

Causal Relationship Between the BRICS Countries' Stock Performances During COVID-19

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Abstract: Stock market performance relationships during disease epidemics is nebulous. The objective of this paper is to analyse the causal relationship between the BRICS countries' stock market performance during the COVID-19 period. The paper inclines on prior work, which posits that anomalies in stock market might stimulate ripples amongst market participants. BRICS countries' stock market data for a period of 95 days between January and May 2020 were analysed for causality using the Vector Auto-regression and the Granger Causality Wald test. Stock performance in China and India during the COVID period can predict the stock performance in Brazil during the COVID period. In addition, stock performance in Russia and South Africa can predict stock performance in India during the COVID period. The findings provide additional investment information to clarify investment risks and uncertainty for current and potential investors in BRICS countries. This paper provides important academic case study for business schools and suggests future research agenda. This article contributes the first empirical analysis of causal relationship amongst the BRICS market performance during the COVID-19 pandemic.

Keywords: BRICS; Stock value; Stock exchange; Investment decision; risk and uncertainty; COVID-19

JEL Classification: D53; E44; G15; G14

1. Introduction

The economic block of countries referred to as BRICS encompasses five countries namely Brazil, Russia, India, China and South Africa. The BRICS countries have some trade, investment and economic understanding to enhance economic growth and development in these emerging nations (Mehrara & Ali, 2013). Although, the BRICS economies are separated by geographical distance, but globalisation of finance, trade openness and the interconnectedness of advanced information technology and communication has made it possible for distant economies to operate in globalized space (Shahbaz, 2018). Accordingly economic ambiances in one country located within a group of nations tied with a common economic and

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trade interest may likely resonate some shock in other countries within the common interest group (other things being equal) (Baltagi, Egger & Pfaffermayr, 2008).

Researchers reason that the BRICS nations appear to have some similarity in certain economic areas; for instance Movcham (2015) opine that aside from Russia, other BRICS countries seem to have significant amount of foreign reserve, which constitutes 15% to 35% of their GDP with a cushioning low level of external debts estimated at between 15% and 37% of their countries' GDP. Additionally, the BRICS nations produce more of consumer of consumer goods apart from Russia. These economic commonalities between the BRICS nations may engender some market behaviour ripple from one BRIC country to the other. This interconnected economic behaviour was opined in a multi-polarity economic interdependence amongst the BRICS countries (Prabhakar, 2016). The existence of interdependence of economic activities in BRICS countries was further opined by (Kwenda, 2018). The closest existing research, which provide research evidence on the likelihood of relationship amongst BRICS countries' stock market indices and exchange rate performance is the research by Mroua and Trabelsi (2020), but their paper was not focussed on the COVID-19 period; hence this paper extends and contributes to existing research by examining the concept within a unique period, which is the causal relationship between BRICS stock markets during the COVID-19 period – this is important as research is still silent on BRICS countries stock performance within the period of COVID-19, accordingly a new knowledge is provided by this paper and offers new policy implication for investors and policy makers within a challenging period of COVID-19 disease pandemic.

2. Problem Statement

The BRICS stock market performance have attracted little research attention and debate that considers the impact of COVID-19 pandemic on BRICS countries equity performance and their possible causality during this period of COVID-19 disease pandemic. This becomes very important since researchers have pointed out that BRICS market indices such as equities and exchange rate appear to be weakening in some BRICS nations during this period of COVID-19 pandemic (Dabrowski & Domínguez-Jiménez, 2020). The stock market causality amongst the BRICS stock markets becomes crucial to evaluate if the stock performance amongst the BRICS nations impacts the performance in other co-BRICS nations to provide equity investors with investment information that can enable them to understanding where to invest and where to pair their investments in BRICS nations during the period of COVID-19 pandemic. Given the infectious nature of COVID-19, whether the pattern of stock performance in one BRICS country can infect another BRICS country is a question that current research has not answered. This paper provides a novel answer to this puzzling issue. This information has not

been provided in current research literature. Hence this paper bridges a gap in research and contributes new investment information for BRICS' market investors.

2.1. Objective of the Paper

Following the aforesaid research problem, the objective of this paper is to analyse the causal relationship between the BRICS stock markets during the covid-19. The aim thus is to identify which BRICS market trigger a change in other BRICS countries' stock market performance during this current COVID-19 disease pandemic.

