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EXAMINING THE CONNECTIONS BETWEEN THE NIFTY 50 AND OTHER EMERGING AND DEVELOPED GLOBAL STOCK MARKETS: AN ECONOMETRIC MODELING APPROACH

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ABSTRACT
This paper aims to examine the connections between the Nifty 50 and other emerging and developed global Stock Markets viz. Jakarta Price, Korea Composite Stock Price Index (KOSPI) and Moscow Exchange (MOEX) Price. Financial markets across the world have become increasingly integrated due to globalization. Understanding these connections can help investors and policymakers comprehend the degree of interdependence and integration between the Nifty 50 and other global markets. Therefore, an empirical investigation has been conducted to determine the cointegration and causality between the macroeconomic variables and the Sensex using Johansen's cointegration and Granger causality techniques. Monthly data points spanning a period of one year starting from 2022 to 2023 have been used for empirical investigation. Empirical results of the cointegration technique reveal no cointegrating equations between the macroeconomic variables. The results of the Granger causality reveal the unidirectional relationship between the Nifty 50 and Jakarta Price as well as the NIFTY 50 and KOSPI Price and MOEX Price.

Keywords: *Johansen Cointegration, Granger Causality, NIFTY 50, KOSPI, MOEX, etc.*

1. INTRODUCTION

A stock market, also known as an equity market or share market, is a place where investors can buy and sell shares of publicly traded companies. These shares, also called stocks or equities, represent ownership claims on businesses. Stock markets provide a platform for companies to raise capital by selling shares to the public, and they also offer investors the opportunity to participate in the growth and profits of these companies. Stock markets are a crucial component of the financial system, facilitating the buying and selling of stocks, which

represent fractional ownership in companies. These markets serve as a platform for companies to raise capital and for investors to participate in the growth of businesses. Stock markets operate through organized exchanges, which act as regulated marketplaces for buying and selling stocks. These exchanges establish rules and procedures to ensure fair and orderly trading. Some of the world's most prominent stock exchanges include the New York Stock Exchange (NYSE), Nasdaq, London Stock Exchange (LSE), and Tokyo Stock Exchange (TSE). The renowned stock exchanges in India include the National Stock Exchange (NSE) and Bombay Stock Exchange (BSE), along with several other stock exchanges that form the Indian Stock Market.

Trading in the stock market occurs through various mechanisms, including auctions and electronic trading platforms. In an auction-based system, buyers and sellers place bids and ask, representing their willingness to buy or sell shares at specific prices. The exchange matches these orders to determine the market price for each stock. Electronic trading platforms, on the other hand, facilitate direct transactions between buyers and sellers, often using algorithms to match orders and execute trades. Stock markets around the world are increasingly interconnected, influenced by global economic events, investor sentiment, and currency fluctuations. This interconnectedness has led to increased correlation among stock markets across different regions. For instance, a significant decline in the US stock market may trigger a ripple effect, causing stock prices in other marketsto fall as well.

Understanding the intricate relationship between the Nifty 50, India's benchmark stock index, and global stock markets holds immense significance for investors, policymakers, and the overall Indian economy. By delving into this nexus, we gain valuable insights into the factors that influence India's stock market performance, enabling informed investment decisions and effective policy formulation. Firstly, examining the connections between the Nifty 50 and global markets helps investors gauge the potential impact of global events and trends on the Indian stock market. This knowledge allows investors to make informed decisions about diversifying their portfolios, hedging against risks, and capitalizing on opportunities that arise from global market movements. Secondly, analyzing the interplay between the Nifty 50 and its global counterparts provides policymakers with crucial information for crafting sound economic policies. By understanding the factors that drive the Indian stock market's performance relative to global markets, policymakers can tailor their decisions to promote economic stability, attract foreign investment, and foster sustainable growth. For Instance, T. Vanita and S. Shruti (2012), discovered that across the whole time period, there was a

