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RUSSIA – UKRAINE CRISIS: THE IMPACT ON BRICS STOCK MARKET

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ABSTRACT

This essay looks at how the war between Russia and Ukraine has affected the dynamics between the BRICS countries. Because to the recent sanctions placed on Russia, the country's closeness, and the rise in political volatility, an effort is being made to understand the affiliation and interaction among the BRICS states. The main objective is to examine which market has the dominant effect of this war among the players of the BRICS financial market listed under MSCI net USD. By taking into account the indices' price and return movements, pre- and post-war analyses are conducted on the BRICS nations. To study the war effect correlation, cointegration, and vector error correction models are used. Our study reveals that not all BRICS nations react to rating changes the same way and interact with global market variables in diverse manners. The index returns have a consistent long-term casual association but not the index prices. Russia's index forecast error variance affected the other country before the conflict and presumably dropped during the crisis.

Keywords - BRICS, Cointegration, Correlation, Indices, Stock market, Econometric analysis.

JEL Classification: D53, G17, G15

Hybrid warfare between world powers presents a new threat to financial stability amid widespread global health concerns. For months, the ongoing political conflict between Russia and Ukraine on February 24, 2022, has contributed to instability throughout the world. This conflict is unique due to the size, geopolitical position, and friends of the opposing parties (Caldara & Iacoviello, 2022). As far as emerging markets go, Russia is a big one economically. It has special energy connections to important nations in Asia and Europe, including as China and India, and is deeply engaged in international trade. In order to address the crisis that is migrating from other markets to the home market, integration can aid policymakers in developing effective economic policies. Because of increasing global economic connections, raised in the global level capital mobilisation (Chen et al., 2006).

Investors, investment firms, and decision-makers need to be familiar with the worldwide stock market institutions in today's globalised society. When making financial judgments on investments and risk management, policymakers and fund managers need to understand the information

linkages and relationships between markets. In particular, investing in several stock markets would not result in the necessary portfolio diversity if the stock markets of various countries moved together (Lim, 2007). As a result, they need to precisely ascertain the kind and extent of the connection between the returns across the global stock market (Siddiqui, 2009).

The globalization of capital markets and easing regulations on International cross-listings have allowed for more significant cross-country capital flows, more open ownership, and simpler trading of securities worldwide. As a result of expanding economic integration, the modern world's financial market has increasingly become more interconnected and interdependent (Bekaert & Harvey, 1997).

The current study, a small effort in this area, explores how the BRIC economies are interdependent. BRICS are referred to as the BRICS in economics, and they are all thought to be in the same stage of further advanced economic development. This serves as a foundation for research on how the stock markets of the BRIC countries are interconnected. Because there is little correlation between developing and developed stock markets, this research will focus on the stock markets of the BRIC nations rather than other developed markets.

Financial instability among any of the BRICS nations encourages general research on how war affects international financial markets. To track the severity of shock transmission throughout the markets, we intend to evaluate the effects of the Russia-Ukraine conflict on the BRICS country and the dynamics of their financial markets before and during the war.

We consider the time frame from June 2021 to January 2022 to February 2022 to September 2022, which includes significant previous financial and economic crises, such as before and during political and war upheavals that impacted the world economy. These sections make up the remainder of the paper.

The literature review is explained in Section 1. The objective and methodology are examined in the second section. The empirical findings are discussed in the third section, and the conclusion is presented in the fourth section.

REVIEW OF LITERATURE:

There has been much research done on the connections between the world's stock markets.

However, experts have not shown much interest in investigating the connections between the stock exchanges of all the BRIC countries.

(Saha & Bhunia, 2012) When the stock markets in India along with other Asian nations were compared, it was discovered that both short- and long-term cointegration existed. Using the Johansen-Juselinus test, (Darrat et al., 2000) hypothesized that while these Middle East countries' emerging stock markets are classified at international level, they seems to be highly integrated among these countries. The long-term connections between the Australian, German, and US stock

markets were examined (Daly, 2003). He used daily data from 1990 to 2001 to analyze the differences between developed and especially with the Southeast part Asian markets. He discovered that whereas Southeast Asian regions are not closely tied to developed markets, they were also not closely related to one another. Three important stock markets in Southeast Asia were determined to have cointegration and causal linkages (Febrian & Herwany, 2007). The three main Southeast Asian stock exchanges' cointegration and causal relationships were examined using a vector error autoregression correction (VECM) model.

