Trade openness, Financial Stability and Economic rowth Evidence from Some BRICS Countries: Russia, India and South Africa from (1988-2022)

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Abstract

This study examines the relationship between trade openness, financial Stability, and economic growth in Russia, India, and South Africa using time-series data from 1988 to 2022. The analysis employs the Johansen co-integration test (JCT), vector error correction model (VECM), and Wald Granger causality (WGC) approaches. The findings reveal a long-term relationship among trade openness, financial Stability, and economic growth in all three countries. In the long run, Russia and South Africa exhibit unidirectional causality from financial stability and trade openness to economic growth, while India displays bidirectional causality. In the short run, trade openness shows no direct causal relation with growth, and a weak causal link exists between financial Stability and economic growth in Russia and South Africa. No significant short-term causal relations are observed in India. Based on these findings, the study recommends fostering both trade openness and financial Stability in India, prioritizing financial sector reforms for stability in Russia and South Africa, and focusing on policies that reduce trade barriers and enhance trade infrastructure to stimulate economic growth.

1. Introduction

Trade openness, financial deepening, and economic growth are three interconnected concepts that have been extensively studied in the field of economics. Trade

Liberalization refers to a country's willingness to participate in international trade by removing trade barriers, while financial stability refers to the development of financial intermediaries and markets to mobilize savings and allocate credit efficiently. Economic growth, on the other hand, refers to the increase in a country's output of goods and services over time. Studies have also explored the causal relationships between these variables. Some suggest that trade openness and financial Stability are leading indicators of economic growth, while others argue that economic growth drives trade openness and financial deepening. The direction of causality may also differ across countries and over different time periods.

Schumpeter (1912) is credited with highlighting the significant role of the financial sector in shaping innovation and Deepening patterns. Gurley and Shaw (1967), Goldsmith (1969), McKinnon (1973), and Shaw (1973) further demonstrated the substantial impact of the financial sector on economic growth (EG). The new growth theory suggests that financial intermediation and markets emerge in response to incomplete markets, and thus, contribute to long-term (LR) growth (Bittencourt, 2012). Financial systems (FS) play a crucial role in the process of EG due to their ability to facilitate the supply function with novel technological innovations and accumulated capital.

Trade openness, often signified by the removal of trade barriers and the promotion of cross-border exchanges, is a driving force behind economic globalization. It has the potential to stimulate economic growth by expanding market access, increasing competition, and fostering specialization in production. On the other hand, financial stability, encompassing the robustness of financial intermediaries, markets, and regulatory frameworks, plays a crucial role in channeling savings into productive investments and maintaining economic equilibrium.

In the next sections, we present a rigorous analysis of our findings, offering an accurate understanding of the relationships among trade openness, financial stability, and economic growth in Russia, India, and South Africa. Through this exploration, we contribute to the ongoing discourse on the intricate web of economic variables that shape the trajectory of emerging economies on the global stage. Providing valuable insights that can guide informed policy decisions, fostering sustainable development and resilience in these dynamic economies.

1.1. Importance of the Study: The examination of the complex interplay between trade openness, financial deepening, and economic growth holds significant importance within the field of economic scholarship. This empirical investigation focuses on three prominent BRICS nations—Russia, India, and South Africa— spanning a substantial period from 1988 to 2022, serving a dual purpose. Firstly, it

contributes substantially to the advancement of economic theory by delving into the intricate relationships among trade openness, financial stability, and economic growth. Secondly, it addresses the practical needs of policymakers and stakeholders within these countries, offering valuable insights for the formulation of effective trade and financial policies geared toward sustainable economic development. Moreover, this research extends its relevance beyond the borders of these three nations, offering insights that resonate with the global economic community, thereby shedding light on the evolving role of emerging economies in shaping the contemporary international economic landscape.

1.2.Objectives of the study: This study is designed to achieve several key objectives:

- To undertake a rigorous empirical analysis of the relationships between trade openness, financial Deepening, and economic growth in Russia, India, and South Africa.

- To examine the impact of trade policies, financial regulations, and pivotal macroeconomic indicators on the intricate interplay between these variables.

- To facilitate a comparative examination of the experiences of these three BRICS countries, thereby drawing attention to unique challenges and opportunities presented within each context.