positive and strong correlation between the Indian stock market and all advanced emerging markets. Taiwan had the lowest correlation and South Africa had the highest. J. Prashant (2011), revealed that Asian stock markets are highly interconnected, with bidirectional linkages in terms of return, shock transmissions, and volatility. The Hang Seng index has the greatest impact on other Asian stock markets. The volatility of the Japanese stock market is the most persistent. Later, S. Swetadri and B. Amalendu (2018), observed the integration of the most important stock markets, namely, Australia, Canada, France, Germany, India, the UK, and the USA to examine the short-run and long-run relationships between Indian stock market and selected developed stock markets. Boateng et al. (2022) reveal that in the short run, investors can take minimal benefits by investing in emerging markets such as India from the high-risk stocks of developed countries. However, if the portfolio consists of stocks from Russia and Brazil, they can provide immunity from the high-risk stocks of developed countries except the US. Belaid et al. (2023) employed the Diebold and Yilmaz index, Toda–Yamamoto, and Dolado and Lütkepohl causality approach to examine the relationship between developed and emerging economies of the world during COVID-19. The empirical results reveal that emerging markets are driven by the developed countries' financial markets, especially European ones. Hong et al. (2024) used a novel time varying Granger causality test to determine the impact of economic policy uncertainty (EPU) on a group of seven emerging market nations. The findings show that the significant causal relationship between EPU and the chosen stock markets.

In this paper, a study has been conducted to understand and examine the connections between (I) Indian Stock Market (Nifty 50) and Developed Markets like the South Korean Stock Market (KOSPI) and (II) Indian Stock Market (Nifty 50) and Emerging Markets like Jakarta Stock Market and MOEX – Russia Stock Market. This study is divided into six pieces. The first portion is an introduction that provides a quick summary of the Indian stock market as well as information about the research gap and study implications. The literature review of pertinent studies and the macroeconomic factors employed by earlier research are shown in Section 2. The data and statistical techniques used for analysis are described in Section 3. Empirical results are presented in Section 4. While Section 5 offers asuccinct summary of the study's result, Section 6 offers insights into the implications of the study.

2. REVIEW OF LITERATURE

This section presents the past studies done by various researchers. A thorough evaluation of the literature on both developed and emerging global stock markets is conducted in this study. Various variables have emerged as potentially significant indicators to explain the relationship between the India Stock Market and other mature and emerging global markets, despite the majority of study efforts being done in this area. The summary of relevant literature is shown in Table 1, and the findings from these studies are conflicting. While some studies find that macroeconomic variables significantly affect the relationships between stock markets, other studies find that macroeconomic variables have little bearing on the explanation of stock marketlinkages. Furthermore, the literature implies that macroeconomic variables should be investigated even though they are not significant.

Table 1: Summary of Literature Review

S No.	***Author and Year***	***Title***	***Objective***	***Research Methodology***	***Findings***
1	*Donatas Pilinkus (2010)*	*Macroeconomic Indicators and Their Impact on Stock Market Performance in the Short and Long Run: The Case of the Baltic States*	*Introduce the terms stock market and macroeconomic indicators, offera model of howthese two concepts affect stock market indexes, and describe what macroeconomic indicators have a short- and long-term relationship with the stock market index.*	*Granger Causality, Vector autoregression equations, Johansen cointegration equations,*	*This paper led to the creation of the model illustrating how macroeconomic indicators affect the stock market index.*
2	*Tobias Olweny, Kennedy Omondi (2011)*	*The effect of macro-economic factors on stockreturn volatilityin the Nairobi stock exchange, Kenya*	*To determine how changes inforeign exchange rates affect the volatility of stock returns onthe Nairobi Stock Exchange, to determine how changes in interest rates affect the volatility of stock returns onthe Nairobi Stock Exchange, to determine how changes in the inflation rate affect the volatility of stock returns onthe Nairobi Stock Exchange.*	*Augmented DickeyFuller (ADF)*	*The study's conclusions highlight how the stock market influences economic growth; specifically, it has been discoveredthat the Nairobi stockexchange is a leading indicator of economic expansion.*

