	-82.8691
2	12636.83	110.0964	2.2300	-83.1129	-79.9741	-81.8565
3	12709.61	128.9553	3.1100	-82.7893	-78.1493	-80.9319
4	12794.56	144.2463	4.0200	-82.5473	-76.4062	-80.0891
5	12869.01	120.9189	5.6300	-82.2349	-74.5926	-79.1758
6	12974.72	163.8759*	6.4600	-82.1323	-72.9888	-78.4722
7	13071.46	142.8435	8.0100	-81.9695	-71.3248	-77.7085
8	13153.06	114.4537	1.1200	-81.7050	-69.5592	-76.8432
9	13261.35	143.9061	1.3300	-81.6197	-67.9728	-76.1570
10	13370.51	137.0035	1.6200	-81.5403	-66.3921	-75.4766

Notes: * indicates lag order selected by the criterion. FPE: Final prediction error, AIC: Akaike information criterion, SC: Schwarz information criterion, LR: sequential modified LR test statistic (each test at 5% level), HQ: Hannan-Quinn information criterion.

As seen in Table 4, FPE, AIC, and HQ values were in the same direction and 0. On the other hand, LR is based on a minimum of 6 lag lengths. Therefore, 6 lags were used in the study.

Figure 2. AR Characteristic Inverse Polynomial Roots in the Unit Circle



Finally, for the stationary variables, it should also be tested whether all the characteristic polynomial roots are contained within the unit circle to test the stability of the VAR model. The unit circle included all its characteristic roots, as seen in Figure 2. Therefore, there was no problem in terms of stationarity.

The stability of VAR model is required to construct a valid Impulse Response Function and Variance Decomposition analysis. The shock effects of all stock indices on volatility in other market returns can be analyzed by using the Impulse Response Function Variance Decomposition analysis over 10 days. In all stock markets, except Romania Bucharest Stock Exchange, first-day shocks had an effect on stock index returns. These shocks increased from the second day to the tenth day. These results are presented in Annex 1 and 2.

Table 5. Results of Granger Causality Test

Direction of Causality →		**Chi-square**	**Probability**
CRO	BET	14.3062	0.0264
SBITOP	BET	12.3057	0.0462
SOFIX	BET	12.3725	0.0498
PX	BUX	12.3348	0.0487
WIG 20	CRO	12.3840	0.0499
SOFIX	PX	12.1666	0.0433
TALSE	PX	12.3501	0.0470
CRO	RIGSE	15.4017	0.0174
WIG 20	RIKSE	12.3840	0.0499
CRO	SBITOP	15.4385	0.0171
CRO	SKSM	14.8527	0.0233
BET	SOFIX	12.2927	0.0458
CRO	SOFIX	14.4985	0.0245
RIKSE	SOFIX	12.3819	0.0498
CRO	WIG 20	14.9490	0.0207

Notes: The rejection of null hypotheses at 5 % ($p < 0.05$).

Table 5 presents the results of the Granger Causality Test. According to these results, there is a one-way relationship between the Croatia Zagreb Stock Exchange Index and Romania Bucharest Stock Exchange Index, the Slovenia Ljubljana Stock Exchange Index and Croatia Zagreb Stock Exchange Index, the The Czech Republic Stock Exchange Index and Hungary Budapest Stock Exchange

Index, the Bulgaria Stock Exchange Index and The Czech Republic Stock Exchange Index, the Estonia Tallinn Stock Exchange Index and The Czech Republic Stock Exchange Index, the Croatia Zagreb Stock Exchange Index and Latvia Stock Market Index, the Croatia Zagreb Stock Exchange Index and Slovakia Stock Exchange Index, the Croatia Zagreb Stock Exchange Index and Bulgaria Stock Exchange Index, and the Lithuania Stock Market Index and Bulgaria Stock Exchange Index.

On the other hand, Table 5 presents that there is a bidirectional relationship between the Bulgaria Stock Exchange Index and Romania Bucharest Stock Exchange Index, the Polish Warsaw Stock Exchange Index and Croatia Zagreb Stock Exchange Index, the Romania Bucharest Stock Exchange Index and Bulgaria Stock Exchange Index, and the Croatia Zagreb Stock Exchange Index and Polish Warsaw Stock Exchange Index.

5. Results

This study aims to contribute to the academic literature on the analysis of the correlation and the spillover effects between Central and East European (CEE) Countries' (Bulgaria, Croatia, the Czech Republic, Hungary, Poland, Romania, the Slovak Republic, Slovenia, Estonia, Latvia, and Lithuania) stock markets during COVID-19 Pandemic Period.