11 established and developing financial markets from Asia, Europe, and America had their stock indexes reviewed to see whether there was integration or not (Bhattacharyya & Banerjee, 2004). In Asia stock markets are related among themselves has been continued a prominent subject of study. When these five ASEAN stock exchanges were analyzed, (Azman-Saini et al., 2002) found evidence of cointegration, but they also observed that there are no universal stochastic trends among the stock exchanges. The stock markets of Indonesia, Malaysia, the Philippines, Singapore, and Thailand, as well as the stock markets in Indonesia, Malaysia, the Philippines, and Singapore, were found to be long-term cointegrators and related to one another after the Asian financial crisis (Click & Plummer, 2005). To find out if every variable is present in the long-term association, the authors also ran a few exclusion tests.

The finding demonstrated that over time, each variable has a considerable contribution. The five ASEAN stock markets were examined by (Majid et al., 2009) both before and after the Asian financial crisis, and it was discovered that the markets started to cointegrated. (Hoque, 2007) indicates that the Bangladesh market is unaffected by the USA or India. According to the report, the Indian situation is unaffected by the USA, Japan, or its lag. (Singh et al., 2008) shows the short-term dependency between India and the majority of the other sample nations, where Asian markets have been found to have a regional effect more than European and American markets. Gay Jr. (2008) examined the time series relationship between the BRIC stock market index values and the macroeconomic variables of oil price and exchange rate using the Box-Jenkins ARIMA model. However, there didn't seem to be any correlation between the index values of the stock markets in the two Bric countries and the price of oil at the relevant exchange rate. Rajwani & Mukherjee (2013) looked into the connection between the Indian stock market and other Asian stock markets.

The lack of correlation they discovered suggests that the Indian stock market is not sensitive to outside markets. (Sarwar & Bhuyan, 2009) investigated the spillover effects between the US stock market and the developing stock markets of Brazil, Russia, India, and China (BRIC) between 1995 and 2007. They did this by using a variation of the aggregate shock model inside the GARCH framework. Additionally, he discussed the volatility and mean return spillovers from the US market to the BRIC markets.

A seminal study by (Rajiv Menon et al., 2009) claims that the Singaporean and Indian stock markets have high coin They found no correlation, indicating the insensitivity of the Indian stock market to external markets. (Sarwar & Bhuyan, 2009) looked into the ways that the US stock

market and emerging stock markets influence each other. He also mentioned how the US market's volatility and mean return trickle down to the BRIC markets. The stock markets of Singapore and India have a strong cointegration relationship, according a ground-breaking study by Rajiv Menon et al. (2009). However, the cointegrating link between the Chinese and Indian stock markets is not good.

Moreover, (Tripathi & Sethi, 2010) states that there is cointegration between the US and Indian stock markets. Using the Granger Causality test, (Periyakulam & Nadu, 2012) examined the long- and short-term correlations between the stock prices of the BRIC nations. The Granger causality test indicates that, both during the sample period and prior to the crisis, there is bidirectional Granger causality between Brazil and China and India. The results showed that there was no cointegration between the two indices. However, using the Granger causality test, (Reddy & Wadhwa, 2012) examined the financial integration of the US markets and the emerging BRIC nations. The findings indicate that there is only one way of interaction between the US stock exchange and the stock markets of the other BRIC countries.

Examining the connections between the stock markets of the ASEAN-5 countries, China, and the United States (Caporale et al., 2016) found a considerable cointegration between the ASEAN-5 countries and the US, but not with the countries the US and China. The authors also state that the GFC in 2008 and the Chinese stock market fall in 2015 have reduced the links between the countries under consideration on a global scale. Using the asymmetric BEKK-GARCH and the VAR approach, (Zhang & Jaffry, 2015) found considerable bi-directional volatility spillover between the stock markets in Mainland China and Hong Kong during the global financial crisis.

2.1. OBJECTIVES

In light of the war crisis, this paper tries to understand the integration of stock market integration with reference to all the BRIC countries'stock markets. It examines the relationship between the indices' long-run equilibrium values. Due to the current war period, Russia serves as a dependent variable. The relationship between the daily indices prices and their return for a particular study period is discovered using correlation. To ascertain the MSCI BRICS market integration, unit root tests are carried out. Using the vector error correction method, the co-movement of a long-term equilibrium relationship between the MSCI USD Brazil, Russia, India, China, and South Africa and the MSCI BRICS NET USD index is evaluated and cointegration analysis which helps to identify the variation in the dependent variable and determine the significance of each variable that influences the change in other study variables.