3	*Dan Kibet Chirchir (2011)*	*The Relationship between share Prices and exchange rates: Evidence from Kenya*	*Examining the relationship between shifts in stock prices and exchange rates for Kenya from November1993 to April 2011 is the aim of this study.*	*Augmented Dickey Fuller (ADF), Toda-Yamamoto Causality Test,*	*The research has demonstrated a negative, two-way link between share price and exchangerates.*
4	*Mohammed Mustapha Wasseja, Elizabeth Njoroge, Samwel N. Mwenda (2015)*	*Investigation ofthe Granger Causal Relationship Between Macroeconomic Variables and Stock Prices in Kenya*	*To look into whether there isa causal relationship between macroeconomic conditions and stock prices, to investigate whether there isa unidirectionalor bidirectional causal relationship between macroeconomic variables and stock marketprices.*	*Augmented DickeyFuller (ADF), Johansen-Juselius test, Granger-causality test, OLS Regression analysis*	*The results support the non-portability of the EMH by indicating that there may be arbitrage profit opportunities on the Nairobi stock market. Financial analysts can forecast stock returns to generate abnormal profits based on historical values of the money supply, inflation, and exchange rate.*
5	*Cornelius Kiprono Serem, Edwin Kipyego Kipchoge ,Silas Kiprono Samoei (2020)*	*Granger Causality between Macroeconomic Variables and Stock Market Prices at Nairobi Securities Exchange, Kenya*	*To find the bidirectional relationship of selected microeconomicvariables and stock market prices.*	*Phillips-Perron UnitRoot Test, Granger Causality Results*	*The findings showed that that inflation Granger causes interest rate in Kenyaand nominal GDP Granger causes exchange rates with probability 0.0008 which showed a unidirectionalcausality.*
6	*Dr. Vanita Tripathi, Ms. Shruti Sethi (2012)*	*Inter linkages of the Indian StockMarket withAdvanced Emerging Markets*	*To determine whether, overtime, the sophisticated emerging economies' stock markets are connected to those of the Indian stock market. To determine whether, over time, the sophisticated emerging economies' stock markets are connected to those of the Indian stock market. Toascertain the short-term correlation between the advanced developing markets' stock markets and the Indian stock market. Todetermine*	*Granger causality test, Correlation Analysis, Augmented DickeyFuller (ADF), Johansen cointegration Test,*	*It was discovered that across the wholetime period, there was a positive and strong correlation between the Indian stock market and all advanced emerging markets. Taiwanhad the lowest correlation and South Africa had the highest.*

			whether there have been any changes in the nature of the short-term relationship between the stock markets of advanced developing nations and India.		
7	*Raman Preet Singh, Nawal Kishor (2017)*	*Short and long run inter linkages of market returns of the Indian stockmarket withdeveloped stock markets*	*The study's goal is to look at and analyze the patterns in the stock exchange indices of the top economies. Secondly, to investigate the relationship between the leading economies' indices. The third objective is to examinethe historical correlation between the Nifty and leading stock exchange returns, and the fourth is to investigate the causal relationship between the leading economies.*	*Augmented DickeyFuller (ADF), Johansen co-integration test, Granger causality test, Variance decomposition analysis*	*The stock indices of the United States and the United Kingdom had the highest degree of correlation among developed economies. TheUSA, UK, Hong Kong, andIndia have a strong and positive correlation; the S&P 500 index has the strongest correlation and the HK50 index the lowest, but the developed countries index has a positive correlation overall.*
8	*Prashant Joshi (2011)*	*Return and Volatility Spillovers Among Asian Stock Markets*	*The aim of the study is to examine the interdependence across thesix stock markets.*	*Augmented DickeyFuller (ADF)*	*Asian stock markets are highly interconnected, with bidirectional linkages in terms of return, shock transmissions, and volatility. The Hang Seng index has the greatest impact on other Asian stock markets. The volatility ofthe Japanese stock market is the most persistent.*
9	*Stock pricesand exchange rate dynamics*	*To study the dynamics that exist between exchange rates and stock prices over the long and short terms, as well as the pathways that external shocks use to affect these markets.*	*Granger CausalityResults*	*The US stock market is an important conduit through which foreign exchange and local stock markets are linked. Previous studies that did not include the influence of world markets may be flawed.*	*Foreign exchange restrictions are not an importantdeterminant of the link between domestic and foreign markets.Access to market information is important for international investment. Links between markets can be fostered through other channels.*