The data set was obtained from the Bloomberg data services and includes 308 observations of daily returns between March 11th, 2020 and August 1st, 2021. Firstly we used the Pearson Correlation Coefficient analysis. According to the results, a high correlation (a correlation above 0.50) was observed between many of the stock market indices. Afterward, the shock effects of all stock indices on volatility in other market returns were analyzed by using the Impulse Response Function Variance Decomposition analysis over 10 days. According to the results of the analysis, in all stock markets, except the Romania Bucharest Stock Exchange, first-day shocks had an effect on stock index returns. These shocks increased from the second day to the tenth day. Finally, the Granger Causality Test was used to determine the causality relationships and their directions. As a result, 15 causality relationships were determined. The analysis also reveals bidirectional relationships between the Bulgaria Stock Exchange Index and Romania Bucharest Stock Exchange Index, the Polish Warsaw Stock Exchange Index and Croatia Zagreb Stock Exchange Index, the Romania Bucharest Stock Exchange Index and Bulgaria Stock Exchange Index, and the Croatia Zagreb Stock Exchange Index and Polish Warsaw Stock Exchange Index. Thereby, the empirical analysis of our study reveals that there is a spillover effect between the stock markets of CEE countries in the Covid-19 Pandemic Period.

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Annex 1. Impulse Response Function (IRF) - 10-Day Period

Response of BET:											
Period	BET	BUX	CRO	PX	RIGSE	RIKSE	SBITOP	SKSM	SOFIX	TALSE	WIG_20
1	0.0114	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
2	-0.0011	-0.0017	-0.0008	0.0003	-0.0002	-0.0006	-0.0016	0.0004	- 0,0001	-0.0011	0.0004
3	0.0006	0.0018	0.0029	- 0,0001	-0.0003	0.0008	- 0,0001	- 0,0001	0.0014	0.0003	-0.0008
4	0.0003	0,0001	-0.0007	0.0006	-0.0002	-0.0004	-0.0005	0.0003	-0.0002	0.0001	0.0001
5	0.0003	0.0001	0.0004	0.0001	0.0001	0.0004	0.0003	-0.0002	0.0002	0.0004	-0.0003
6	0.0001	0.0000	0.0000	-0.0001	-0.0001	-0.0002	-0.0001	0.0001	0.0000	0.0003	0.0002
7	0.0000	0.0000	0.0000	0.0000	0.0000	0.0001	0.0001	-0.0001	0.0001	0.0000	0.0000
8	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0001	0.0000	-0.0001	0,0000
9	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	-0.0001	0.0000
10	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Response of BUX:											
Period	BET	BUX	CRO	PX	RIGSE	RIKSE	SBITOP	SKSM	SOFIX	TALSE	WIG_20
1	0.0058	0.0116	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
2	0.0014	0.0008	-0.0014	0.0028	0.0008	0.0009	-0.0010	-0.0006	0.0002	-0.0011	-0.0015
3	0.0019	0.0004	0.0024	-0.0006	0.0001	-0.0002	0.0007	-0.0001	-0.0002	0.0022	-0.0007
4	0.0002	-0.0003	-0.0003	-0.0001	-0.0004	-0.0006	-0.0005	0.0001	0.0001	0.0012	0.0007
5	0.0002	0.0002	0.0002	0.0000	0.0000	0.0008	0.0001	0.0000	0.0005	0.0002	0.0002
6	0.0003	0.0000	-0.0001	-0.0002	-0.0001	0.0000	0.0001	0.0002	0.0001	-0.0002	0.0002
7	0.0001	0.0000	0.0000	0.0000	0.0000	0.0000	0.0001	0.0000	0.0001	0.0001	-0.0001
8	0.0000	0.0001	0.0001	0.0000	0.0000	0.0000	-0.0001	0.0000	0.0000	-0.0001	-0.0001
9	0.0000	0.0001	0.0001	0.0001	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	-0.0001
10	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0001	0.0000