2.2. METHODOLOGY

The study used six indices as secondary data: MSCI BRIC Net USD, MSCI Brazil Net USD, MSCI Russia USD TR, MSCI India Net USD, MSCI China Net USD, and MSCI South Africa NR USD. Phase 1 of the study covered the period before the war from June 2021 to January 2022, and Phase

2, which covered the period from February 2022 to September 2022, both included daily data. In these phases, the prices and returns of the indices are examined.

Test of Jarque- Bera: The test of Jarque-Bera test (JB test) is used for getting assess if any skewness and kurtosis of sample data are in line with a normal distribution.

$$JB = \frac{n}{6}(S^2 + \frac{1}{4}(K-3)^2)$$

The Jarque-Bera test (JB test) looks for skewness and kurtosis in sample data that are compatible with a normal distribution.(or, more generally, the degree of freedom).

The data must come from a normal distribution for the test's null hypothesis (H0) to be true (i.e., the joint hypothesis of zero skewness and the excess kurtosis being zero for the JB test); Other than Null hypothesis (H1) observes that the data do not follow a normal distribution. Generally, when the P value is more than 0.05, the data are consistent with skewness and excess kurtosis zero. Since we are using normally distributed random numbers, a high P-value is anticipated in this case. As mentioned by Bowman and Shenton (1975), Jarque-Bera (JB) is essentially the sum of the squares of two standardized normal asymptotically independent figures. For additional details, JB is a chi-square figure with asymptotic minimal degrees of freedom.

Unit root test: To determine if the variables were stationary, the study employed the Augmented Dicky-Fuller test (ADF). This test is an improved Dicky-Fuller test is for a more extensive and complex set of time series models. The augmented Dicky-Fuller test (ADF) yields negative results for statistics. The stronger the rejection of the existence of a unit root at a given degree of confidence, the more negative the hypothesis. Adding a lag difference term to the right side of the equation allows ADF to account for higher-order serial correlation.

The Dickey-fuller test and the ADF test use the identical testing methodology, with the exception of applying it to a model.

$\Delta yc = \alpha + \beta t + yyc\text{-}1 + \Delta yc\text{-}1 + \ldots\ldots\ldots\ldots + p\text{-}1\Delta y\ c\text{-}p + 1 + \varepsilon c$

In the above example, The autoregressive process has p as the lag order, α as a constant, and β as the coefficient on a temporal trend. modeling a random walk with a drift and applying the conditions $\alpha = 0$ and $\beta = 0$.

Johansen's cointegration mode: This econometric tool of cointegration can be applied to the study of time series variables. A necessary condition for an economic relationship involving two or more variables with unit roots is the degree of long-term stability in the relationship. Because the data is categorized as a time series, the Johansen technique by Johansen & Juselius (1992) calculates the number of cointegrated vectors against every specified number of non-stationary variables in the same sequence. Random variables are regarded as cointegrated if it is found that every time series is non-stationary.

Vector Error Correction Model: Since a series of partial short-run adjustments gradually correct the long-run equilibrium deviation, the cointegration component serves as the error correction term.

This was developed to be applied with non-stationary series identified as cointegrated. Cointegration relations have been incorporated into the VEC specification to allow for short-term to be adjusted dynamics while preventing endogenous variables' long-term behavior from converging toward their cointegrating relationships (Engle & Granger, 1987). The cointegration term acts as the error correction term because the long-run equilibrium deviation is progressively corrected through a series of partial short-run adjustments. An accurate error correction model relating the two variables exists if they are cointegrated in the same sequence. An error correction model must be used to analyze the cointegration connection, or cointegration vector, which indicates the existence of a causal relationship and a long-term relationship between variables. Aside from the ones mentioned above, correlation analysis has been carried out to determine how index prices and returns move together. Descriptive statistics have also been used to shed light on the variables' characteristics. Because the Johansen cointegration test showed a lead-lag relationship between the variables, the ADF test was used to convert the non-stationary series into a stationary series. Finally, VECM has been checked with the appropriate test. The data is induced from the website of investing.com. The tool used for tests is IBM SPSS, Microsoft Excel, and Eviews 12.

3. FINDING & ANALYSIS

3.1. Correlation of stock prices and returns

It is evident that during the first era, particularly up until the conflict, all market indices except India and Russia have positive correlations with MSCI BRICS, which gauges the performance of emerging markets across all BRICS states. India and Russia have good correlations. However, the rest of the country and India have negative correlations. Before the war, China and India had negligible weak correlations with Russia, whereas the rest had significant negative correlations (Table 1).

The MSCI BRICS index exhibits a significant and positive correlation with China and Russia in the second phase, a moderately positive correlation with South Africa and India, and a weak but positive correlation with Brazil. India's USD market remains favourable concerning all of the BRICS countries, but it is more correlated with Russia. The Russian USD market exhibits a stronger positive correlation with India and China during the conflict but a weaker negative correlation with Brazil and South Africa.