10	*Bakri Abdul Karim, Zulkefly Abdul Karim (2012)*	*Integration of ASEAN-5 Stock Markets: A Revisit*	*This study re-examines theintegration among five selected ASEAN emerging stock markets (Malaysia, Thailand, Indonesia, the Philippines, and Singapore)based on the Autoregressive Distributed Lag (ARDL) bound testing approach proposed by Pesaran, Shin and Smith (2001)*	*Breusch-Godfrey LM test, Jarque-Bera normality test.*	*ASEAN stock markets are integrated and moving towardsmore integration. Long-run diversificationbenefits for ASEAN investors diminish. ASEAN needs policy coordination to mitigate financial fluctuations.*
11	*Parminder Kaur, Harman Arora (2018)*	*Financial markets interdependence in India: an empirical analysis*	*To investigate if different kinds of Indian domestic financial markets—such as the stock, bond, currency, and commodity markets—are eventually related to and dependent upon one another. to gauge how well the four Indian local markets co-move together in terms of synchronization. to investigate the relationship between various Indian financial markets.*	*Augmented Dickey-Fuller test, Philip Perron test, Granger Causality, Johansen's co-integration test*	*BRICS equity markets show no long-term co-movement, Investors can exploit this to reap good returns by diversifying their portfolios, BRICS, economies are heterogeneous, offering investors a unique investment landscape, Future research should focus on optimizing portfolio weights and exploring other emerging economies*
12	*Gagan Deep Sharma B.S. Bodla (2011)*	*Inter-linkages among stock markets of South Asia*	*To study the interlinkages between the stock markets of India, Pakistan,and Sri Lanka.*	*Granger causality, vectorauto-regression model, variance decomposition analysis*	*The study finds that although the Colombo Stock Exchange (Sri Lanka) and Karachi Stock Exchange (Pakistan) are caused by the National Stock Exchange (India), the opposite is not true. The VARmodels also support the findings ofGranger's causation model.*
13	*Wing-Keung Wong, Aman Agarwal, Jun Du (2005)*	*Financial Integration for India Stock Market, a Fractional Cointegration Approach*	*This study uses empirical research to examine the long-term equilibrium relationship and the short term dynamic connectivity between the stock markets of major industrialized nations (Japan, the United States, and the United Kingdom) and the Indianstock market after*	*unit root test, cointegration, Error Correction Model, Vector Autoregression Model, Johansen Multivariate Cointegration, Fractional*	*This study comes to the conclusion that the Indianstock market is linked to more established markets and, over time, is susceptible to their characteristics.The Indian stock market is short-term driven by the US and Japanese*

			1990.	*Cointegration*	*stockmarkets, but not the other way around. Furthermore, we discover that over time, the Indian stock index and the maturestock indices develop a fractionally cointegrated relationship with a shared fractional, nonstationary component and that the Johansen approach provides the most accurate representation of this relationship.*
14	*Amanjot Singh Parneet Kaur (2015)*	*Stock Market Linkages: Evidence Fromthe US, China and India during the subprime crisis*	*To analyze the stock market linkages between the US, India, and China, especially during the US subprime Crisis.*	*Vector Auto-Regression Model, TGARCH Model,Unit root Test*	*There is evidence of a unidirectional causal relationship between the US market andthe Chinese and Indian markets. Additionally, there is evidence of a unidirectional relationship between the Chinese and Indian marketsconcerning stock market returns throughout thecrisis era. It has been determined that there is a considerable unidirectional volatility spillover from the US to the Indian market and from the Indian market to the Chinese market.*
15	*Shegorika Rajwani Jaydeep Mukherje e (2015)*	*Is the Indian stock market cointegrated with other Asian markets?*	*To investigate the linkages between Indian stock markets with other Asian stock markets namely, Hong Kong, Indonesia, Japan, South Korea, Malaysia, Taiwan, and China.*	*Augmented Dickey and Fuller(ADF), Phillips and Perron (PP),*	*The findings imply that there is no integration between the Indian stock markets and any Asian market, either singly or collectively, andthey also draw the conclusion that Indian markets are not long-term sensitive to the dynamics in these markets.*