3. Literature Review

Mroua and Trabelsi (2020) used a novel method of analysis by joining the known panel generalized model and the panel auto-regressive distributed lag (ARDL) model to analyse the presence of a causal correlation between the BRICS stock and exchange markets. Their findings reveal that fluctuations in exchange rates have a significant impact on the previous and current stock index volatilities amongst BRICS countries. Additionally, the ARDL technique show that movements in exchange rate pose a substantial impact on BRICS long-term and short-run market indices. In another related paper, Kinateder, Weber and Wagner, (2019) applied a GARCH-dummy technique to evaluate the impact of calendar irregularities on restricted daily stock returns and stock risk for BRICS countries' stock exchange markets for the past period covering 1996 to 2018. The researchers examined and validated the TOM effect and found no indication of a January effect. Furthermore, a general holiday consequence was not found; however, the Indian stock market displayed a significant pre- and a post-holiday impact. On the contrary, the Chinese stock market proved to be anomalous prior to public holidays, but the South African stock market proved to be impacted only post-holidays.

Another group of researchers (Zhou, Jiang, Liu, Lin & Liu, 2019) applied the cross-quantilogram technique to examine whether volatility in BRICS oil prices does have a predicting impact on BRICS countries stock returns. Results from the empirical analysis indicate that generally, volatility in oil has a predictable directional stock returns for BRICS countries. In contrary, they find that low quantile oil volatility has a lesser likelihood of showing large loss or gain in the BRICS stock markets. However a high quantile oil volatility has a greater likelihood of showing large loss or gain in the BRICS stock markets. A general finding from their study show that a predictable general volatility of oil price to stock market return is inclined on the overall position of exports and imports of oil in the BRICS countries oil market. Furthermore, their research showed that, the net

oil exporting countries namely Russia and Brazil are less prone to having higher stock market losses or gains than the net BRICS oil importers namely South Africa, India and China when the volatility of oil in a lower quintile. However, the net oil exporting countries namely Russia and Brazil are more prone to having higher stock market losses or gains than the net BRICS oil importers namely South Africa, India and China when the volatility of oil in a high quantile region (Zhou, Jiang, Liu, Lin and Liu, 2019).

Dong, An, Liu, Li and Yuan (2020) evaluated the network structural evolution of BRICS countries stock indices using a time-varying technique. The results from their empirical analysis showed that there is a positive relationship between BRICS stock market indices between 2001 and 2018, however, this relationship is not permanent. The researchers identified some key modes of correlation whereupon the relationships and investment decisions incline. For instance, they found that high risk investors in BRICS stock markets should select portfolios from the South African or Brazilian stock markets. However, medium risk investors in BRICS stock markets should combine portfolios from the following South Africa, Brazil, India or Russian stock markets. Furthermore, low risk investors in BRICS stock markets should select portfolios from China stock market with a combination from one of the following South Africa, Brazil, India or Russian stock markets (Dong, An, Liu, Li and Yuan, 2020). Marinova (2019) analysed the importance of risk factors namely specific and common risk factors and their effect on BRICS countries stock markets. Their empirical findings showed that the overriding risk factor for the BRICS countries stock markets is the market premium. Furthermore, their analysis also showed that the momentum, value and size of the stock markets have insignificant impact on the performance of the market returns. However, their findings showed that profitability and investment factors prove to be the major factors impacting the BRICS stock market returns. In addition, their paper found that traditional factor models have different explanatory power between the developed and emerging markets.

Sharma, Kayal and Pandey (2019) evaluated the relationship amongst the optimistic measures of volatility index of BRICS countries' stock market indices. Applying the technique of information transmission procedure, their findings indicate a long-term equilibrium association between a combinations of two BRICS countries. In their further analysis, an application of multivariate generalised autoregressive conditional heteroscedasticity (MGARCH) technique showed a higher near-term relationship between the volatility indices sample used. Their analysis of ripples of volatility and return milieu indicates different degrees of relationship between the BRICS' countries volatility indices during the period of study (Sharma, Kayal & Pandey, 2019). Salisu and Gupta (2020) applied the GARCH technique to evaluate the reaction of equity market volatility of the BRICS countries to shocks in oil. They used current dataset, which were prepared