BRICS INDICES BEFORE WAR (JUNE 2021-JAN 2022)

PEARSON CORRELATION	MSCI BRICS	INDIA	RUSSIA	CHINA	BRAZIL	SOUTH AFRICA

MSCI BRICS	1	-.547 (.000)	.198 (.004)	.987 (.000)	.794 (.000)	.660 (.000)
INDIA	-547. (.000)	1	.426 (.000)	-.661 (.000)	-.809 (.000)	-.344 (.000)
RUSSIA	.198 (.004)	.426 (.000)	1	.079 (.150)	-.265 (.000)	-.134 (.038)
CHINA	.987 (.000)	-.661 (.000)	.0.79 (.150)	1	.828 (.000)	.651 (.000)
BRAZIL	.794 (.000)	-809. (.000)	-.265 (.000)	.828 (.000)	1	.630 (.000)
SOUTHAFRICA	.660 (.000)	-.134 (.038)	-.344 (.000)	.651 (.000)	.630 (.000)	1

BRICS INDICES DURING WAR (FEB 2022-SEP 2022)

PEARSON CORRELATION	**MSCI BRICS**	**INDIA**	**RUSSIA**	**CHINA**	**BRAZIL**	**SOUTH AFRICA**
MSCI BRICS	1	.443 (.000)	.937 (.000)	.912 (.000)	.221 (.000)	.631 (.000)
INDIA	.443 (.000)	1	.885 (.000)	.159 (.018)	.662 (.000)	.516 (.000)
RUSSIA	.937 (.000)	.885 (.000)	1	.909 (.000)	-.565 (.001)	-.260 (.099)
CHINA	.912 (.000)	909 (.000)	.159 (.018)	1	-.002 (.489)	.529 (.000)
BRAZIL	.221	.662	-.565	-.002	1	.695

	(.000)	(.000)	(.001)	(.489)		(.000)
SOUTHAFRICA	.631 (.000)	.516 (.000)	-.260 (.099)	529 (.000)	.695 (.000)	1

NOTE: Author Calculation using IBM SPSS

Table 1: Correlation of stock price indices

It is important to study the stock return correlation since the persistence of prices in level form and an underlying temporal trend may improve the correlation of stock price indices. The pairwise correlations of daily stock returns are displayed in Table 2. The association between the MSCI BRICS index and the returns of India and Russia decreased from phase one to phase two. Comparing their returns with those of the other BRICS nations, Russia and India exhibit a robust and favorable correlation. Conversely, the return correlation is moderate prior to and during the crisis period in China, Brazil, and South Africa.

BRICS INDICES RETURNS BEFORE WAR (JUNE 2021-JAN 2022)

PEARSON CORRELATION	**MSCI BRICS**	**INDIA**	**RUSSIA**	**CHINA**	**BRAZIL**	**SOUTHAFRICA**
MSCI BRICS	1	.516 (.000)	.434 (.000)	.961 (.000)	.423 (.000)	.598 (.000)
INDIA	.516 (.000)	1	.422 (.000)	.320 (.000)	.255 (.000)	.401 (.000)
RUSSIA	.434 (.000)	.422 (.000)	1	.257 (.000)	.335 (.000)	.483 (.000)
CHINA	.961 (.000)	.320 (.000)	.257 (.000)	1	.265 (.000)	.504 (.000)
BRAZIL	.423 (.000)	.255 (.000)	.335 (.000)	.265 (.000)	1	.427 (.000)
SOUTHAFRICA	.598 (.000)	.401 (.000)	.483 (.000)	.504 (.000)	.427 (.000)	1

BRICS INDICES RETURNS DURING WAR (FEB 2022-SEP 2022)

PEARSON CORRELATION	MSCI BRICS	INDIA	RUSSIA	CHINA	BRAZIL	SOUTH AFRICA
MSCI BRICS	1	.044 (.281)	-.167 (.212)	.137 (.036)	.147 (.026)	.178 (.010)
INDIA	.044 (.281)	1	.677 (.000)	.384 (.000)	.336 (.000)	.444 (.000)
RUSSIA	-.167 (.212)	.677 (.000)	1	.399 (.024)	.537 (.003)	.479 (.008)
CHINA	.137 (.036)	.384 (.000)	.399 (.024)	1	.258 (.000)	.485 (.000)
BRAZIL	.147 (.026)	.336 (.000)	.537 (.003)	.258 (.000)	1	.623 (.000)
SOUTHAFRICA	.178 (.010)	.444 (.000)	.479 (.008)	.485 (.000)	.623 (.000)	1

NOTE: Author Calculation using IBM SPSS

Table 2: Correlation of stock market return

3.2. Descriptive Statistics

Tables 3 and 4 give brief statistical information regarding index prices & returns, sample means, median, standard deviations, skewness, kurtosis, and the Jarque-Bera.