- To clarify the temporal evolution of the relationship between trade openness, financial stability, and economic growth, taking into account the changes in domestic and global economic conditions over the extensive timeframe under investigation.

1.3. Statement of the problem: The relationship between trade openness, financial Stability and economic growth has been the subject of extensive research and policy making in Russia, India and South Africa. These three emerging economies have experienced dynamic changes in their economic structures and policies over the past few decades, which makes it necessary to assess how trade openness and financial Stability interact with economic growth in these distinct contexts. Although there is a growing frame of literature on this topic, there are many important questions and issues that need to be addressed. In light of the complex dynamics within these emerging economies, this study seeks to address the following critical research questions:

1. How does trade openness impact economic growth in the distinct economic environments of Russia, India, and South Africa, and what are the specific channels through which this influence manifests?

2. To what extent does financial Stability contribute to the relationship between trade openness and economic growth in each of the selected BRICS countries, and how does the role of financial intermediation evolve over time?

3. What are the unique policy implications for each nation regarding the optimization of trade openness, financial deepening, and economic growth in light of their distinct historical, political, and economic contexts?

1.4. Research Hypotheses: The following hypotheses guide the empirical analysis in this study:

Null Hypothesis (H0): There is no causal impact and relationship between trade openness, financial Deepening, and economic growth in Russia, India, and South Africa.

Alternative Hypothesis (H1): there is a casual impact and relationship between trade openness, financial Deepening, and economic growth in Russia, India, and South Africa.

2. Literature Review: In the context of trade openness, financial deepening, and economic growth, numerous studies have been conducted to examine the relationship between these variables. A pioneering study on how finance and growth are related was conducted by Goldsmith (1969). He assessed whether FD had a causal impact on development, and if markets and intermediaries, operating in an economy, impacted its growth. He used the 1860 to 1963 for 35 countries and found that the worth of the financial intermediation assets to GFP positively impacted the performance of the economy. The conclusion is that the size of the financial intermediary (FI) sector has a direct correlation with the value of financial functions that the FS provides. Furthermore, FD and economic activity could be positively correlated.

Most empirical studies have concentrated on measuring the roles of the financial system, or on measuring bank sizes and financial markets. Petersen and Rajan (1997), Demirguc-Kunt and Maksimovic (2001) and Fisman and Love (2002) came to the conclusion that companies often function as FIs to provide trade credit (TC). This form of trade financing could be crucial, particularly in economies with limitations on FIs and standardization in countries that lack developed legal systems, and incapable of supporting formal FD.

Employing provincial data from 1985 to 1999, Chen (2006) demonstrated that China's FD contributed to the development of its economy. Furthermore, he determined two ways in which the financial sector contributed to the economy, which were: by mobilizing savings and substituting loans for budget appropriation. Additionally, utilizing provincial data from 1995 to 2003, Cheng and Degryse (2007), studied the effect of developing banks and non-bank financial organizations

on the development of the local economy and reported that the growth of the banking sector significantly and positively affected EG.

Raynal (2007) analyzed the effect of developing the financial sector on EG (productivity and capital growth), income disparity, and education in BRICS countries using yearly data from a selected sample of a dozen BRICS countries nations over the years from 1971 to 1998. The FD indicators utilized encompassed private credit and bank deposits as a share of GDP. He found the existence of a two-way causation problem, whereby FD was internally- derived from the growth equation. To resolve this internal nature of the FD, he used instrumental variables for measuring it, and the outcomes are considerably different from earlier empirical work. He also revealed that financial development does no significantly affect GDP per capita development. Furthermore, the outcomes indicated that FD positively affects income disparity and the proportion of the population that finished secondary education.

Leitao (2010) investigated the relationship between FD and EG in the EU countries (EU-27) and BRIC (India, Russia, India and China) countries covering the years 1980 to 2006. Adopting a static and dynamic panel data technique, the outcome's showed FD does make a contribution to EG. The investigation also considered productivity and trade as proxies which confirmed the positive impact on EG.

Mhadhbi (2014) also examined how FD and EG were related. The data from 1973 to 2012 were drawn from 110 developing and developed countries. The statistics on imports were determined employing the Generalized Method of Moments dynamic panel and showed that the variable that influenced EG significantly and positively was the variable that reflected the availability level of the banking system. On the contrary, the credit availability from the FS to the private sector, although substantial, negatively impacted growth. Besides, what indicators of the financial Stability of the economy appears to be positively dependent on EG for emerging economies and negatively dependent for advanced economies?

