

## Cointegration and stock market interdependence: Evidence from India and selected Asian and African stock markets

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**Abstract.** *This research aims to investigate the kind of link and potential long-term and short-term relationships between the stock market indexes of India and certain Asian and African nations. The stock market indexes of India, Indonesia, South Africa, Japan, Singapore, and China are studied using annual data from 2000 to 2021. There is a strong correlation between the stock markets. With a correlation coefficient ranging from 0.68 to 0.82, all nations have substantial correlations with the Indian stock market, with the exception of the Chinese stock market. Augmented Dickey-Fuller Test is used to determine whether the time series data is stationary or not, it is discovered that all values of the series are stationary at their level form. The Johansen Co-integration Approach is used to analyse the long-term linkages between the stock market indexes. The result demonstrated that the NSE Nifty and other key stock exchange indexes in Asian and African markets have a long-term relationship.*

**Keywords:** Asian stock markets, long-term relationship, stock market integration, augmented Dickey-Fuller test, Johansen cointegration.

**JEL Classification:** B26, C58, D53, F15.

## Introduction

Globalization's effects have increased the links between stock markets worldwide. The accelerating rate of global integration, or the tightening of economic linkages between nations, is expected to continue in the years to come. Trade and financial globalisation, interdependence among states, and policy adjustments by nations to suit the world system are the norm today. Countries that embrace more foreign investment, technology, and technology specialists tend to have a bigger stock of foreign factors of production due to the process of internationalisation. The financial markets across the globe have expanded significantly beyond their original boundaries as a result of money moving across borders in the form of foreign investment, foreign currency markets, etc. The international interconnection of national money and capital markets has rapidly increased as a result of the elimination or easing of restrictions on financial flows across national borders, the deregulation of financial institutions, and international financial innovations. With the advent of technology, investors may now monitor stock and currency values whenever they choose, which has significantly impacted market growth and development. Business operations have undergone major modifications as a result of pressure from global competition. For the purpose of exploring and gaining access to new markets or to realise economies of scale, businesses all over the globe are integrating their operations internationally and moving to new countries.

Both Government and financial experts have given integration between stock markets a lot of consideration. There are a number of arguments in favour of this action. First, it might be claimed that it gives integrated markets chances for risk sharing (Marashdeh and Shrestha, 2010, pp. 102-114). Additionally, it promotes competitiveness and efficiency in resource allocation while lowering the cost of capital and price volatility across integrated markets, all of which help to maintain financial stability (Tai, 2007, pp. 264-283). The integration of stock markets is crucial for encouraging domestic investment and saving, and it may have a favourable impact on total factor productivity and economic development (Levine, 2001, pp. 688-702). There are, however, a number of research that disagree with stock market integration. Especially those who contend that stock market integration may greatly increase the danger of contagion, as seen during the Asian Crisis of 1997 and the 2008 Global Financial Crisis.

For a developed economy, a vibrant financial market with wide participation is crucial. A rising economy like India, which has shown strong development potential over the last several decades, needs significant capital inputs from both the public and private sectors. To meet the capital requirements of the economy and to make sure that the advantages of development reach the bottom of the socioeconomic pyramid, India must enhance resources for businesses. In this way, the growth of the nation's economy has been significantly influenced by the global financial markets. This is due to the fact that capital markets connect investors with available cash and businesses in need of funding. Capital markets in developed and some developing nations effectively handle this movement of cash from those who have excess funds to others who are short on funds. Financial, insurance, and corporate bond markets are only a few examples of the many markets that make up the capital markets. The share market is the one of these that has the greatest sway.

With growing globalisation and openness in the operation of financial markets over the last 20 years, there has been a fast growth in international capital mobility in the form of direct and indirect investments. This phenomenon results from increased contact between emerging and established economies worldwide (Chen et al., 2005). The worldwide diversification of portfolios has been aided by the opening of capital markets, the expansion of financial instruments, and technological advancements. The investigation of the connections between diverse stock markets and the advantages of global portfolio diversification was started by (Grubel, 1968, pp. 1299-1314). Such connections have important ramifications for portfolio diversification as well as the respective nations' macroeconomic strategies. Shareholders in both local and foreign businesses purchase stock in an effort to diversify their portfolios internationally and lower market risk. As long as the markets are not fully connected, this diversity will be advantageous. Studies over the last ten years indicate that as markets get more linked, the returns in global markets via international diversification have decreased (Srivastava, 2007, pp. 251-265).