Annex 1. Continue

Response of CRO:											
Period	**BET**	**BUX**	**CRO**	**PX**	**RIGSE**	**RIKSE**	**SBITOP**	**SKSM**	**SOFIX**	**TALSE**	**WIG_20**
1	0.0046	0.0011	0.0070	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
2	0.0002	-0.0004	-0.0008	0.0004	-0.0003	0.0000	-0.0011	0.0006	-0.0001	-0.0003	0.0009
3	0.0005	0.0009	0.0018	0.0003	0.0001	0.0010	0.0002	0.0002	0.0006	0.0005	-0.0008
4	0.0004	0.0001	-0.0003	0.0001	-0.0002	-0.0005	-0.0003	0.0003	0.0000	0.0003	0.0002
5	0.0002	0.0001	0.0002	0.0001	0.0001	0.0002	0.0001	-0.0001	0.0002	0.0002	-0.0001
6	0.0001	0.0000	0.0000	-0.0001	0.0000	0.0000	-0.0001	0.0001	0.0000	0.0001	0.0001
7	0.0001	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0001	0.0000	0.0000
8	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
9	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
10	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Response of PX:											
Period	**BET**	**BUX**	**CRO**	**PX**	**RIGSE**	**RIKSE**	**SBITOP**	**SKSM**	**SOFIX**	**TALSE**	**WIG_20**
1	0.0067	0.0044	0.0017	0.0089	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
2	0.0007	0.0001	-0.0012	0.0007	0.0002	0.0002	-0.0011	-0.0005	0.0005	0.0007	-0.0015
3	0.0011	0.0009	0.0025	-0.0004	0.0000	-0.0005	0.0002	0.0000	0.0006	0.0028	-0.0003
4	0.0003	-0.0002	-0.0009	0.0001	-0.0004	-0.0001	-0.0004	0.0001	0.0002	0.0009	0.0009
5	0.0004	0.0001	0.0001	-0.0001	0.0001	0.0007	0.0004	0.0001	0.0004	0.0000	0.0002
6	0.0003	0.0000	-0.0001	-0.0002	-0.0002	-0.0002	0.0000	0.0002	0.0001	-0.0003	0.0002
7	0.0000	0.0000	0.0001	0.0001	0.0000	0.0001	0.0000	0.0000	0.0001	-0.0003	-0.0001
8	0.0000	0.0001	0.0001	0.0001	0.0000	0.0000	-0.0001	0.0000	0.0000	0.0000	-0.0001
9	0.0000	0.0000	0.0001	0.0001	0.0000	0.0000	0.0000	0.0000	0.0000	0.0001	-0.0001
10	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0001	0.0000

Annex 1. Continue

Response of RIGSE:											
Period	BET	BUX	CRO	PX	RIGSE	RIKSE	SBITOP	SKSM	SOFIX	TALSE	WIG_20
1	0.0005	-0.0006	0.0007	-0.0004	0.0114	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
2	0.0008	-0.0001	0.0012	-0.0011	-0.0014	-0.0003	-0.0011	-0.0001	0.0010	0.0006	0.0002
3	0.0006	-0.0006	-0.0009	-0.0002	-0.0001	-0.0001	-0.0001	0.0010	0.0003	-0.0003	-0.0012
4	-0.0001	0.0003	0.0005	0.0002	0.0000	0.0003	0.0000	0.0002	0.0002	-0.0001	0.0001
5	0.0000	0.0002	0.0001	0.0003	-0.0001	-0.0001	-0.0002	-0.0001	0.0001	0.0001	0.0000
6	0.0001	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0002	-0.0001
7	0.0001	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0001	0.0000
8	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
9	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
10	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Response of RIKSE:											
Period	BET	BUX	CRO	PX	RIGSE	RIKSE	SBITOP	SKSM	SOFIX	TALSE	WIG_20
1	0.0017	-0.0004	0.0018	0.0015	0.0004	0.0088	0.0000	0.0000	0.0000	0.0000	0.0000
2	0.0014	-0.0004	0.0003	-0.0002	-0.0008	-0.0031	0.0003	-0.0001	0.0006	0.0006	0.0002
3	0.0003	0.0001	-0.0005	-0.0002	-0.0002	-0.0006	-0.0003	-0.0009	0.0009	-0.0003	-0.0002
4	-0.0002	0.0003	0.0005	0.0003	0.0002	0.0010	-0.0002	0.0002	0.0001	-0.0002	-0.0001
5	0.0003	0.0002	0.0001	0.0001	-0.0002	-0.0002	0.0001	0.0001	0.0001	0.0001	-0.0001
6	0.0001	-0.0001	-0.0001	0.0000	0.0000	-0.0002	0.0000	-0.0001	0.0000	0.0001	0.0000
7	0.0000	0.0000	0.0001	0.0000	0.0000	0.0001	0.0000	0.0000	0.0000	0.0001	0.0000
8	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
9	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
10	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Annex 1. Continue

Response of SBITOP:											
Period	**BET**	**BUX**	**CRO**	**PX**	**RIGSE**	**RIKSE**	**SBITOP**	**SKSM**	**SOFIX**	**TALSE**	**WIG_20**
1	0.0048	0.0012	0.0024	0.0015	0.0002	0.0012	0.0074	0.0000	0.0000	0.0000	0.0000
2	0.0012	-0.0001	-0.0002	0.0004	0.0000	0.0002	-0.0010	0.0005	-0.0002	-0.0007	0.0006
3	0.0004	0.0008	0.0018	0.0009	0.0009	0.0007	0.0000	-0.0004	0.0011	-0.0001	-0.0008
4	0.0007	0.0003	0.0002	0.0001	-0.0002	-0.0004	-0.0004	0.0001	0.0002	0.0008	-0.0002
5	0.0003	0.0000	0.0001	0.0002	0.0000	0.0001	0.0000	-0.0001	0.0003	0.0005	-0.0002
6	0.0002	0.0001	0.0001	0.0000	-0.0001	0.0000	0.0000	0.0000	0.0001	0.0003	0.0001
7	0.0001	0.0000	-0.0001	0.0000	-0.0001	0.0000	0.0000	0.0000	0.0001	0.0001	0.0001
8	0.0001	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	-0.0001	0.0000
9	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0001	-0.0001	0.0000
10	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	-0.0001	0.0000