Asteriou and Spanos (2019) studied how FD and EG were related with regard to the recent financial crisis, employing a panel dataset of 26 EU countries from 1990 to 2016. The empirical approach utilized multiplicative dummies in a comparison of two separate sub-periods prior to and following the crisis. The outcomes indicated that prior to the crisis, FD encouraged EG, whereas in the post-crisis period it stalled economic activity. Besides, the outcomes give an indication that in 2008 and 2009 the capital adequacy of banks shielded depositors and helped to stabilize the financial system.

Recent studies have also examined the causality and direction of the relationship between these variables. For example, Alam and Uddin (2020) found bidirectional causality between trade openness and financial deepening in India, while Siddiqui and Iqbal (2019) found a unidirectional causality from financial deepening to economic growth in Pakistan.

Therefore, FD can potentially promote to EG in some ways. FD, by way of enhanced confidence in the financial system motivates the less affluent families to increase their savings, which boosts the availability of funds to large investors and also increases investments. Additionally, FD facilitates greater efficiency in the utilization of financial capital. It should be noted that despite the many studies that appear to hypothetically back the notion that FD affects EG, there remains a lack of consensus on the type and form of the effect as proposed by a number of researchers.

3. Financial and Economic Outlook of BRICS countries

Russia, India and South Africa in BRICS countries have similar levels of FD according to Garcia et al. (2002) who analyzed the FD in the BRICS countries context. They made comparisons of FD in BRICS countries with other emerging regions, namely Asia and Eastern Europe, and showed that BRICS countries are behind in terms of FD. The authors maintain that the financial system in BRICS countries are mainly bank-based, while the stock market lacks the significance compared to developed regions. In the last decade of the 20th century, credit available to the private sector in BRICS countries averaged only 28% of GDP, which is a strong indication of a lack of FD in BRICS countries compared to 72 % for Asia and 43% for the MENA countries.

Russia was still a part of the Soviet Union in 1988, a socialist nation that was having significant economic problems. Consumer goods shortages, a stagnating agriculture sector, and a lack of innovation had been caused by years of centralized planning, a focus on heavy industries, and inefficiency. High military expenses put a pressure on the economy and led to inflation, budget deficits, and a decline in living standards. These economic difficulties resulted in the collapse of Soviet Union in 1991, leading to the emergence of the independent Russian Federation.

However, BRICS countries' encouraging economic record since the beginning of the 21^{sr} century (2003) has suggested the possibility of transformation of the state, and thus enable the adoption of progressive and optimistic public policies that can lead to growth in the long-run while short-term risks are mitigated. Even though there are significant variances in the existing economic situations in the region (with South America performing better than Central America, South Africa and the Caribbean) robust external demand (in particular from dynamic economies like China), in

tandem with strong domestic requirements, average GDP growth rate was nearly 5% for each of the years from 2003 to 2008. This was partly due to sound macro-economic management that resulted in adequate fiscal space for managing the impacts of the worldwide financial crisis while remaining fiscally sustainable. From 2000 to 2007, public debt in the region contracted averagely by 15 % of GDP, whereas fiscal balances improved from an overall GDP deficit of 2.4% to a surplus of 0.4% of GDP. Macro-economic policies and improved earnings from primary exports reinforced macro-economic stability and made available funds for the eradication of poverty and enhancing accessibility to essential public services. This resulted in a lower rate of pronounced recessions and more rapid recoveries in comparison with OECD economies. Even as real GDP growth in the more developed countries was projected to be slow, BRICS countries was then projected to grow 4.4% in 2011 and 4.1% in 2012 (UNECLAC, 2012).

In general, BRICS countries inadequately developed financial sector can be attributed, ironically to the well-intentioned and strong intervention of the government in that sector over the decade from the 1970s to the 1980s. It was common practice for many governments in BRICS countries to utilize the banking sector for financing their budget deficits as well as loans and implicit taxation (Mas, 1995). Over the same period, the regional governments also made use of the banking sector to provide subsidies for sectorial development activities. Such intervention in the banking sector led to the creation of a bias with regard to refinancing non-performing loans, and worked to the benefit of inefficient banks and particularly defaulting borrowers.