The global financial markets have been significantly impacted by the trend of Globalisation. It is probable to anticipate that the Indian stock market will be correlated with other global markets as a result of the liberalisation of the Indian capital markets and the easing of barriers on the international movement of money and commerce. In a nation like India, where the stock market is significantly changing as a result of liberalisation measures, there are also worries about its exposure to risk in the event of a global or regional crisis. In an increasingly globally integrated environment, it is important to understand how much a Depression or Crisis in another market can affect the Indian stock market. As a result, an analysis of the types of long-term dependencies or co-movements with other developed or developing emerging markets would not only provide insight into potential portfolio diversification gains for the Indian market, but it might also provide some clues about how vulnerable the stock market might be in the event of a regional crisis. Increased global stock market integration has resulted from the opening of the Indian capital market. The goal of the current research is to assess the level of integration between the Asian and African stock markets and the Indian stock market. Therefore, in order to better understand the dynamics of portfolio diversification via investments in other markets, it is necessary to determine whether or not markets are interconnected.

### Research questions and contribution

In general, cross-border capital flows in the form of FDI, FII, and other macroeconomic factors have a significant role in the stock market's volatility. Other exchanges that suffered losses in the 2008 Crisis should learn an expensive lesson from the US Subprime disaster. The recent depreciation of the Chinese currency caused the Asian and African stock markets to crash. It is inevitable that stock exchanges will respond to developments in the global financial markets. The stock markets in India are not an exception to this trend. Understanding the connections between and reliance on different transactions is crucial in this situation. This research contrasts the geopolitically and socioeconomically distinct stock markets of Asia and Africa. It is reasonable to assume that a particular stock exchange will have some influence on the movement of other exchanges given the dramatic change

in capital flows to nations and the easing of bureaucratic restrictions that have caused various stock exchanges to diverge in terms of system and regulations. In light of this, scholars have shown interest in determining the long-term causal link between Indian stock markets, paying particular attention to NSE and other significant stock exchanges in the Asian and African markets. The researchers have made an effort to provide solutions to the following queries in this context.

The following are the primary research issues this study addressed:

- What kind of relationship does the movement of the Indian stock market have with the markets in Asia and Africa?
- What are the long- and short-term relationships between these stock market indices?
- Does the NSE immediately suffer from the migration of other stock exchanges?

#### **Objectives of the study**

- To compare the movements of the chosen Asian and African indexes to those of the Indian Stock Market, paying particular attention to the NSE.
- To investigate the causal and long-term relationships between the NSE and other significant stock exchanges.

#### **Statement of hypothesis**

- There are long-standing connections between the Indian Stock Exchange and a few other stock exchanges.
- The Indian stock market and a few other stock exchanges are causally related to one another.

#### **Research approach: Data collection and analysis**

The current investigation is supported by secondary information. Selected indexes' yearly returns have been gathered from the relevant stock exchange websites. The research spans the years from 2000 to 2021. The most popular method for examining the distributional properties of time series data is the Jarque-Bera (JB) test. The correlation coefficient assesses the relative strength of a linear connection. Using the Augmented Dickey-Fuller, the data series is examined for the existence of a unit root (ADF). The long-term link or relationship between the stock markets of Asian and African nations is determined using Johansen's test.

#### **Background theory and literature review**

The guiding idea behind financial market integration is the law of one price (LOOP), which was first proposed by Augustin Cournot and Alfred Marshall in 1927 and 1930, respectively. Finance literature offers numerous ideas that create operational links between various financial market divisions, whereas the LOOP offers a generalised framework for financial market integration. Financial and stock market integration often takes place on three levels: domestically, regionally, and internationally (BIS, 2006). In a different light, stock market integration may occur both horizontally and vertically. Interlinkages between local stock market divisions are known as horizontal integration, while vertical integration is the relationship between domestic markets and foreign/financial markets (USAID,

1998). The vertical integration of the Indian stock market with the capital markets in Asia and Africa is the main topic of this research.

Emerging trends toward financial integration across all stock markets increase market effectiveness and shield stakeholders from market crises of any form. The developed markets are more economically significant and they dominate all global stock exchanges. The financial integration of the global stock market serves as a representation of the effects of one market on another. Market cointegration is of particular interest to academics and researchers working in the fields of economics and finance.

A higher degree of financial integration, it has long been argued, can strengthen the domestic markets involved, which is crucial for the development of a friendly corporate environment at home, increasing domestic capital accumulation and technological innovation, and consequently essential for long-term economic growth (Maghyereh, 2006, pp. 59-94). Therefore, scholars have been concentrating on the examination of the problem of the degree of stock market integration. There are a significant number of studies on this topic that are available in the context of developed economies' financial markets (Eun and Shim, 1989, pp. 241-256), but there are relatively few studies that are available in the context of Asian and African nations.