by Baumeister and Hamilton (2019), which categorized oil shocks into four types namely economic shock, supply shock, consumption shock and inventory shock. They also divided the shocks into a negative and positive genre of shocks. Their findings indicate a heterogeneous reaction of equity market volatility BRICS countries to substitute oil shocks. They conclude that the different reaction of shocks amongst the BRICS countries can be traceable to divergences in economic girth, level of oil production and consumption, market equity distribution amongst companies and type of financial regime in place. In their study on regional economic activity, Ioan and Ioan, (2011) confirmed that amongst other variables consumption is important in determining the rate of regional economic activity.

4. Methodology

The research applied a quantitative approach with the usage of Vector Autoregression and VAR Granger causality techniques. Exchange rate data for BRICS countries (Brazil, Russia, India, China and South Africa) were collected from the Investing.com online stock market data for a period of 95 days between January and May 2020. Findings from the VAR and Granger causality results are discussed below.

4.1. Findings

From the analysis in Tables 1 to Table 7, there is a significant unidirectional causal relationship between some of the BRICS countries' stock performance within the COVID-19. The results show evidence that lagged India stock exchange performance strongly predict the performance of Brazil stock market performance during the COVID-19 period (with p-value less than 0.001) but not vice versa. In the same vein, the results also show that lagged China stock market value does influence the performance of Brazil stock market value during the COVID-19 period (with p-value of 0.0488) but the relationship is not vice versa. Further to the above, the results also indicate that lagged South Africa's stock exchange performance during the COVID-19 period can cause and/or predict India's stock exchange performance during the COVID-19 pandemic period (with a p-value of 0.0053) but not vice versa. Similarly, the results show that lagged Russia's stock exchange performance during the COVID-19 period can predict or cause the performance of India's stock exchange during the COVID-19 pandemic period (with a p-value of 0.0220), but this relationship is not vice versa. Additionally, the results also indicate that the lagged performance of India's stock market value during the COVID-19 period can predict the performance of China's stock market performance during the COVID-19 period (with a P-value of 0.03), however the

relationship only runs from India stock value to China stock value and not vice versa.

These results thus provide investment directions for current and prospective investors in BRICS stock markets to strengthen their investment directions. The foregoing predictive potential of stock performance in the BRICS markets can assist investors in forecasting stock market values in BRICS countries during COVID-19 period and to be pre-informed on when to invest and dis-invest. In the same manner, Russia and South Africa's stock performance also offer a predictive ability to inform stock investors on likely stock behaviour in Indian's stock exchange – this way, investors in Indian stock market during the COVID-19 period may not be taken unawares if they study the trend of Russia and South Africa's stock behaviour during the COVID-19 period. It is also important to note that India's stock market performance during the COVID-19 also provide useful guide for investors to understand and forecast the China's stock market performance and to make informed decision on investment during the COVID-19 period.

Table 1. Vector Autoregression Summary

(. var brazil india southafri china russia, lags(1/2) small dfk)					
Sample: 04jan2020 - 07apr2020	-	Number of obs =			95
Log likelihood = 3262.161	-	AIC	=		69.83496
FPE = 1.48e+24		HQIC	=		70.43241
Det(Sigma_ml) = 4.61e+23		SBIC	=		71.31352
Equation	Parms	RMSE	R-sq	F	P > F
Br.SV	11	2702.07	0.9810	434.0947	0.0000
In.SV	11	245.081	0.9774	363.5894	0.0000
Sa.SV	11	1236.46	0.9597	199.8365	0.0000
Ch.SV	11	39.8832	0.8945	71.25815	0.0000
Ru.SV	11	32.0182	0.9841	521.241	0.0000

Table 2. VAR Coefficients for Brazil

	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]
Br.SV					
Br.SV					
L1.	.3893207	.1087079	3.58	0.001	.1731431 .6054984
L2.	.1860566	.1095353	1.70	0.093	.0317665 .4038796
In.SV					
L1.	2.354302	1.224447	1.92	0.058	.0806456 4.78925
L2.	1.753543	1.370126	1.28	0.204	.9711035 4.47819
Sa.SV					

