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THEORETICAL MODEL EVALUATION OF STOCK PRICE AND EXCHANGE RATE RELATIONSHIPS IN BRICS COUNTRIES

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Abstract

This study investigates the theoretical and empirical relationships between stock prices and exchange rates within the BRICS countries (Brazil, Russia, India, China, South Africa, and Indonesia), particularly focusing on Indonesia following its official inclusion in BRICS on January 6, 2025. Using a daily time series dataset from June 2023 to May 2025, this research applies the Granger Causality Test to evaluate the direction of causality between capital and foreign exchange markets. The study is grounded in four major theoretical frameworks: flow-oriented, stock-oriented, portfolio balance, and asset market models.

The analysis reveals a heterogeneous structure of interdependence across BRICS countries, encompassing both unidirectional and bidirectional causalities. Notably, Indonesia's capital market (JSX) demonstrates predictive influence over the domestic exchange rate (IDR), supporting the stock-oriented hypothesis. Moreover, the South African Rand (ZAR) exhibits dominant influence across multiple BRICS markets, while China's Yuan (CNY) significantly affects the South African stock index, confirming China's pivotal economic role. The study also identifies feedback loops between several country pairs, indicating strong financial integration and information transmission. This research contributes to the literature by incorporating daily data analysis and exploring the impact of Indonesia's BRICS membership, an area previously underexplored. It offers theoretical enrichment by mapping empirical findings onto established models and provides policy insights for enhancing macro-financial coordination and volatility risk management among BRICS nations.

Keywords: Granger causality, stock-exchange relationship, BRICS integration, financial interconnectedness, theoretical financial models

INTRODUCTION

Globalization and international economic integration have increasingly driven the interconnectedness between stock markets and foreign exchange markets, particularly in developing countries such as BRICS members (Brazil, Russia, India, China, South Africa, Egypt, Ethiopia, Iran, United Arab Emirates, and Indonesia). Numerous studies indicate a reciprocal relationship between exchange rate fluctuations and stock prices, where traditional and portfolio mechanisms play key roles in this dynamic. Crisis periods, such as the COVID-19 pandemic, further complicate this relationship through heightened volatility and stronger spillovers across countries. With Indonesia officially joining BRICS on January 6, 2025, understanding how this integration affects the relationship between the stock and foreign exchange markets in Indonesia within the BRICS context becomes crucial.

Although several studies have explored the link between stock prices and exchange rates in BRICS countries, a deep gap remains, particularly regarding the intensity and direction of causality between Indonesia and other member countries. Recent research has generally employed volatility analysis or VAR approaches; however, empirical Granger Causality analysis using daily data post Indonesia's accession to BRICS remains scarce. Moreover, variations in

results positive, negative, or no relationship at all highlight the academic and practical urgency to explore the most appropriate theoretical model for Indonesia and BRICS collectively.

The use of flow-oriented and stock-oriented theories, as well as alternative models such as portfolio balance and asset market approaches, provides a rich conceptual framework for analyzing the relationship between exchange rates and stock prices. The Dornbusch & Fisher (1980) model supports the direction from exchange rate to stock price, while Gavin (1989) and Branson (1983) argue that the reverse may hold. Incorporating all these theories, this study adopts the Granger Causality Test to identify the direction of causality within an evolving theoretical framework.

This study aims to answer the primary question: What is the relationship between Indonesia's stock and foreign exchange markets and those of the BRICS countries? Specifically, the research questions are formulated as follows: (1) Is there Granger causality between exchange rates and stock prices in Indonesia and BRICS countries? (2) Which theoretical model—flow-oriented, stock-oriented, portfolio balance, or asset market—best explains the dynamics of the Indonesian market following its BRICS membership? The study aims to map the most relevant theoretical model based on daily data from June 2023 to May 2025.

The main contribution of this research lies in presenting an applied theoretical evaluation of causality direction between Indonesia's stock and foreign exchange markets within the BRICS framework, using the robust Granger Causality method and up-to-date daily data. The study's novelty includes: (1) the context of Indonesia's accession to BRICS, (2) the use of recent daily data spanning two full years, and (3) the theoretical update across various existing models. These findings are expected to enrich empirical literature on macro-financial interactions involving exchange rates and offer crucial references for market players and policymakers in Indonesia and BRICS nations.

LITERATURE REVIEW

This study is grounded in several major theories regarding the relationship between stock prices and exchange rates. First, the flow-oriented theory (Dornbusch & Fisher, 1980) explains how domestic exchange rate factors affect export performance and indirectly stock prices through international trade mechanisms. The stock-oriented theory, including the monetary model (Gavin, 1989) and portfolio balance model (Branson, 1983; Frankel, 1983), offers the opposite view: stock price changes can determine exchange rate fluctuations. Alternative models such as the global portfolio balance (Hau & Rey, 2004) and asset market model (Frenkel, 1976) add the dimension that external factors and global investor preferences can influence exchange rate and capital market dynamics.