BRICS INDICES BEFORE WAR (JUNE 2021-JAN 2022)

OBSERVATION	MSCI BRICS	INDIA	RUSSIA	CHINA	BRAZIL	SOUTHAFRICA
MEAN	699.96	978.74	960.73	680.10	474.38	549.17
MEDIAN	697.81	990.79	942.85	670.13	459.74	547.09

STD DEV	40.21	52.05	69.37	59.22	57.06	24.74
SKEWNESS	0.256	-0.31	0.13	0.55	0.34	0.84
KURTOSIS	-0.704	-1.36	0.403	-0.596	-1.36	1.53
OBSERVATION	175	175	175	175	175	175
JARQUE B	5.539	16.61	1.708	11.67	17.00	37.76
P VALUE	0.062	0.00024	0.425	0.0029	0.000203	6.30

BRICS INDICES DURING WAR (FEB 2022-SEP 2022)

OBSERVATION	**MSCI BRICS**	**INDIA**	**RUSSIA**	**CHINA**	**BRAZIL**	**SOUTHAFRICA**
MEAN	542.71	937.76	102.49	511.71	488.47	538.47
MEDIAN	530.38	952.15	0.00	507.58	489.60	527.08
STD DEV	41.37	47.58	259.88	43.09	41.91	56.86
SKEWNESS	1.35	-0.31	2.36	0.62	0.084	0.21
KURTOSIS	1.62	-1.04	3.98	0.18	-0.29	-1.02
OBSERVATION	173	173	173	173	173	173
JARQUE B	72.26	10.66	275.45	11.69	0.83	8.82
P VALUE	2.032	0.00482	1.53	0.00289	0.65	0.012

NOTE: Author Calculation using Excel

Table 3: Statistical moments of stock indices

Table 3's statistical moments of stock indices reveal that the time before and during the war in Russia had the highest standard deviation, indicating the country's highest level of volatility. Before the crisis, South Africa was found to be the least volatile, and during the war, Brazil and MSCI BRICS were also less volatile.

Every index before and after the war except for India, has positive skewness, which suggests that, the right tail is greater than the left. India's negative skewness indicates that the country's left tail is longer than its right. Depending on how it turns out, kurtosis can also result in a platykurtic or

leptokurtic graph. All pre-war indices' kurtosis values are less than 3, indicating the platykurtic distribution. Except for Russia, where the distribution changed to leptokurtic during the conflict, this distribution continued in phase two. The Jarque-Bera test determines if the stock indexes under study are normally distributed. In the MSCI BRICS, Russia is normally distributed in both phases, but India and China are not. Brazil continues to be evenly distributed simultaneously in phase one and non-normally distributed in phase two. In phase one, South Africa was noted as normally distributed, but it was not during the crisis.

BRICS INDICES RETURNS BEFORE WAR (JUNE 2021-JAN 2022)

OBSERVATION	MSCI BRICS	INDIA	RUSSIA	CHINA	BRAZIL	SOUTHAFRICA
MEAN	0.00194	0.00067	0.00741	0.00224	0.0005	0.0019
MEDIAN	0.00310	0.00	0.00	0.00211	0.00	0.0019
STD DEV	0.016	0.0137	0.063	0.02197	0.01917	0.0187
SKEWNESS	-0.511	0.660	6.43	-0.95	0.338	0.117
KURTOSIS	5.032	2.584	57.01	7.33	0.146	-0.1926
OBSERVATION	173	173	173	173	173	173
JARQUE B	190.08	60.70	24623.87	413.9	3.462	0.664
P VALUE	5.2987	6.573	0	1.32	0.177	0.717

BRICS INDICES RETURNS DURING WAR (FEB 2022-SEP 2022)

OBSERVATION	MSCI BRICS	INDIA	RUSSIA	CHINA	BRAZIL	SOUTHAFRICA
MEAN	0.00119	-0.000524	0.000543	0.001897	0.001006	0.00060
MEDIAN	0.00069	-0.000525	-0.002219	0.002672	0.000585	0.00035