Response of SKSM:											
Period	**BET**	**BUX**	**CRO**	**PX**	**RIGSE**	**RIKSE**	**SBITOP**	**SKSM**	**SOFIX**	**TALSE**	**WIG_20**
1	0.0005	-0.0006	0.0007	-0.0004	0.0114	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
2	0.0008	0.0000	0.0011	-0.0011	-0.0014	-0.0003	-0.0011	0.0001	0.0010	0.0006	0.0002
3	0.0006	-0.0006	-0.0009	-0.0002	-0.0001	-0.0001	-0.0001	0.0010	0.0003	-0.0003	-0.0012
4	0.0000	0.0003	0.0005	0.0003	0.0000	0.0003	0.0000	0.0002	0.0002	-0.0001	0.0001
5	0.0000	0.0002	0.0001	0.0003	-0.0001	-0.0001	-0.0002	-0.0001	0.0001	0.0001	0.0000
6	0.0001	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0002	-0.0001
7	0.0001	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0001	0.0000
8	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
9	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
10	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Annex 1. Continue

Response of SOFIX:											
Period	**BET**	**BUX**	**CRO**	**PX**	**RIGSE**	**RIKSE**	**SBITOP**	**SKSM**	**SOFIX**	**TALSE**	**WIG_20**
1	0.0028	0.0009	0.0006	0.0009	-0.0001	0.0001	0.0009	-0.0003	0.0072	0.0000	0.0000
2	0.0010	0.0000	-0.0003	0.0007	-0.0004	-0.0001	-0.0008	0.0002	0.0003	0. 0001	-0.0005
3	0.0005	0.0004	0.0008	0.0005	0.0000	0.0009	0.0002	-0.0001	0.0011	-0.0001	-0.0007
4	0.0005	0.0003	0.0002	0.0002	-0.0002	-0.0004	-0.0002	0.0000	0.0002	0.0004	0.0000
5	0.0002	0.0001	0.0000	0.0002	0.0000	0.0001	0.0000	-0.0002	0.0003	0.0003	-0.0001
6	0.0002	0.0001	0.0001	0.0000	0.0000	0.0001	0.0000	0.0000	0.0001	0.0002	0.0000
7	0.0001	0.0000	0.0000	0.0000	-0.0001	0.0000	0.0000	0.0000	0.0001	0.0000	0.0001
8	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
9	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
10	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Response of TALSE:											
Period	**BET**	**BUX**	**CRO**	**PX**	**RIGSE**	**RIKSE**	**SBITOP**	**SKSM**	**SOFIX**	**TALSE**	**WIG_20**
1	0.0034	0.0010	0.0025	0.0017	0.0005	0.0013	0.0017	0.0008	0.0007	0.0073	0.0000
2	0.0004	-0.0012	-0.0019	-0.0002	-0.0003	-0.0006	-0.0003	0.0003	0.0003	0.0020	0.0013
3	0.0010	0.0003	0.0004	-0.0007	-0.0001	0.0008	0.0008	0.0000	0.0014	-0.0001	0.0007
4	0.0004	-0.0001	-0.0004	-0.0002	-0.0003	-0.0001	-0.0001	0.0004	0.0002	-0.0009	0.0004
5	0.0001	0.0002	0.0004	0.0002	0.0001	0.0003	0.0001	0.0000	0.0002	-0.0007	-0.0004
6	0.0000	0.0002	0.0003	0.0002	0.0001	-0.0001	-0.0002	0.0000	-0.0001	-0.0001	-0.0002
7	0.0000	-0.0001	0.0001	0.0002	0.0001	0.0000	-0.0001	-0.0001	0.0000	0.0002	-0.0002
8	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0002	0.0000
9	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0001	0.0001
10	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0001

Annex 1. Continue

					Response of WIG_20:						
Period	**BET**	**BUX**	**CRO**	**PX**	**RIGSE**	**RIKSE**	**SBITOP**	**SKSM**	**SOFIX**	**TALSE**	**WIG_20**
1	0.0066	0.0053	0.0020	0.0029	-0.0011	-0.0005	0.0015	-0.0002	-0.0018	0.0006	0.0114
2	-0.0004	-0.0013	-0.0020	-0.0007	-0.0002	0.0015	-0.0004	0.0000	-0.0005	-0.0022	-0.0006
3	0.0012	0.0004	0.0027	-0.0018	0.0008	0.0001	0.0009	0.0016	-0.0005	-0.0007	-0.0005
4	-0.0002	0.0000	-0.0002	0.0005	-0.0002	-0.0006	-0.0006	0.0002	-0.0002	-0.0005	0.0005
5	-0.0001	0.0003	0.0006	0.0004	0.0004	0.0007	-0.0001	-0.0001	0.0001	-0.0001	-0.0006
6	0.0002	0.0001	0.0001	0.0000	-0.0001	-0.0003	-0.0001	0.0001	-0.0001	0.0004	0.0000
7	0.0000	0.0000	-0.0001	0.0000	0.0000	-0.0001	0.0000	-0.0001	0.0001	0.0002	0.0001
8	0.0000	0.0000	0.0000	0.0000	0.0000	0.0001	0.0000	0.0000	0.0000	0.0001	0.0001
9	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
10	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	-0.0001	0.0000