Various previous studies have mapped the relationship between stock prices and exchange rates, yet the results vary in direction and strength. For instance, Aggarwal (1981), Bahmani-Oskooee and Saha (2016), and Mitra (2017) found positive relationships, while Chkili & Nguyen (2014) and Tsen (2017) reported negative correlations, and Alagidede et al. (2011) found insignificant results. In the BRICS context, Sui & Sun (2015) observed that short-term causality

can be unidirectional depending on the country. Additionally, Dahir et al. (2018), using wavelet analysis, found that crisis conditions affect both the magnitude and direction of the relationship. Nguyen (2019) found that for emerging markets the relationship is negative, while for developed countries it is positive. Allimuthu (2023) found no relationship between exchange rates and stock markets, and Ali and Sun (2017) found mixed results.

The relationship can also be unidirectional or bidirectional (Erdogan et al., 2020; Kilic et al., 2023). A unidirectional relationship from exchange rates to stock markets was found by Kumar (2019) and Nawab (2021), while a bidirectional relationship was observed by Sikhosana and Aye (2018).

Although the body of literature is extensive, an important gap remains in recent empirical studies. Most use annual, monthly, or quarterly data, while studies based on daily data—especially post Indonesia's accession to BRICS are still limited. Differences in methods (VAR, GARCH, wavelet) also lead to heterogeneity in results. Studies employing Granger Causality with the most recent two-year data in the BRICS context are still scarce.

This article addresses that gap by presenting a theoretical evaluation combined with Granger Causality analysis using daily data from June 2023 to May 2025, including Indonesia's capital and foreign exchange markets after joining BRICS. The main contributions include: (1) an up-to-date empirical analysis using daily data; (2) a causality evaluation within the framework of flow-oriented, stock-oriented, and alternative models; and (3) the integration of Indonesia into the BRICS analytical model as a contribution to a previously underexplored empirical domain.

METHOD

This study adopts a quantitative time series causality approach using the Granger Causality Test as the main method to examine the direction of the relationship between exchange rates and stock prices in BRICS countries, including Indonesia.

The type and source of data used are secondary daily time-series data obtained from the Investing.com website (https://id.investing.com), covering stock index prices and local currency exchange rates for six BRICS countries (Brazil, Russia, India, China, South Africa, and Indonesia), from June 2023 to May 2025. These data were chosen because they are representative of market volatility and enable daily causality analysis.

Data collection was conducted through manual downloading and automatic extraction (web-scraping) from Investing.com. All data were retrieved simultaneously, covering six BRICS member countries. The units of analysis are the capital markets (stock index prices) and foreign exchange markets (exchange rates) of each country, analyzed in pairwise comparisons between countries.

Data analysis was carried out in several stages: (1) stationarity testing using the Augmented Dickey-Fuller (ADF) method, and (2) the Granger Causality Test to examine whether there is a unidirectional or bidirectional causal relationship.

Data were processed using EVIEWS12 software with the pairwise Granger Causality Test option. This approach aligns with modern analytical practices in economic and financial

research, where Granger Causality has been proven effective and supported by strong theoretical foundations.

With this structured and scientifically grounded methodology, the research enables causal interpretation based on flow-oriented, stock-oriented, and alternative theoretical models, as well as empirical testing of the relationship between capital and foreign exchange markets in the six BRICS countries. The analytical tools employed also support reproducibility and replicability in accordance with international academic standards.

RESULTS AND DISCUSSION

The Granger causality test results based on EVIEWS 12 output reveal a complex and dynamic interconnection between capital and foreign exchange markets in BRICS countries, including Indonesia. These findings indicate that both unidirectional and bidirectional relationships between stock indices and exchange rates in each country are observable, supporting the theory that global financial integration creates interdependent systems across markets.

First, from the capital market to the currency market, several significant patterns emerged, showing both unidirectional and bidirectional relationships. The unidirectional relationship from JSX (Indonesia's capital market) to IDR (Indonesia's currency market) confirms that Indonesia's stock index can serve as a leading indicator for domestic exchange rate movements, supporting the stock-oriented model as argued by Gavin (1989). This strengthens evidence from Rubianto et al. (2019), which demonstrated a negative relationship where JSX influences IDR.

Similar findings are observed in the relationship from NIFTY50 (India's capital market) to BRL (Brazil's currency), and from SHANGHAI (China's capital market) to IDR, indicating the dominance of Asian capital market information over other countries' currency markets. This aligns with the findings of Yadav et al. (2022), who reported that Asian markets are increasingly influential sources of volatility for regions such as Latin America and Africa. The relationship from Russia's MOEX index to the INR also suggests cross-market risk transmission, likely due to energy dependency as discussed by Kumar (2019).