STD DEV	0.0117	0.00922	0.0186	0.0157	0.0173	0.0156
SKEWNESS	0.152	0.666	1.360	0.21	0.4092	0.323
KURTOSIS	1.139	1.531	5.40	1.898	0.785	1.251
OBSERVATION	175	175	175	175	175	175
JARQUE B	10.149	30.0726	266.93	27.65	9.382	14.480
P VALUE	0.0062	2.949	1.086	9.892	0.00917	0.000717

NOTE: Author Calculation using Excel

Table 4: Statistical moments of stock indices returns

Russia had the highest standard deviation before and during the war, indicating the country had the highest volatility over the study period. It was shown statistically by the stock index returns in Table 4. Prior to the war, MSCI BRICS, China's negative skewness indicates that the left tail is longer than the right. The right-hand tail is larger than the left-hand tail, according to phase one positive skewness data for Brazil, South Africa, India, and Russia as well as all indices during the conflict.

With the exception of Russia before and during the conflict, all of the indices have kurtosis values that are less than 3. This indicates a platykurtic distribution, which proved out to be the case for Russia. The Jarque-Bera test is operated to to find out the returns of the stocks indices under consideration are regularly shared, with the exception of Russia during the war, all index returns being normally distributed. Before the crisis, all the indices returns were normally distributed, except Russia's indices return is not normally distributed. All of the indices returns in phase two are normally distributed, with the exception of the MSCI BRICS indices.

3.3. Unit Root

Including stationary variables in the model is necessary to avoid misleading regression scenarios. The present study employs the Augmented Dickey-Fuller (ADF) test to investigate the stationary nature of the series, as presented in Table 5.

	AUGMENTED DICKEY-FULLER			
INDEX	**BRICS INDICES BEFORE WAR**	**BRICS INDICES RETURNS BEFORE WAR**	**BRICS INDICES DURING WAR**	**BRICS INDICES RETURNS DURING WAR**

	WITH movements	First variation	WITH TREND	FIRST Variation	WITH TREND	FIRST Variation	WITH movements	FIRST Variation
MSCI BRICS NET		-11.21	-11.47			-11.46	-11.50	
INDIA		-11.44	-11.65			-12.69	-12.78	
RUSSIA		-13.44	-13.31		-3.84		-3.82	
CHINA		-10.94	-11.19			-11.29	-11.41	
BRAZIL		-13.56	-13.62			-10.44	-10.54	
SOUTHAFRICA	-3.15		-12.87			-10.23	-10.43	

NOTE: Author Calculation using E views 12

Table 5: Unit Root

Indices returns before and during the crisis were stationary at level. However, in the case of stock indices before the war, South Africa is stationary at the level, whereas all other indices are stationary at first difference. Furthermore, during the crisis period, the Russian index is stationary at the level, and the rest of the indices are stationary at first difference.

3.4. Johansen's cointegration test

When two or more variables move together over time, it is known as co-integration. These variables have distinctive tendencies, but they will not deviate too much from one another because they are somewhat related. The test of Unit Root findings demonstrate as stationary as per the time series of share price indices associated with the several stock exchanges under study.

TRACE					**MAXIMUM EIGEN VALUE TRACE**			
Hypothesized Number of CEs	**Value of the Eigen**	**Trace Statistic value**	**0.05 CV**	**Probability.****	**Value of the Eigen**	**Static Max-Eigen**	**Critical Value(0.05)**	**Probability****

None*	0.397472	255.6637	95.75366	0.0000	0.397472	85.61889	40.07757	0.0000
Atmost 1*	0.283526	170.0448	69.81889	0.0000	0.283526	56.34676	33.87687	0.0000
Atmost 2*	0.239456	113.6981	47.85613	0.0000	0.239456	46.25897	27.58434	0.0001
Atmost 3*	0.195197	67.43911	29.79707	0.0000	0.195197	36.69958	21.13162	0.0002
Atmost 4*	0.109748	30.73953	15.49471	0.0001	0.109748	19.64635	14.2646	0.0064
Atmost 5*	0.063532	11.09317	3.841465	0.0009	0.063532	11.09317	3.841465	0.0009

(a)

TRACE					**MAXIMUM EIGEN VALUE TRACE**			
Hypothesized Number of CEs	**Value of Eigen**	**Trace Statistic value**	**0.05 Critical Value**	**Probability.****	**Value of the Eigen**	**Static Max-Eigen**	**Critical Value(0.05)**	**Probability****
None*	0.502966	306.5592	95.75366	0.0000	0.502966	116.7493	40.07757	0.0000
Atmost 1*	0.316911	189.8100	69.81889	0.0000	0.316911	63.64883	33.87687	0.0000
Atmost 2*	0.251573	126.1611	47.85613	0.0000	0.251573	48.39358	27.58434	0.0000
Atmost 3*	0.233337	77.76754	29.79707	0.0000	0.233337	44.37325	21.13162	0.0000
Atmost 4*	0.109310	33.39429	15.49471	0.0000	0.109310	19.33173	14.26460	0.0072