16	*Vanita Tripathi, RitikaSeth (2016)*	*Market efficiency, inter-linkages, and volatility transmission in stock markets of selected SAARC countries*	*Investigating the degree of volatility transmission, contemporaneous relationships, short- and long-term co-integration, and the weak form of market efficiency in the stock markets of a few SAARC nations.*	*Augmented Dickey and Fuller (ADF), Phillips and Perron (PP), Granger causality test, Impulse response analysis, Johansen's Co-integrationtest, and the ARCH-GARCH model.*	*Findings revealed significant short-run interlinkages, with the causality moving from the Indian stock market towards the Pakistan stock market and long run co-integration among almost all the four stock markets of SAARC countries.*
17	*N Rajiv Menon, M.V. Subha, S. Sagaran (2019)*	*Cointegration ofIndian stock markets with other leading stock markets*	*To examine whether the stock markets in the Indian subcontinenthave any link with the major stock markets from China, Singapore,America, and Hong Kong.*	*Engle Granger test of cointegration*	*The paper findsthat the Indian markets are related to someof the markets around the world*
18	*Swetadri Samadder , Amalendu Bhunia (2018)*	*Integration between Indianstock market and developed stock markets*	*To look into the relationship, both short and long term, between the established stock markets and the Indian stock market. to look for both bidirectional and unidirectional causal relationships between the developedstock markets and the Indian stock market. Toexamine investor potential for diversification*	*Augmented Dicky-Fuller, Johansen's Cointegration Test, Granger Causality Test*	*The present study observes the integration of most importantstock markets,namely, Australia, Canada, France, Germany, India, the UK, and the USA to examine the short-run and long-run relationships between the Indian stock market and selected developed stock markets*
19	*Amarnath Mitra, Vishwanat hanIyer (2017)*	*Transmission ofVolatility acrossAsia-Pacific Stock Markets: Is There a Pattern?*	*The goal of the study isto monitor the 20-year volatility transmission across 11 global stock markets in the Asia-Pacific area, encompassing both crisis and non-crisis periods (i.e., contagion form).*	*VAR- EGARCH model,*	*Historical data indicates that there is constantvolatility transmission throughout the Asia-Pacific stock markets. This information contradicts the previously held belief that stock market volatilityspillover occurs as a result of a crisis. Over 85% of the cases provide strong evidence that the volatility spillover between the Asia-*

					Pacific stock markets is not random.
20	*Himanshu Goel* and Narinder PalSingh (2021)*	*Analysing the nexus between stock market and key macroeconomi cvariables using cointegration and causality approaches*	*To analyse the nexus between the Bombay Stock Exchange (BSE) and macroeconomic factors.*	*Johansen cointegration, Granger causality*	*There are no cointegrating equations between the macroeconomic variables and the Sensex, according to empirical findings using the cointegration technique. Granger causality resultsshow that the sole thing that causes the Sensex is the consumer price index. Additionally, the regression model's results show that the world index of Morgan StanleyCapital International and the foreign exchange rate between the US dollar and the rupee are significant. The absence of multicollinearityand autocorrelation in the dataset is further demonstrated bythe results. The outcomes of thisstudy hold significant valuefor individual investors, asset managers, and legislators.*