Annex 2. Variance Decomposition of Variables (%)

					BET							
Period	S.E.	BET	BUX	CRO	PX	RIGSE	RIKSE	SBITOP	SKSM	SOFIX	TALSE	WIG_20
1	0.0114	100.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
2	0.0117	94.3545	1.9703	0.4188	0.0550	0.0388	0.2162	1.8822	0.1342	0.0017	0.8408	0.0875
3	0.0124	85.2235	3.9521	5.8383	0.0538	0.0772	0.5785	1.6977	0.1219	1.1926	0.8011	0.4634
4	0.0124	84.4123	3.9166	6.1364	0.2633	0.0935	0.6693	1.8708	0.1638	1.2016	0.8051	0.4675
5	0.0125	83.9899	3.9080	6.2081	0.2751	0.0973	0.7711	1.9082	0.1804	1.2243	0.9213	0.5164
6	0.0125	83.8717	3.9027	6.2008	0.2817	0.1042	0.8037	1.9108	0.1855	1.2231	0.9717	0.5442
7	0.0125	83.8497	3.9016	6.1995	0.2816	0.1042	0.8103	1.9122	0.1880	1.2354	0.9717	0.5458
8	0.0125	83.8438	3.9013	6.1990	0.2827	0.1043	0.8111	1.9121	0.1897	1.2353	0.9741	0.5466
9	0.0125	83.8413	3.9012	6.1988	0.2828	0.1043	0.8111	1.9121	0.1896	1.2357	0.9762	0.5467
10	0.0125	83.8404	3.9013	6.1991	0.2829	0.1043	0.8111	1.9122	0.1896	1.2357	0.9765	0.5470
					BUX							
Period	S.E.	BET	BUX	CRO	PX	RIGSE	RIKSE	SBITOP	SKSM	SOFIX	TALSE	WIG_20
1	0.0173	20.0243	79.9758	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
2	0.0137	19.1029	72.3258	1.0621	4.1171	0.3767	0.4024	0.5611	0.2070	0.0218	0.6060	1.2171
3	0.0143	19.4454	66.8765	3.7858	4.0003	0.3538	0.3907	0.7433	0.1944	0.0350	2.8362	1.3384
4	0.0143	19.1748	65.8925	3.7725	3.9407	0.4316	0.5789	0.8532	0.1945	0.0379	3.5446	1.5789
5	0.0144	19.1006	65.5876	3.7674	3.9215	0.4316	0.8617	0.8588	0.1937	0.1450	3.5404	1.5917
6	0.0144	19.1184	65.5002	3.7681	3.9278	0.4408	0.8614	0.8588	0.2103	0.1499	3.5545	1.6098
7	0.0144	19.1164	65.4731	3.7666	3.9262	0.4406	0.8612	0.8602	0.2104	0.1545	3.5796	1.6114
8	0.0144	19.1127	65.4620	3.7729	3.9265	0.4411	0.8619	0.8613	0.2107	0.1545	3.5834	1.6131
9	0.0144	19.1113	65.4580	3.7748	3.9283	0.4411	0.8618	0.8616	0.2107	0.1546	3.5836	1.6144
10	0.0144	19.1108	65.4559	3.7746	3.9284	0.4411	0.8619	0.8616	0.2107	0.1546	3.5858	1.6145

Annex 2. Continue

CRO												
Period	S.E.	BET	BUX	CRO	PX	RIGSE	RIKSE	SBITOP	SKSM	SOFIX	TALSE	WIG_20
1	0.0084	29.6017	1.7515	68.6468	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
2	0.0086	28.1865	1.8975	66.1490	0.2218	0.0834	0.0022	1.6599	0.5239	0.0048	0.1280	1.1429
3	0.0090	26.2637	2.6666	64.7310	0.2994	0.0995	1.1111	1.5640	0.5207	0.4638	0.4396	1.8405
4	0.0090	26.2357	2.6442	64.1865	0.3040	0.1268	1.4096	1.6373	0.5911	0.4595	0.5376	1.8677
5	0.0090	26.1846	2.6438	64.0089	0.3216	0.1276	1.4699	1.6451	0.6105	0.5235	0.5974	1.8672
6	0.0090	26.1843	2.6431	63.9743	0.3246	0.1294	1.4691	1.6473	0.6202	0.5235	0.6079	1.8762
7	0.0090	26.1859	2.6428	63.9614	0.3246	0.1300	1.4691	1.6487	0.6204	0.5332	0.6079	1.8761
8	0.0090	26.1862	2.6428	63.9591	0.3246	0.1300	1.4694	1.6487	0.6208	0.5333	0.6091	1.8761
9	0.0090	26.1858	2.6430	63.9583	0.3248	0.1300	1.4694	1.6486	0.6208	0.5337	0.6094	1.8762
10	0.0090	26.1857	2.6430	63.9580	0.3249	0.1300	1.4694	1.6487	0.6208	0.5337	0.6094	1.8763