Second, from the currency market to the capital market, an interesting finding is the relationship from IDR to BOVESPA (Brazil's stock market), which, despite geographical distance, signals systemic spillovers from emerging markets. This aligns with the systemic spillover argument presented by Diebold and Yilmaz (2015), Laghari and Chengang (2017), and Nawab et al. (2021), in which fluctuations in one country's currency market may serve as early warnings for changes in another's capital market.

Particularly notable is the dominance of the South African Rand (ZAR), which shows unidirectional relationships with multiple stock indices (JSX, BOVESPA, NIFTY50, FTSEJSE) and a bidirectional relationship with MOEX. ZAR emerges as a dominant variable in the cross-country BRICS causality system, reinforcing findings by Nyopa and Khumalo (2022), who demonstrated strong ZAR integration within BRICS. This underscores the importance of external variables in shaping domestic stock index dynamics in emerging markets.

Additionally, the effect of the Chinese Yuan (CNY) on South Africa's FTSEJSE stock index further affirms China's status as a global economic hub influencing African stock prices, consistent with the studies by Christensen (2010) and Guo and Ibhagui (2019), which highlighted increasing Chinese investment in African countries. Similarly, the unidirectional relationship from RUB (Russia's currency) to BOVESPA reflects Russia's economic-political impact on other BRICS stock markets (Singh et al., 2021).

Third, bidirectional relationships between capital and currency markets are observed. The bidirectional links between FTSEJSE and IDR, FTSEJSE and BRL, INR and FTSEJSE, and ZAR and MOEX illustrate interregional interactions, reflecting the effects of financial globalization. These findings are consistent with the results of Bal and Maglani (2016), who found two-way relationships between stock markets and exchange rates.

The existence of bidirectional relationships between capital and currency markets indicates strong linkages through cross-border investor expectations and sentiment. This aligns with previous findings by Sensoy and Sobaci (2014), showing that emerging markets tend to influence each other through regional volatility transmissions.

Overall, these findings confirm that in the BRICS context, the interrelationship between exchange and capital markets is trans-regional. Some markets exhibit feedback loops, while others display one-directional dominance or dependence patterns. These results support complementary theoretical models such as stock-oriented, flow-oriented, and portfolio balance approaches in explaining the variation in cross-country relationships. The Granger Causality Test provides robust evidence that market fluctuations in one BRICS country can serve as significant predictors for others, reinforcing the global market integration argument in the post-globalization era, as also noted by Chkili and Nguyen (2014).

CONCLUSION

Based on the quantitative analysis using the Granger Causality Test on daily data from June 2023 to May 2025, it can be concluded that the relationship between capital and currency markets in BRICS countries, including Indonesia, exhibits complex causality patterns, both unidirectional and bidirectional. These findings affirm that financial integration among BRICS countries is not homogeneous but is reflected in various relationship configurations depending on country pairs and direction of influence. Some markets play dominant roles in the cross-country information system, such as India and China's capital markets toward other countries' currencies, and the South African Rand (ZAR), which repeatedly influences various BRICS stock markets, including Indonesia's JSX. The presence of bidirectional relationships between stock indices and exchange rates in several country pairs also demonstrates feedback mechanisms that strengthen stock-oriented and portfolio balance theories in the context of global financial markets.

In the Indonesian context, several key findings have strategic economic implications. First, the unidirectional relationship from JSX to IDR indicates that the domestic stock market acts as an early indicator for exchange rate fluctuations, highlighting the importance of index stability and performance in maintaining investor perceptions of the national economy. Second, the

sensitivity of IDR to stock indices of BRICS partners such as Shanghai and FTSEJSE reflects Indonesia's structural linkages in the international financial system following BRICS membership. Third, IDR's role as a causal variable affecting BOVESPA stock movements suggests that Indonesia's domestic volatility not only has national impact but also international resonance within the emerging market network.

Based on these findings, the following policy recommendations are proposed for Indonesian authorities: (1) strengthen anticipatory macroprudential policies in response to external dynamics, particularly those from influential BRICS countries; (2) enhance coordination between monetary and capital market authorities to mitigate volatility transmission from one market to another; (3) develop more robust daily-based monitoring systems for capital flows and exchange rate risk management to respond adaptively to early signals from global stock markets.

For future researchers, it is recommended to develop extended studies integrating multivariate approaches such as VECM, VAR-GARCH, or Time-Varying Parameter Models to explore the depth and temporality of causality dynamics. This study also opens avenues to expand the scope by incorporating other dimensions such as commodity prices, geopolitical risk indices, or fundamental macroeconomic factors to better understand variable relationships in an integrated emerging market framework.

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