Source: Author's Compilation

3. CONCEPTUAL FRAMEWORK

The interconnections between global financial markets have garnered significant attention from academics, investors, and policymakers. Understanding these relationships is crucial for portfolio diversification, risk management, and policy formulation. The Nifty 50, representing the top 50 companies listed on the National Stock Exchange of India, serves as a barometer for the Indian equity market. By examining its connections with other emerging and developed global stock markets, we can gain insights into the degree of market integration, the transmission of shocks, and the influence of global economic dynamics on local markets. The market integration theory says that the financial markets become

integrated when capital flows freely across borders, leading to a convergence in asset prices. The integration is influenced by factors such as trade liberalization, technological advancements, and regulatory harmonization. In a highly integrated market, shocks in one market are quickly transmitted to others. Moreover, according to the efficient market hypothesis, asset prices reflect all available information. In the context of global markets, the hypothesis suggests that information about economic events in one part of the world is quickly incorporated into the prices of securities in other markets. This rapid information dissemination implies a strong connection between global markets. In the end, the contagion theory explains how financial crises or shocks can spread from one market to another, often through investor behavior and market sentiment. Contagion can occur due to real economic linkages, financial interdependencies, or herd behavior among investors.

4. RESEARCH OBJECTIVE

1. *To examine the connection between the Indian Stock Market (Nifty 50) and the developed stock markets such as Russia (MOEX) and South Korea (KOSPI).*
2. *To examine the connection between the Indian Stock Market (Nifty 50) and emerging markets such as Indonesia (Jakarta Price Index).*

4.1 DATA AND RESEARCH METHODOLOGY

The study approach is split into two sections to meet the intended goals. For the study, the dataset is first subjected to preliminary analysis, which involves determining descriptive statistics, testing the unit root features of each data series, and looking for outliers. The Augmented Dickey Fuller (ADF) technique has been used in this investigation for this reason. Second, to ascertain the causality and cointegration relationship between Sensex and important macroeconomic factors, the Granger causality and Johansen cointegration approaches are utilized.

4.2 DATA

Secondary data has been collected from various sources. Monthly data spanning a period over a period of 2022 to 2023 has been considered for the study. Data on the Sensex of 4 different countries has been taken from the investing.com site for inflation and the exchange rate has been retrieved from global rates.

4.3 AUGMENTED DICKEY FULLER TEST

When assessing the stationarity of time series data, the ADF methodology is the method most frequently employed (Goyal and Bansal, 2019; Singh and Singh, 2018). The series has a unit root or is non-stationary, according to the null hypothesis of the ADF test, whereas the alternate hypothesis claims that the series does not. A series is considered stationary if the null hypothesis is rejected; that is, it is an integral series of zero order i.e., *I(0)*. The series is deemed non-stationary at the level, however, if we are unable to reject the null hypothesis. Financial series are typicallyfound to be the first difference stationary, or integrated series of the first order i.e., *I(1)*. The test has been carried out in two versions in this instance, i.e., intercept trend and intercept forms.

4.4 JOHANSEN COINTEGRATION

The method for figuring out the long-term cointegration between the data variables is called the Johansen test, after Soren Johansen. The method most frequently used to assess the cointegration of the variables is Johansen's cointegration (Goyal and Bansal, 2019; Megaravalli et al., 2018; Barakat et al., 2015). A series is considered cointegrated if it consists of two or more non- stationary components that come together to produce a stationary series. Additionally, cointegrated series move in unison over the long term, but in the near term, the presence of external influences may cause them to drift apart. In this case, a set of null hypotheses is assumed by the Johansen cointegration test for any number of cointegrating relationships that could exist between the select variables. The Johansen cointegration test, for example, has as its initial null hypothesis that there isn't a cointegrating vector ($r = 0$) among some variables.

Nonetheless, as per Johansen and Juselius (1990), the number of cointegrating vectors pertaining to the specified variables cannot surpass the total number of variables. There are, therefore, a maximum of five ($r \leq 5$) cointegrating vectors among the variables provided, according to the final null hypothesis of the Johansen cointegration test.

4.5 GRANGER CAUSALITY

The section represents the Granger causality approach. The Granger causality test has been used to examine the lead-lag connection between the data series. The direction of causation between the variables is shown by this test. The Granger causality technique can be applied in two different ways. To analyze the short run causality, we use VEC Granger causality (Engle

and Granger, 1987) in the event of cointegration and VAR Granger (1969) causality in the absence of cointegration.