Pagan and Soydemir (2000, pp. 415-433) use impulse response functions to analyze the impact of innovations in the US stock market on Argentina, Brazil, Chile and Mexico and to study the relationships among these Latin American stock markets, using weekly data from December 1988 to September 1994. They found evidence suggesting that the US stock markets strongly influence Latin American markets but the responses are not homogeneous. Effects of US innovations were found to be more pronounced for Mexico than for Argentina, Chile or Brazil. Finally, Argentina and Chile seemed to be more responsive to a Brazilian market shock than to a shock originating from Mexico.

The dynamic link between the daily returns of eight Pacific-Basin nations (Australia, Hong Kong, Japan, New Zealand, Singapore, Indonesia, Malaysia, and Thailand) and the US is examined by Janakiraman and Lamba (1998, pp. 155-173). With the exception of Indonesia, all other markets in the research that uses Vector Auto Regression (VAR) show evidence of US impact. The research also reveals a large reciprocal impact between markets that are physically and economically adjacent to one another.

In a 15-year study, Malkamaki (1992) looked at the stock markets of Finland, Sweden, and their major trade partners. According to the findings, the German and British markets are outpacing those of Scandinavia. Aggarwal and Raja (2019, pp. 59-74) examined and analysed the cointegration among the stock markets of the BRIC economies (Brazil, Russia, India, and China) during the reform era in order to investigate the opportunities for global diversification. They discovered a long-term cointegrating association among the chosen stock markets of the BRIC economies. Further, it was discovered that the US stock market dominated these four main Asian stock markets for assessing the dynamic interdependence between them (Dhanaraj et al., 2013, pp. 220-237). Multivariate GARCH time-varying, conditional correlation models were employed by Antoniou et al. (2007, pp. 173-194) to investigate the integration of the US, European, and UK equities markets. Both

in terms of stock market and overall sectors, they discovered that the UK stock market was more closely related to the European market.

Menon et al. (2009, pp. 87-94) used the Engle-Granger test of co-integration over a ten-year period to analyse the connections between the stock markets of India and China, America, Singapore, and Hong Kong. The findings show that there is no interconnectedness between the stock markets in India and America or in India and Hong Kong. However, the Indian and Shanghai stock markets do show some correlation, and when India's and Singapore's stock markets are contrasted, a significant correlation is shown. Using co-integration and Granger causality tests, Saha and Bhunia (2012, pp. 45-52) investigated the relationship between the Indian and South Asian stock markets over a ten-year period. They made the case that markets were interconnected over the long and short terms. Between 2001 and 2016, Samadder and Bhunia (2018, pp. 13-23) looked studied the correlation between a few international stock markets and the Indian stock market. They discovered a little overlap between the French and Indian stock markets.

In a research on the integration of stock markets that spanned a 32-year period, Chan et al. (1997, pp. 306-686) included stock markets from 18 different countries. To test for the weak type of market efficiency, these marketplaces were examined both singly and collectively across regions. Using the Johansen co-integration test, the effectiveness of the cross-country market is evaluated. The findings revealed that only a few stock markets have signs of co-integration with other markets. By analysing the Granger causality relationship and the pair-wise, multiple, and fractional co-integrations between the Indian stock market and the developed stock markets like the US, UK, and Japan. Wong, Agarwal, and Du Jun (2004, pp. 1581-1604) have empirically investigated the long-run equilibrium relationship and short-run dynamic linkage between the Indian stock market and the stock markets in major developed countries. The study's conclusions showed that the stock markets of the US, UK, and Japan are statistically and substantially co-integrated with the Indian stock market. There is a unidirectional Granger causation connecting the stock markets in the US, UK, and Japan to those in India. The Johansen approach was used to uncover the co-integration connection between the Indian stock index and the mature stock indices, which forms a fractionally co-integrated relationship across time with a shared fractional, non-stationary component.