Atmost 5*	0.080759	14.06255	3.841465	0.0002	0.080759	14.06255	3.841465	0.0002

(b)

Table 6: Cointegration test of indices phase 1 & 2

NOTE: Author Calculation using Eviews 12

TRACE					**MAXIMUM EIGEN VALUE TRACE**			
Hypothesized Number of CEs	**Eigen Value**	**Trace Statistic**	**0.05 of Critical Value**	**Probability****	**Eigen value**	**Static Eigen Max-value**	**Critical of Value(0.05)**	**Probability****
None *	0.350980	262.3817	95.75366	0.0000	0.350980	73.48963	40.07757	0.0000
Atmost 1*	0.297188	188.8921	69.81889	0.0000	0.297188	59.95328	33.87687	0.0000
Atmost 2*	0.217301	128.9388	47.85613	0.0000	0.217301	41.65115	27.58434	0.0004
Atmost 3*	0.190878	87.28769	29.79707	0.0000	0.190878	36.00704	21.13162	0.0002
Atmost 4*	0.172236	51.28065	15.49471	0.0000	0.172236	32.13459	14.26460	0.0000
Atmost 5*	0.106513	19.14606	3.841465	0.0000	0.106513	19.14606	3.841465	0.0000

(a)

TRACE					**MAXIMUM EIGEN VALUE TRACE**			
Hypothesized Number of CEs	**Value of the Eigen**	**Trace Statistic value**	**At 0.05 Critic**	**Probability****	**Value of theEigen**	**Static Max-Eigen**	**Critical Value(0.05)**	**Probability****

			al Value					
None *	0.410254	265.8180	95.75366	0.0000	0.410254	88.71475	40.07757	0.0000
Atmost 1*	0.295259	177.1033	69.81889	0.0000	0.295259	58.78735	33.87687	0.0000
Atmost 2*	0.258280	118.3159	47.85613	0.0000	0.258280	50.19569	27.58434	0.0000
Atmost 3*	0.238285	68.12021	29.79707	0.0000	0.238285	45.72674	21.13162	0.0000
Atmost 4*	0.086981	22.39348	15.49471	0.0039	0.086981	15.28785	14.26460	0.0343
Atmost 5*	0.041413	7.105629	3.841465	0.0077	0.041413	7.105629	3.841465	0.0077

(b)

Table 7: Cointegration test of indices returns phase 1 & 2

NOTE: Author Calculation using Eviews 12

The cointegration test is carried out after the unit root test since all the series, including MSCI BRICS Net USD, BRICS are in the same sequence. The long-term equilibrium connection movement between the six stock market indexes is assessed using the cointegration approach.

As all the series, including MSCI BRICS Net USD,the countries of BRICS are in the same sequence, the cointegration test is conducted after the unit root test. The cointegration approach is applied to evaluate the equilibrium connection trend over the long run between the six stock market indices.

Johansen cointegration will be an appropriate method for validly evaluating hypotheses relating to the sustainable relationship among the time series under study. The null hypothesis, according to which there are no cointegrating equations among variables, is tested. There are six cointegrating vectors at a 5% level both before and during the war, according to Tables 6 and 7, which are the first part of the cointegration results. The second section of the cointegration results (Tables 6 and 7) includes the test of, which supports the similar finding.

Thus, both the tests demonstrate the prices and returns of stock market indexes are cointegrating; that is, they are moving together, which may suggest that the potential for diversification gains offered by asset allocation across markets is insufficient.

It is significant to highlight that cointegration does not show the correlation between the variables under study but rather the co-movements between the wo-time series over a given duration. Therefore, one may derive from the cointegration tests that the overall stock price & returns indices among BRICS countries before and during the war moved together.