5. EMPIRICAL FINDING

This section presents pragmatic findings of the considered study. The results of each considered test are discussed as below.

5.1 AUGMENTED DICKEY FULLER TEST RESULT

In this section, the result of ADF test for considered problem. ADF test is employed to check the stationarity of the variables. All the variables are being tested at level (Table 2) and first difference (Table 3).

Table 2: ADF Test Results at Level

Variable	***Test Form***	***ADF Result***	
		Test stat. (Critical Value)	***p-value***
Nifty50 Price	*Intercept Trend*	*-1.525 (-2.872)*	*0.519*
	Intercept	*-2.003 (-3.427)*	*0.596*
Jakarta Price	*Intercept Trend*	*-2.370 (-2.872)*	*0.151*
	Intercept	*-2.694 (-3.427)*	*0.239*
Kospi Price	*Intercept Trend*	*-2.348 (-2.872)*	*0.157*
	Intercept	*-1.877 (-3.427)*	*0.663*
MOEX Price	*Intercept Trend*	*-3.959 (-2.872)*	*0.001*
	Intercept	*-3.540 (-3.427)*	*0.037*

Source: Author's Calculations

Tables 2 and 3 illustrate the ADF results at the level and first difference respectively of all the variables. All variables were found non-stationary at the level that indicates macroeconomic variables chosen for study and Nifty 50 has the presence of unit root. Therefore, the null hypothesis of unit root cannot be rejected at a 5% level of significance. Table 2 reveals that all the variables were stationary at 5% in intercept form and in trend and intercept form at the first difference. Thus, we can conclude that all the variables were integrated of first order, i.e., *I(1)*.

Table 3: ADF Test Results at First Difference

Variable	***Test Form***	***ADF Result***	
		Test stat. (Critical Value)	***p-value***
Nifty50 Price	*Intercept Trend*	*-15.688 (-2.872)*	*0.000**
	Intercept	*-15.670 (-3.427)*	*0.000**
Jakarta Price	*Intercept Trend*	*-16.809 (-2.872)*	*0.000**
	Intercept	*-16.776 (-3.427)*	*0.000**
KOSPI Price	*Intercept Trend*	*-16.240 (-2.872)*	*0.000**
	Intercept	*-16.350 (-3.427)*	*0.000**
MOEX Price	*Intercept Trend*	*-13.687 (-2.872)*	*0.000**
	Intercept	*-13.862 (-3.427)*	*0.000**

Source: Author's Calculations

Note: Rejection of null hypothesis at 1 percent level of significance

5.2 JOHANSEN COINTEGRATION TEST RESULTS

This section presents result of Johansen Cointegration test for considered problem. Johansen Cointegration technique was employed to determine the connection between the developing and emerging stock market viz. Nifty50. Tables 4 and 5 show the results of Nifty 50 and Jakarta and Nifty 50 and the KOSPI Price index, respectively. The results of ADF tests allowed the author to employ the Johansen cointegration technique to determine the connection. Here, the optimal laglength was determined using the SIC criterion. According to SIC, the optimal lag is 2 and 1 for two separate results respectively. The results indicate no cointegrating relation among the variables. Put differently, there was either no sustained correlation or a non-linear long-term movement among the variables used for the study. These are as follows:

Table 4: Nifty 50 and Jakarta Price Index

Null Hypothesis	***Eigen Value***	***Trace Test***		***Max Eigen Value***	
		Statistics	***p-value***	***Statistics***	***p-value***
None	*0.026*	*8.79*	*0.38*	*6.91*	*0.49*
At Most 1	*0.007*	*1.87*	*0.17*	*1.87*	*0.17*

Note: The null hypothesis is accepted when test statistics < Critical Value. Critical Value is considered at 5%.
Source : - Author's Calculations