Over the expansive period spanning from 1988 to 2022, the BRICS nations collectively underwent significant economic growth. This coalition, consisting of Russia, India and South Africa, witnessed substantial economic expansion. India, in particular, stood out as a standout performer, experiencing remarkable GDP growth due to its commitment to market-oriented reforms and a strategic focus on export-oriented policies (World Bank, 2021). India made notable progress, driven by its abundant youthful workforce and successful implementation of economic reforms (Reserve Bank of India, 2020). Russia's economic journey was closely tied to its abundant natural resources, while Russia faced a cycle of economic ups and downs influenced by fluctuating commodity prices (International Monetary Fund, 2019). South Africa, the smallest economy within the BRICS group, pursued a more modest growth path while grappling with persistent structural challenges throughout this extensive period (Fourie & Santana-Gallego, 2014).

4. Data Source and Description: This research focuses on an investigation conducted in three BRICS countries, namely Russia, India, and South Africa, covering the period from 1988 to 2022. The study employs annual data obtained from the World Bank Development Indicators (WDI) of the World Bank in 2022. The variables of interest are measured in terms of the growth rate of Gross Domestic Product (GDPGR), which serves as a proxy for economic growth. Furthermore, the study incorporates three indicators to assess financial development, namely Domestic Credit to the Private Sector (DCPS), money supply (M2), and trade (TRD). By utilizing these variables, the research aims to analyze the relationship between trades openness, financial Stability indicators and economic growth within the context of the selected BRICS countries. Basically, the study model for estimation can be expressed as a functional relationship form as follows:

$$GDPGR_t = f(DCPS/GDP, M2/GD, TRD/GDP) \qquad (1)$$

Where:

•GDPGR (Real Gross Domestic Product Growth Rate): Measures the annual change in a country's economic output after adjusting for inflation. It indicates whether the economy is growing or contracting.

•DCPS (Domestic Credit to Private Sector as a Ratio of GDP): represents the amount of credit provided by domestic financial institutions to private businesses and individuals as a percentage of the country's GDP. It assesses access to credit in the private sector.

•M2 (Money and Quasi Money as a Ratio of GDP): M2 is a measure of the total money supply in an economy, including cash and near-money assets like savings accounts. It's expressed as a ratio of the money supply to GDP.

•TRD (Trade as a Ratio of GDP): TRD assesses the importance of international trade in an economy. It's the total value of imports and exports of goods and services as a percentage of GDP.

5. Methodology: This study adopts the model of Katircioglu (2010) in determining the study model's specifications, Firstly; a unit root test (URT) of stationarity was conducted using ADF and PP test approach. Secondly, the JCT was performed to study the availability of a LR relationship among the variables. Thirdly, VECM was utilized to indicate the LR and SR relationships. The study employed yearly data from 1988 to 2022, which were extracted from the World Bank website.

5.1. Unit Root Test (URT): Unit root tests are statistical methods employed in econometric analysis to determine the stationarity of a time series variable. Stationarity is an essential assumption in econometric modeling as it guarantees the

stability and reliability of statistical inferences. The presence of a unit root indicates a non-stationary time series characterized by a stochastic trend. Non-stationary variables often exhibit persistent behavior or long-term trends, rendering them unsuitable for various econometric analyses that rely on stationarity.

Let X is any variable and the definition of the ADF model is:

$$\Delta X_t = \beta_1 + \beta_2 t + \delta X_{t-1} + \sum_{i-1}^{m} \alpha_i \Delta X_{t-i} + \varepsilon_t \qquad (2)$$

Where:

X is "the series" and "t= trend factor (time);"

$B1$ is "constant;"

m is "the lag order;"

ε_t is "a pure white noise error term," and

$\Delta X_{t-1} = (X_{t-1} - X_{t-2})$,

$\Delta X_{t-i} = (X_{t-i} - X_{t-j})$, and

i is t"he number of recent times," and

j is "the number of previous times or years."