PX												
Period	S.E.	BET	BUX	CRO	PX	RIGSE	RIKSE	SBITOP	SKSM	SOFIX	TALSE	WIG_20
1	0.0121	30.3021	13.4160	2.0505	54.2314	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
2	0.0124	29.2466	12.8264	2.8386	52.1415	0.0291	0.0345	0.8376	0.1730	0.1369	0.3088	1.4270
3	0.0130	27.0875	12.0000	6.1640	47.0411	0.0273	0.1889	0.7850	0.1564	0.3121	4.8875	1.3503
4	0.0132	26.6886	11.8195	6.5233	46.2336	0.1128	0.1875	0.8515	0.1553	0.3383	5.2936	1.7961
5	0.0132	26.6147	11.7565	6.4954	45.9858	0.1122	0.4579	0.9170	0.1569	0.4346	5.2643	1.8048
6	0.0132	26.6034	11.7331	6.4890	45.9151	0.1242	0.4757	0.9161	0.1710	0.4379	5.3108	1.8238
7	0.0132	26.5846	11.7255	6.4884	45.8832	0.1249	0.4779	0.9156	0.1714	0.4433	5.3571	1.8282
8	0.0132	26.5763	11.7254	6.4981	45.8719	0.1254	0.4786	0.9175	0.1719	0.4432	5.3589	1.8328
9	0.0132	26.5735	11.7248	6.4989	45.8694	0.1254	0.4791	0.9178	0.1721	0.4432	5.3610	1.8350
10	0.0132	26.5721	11.7242	6.4985	45.8671	0.1254	0.4791	0.9178	0.1722	0.4432	5.3656	1.8350

Annex 2. Continue

RIGSE												
Period	**S.E.**	**BET**	**BUX**	**CRO**	**PX**	**RIGSE**	**RIKSE**	**SBITOP**	**SKSM**	**SOFIX**	**TALSE**	**WIG_20**
1	0.0115	0.1632	0.3164	0.3219	0.1502	99.0483	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
2	0.0118	0.6508	0.2999	1.2864	0.9490	94.9372	0.0598	0.7950	0.0068	0.7583	0.2391	0.0177
3	0.0120	0.9035	0.5223	1.8284	0.9429	92.1412	0.0690	0.7749	0.6579	0.7786	0.3073	1.0741
4	0.0120	0.9002	0.5775	1.9774	0.9903	91.8019	0.1193	0.7720	0.6786	0.7925	0.3132	1.0771
5	0.0120	0.8989	0.6112	1.9802	1.0551	91.6532	0.1251	0.7862	0.6914	0.8057	0.3176	1.0754
6	0.0120	0.9043	0.6115	1.9795	1.0550	91.6221	0.1254	0.7860	0.6929	0.8056	0.3342	1.0837
7	0.0120	0.9059	0.6118	1.9792	1.0557	91.6056	0.1255	0.7860	0.6929	0.8054	0.3472	1.0850
8	0.0120	0.9061	0.6118	1.9795	1.0557	91.6023	0.1255	0.7860	0.6929	0.8061	0.3476	1.0865
9	0.0120	0.9062	0.6118	1.9795	1.0559	91.6007	0.1258	0.7861	0.6929	0.8063	0.3484	1.0867
10	0.0120	0.9062	0.6118	1.9795	1.0558	91.5999	0.1258	0.7861	0.6929	0.8063	0.3490	1.0867
RIKSE												
Period	**S.E.**	**BET**	**BUX**	**CRO**	**PX**	**RIGSE**	**RIKSE**	**SBITOP**	**SKSM**	**SOFIX**	**TALSE**	**WIG_20**
1	0.0093	3.3861	0.2147	3.7055	2.6337	0.1812	89.8789	0.0000	0.0000	0.0000	0.0000	0.0000
2	0.0100	4.9213	0.3569	3.3022	2.3040	0.8378	87.4646	0.0882	0.3225	0.3124	0.3669	0.0456
3	0.0101	4.8912	0.3522	3.5137	2.2851	0.8556	85.6277	0.1612	0.7987	1.0081	0.4344	0.0721
4	0.0102	4.8579	0.4390	3.7208	2.3403	0.8740	85.1930	0.2157	0.8285	0.9965	0.4509	0.0834
5	0.0102	4.9256	0.4584	3.7238	2.3456	0.9063	85.0251	0.2211	0.8267	1.0123	0.4668	0.0883
6	0.0102	4.9319	0.4613	3.7355	2.3441	0.9057	84.9869	0.2210	0.8315	1.0116	0.4807	0.0898
7	0.0102	4.9309	0.4618	3.7407	2.3435	0.9059	84.9767	0.2211	0.8313	1.0126	0.4848	0.0907
8	0.0102	4.9319	0.4620	3.7405	2.3434	0.9066	84.9729	0.2211	0.8314	1.0134	0.4850	0.0917
9	0.0102	4.9324	0.4620	3.7410	2.3435	0.9066	84.9714	0.2212	0.8314	1.0136	0.4853	0.0917
10	0.0102	4.9324	0.4620	3.7411	2.3435	0.9066	84.9711	0.2212	0.8314	1.0136	0.4855	0.0917