Table 5: Nifty 50 and KOSPI Price and MOEX Price

Null Hypothesis	***Eigen Value***	***Trace Test***		***Max Eigen Value***	
		Statistics	***p-value***	***Statistics***	***p-value***
None	*0.054*	*26.8*	*0.1*	*14.55*	*0.32*
At Most 1	*0.035*	*12.3*	*0.14*	*9.45*	*0.25*
At Most 2	*0.01*	*2.44*	*0.09*	*2.84*	*0.09*

Note: The null hypothesis is accepted when test statistics < Critical Value. Critical Value is considered at 5%.
Source: Author's Calculations

4.3 GRANGER CAUSALITY TEST RESULTS

This section presents the result of the Granger causality test for the considered problem. The Granger causality test was used to ascertain the lead-lag relationship between the variables and Sensex following the completion of the Johansen cointegration test. The direction of causalitybetween the variables under investigation is also provided by the Granger causality test. The bestlag length has been determined using the Akaike information criteria (AIC) and Schwarz information criteria (SC), as the Granger causality test is sensitive to the lag operator. Both the statistics suggested the optimal lag length is 2. Table 6 shows unidirectional causality was runningbetween the KOSPI price and NIFTY 50, MOEX Price and NIFTY 50, and MOEX and KOSPI, whereas Table 7, shows unidirectional causality was running between the Jakarta price and NIFTY 50.

Table 6: Nifty 50 and Developed Markets

Null Hypothesis	***OBS***	***F- Statistic***	***Prob.***	***Results***
RKOSPI does not Granger Cause RNIFTY 50	*258*	*0.97008*	*0.3805*	*Uni-directional*
RNIFTY 50 does not Granger Cause RKOSPI		*3.91155*	*0.0212*	
RMOEX does not Granger Cause RNOFTY 50	*258*	*6.553*	*0.0017*	*Uni-directional*
RNIFTY 50 does not Granger Cause RMOEX		*0.35746*	*0.6998*	
RMOEX does not Granger Cause RNOFTY 50	*258*	*3.58576*	*0.0291*	*Uni-directional*
RKOSPI does not Granger Cause RMOEX		*0.59706*	*0.5512*	

Note: All results at 5% significance level

Table 7: Nifty 50 and Emerging Market

Null Hypothesis	*OBS*	*F- Statistic*	*Prob.*	*Results*
RJAKARTA does not Granger Cause RNIFTY 50	*258*	*0.97008*	*0.3805*	*Uni-directional*
RNIFTY 50 does not Granger Cause RJAKARTA		*3.91155*	*0.0212*	

Note: All results at 5% significance level

6. RESEARCH IMPLICATIONS

Examining the connections between the Nifty 50 and other emerging and developed global stock markets using an econometric modeling approach has significant managerial and academic implications. For managers, the study offers practical insights into investment strategies, risk management, and strategic decision-making. Academically, it contributes to the theoretical understanding of market integration, methodological advancements, and empirical evidence, while also informing policy recommendations and opening new research avenues.

7. LIMITATION AND FUTURE SCOPE

The limitations of the study include the chosen time frame might not capture all market cycles, including bull and bear phases which can influence the connections between markets. Moreover, econometric models often rely on assumptions such as linearity, normality, and stationarity. Therefore, violations of these assumptions can lead to biased or inconsistent results.

The current study has future scope for more comprehensive results as they can focus on employing high-frequency data to capture more granular interactions between markets, especially for intraday analysis. Furthermore, employing more sophisticated models like machine learning algorithms or nonlinear models can provide deeper insights into market dynamics.

8. CONCLUSION

In this globalized arena, it has become significantly imperative to study the factors that show the linkages between the developed and emerging stock markets of the world. Therefore, the research has made an effort to study the connection between the developed and emerging stock markets viz. KOSPI, MOEX, Jakarta, and NIFTY 50. The results were obtained by employing techniques such as ADF, Johansen Cointegration, and Granger Causality test. Results of Johansen cointegration reveal no cointegration between the factors chosen for the study and Sensex. Granger Causality reveals a unidirectional causality running between KOSPI Price, MOEX, and NIFTY 50,and also between the JAKARTA Price and NIFTY 50.

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