The hypothesis of ADF is:

$H_0 : \delta = 0, X_t$ is non- stationary (unit root exists)

$H_1 : \delta \neq 0, X_t$ is stationary (no unit root exists)

5.2. Johansen co-integration test (JCT): The Johansen co-integration test is a statistical method extensively used in econometrics to examine the existence of long-term relationships among multiple time series variables. Co-integration arises when two or more non-stationary variables exhibit a stable and persistent relationship, allowing them to move together in the long run despite short-term deviations. Developed by Soren Johansen, the Johansen co-integration test extends the Engle-Granger two-step procedure, which focuses on analyzing pairwise relationships, to consider co-integration among several variables simultaneously (Johansen and Juselius, 1990). The test estimates a vector error correction model (VECM), incorporating lagged differences of the variables to address issues of serial correlation and endogeneity. This model captures both the short-term dynamics and the long-run equilibrium relationship among the variables (Katircioglu et al., 2007). This approach is shown in the VAR model below:

$$x_t = C + \Pi_k x_{t-1} + \cdots \Pi x_{t-k} + \varepsilon_t \qquad (3)$$

Where:

Xt, Xt-1… Xt-K are "vectors of current and lagged values of *n* variables respectively, which are *I(1)* in the model;"

Π*1,...., *ΠK are "known as matrices of coefficients with *(n X n)* dimensions;"

C is "an intercept vector," and

ε_t is "a vector of random errors" (Katircioglu et., 2007).

The quantum of lagged values is discovered with no auto-correlation among the error terms. The rank of Π indicates the sum of co-integrating relationship(s), i.e. *r,* which is obtained by determining if its Eigen values *(λi)* differ from zero. JCT utilizes the trace test and the maximum eigenvalue test for co-integration. Cheung and Lai (1993) state that the trace test shows greater robustness compared to maximum Eigen value and also provides improved outcomes for co-integration. Johansen (1988) and Johansen and Juselius (1990) proposed that utilizing the Eigen value of Π in the order of largest to the smallest is for computing the trace statistic (Katircioglu et al., 2007). The trace statistic *(λtrace)* is calculated as follows:

$$\lambda_{trace} = -T \sum Ln(1 - \lambda_i), i = r + 1 \dots n - 1 \tag{4}$$

and the hypotheses are: H0: r = 0 H1: r ≥ 1, H0: r ≤ 1 H1: r ≥ 2 , H0: r ≤ 2 H1: r ≥ 3

5.3. Vector Error Correction model (VECM): Specifications of the Vector Error Correction model (VECM) are shown below, where GDP growth does not necessarily directly control their Long run (LR) equilibrium levels whereby the speed of adjustment between the SR and LR levels can be obtained by the *ECt-1* in the Error Correction, where Δ denotes modification in GDP growth, FD and trade proxy, and the expected sign of *ECT* is negative. The empirical model estimated employing (VECM) approach is:

$$\Delta lnGDPGR_t = \beta0 + \sum_{i=1}^{P} \beta_1 \Delta lnGDP_{t-1} + \sum_{i=0}^{P} \beta_2 \Delta lnDCPS_{t-1} + \sum_{i=0}^{P} \beta_3 \Delta lnM2_{t-1} +$$

$$\sum_{i=0}^{P} \beta_4 \Delta lnTRD_{t-1} + \sum_{i=0}^{P} + \beta_5 EC_{t-1} + \mu t \tag{5}$$

6. Discussion of the Analysis and Empirical Results

6.1. Unit Root Test (URT): The study employs unit root tests to determine the stationarity of variables, and these tests are conducted in both log levels and at levels and first differences. Failure to detect non-stationarity in time series analysis may lead to spurious regression. Table 1 displays the outcomes of the unit root tests for stationarity, which utilize ADF and PP. The results indicate that all variables at levels are non-stationary, and the null hypothesis of a unit root and non-stationarity cannot be rejected. However, the variables become stationary after taking first differences,

and they are integrated in first order [I(1)] with a linear deterministic trend. These findings suggest that all variables are stationary at first-difference using both ADF and PP tests.