L1.	.4161599	.247869	1.68	0.097	.0767549 .9090747
L2.	-.5857256	.2557817	-2.29	0.025	1.094376 -.0770756
Ch.SV					
L1.	17.30005	7.194478	2.40	0.018	2.993041 31.60706
L2.	-11.01564	7.232673	-1.52	0.132	25.39861 3.367323
Ru.SV					
L1.	10.22074	9.45015	1.08	0.283	8.571915 29.0134
L2.	-.8636531	7.843031	-0.11	0.913	16.46038 14.73308
_cons	-24143.3	10633.42	-2.27	0.026	45289.03 -2997.582

Table 3. Var Coefficients for India

	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]
In.SV					
Br.SV					
L1.	.0194762	.0098599	1.98	0.052	.0001314 .0390838
L2.	.0034999	.009935	0.35	0.726	.0162569 .0232567
In.SV					
L1.	.7367072	.1110588	6.63	0.000	.5158546 .9575597
L2.	.101829	.124272	0.82	0.415	.1452995 .3489576
Sa.SV					
L1.	-.018008	.022482	-0.80	0.425	.0627159 .0267
L2.	.0516581	.0231997	2.23	0.029	.0055229 .0977932
Ch.SV					
L1.	.1844061	.6525472	0.28	0.778	1.113256 1.482068
L2.	-.1448869	.6560116	-0.22	0.826	1.449438 1.159664
Ru.SA					
L1.	-1.781125	.8571393	-2.08	0.041	-3.48564 -.0766092
L2.	.1300834	.7113718	0.18	0.855	1.284557 1.544724
_cons	-199.0972	964.4632	-0.21	0.837	2117.038 1718.844

Table 4. VAR Coefficients for South Africa

	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]
Sa.SV					
Br.SV					
L1.	.0644479	.0497444	1.30	0.199	.0344744 .1633701
L2.	.0352112	.050123	0.70	0.484	-.064464 .1348864
In.SV					
L1.	.551636	.5603034	0.98	0.328	.5625888 1.665861
L2.	-.8198874	.6269657	-1.31	0.195	2.066678 .4269027
Sa.SV					
L1.	.8440403	.1134241	7.44	0.000	.6184839 1.069597
L2.	.1207512	.1170449	1.03	0.305	.1120055 .3535079
Ch.SV					
L1.	1.963656	3.292171	0.60	0.552	4.583188 8.510499

L2.	-3.143897	3.309649	-0.95	0.345	9.725497	3.437704
Ru.SV						
L1.	-3.18758	4.32436	-0.74	0.463	11.78704	5.411884
L2.	-2.275854	3.588947	-0.63	0.528	-9.41287	4.861161
_cons	5731.617	4865.821	1.18	0.242	3944.602	15407.84

Table 5. VAR Coefficients for China

	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]
Ch.SV					
Br.SV					
L1.	-.0019095	.0016046	-1.19	0.237	.0051004 .0012813
L2.	-.0000602	.0016168	-0.04	0.970	.0032754 .0031549
In.SV					
L1.	-.0138255	.0180731	-0.76	0.446	.0497659 .0221149
L2.	.0432829	.0202234	2.14	0.035	.0030665 .0834993
Sa.SV					
L1.	-.0018482	.0036586	-0.51	0.615	.0091237 .0054273
L2.	.0041905	.0037754	1.11	0.270	.0033173 .0116983
Ch.SV					
L1.	.7923722	.1061921	7.46	0.000	.5811976 1.003547
L2.	.0066206	.1067559	0.06	0.951	.2056751 .2189163
Ru.SV					
L1.	-.0971861	.1394863	-0.70	0.488	.3745699 .1801977
L2.	.0905731	.1157649	0.78	0.436	.1396381 .3207843
_cons	351.0137	156.9516	2.24	0.028	38.89816 663.1293