Annex 2. Continue

SBITOP												
Period	S.E.	BET	BUX	CRO	PX	RIGSE	RIKSE	SBITOP	SKSM	SOFIX	TALSE	WIG_20
1	0.0094	26.1036	1.6403	6.2148	2.5138	0.0273	1.5026	61.9975	0.0000	0.0000	0.0000	0.0000
2	0.0096	26.5267	1.5887	6.0135	2.5679	0.0273	1.4936	60.6073	0.2883	0.0228	0.4574	0.4065
3	0.0100	24.5197	2.0437	8.7936	3.2171	0.7850	1.7910	55.7201	0.4496	1.1877	0.4320	1.0605
4	0.0101	24.6366	2.1291	8.7196	3.1873	0.8334	1.8918	55.2259	0.4516	1.2145	0.6326	1.0776
5	0.0101	24.5828	2.1207	8.6846	3.2247	0.8298	1.9028	54.9702	0.4529	1.2677	0.8456	1.1183
6	0.0101	24.5743	2.1214	8.6761	3.2198	0.8339	1.9020	54.8840	0.4538	1.2760	0.9270	1.1316
7	0.0101	24.5746	2.1206	8.6748	3.2189	0.8363	1.9013	54.8604	0.4542	1.2911	0.9294	1.1389
8	0.0101	24.5757	2.1204	8.6737	3.2189	0.8363	1.9027	54.8539	0.4545	1.2930	0.9318	1.1392
9	0.0101	24.5752	2.1204	8.6738	3.2187	0.8363	1.9027	54.8512	0.4545	1.2935	0.9346	1.1392
10	0.0101	24.5748	2.1206	8.6742	3.2189	0.8363	1.9027	54.8501	0.4544	1.2935	0.9349	1.1395
SKSM												
Period	S.E.	BET	BUX	CRO	PX	RIGSE	RIKSE	SBITOP	SKSM	SOFIX	TALSE	WIG_20
1	0.0115	0.1666	0.3166	0.3197	0.1494	99.0463	0.0000	0.0000	0.0014	0.0000	0.0000	0.0000
2	0.0118	0.6535	0.3002	1.2876	0.9440	94.9420	0.0597	0.7900	0.0091	0.7565	0.2395	0.0179
3	0.0120	0.9054	0.5215	1.8268	0.9380	92.1490	0.0690	0.7702	0.6630	0.7763	0.3075	1.0735
4	0.0120	0.9021	0.5768	1.9763	0.9853	91.8092	0.1194	0.7673	0.6838	0.7902	0.3133	1.0764
5	0.0120	0.9007	0.6104	1.9791	1.0499	91.6608	0.1252	0.7815	0.6965	0.8033	0.3177	1.0748
6	0.0120	0.9061	0.6107	1.9784	1.0499	91.6297	0.1255	0.7813	0.6979	0.8032	0.3343	1.0830
7	0.0120	0.9077	0.6110	1.9780	1.0505	91.6132	0.1256	0.7813	0.6980	0.8031	0.3473	1.0843
8	0.0120	0.9079	0.6110	1.9784	1.0506	91.6099	0.1256	0.7813	0.6980	0.8038	0.3477	1.0858
9	0.0120	0.9080	0.6110	1.9784	1.0507	91.6083	0.1259	0.7814	0.6980	0.8039	0.3484	1.0860
10	0.0120	0.9080	0.6110	1.9784	1.0507	91.6076	0.1259	0.7814	0.6980	0.8040	0.3491	1.0860