Table (1)Stationarity test outcomes

Variables	Augmented Dickey-Fuller (ADF) Test		Phillips-Person (PP) Test		Order of Integration
	Prob. Value At (level)	Prob. Value (1st Difference)	Prob. Value At (level)	Prob. Value (1st Difference)	
Russia Federation					
∆GDPGR	0.41011	0.0000*	0.49412	0.0000*	I(1)
∆DCPS	1.0000	0.0000*	0.75865	0.0001*	I(1)
∆M2	0.28770	0.0001*	0.46128	0.0000*	I(1)
∆TRD	0,70002	0.0002*	0.59814	0.0000*	I(1)
South Africa					
∆GDPGR	0.33511	0.0001*	0.19410	0.0001*	I(1)
∆DCPS	0.72214	0.0031*	0.35867	0.0000*	I(1)
∆M2	0.26611	0.0000*	0.7000	0.0000*	I(1)
∆TRD	0,06001	0.0033*	0.30092	0.0000*	I(1)
India					
∆GDPGR	0.40117	0.0001*	0.49412	0.0000*	I(1)
∆DCPS	0.80122	0.0031*	0.75865	0.0000*	I(1)
∆M2	0.46221	0.0000*	0.46128	0.0000*	I(1)
∆TRD	0.07009	0.0033*	0.59814	0.0002*	I(1)
* Rejection of null unit root hypothesis at 1%significance point					

 Source: Computed by the authors.

6.2. Selection of the Lag Order (Lag Length Criteria): Verification of stationarity at the first difference of the incorporated variables is essential, given that all the variables exhibit integration of the same order, specifically, order one, denoted as I(1). Prior to conducting co-integration tests, it is imperative to ascertain the suitable lag order. In empirical analysis, widely recognized criteria for this purpose encompass the Schwarz Information Criterion (SC), Hannan-Quinn Information Criterion (HQ), and Akaike Information Criterion (AIC). Consequently, the aforementioned criteria unanimously recommended selecting a lag order of one.

Table (2)Selection of Lag Order

# Lags order	AIC	SC	HQ
0	14.16277	14.29473	14.20882
1	11.71126*	12.23910*	11.89549*
2	13.16261	13.08633	12.48501
3	12.00264	13.32224	12.46322
4	11.88569	13.60117	12.48444

Source: Calculated by author

6.3. Johansen's Co-integration Test (JCT): The unit root test was utilized in this study to conform the integrate of the variables in first order I(1). By conducting the co-integration test, the LR equilibrium relationships among the series could be

evaluated, as previously mentioned. The Johansen and Juselius (1988, 1990) method were employed to determine the optimal lag length selection, and subsequently, the VAR test was conducted using Lag 2, which was found to be optimal for all countries based on the Akaike Information Criterion (AIC). Table 2 presents the co-integration results for all countries.

Table (3)Johansen co-integration test results

Hypothesized No. of CE(s)	RUSSIA		INDIA		SOUTH AFRICA	
	Trace Statistic	Max-Eigen Statistic	Trace Statistic	Max-Eigen Statistic	Trace Statistic	Max-Eigen Statistic
None	61.09554* 0.0003	32.11950* 0.00290	58.81120* 0.0077	33.93889* 0.0311	64.89221* 0.0001	33.32138* 0.0030
At most -1	33.98371* 0.0012	28.29907* 0.0199	28.100765 0.2017	12.93880 0.1009	37.00919* 0.0199	26.10098* 0.0209
At most -2	9.18865 0.2735	7.93377 0.2333	10.40970 0.2126	11.83990 0.3012	9.19965 0.2009	5.99066 0.4060
At most -3	4.01228 0.0661	3.12833 0.0733	1.99750 0.7953	0.008701 0.7853	3.89330 0.0208	4.07677 0.2270
* Indicates that the rejection of the null hypothesis at the 0.05 level						

Source: Computed by the authors

Table 3, presents the outcomes of the co-integration test, Trace and Max-Eigen statistics clearly reject the null hypothesis (r = 0) that there is no co-integration between FD and EG in the three countries under study against the alternative of r ≥1 at 5% significance level, meaning that the alternative hypothesis is acceptable and we conclude that at least one co-integrating vector is found in the relationship between FD and EG, which implies the existence of a LR association between FD and EG and all the variables move together in respect of Russia, India and South Africa, and this motivates investigation of the LR and SR casual relation using VECM approaches.