Table 6. VAR Coefficients for Russia

	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]
Ru.SV					
Br.SV					
L1.	.0045947	.0012881	3.57	0.001	.0020331 .0071563
L2.	-.0000338	.0012979	-0.03	0.979	.0026149 .0025473
India					
L1.	-.0133346	.0145091	-0.92	0.361	.0421875 .0155184
L2.	.0115196	.0162353	0.71	0.480	.0207661 .0438053
Sa.SV					
L1.	.0015186	.0029371	0.52	0.606	.0043222 .0073594
L2.	-.0024315	.0030309	-0.80	0.425	.0084587 .0035958
Ch.SV					
L1.	.2767931	.085251	3.25	0.002	.107262 .4463241
L2.	-.1387262	.0857036	-1.62	0.109	.3091573 .0317049
Ru.SV					
L1.	.5694731	.1119796	5.09	0.000	.3467893 .7921569
L2.	.0691858	.0929361	0.74	0.459	.1156277 .2539994
_cons	-298.059	126.0008	-2.37	0.020	548.6254 -47.49253

Table 7. VAR Granger Causality Wald Test Result

Equation	Excluded	F	df	df_r	Prob > F
Br.SV	In.SV	12.538	2	84	0.0000
Br.SV	Sa.SV	2.8908	2	84	0.0611
Br.SV	Ch.SV	3.1311	2	84	0.0488
Br.SV	Ru.SV	1.0604	2	84	0.3509
Br.SV	ALL	7.7852	8	84	0.0000
In.SV	Br.SV	2.771	2	84	0.0683
In.SV	Sa.SV	5.5716	2	84	0.0053
In.SV	Ch.SV	.03999	2	84	0.9608
In.SV	Ru.SV	3.9934	2	84	0.0220
In.SV	ALL	3.2064	8	84	0.0032
Sa.SV	Br.SV	1.7607	2	84	0.1782
Sa.SV	In.SV	.85908	2	84	0.4272
Sa.SV	Ch.SV	.49105	2	84	0.6137
Sa.SV	Ru.SV	1.7042	2	84	0.1881
Sa.SV	ALL	.85228	8	84	0.5599
Ch.SV	Br.SV	.87608	2	84	0.4202
Ch.SV	In.SV	3.4773	2	84	0.0354
Ch.SV	Sa.SV	1.1299	2	84	0.3279
Ch.SV	Ru.SV	.32392	2	84	0.7242
Ch.SV	ALL	2.7874	8	84	0.0087
Ru.SV	Br.SV	7.6191	2	84	0.0009
Ru.SV	In.SV	.42291	2	84	0.6565
Ru.SV	Sa.SV	.40528	2	84	0.6681
Ru.SV	Ch.SV	6.6694	2	84	0.0020
Ru.SV	ALL	8.0558	8	84	0.0000

4.2. Practical Implication

Findings from this paper hold important implication for the global finance literature and has significant practical implication for equity investors, stock market portfolio managers, stock exchange policymakers and the academia. The causal stock relationships provide additional investment information to clarify investment risks and uncertainty for current and potential investors in BRICS countries. The paper provides a study case for economics, finance and accounting classes on BRICS stock exchange performance studies. Further study is recommended to focus on interrelationship of stock market performance in other economic blocks around the world to determine how such economic blocks performance during the COVID-19 and to compare their performance with the BRICS performance.

4.3. Value (Contribution)

This paper extends earlier studies on the relationship between the BRICS stock markets by contributing the first empirical analysis of causal relationship amongst the BRICS market performance during the COVID-19 pandemic. It thus offers a novel theoretical contribution on how an economic block of countries such as BRICS can perform during disease epidemic.

5. Conclusion

This paper set out to examine the causal relationship between the BRICS countries' stock market performance during the COVID-19 pandemic period – specifically within the months of January and May 2020. The Vector Autoregression and Granger causality tests provide important new information for investors' speculation and understanding of investment direction in BRICS countries during the COVID-19 period. This research findings provide additional information for investors' discernment and stock investment decision during a period that is clouded with unprecedented risk and uncertainty arising from a sudden disease pandemic. Understanding how stock market performance might relate during this period is vital for investment decisions with reduced risk within the BRICS markets. Accordingly the foregoing findings does show that India and China's stock market performance during COVID-19 period can provide a predictive insignia for understanding stock market behaviour in Brazil stock market during the COVID-19 period. In the same vein, South Africa and Russia stock market performance during the disease pandemic can help investors in understanding stock market behaviour in India during the COVID-19 period. The foregoing findings are limited within the periods of January and May; this provides impetus for future research to expand this paper by including the months of June 2020. This paper is important for reducing stock market risk and uncertainty within the BRICS block during the COVID-19 period.

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