Annex 2. Continue

SOFIX												
Period	S.E.	BET	BUX	CRO	PX	RIGSE	RIKSE	SBITOP	SKSM	SOFIX	TALSE	WIG_20
1	0.0079	12.5809	1.3225	0.5178	1.1645	0.0279	0.0213	1.3874	0.1740	82.8038	0.0000	0.0000
2	0.0081	13.4264	1.2728	0.6213	1.8328	0.2263	0.0280	2.3043	0.2516	79.7094	0.0050	0.3221
3	0.0083	13.0721	1.4885	1.4356	2.0903	0.2146	1.0873	2.2474	0.2443	77.1195	0.0054	0.9952
4	0.0083	13.2678	1.5909	1.4802	2.1435	0.2818	1.2487	2.2688	0.2412	76.2354	0.2576	0.9843
5	0.0084	13.2557	1.5912	1.4749	2.1913	0.2810	1.2632	2.2612	0.2857	76.0546	0.3496	0.9919
6	0.0084	13.2740	1.5945	1.4845	2.1895	0.2825	1.2706	2.2584	0.2865	75.9698	0.3959	0.9939
7	0.0084	13.2823	1.5939	1.4858	2.1887	0.2863	1.2705	2.2581	0.2865	75.9523	0.3978	0.9978
8	0.0084	13.2841	1.5939	1.4857	2.1886	0.2864	1.2719	2.2580	0.2865	75.9480	0.3992	0.9978
9	0.0084	13.2841	1.5941	1.4863	2.1886	0.2864	1.2720	2.2579	0.2866	75.9456	0.4006	0.9978
10	0.0084	13.2841	1.5942	1.4866	2.1888	0.2864	1.2720	2.2579	0.2866	75.9446	0.4007	0.9981

TALSE												
Period	S.E.	BET	BUX	CRO	PX	RIGSE	RIKSE	SBITOP	SKSM	SOFIX	TALSE	WIG_20
1	0.0092	17.7704	1.2195	7.2902	3.3959	0.3200	1.9539	3.3499	0.8042	0.6422	63.2538	0.0000
2	0.0099	15.7408	2.6463	10.0370	3.0207	0.3457	2.0470	3.4125	0.8193	0.6260	59.6670	1.6378
3	0.0101	15.8365	2.6125	9.6438	3.3927	0.3348	2.5251	3.7844	0.7790	2.5049	56.5797	2.0067
4	0.0102	15.7204	2.5747	9.6556	3.3781	0.4089	2.4892	3.7386	0.8866	2.4942	56.5387	2.1152
5	0.0103	15.5939	2.5779	9.6895	3.3702	0.4156	2.5408	3.7176	0.8786	2.5180	56.4670	2.2309
6	0.0103	15.5646	2.5940	9.7335	3.3903	0.4155	2.5471	3.7326	0.8792	2.5165	56.3637	2.2631
7	0.0103	15.5469	2.5968	9.7360	3.4141	0.4159	2.5444	3.7323	0.8839	2.5143	56.3342	2.2812
8	0.0103	15.5399	2.5958	9.7312	3.4129	0.4158	2.5431	3.7312	0.8836	2.5130	56.3536	2.2800
9	0.0103	15.5379	2.5956	9.7309	3.4127	0.4163	2.5426	3.7307	0.8835	2.5134	56.3538	2.2826
10	0.0103	15.5375	2.5956	9.7314	3.4136	0.4165	2.5426	3.7308	0.8835	2.5137	56.3505	2.2844

Annex 2. Continue

					WIG_20							
Period	**S.E.**	**BET**	**BUX**	**CRO**	**PX**	**RIGSE**	**RIKSE**	**SBITOP**	**SKSM**	**SOFIX**	**TALSE**	**WIG_20**
1	0.0149	19.8058	12.6079	1.7613	3.7757	0.5717	0.0896	0.9986	0.0208	1.5210	0.1674	58.6803
2	0.0154	18.6523	12.5146	3.4714	3.7620	0.5501	1.0452	0.9933	0.0196	1.5411	2.2068	55.2435
3	0.0160	17.9587	11.6962	6.1411	4.8291	0.7904	0.9737	1.2586	0.9702	1.5331	2.2185	51.6304
4	0.0160	17.8429	11.6123	6.1124	4.9025	0.8065	1.1263	1.4013	0.9824	1.5377	2.3105	51.3652
5	0.0161	17.7383	11.5851	6.2037	4.9441	0.8535	1.2866	1.3940	0.9781	1.5317	2.2974	51.1876
6	0.0161	17.7282	11.5745	6.1993	4.9389	0.8534	1.3141	1.3960	0.9842	1.5357	2.3415	51.1343
7	0.0161	17.7223	11.5710	6.1992	4.9375	0.8533	1.3149	1.3957	0.9867	1.5362	2.3679	51.1155
8	0.0161	17.7207	11.5701	6.1988	4.9380	0.8532	1.3169	1.3956	0.9869	1.5360	2.3700	51.1138
9	0.0161	17.7204	11.5696	6.1988	4.9382	0.8534	1.3169	1.3959	0.9870	1.5365	2.3703	51.1129
10	0.0161	17.7202	11.5694	6.1988	4.9382	0.8534	1.3169	1.3959	0.9870	1.5365	2.3718	51.1120