6.4. Vector Error Correction Model (VECM)

6.4.1 Long run (LR) relationship results: The co-integration test result proved the availability of a LR relationship between FD indicators and EG in the countries under study, so to investigate the LR and SR causality we employed a VECM approach. Long-run causality results from normalized co-integration equation from VECM are obtained and presented in Table 3. The results confirm a long-run casual relation between FD and EG in Russia, India and South Africa. In relation to Russia, the ECT coefficient is negative (-0.6399011) and probability (0.0066) is statistically significant at 5%, and these results confirm the presence of a positive and significant LR relationship between FD indicators (DCPS and TRD) and EG while M2 has no impact, and the speed of adjustment towards equilibrium will be corrected annually by 63%. In the case of India, the coefficient of ECT also is negative (-0.316610) and probability at 0.0390 is statistically significant at 5% level; the results clearly

corroborate the presence of a significant and positive LR relationship between FD indicators (that is, M2) and EG, while DCPS and TRD have negative effect, and the speed of adjustment towards equilibrium implies about 36% of disequilibrium will be corrected annually. As for BRICS countries South Africa, in the LR, ECT coefficient is also negative (-0.488110) and statistically significant (0.00290) at 5%, and the result reveals significant and positive LR relationship between FD indicators (that is, DCPS and TRD) and EG, while M2 measure negatively affects EG, and the speed of adjustment implies that deviation from long-run EG in FD is adjusted by 48% annually.

How causality is directed in the long-run has been identified in VECM outcomes, and the results of Russia and South Africa suggest unidirectional causality running from FD indicators to EG, which is supportive of the SLH and the result is consistent with the reported outcome of Banerjee and Ghosh (1998), whereas in India the result suggests bidirectional causality between FD and EG. This is supportive of the SLH and DFH and the outcome mirrors the reported outcome of Calderón and Liu (2002). With regard to the three countries, the VECM is stable, has no serial correlation, no heteroskedasticity and the residuals are normally distributed.

Table (4)LR Normalized Co-integration Results

Variables	RUSSIA	INDIA	SOUTH AFRICA
	DV GDP Growth	DV GDP Growth	DV GDP Growth
ECT_{-1}	-0.6399011 (0.0066)	-0.316610 (0.0390)	-0.488110 (0.00290)
DCPS	0.181943	-0.137972	0.162790
M2	-0.495294	0.034563	-0.227246
TRD	0.804184	-0.477900	0.062277
C	-10.21072	17.92762	2.135351
*Values in brackets are probability values.			

Source: Computed by the authors

6.4.2. Short run (SR) causality results: Regarding SR causality between FD and RG, the study applied Wald test to reveal the SR relationship and WGC test to explore the causality direction, and the outcomes in Table 4 show that in Russia and South Africa, the SR causal relation between FD and EG is supported, while in India, the study found no causal relationship in the SR, which implies FD and EG have no interdependent relationship. The direction of causality regarding Russia suggests bidirectional causality between DCPS and EG, whereas unidirectional causality was found running from money supply (M2) to EG, which supports the supply leading hypothesis. However, trade measure has no short-run casual effects on GDP growth, which is not consistent with general evidence in the empirical literature. In South

Africa, the outcomes suggest unidirectional causality running from FD indicators (that is, M2) to EG, which indicates backing for the supply leading hypothesis.

Table (5) Short run (Wald granger causality) Test

Variables	RUSSIA		INDIA		SOUTH AFRICA	
	Chi-sq	Prob.	Chi-sq	Prob.	Chi-sq	Prob.
D(GDP) to D(DCPS)	9.10399	0.0000	2.104110	0.3100	4.10776	0.05990
D(DCPS) to D(GDP)	5.82233	0.03844	1.95211	0.22001	5.05543	0.07221
D(GDP) to D(M2)	2.11009	0.0002	0.404050	0.5505	10.33811	0.00610
D(M2) to D(GDP)	4.33880	0.0521	2.267252	0.3219	5.896532	0.05522
D(GDP) to D(TRD)	2.021191	0.3320	0.833310	0.7033	4.33900	0.11998
D(TRD) to D(GDP)	2.181040	0.3360	5.466940	0.5151	5.883320	0.1181
Joint causality Wald test C(4)=C(5)=C(6)= C(7)=C(8)=C(9)=0	8.00112	0.00199	1.66099	0.3180	5.19880	0.01187
Rejection of the null hypothesis at the 0.05 level						

Source: Computed by the authors

The direction of SR and LR between FD indicators (DCPS, M2 and TRD) and EG is summarized in Table 5, with arrows based on VECM outcomes and Wald Granger causality test.