3.5. Vector Error Correction Model

INDICES PHASE 1		INDICES PHASE 2	
COINTEGRATING EQUATION	**CointEq1**	**COINTEGRATING EQUATION**	**CointEq1**
D(RUSSIA (-1))	1.0000	**RUSSIA (-1)**	1.0000
D(BRICS (-1))	22.293	**D(BRICS (-1))**	3086.41
	(5.284)		(1851.54)
	[-4.218]		[2.055]
D(INDIA (-1))	-4.87	**D(INDIA (-1))**	-546.37
	(1.03)		(284.85)
	[-4.724]		[1.918]
D(CHINA (-1))	-12.554	**D(CHINA (-1))**	-2553.379
	(3.47)		(1209.52)
	[-3.617]		[-2.111]
D(BRAZIL (-1))	-0.328	**D(BRAZIL (-1))**	-429.55
	(0.877)		(231.71)
	[-0.37]		[1.853]
SOUTH AFRICA (-1)	-0.169	**D(SOUTH AFRICA (-1))**	-9.163
	(0.112)		(14.844)
	[1.512]		[-0.617]

(a)

RETURNS INDICES PHASE 1		**RETURNS INDICES PHASE 2**	
COINTEGRATING EQUATION	**CointEq1**	**COINTEGRATING EQUATION**	**CointEq1**
RUSSIA RET (-1)	1.0000	**RUSSIA RET (-1)**	1.0000
BRICS RET (-1)	-10.19	**BRICS RET (-1)**	-34.77
	(0.66)		(2.35)
	[-15.21]		[-14.78]
INDIA RET (-1)	1.75	**INDIA RET (-1)**	9.06
	(0.18)		(1.006)
	[9.40]		[9.001]
CHINA RET (-1)	6.66	**CHINA RET (-1)**	23.56
	(0.42)		(1.56)
	[15.66]		[15.089]
BRAZIL RET(-1)	0.99	**BRAZIL RET(-1)**	4.73
	(0.07)		(0.65)
	[13.39]		[7.27]
SOUTH AFRICA RET (-1)	0.076	**SOUTH AFRICA RET (-1)**	-2.51
	(0.061)		(0.72)
	[1.25]		[-3.48]

NOTE: Author Calculation using Eviews 12 **(b)**

Table 8: Johansen's long run vector error correction model of indices price & returns phase 1 & 2

Table 8 (a) & (b) define Johansen's long-run vector error correction model. Signs are to be reversed in the normalized co – integration coefficient.

Before the war, in the long run, except for the MSCI BRICS net index, all countries' indices positively impacted the Russia index. Where Brazil and South Africa have insignificant effect rest stands significant. During the war, the MSCI BRICS index had a negative effect on the Russian index, whereas the rest had a positive effect on Russia's indices. In contrast, Brazil and South Africa had an insignificant impact, and other indices are significant.

Regarding index returns, only the MSCI BRICS Net Index had a positive impact on Russia's index before the war. In contrast, other nations negatively affect it, except for South Africa, every country's variables are significant.

Long-term returns on the MSCI BRICS and South Africa indexes during the conflict were positive, while those of the Russia index were negative, and all significantly impacted it.

CONCLUSION

This paper examined the overall financial integration level among the BRICS countries and also the war crisis. The six indices used in this study are priced at the USD market. Therefore there is no influence from essential factors that affect how other countries' indices perform, such as inflation, interest rates, etc. This study found that the war's effects on the BRICS stock market prices, and returns were interdependent and trendy.

Before the conflict, Brazil and South Africa had negative correlations with Russia's stock prices, whereas India and China had weak positive correlations. Before the conflict, the index had no volatility, and even index prices were typically dispersed. Russia's stock values were strongly associated with India and China throughout the war and were inversely correlated with Brazil and South Africa. Additionally, there is notable volatility that is observed without a normal distribution. Furthermore, to an analysis of the series index's stationarity, Prices were stationary at first differences before and throughout the conflict.

Before the conflict, Russia's stock returns had a relatively positive correlation with other indices but only a weak correlation with those of China and Brazil. Brics's Net index and Russia have a negative correlation. In the case of indices, returns volatility was barely noticeable in any phase, but the distribution was not even normal in the phases under study. Stationarity of the index returns was noted at the level.

The long-term association between index prices and returns shows several outcomes. However, in the case of indices returns, Brics's net index is considerably associated in the long run. In contrast, Brics's net index is not associated in the long run in either phase. Both phases of the connection between index prices from other nations and Russia revealed a favourable long-term relationship. Even though there was no long-term relationship with Russia in index returns before the war, only South Africa and Russia were shown to have such a relationship during the war.

Consider comparing the findings of this study which examined how one market affects other markets, with those of other research in the literature. Given these facts, it is fair to conclude that, while the influence on returns is not significantly lessened in the case of this military crisis, stock market and the dynamics of how different stock markets interact have transformed over time in the context of index pricing. It serves as an example of how the BRICS market responded to the conflict between Russia and Ukraine. Compared to market returns, the effects on prices were more notable. The article's findings are expected to benefit both individual and institutional investors concerned with managing their portfolios and creating policy.

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