Table (6)Long and Short Run Causality Direction

Variables	Russia		India		South Africa	
	Long-run	Short-run	Long-run	Short-run	Long-run	Short-run
GDPGR-DCPS	→	↔	↔	-	→	-
GDPGR-M2	→	→	↔	-	→	→
GDPGR-TRD	→	-	↔	-	→	-
Note: (→) denotes unidirectional, (↔) denotes bidirectional, (-) denotes no direction.						

Source: Computed by the authors

6.5. Diagnostic tests: Diagnostics tests are conducted with the purpose of validating the obtained results, ensuring their reliability, and mitigating the potential introduction of biases into the findings. The outcomes of these diagnostic tests can be founded in Table 7.

Table (7) Residuals Diagnostics Results

#	Diagnostic test	Probability value	Null Hypothesis H0
1	LM	0.9081*	Existing of Serial Correlation
2	Joint White	0.3198*	Existing is Heteroscedasticity
3	Normality Distribution	0.1301*	The residuals are not normally distributed
Inference: -The P. value should be more than 0.05 for the rejection of H0. (*) Indicate that the rejection of H0			

Source: Author's computation, E-Views 10.

Table 7, indicates probability value for detecting serial correlation among residuals is 0.09081, which exceeds the significance level of 0.05. Consequently, the null hypothesis of the absence of serial correlation is rejected, implying that there is no

evidence of serial correlation among the residuals. Furthermore, the probability value for detecting heteroscedasticity of residuals is 0.3198, which also surpasses the significance level of 0.05. As a result, the null hypothesis of no heteroscedasticity is rejected, indicating that there is no indication of heteroscedasticity among the residuals. Lastly, the probability value obtained from the normality test is 0.1301, and it is greater than 0.05. Therefore, the null hypothesis is rejected, signifying that the residuals follow a normal distribution.

7. Conclusion and Policy recommendations: This study aimed to examine the causality among trade openness, financial deepening, and economic growth in the long and short run using data from three BRICS countries (Russia, India, and South Africa). Economic growth was represented by the GDP growth rate, while financial development was represented by indicators such as domestic credit to the private sector and broad money supply, and trade openness by TRD. The study employed time-series analysis, including the Johnsen co-integration test and VECM, and also the Wald Granger causality test for the years 1988 to 2022.

The series' statistical properties were verified for stationarity, with URTs showing that all variables had stationarity at first difference, using both ADF and PP URT. In the long run, the study's results for Russia and South Africa revealed a positive and significant relationship between FD indicators (DCPS and TRD) and EG, while in India, the study found a negative and significant relationship between FD indicators (DCPS and TRD) and EG. The study supports the supply-leading hypothesis (SLH) in Russia and South Africa, with unidirectional causality running from FD indicators to EG. However, for India, the study found bidirectional causality between FD and EG, supporting both the SLH and the demand-following hypothesis (DFH), suggesting that FD promotes EG and vice versa.

Regarding short-run causality, the study showed the existence of a short-run relationship between financial development and economic growth in Russia and South Africa. Still, no short-run relationship was found regarding the direction of causality in India. For Russia, the study found bidirectional and unidirectional causality between financial development and economic growth, with the outcomes being sensitive to certain financial development indicators. In South Africa, the study found unidirectional causality running from financial development to economic growth. Based on the findings of this research on the causality among trade openness, financial deepening, and economic growth in Russia, India, and South Africa, several policy recommendations can be made:

1. Policymakers should consider targeted financial sector reforms. These reforms should aim to strengthen financial intermediaries and markets, enhancing their ability

to mobilize savings and allocate credit efficiently. Additionally, they can focus on maintaining financial stability to sustain long-term economic growth.

2. Policymakers in all three countries can focus on reducing trade barriers, enhancing trade infrastructure, and pursuing trade promotion strategies to stimulate economic growth through trade openness. This includes fostering international trade agreements and partnerships to expand market access and export opportunities.

3. International Cooperation of BRICS countries, Russia, India, and South Africa can explore avenues for increased economic cooperation and coordination, especially in the context of trade and financial integration. Bilateral and multilateral agreements among BRICS nations can promote cross-border trade and investment.

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