Using weekly data from December 1988 to September 1994, Pagan and Soydemir (2000, pp. 207-210) assess the effects of US stock market innovations on Argentina, Brazil, Chile, and Mexico as well as the linkages between these Latin American stock markets. They discovered evidence that Latin American stock markets are significantly influenced by US stock markets, but the effects are not uniform. Effects of US inventions were determined to be more evident for Mexico than for Argentina, Chile or Brazil. Finally, a Brazilian market shock seemed to have more of an impact on Argentina and Chile than a shock coming from Mexico. According to Tabak and Lima's findings from 2002, there is no cointegration between the stock markets of Latin America and the US stock market. These findings suggest that investing in Latin American stock markets might provide diversification benefits for US investors. The evidence of integration between the French and American stock markets was corroborated by Jawadi and Arouri (2008, pp. 107-116),

who also discovered that the process of stock market integration was non-linear, time-varying, and intensified with time. Majid et al. (2009, pp. 87-94) observed that the ASEAN stock markets were integrating more with one another and that levels of short- and long-term integration had greatly grown, particularly after the financial crisis of 1997. Singapore was shown to be the most dominating market to cause another ASEAN market, with the causal link among the markets under research also being found to be shifting during the study period.

Between January 2000 and June 2020, Sachdeva, Bhullar, and Gupta (2021, pp. 5-15) looked studied the co-integration of the Indian stock market with the stock markets of three established and emerging nations. According to the research, the fact that there is a reciprocal link between the USA and Indian stock indices indicates that these global stock indices are interdependent. Additionally, the lack of a causal relationship between the stock indexes of emerging countries suggests that these indices are independent of one another. It suggests that rising economies provide a variety of investment options. By concurrently investing in these rising economies, investors may readily diversify their portfolios and reduce their risk exposure. Zhang (2009) discovered that the American market had a significant impact on Asian markets, while the mainland Chinese market experienced the least amount of impact. It is significant to highlight that owing to the underdevelopment and illiquidity of the African stock markets, little attention has been paid to them. However, the stock markets of some nations have significantly improved, grown quickly, and liberalised (Allen D.E. et al., 2010; Allen A. et al., 2010).

According to Altin and Sachin (2011, pp. 71-89), when capital market limitations between industrialised countries loosened in the 1970s, the issue of stock market integration began to surface. This has roots in 1973 research by Ripley on the interdependencies between 19 open marketplaces. Because the level of market integration impacts the advantages of global diversification, stock market integration and interdependencies have ramifications for international investors and fund managers. Since each stock market becomes an important element of a single global market, improved stock market integration is essential of interest to policymakers since occurrences in one market might have major impacts on other markets. Given the potential economic difficulties that industrialised nations may be experiencing, interest in this field of research is growing. How may these difficulties be conveyed to African markets? According to Lovegrove (2007), small-scale diseconomies harm financial intermediaries and financial institutions in Africa. The report further stated that these inequities may be eliminated by expanding financial systems, for instance via regional financial integration to gain scale. The theory is that financial services in smaller systems often have a narrower scope, are more costly, and are of worse quality than those in bigger systems. The argument for stock market integration makes perfect sense in these circumstances.

Alagidebe (2008) looked at how African stock markets were integrated into the global financial system and what it meant for risk sharing and investment research. The research initially shown that African stock markets are not sufficiently connected using co-integration methodologies. The research also found that modest stochastic patterns exist between African markets and the rest of the globe, suggesting that African markets are

more likely to react to local than to global information. The thesis was that risk perception and institutional underdevelopment continue to be barriers to the development of Africa's developing equities markets, even while the weak trends discovered provide a chance to diversify portfolios into African markets.

### Research gap

The bulk of research on stock market co-integration has been done on markets in developed nations like the US and Europe. A sizable number of studies have also compared different Asian and emerging stock markets. However, the co-integration of the stock markets of Asian and African nations is not examined in any of the papers that the researchers analysed. This essay aims to investigate the unique ties that exist between South Africa, Singapore, Japan, China, India, and China. This research paper tries to look into the dynamic connections between the Asian and African equity markets and the Indian stock market. The research makes use of annual stock market return data from 2000 to 2021. Table 1 lists the chosen Asian and African nations and the corresponding stock market indexes that the research takes into account.

**Table 1.** *Description of stock market indices*

Country	Index	Stock Exchange
India	NSE Nifty	National Stock Exchange(NSE)
China	Shanghai SE Composite Index	Shanghai Stock Exchange(SSE)
Singapore	Straits Times Index (STI)	Singapore Exchange (SGX)
Japan	Nikkei 225	Nihon Keizai Shimbun (JP225) Tokyo Stock Exchange
Indonesia	IDX Composite	Indonesia StockExchange
South Africa	South Africa Top 40 (JTOPI)	Johannesburg Stock Exchange Ltd.

Source: Globaleconomy.com

**Table 2.** *Stock market indices descriptive statistics*

Statistics	India	China	Indonesia	Japan	Singapore	South Africa
Mean	13.70	9.125	15.639	3.38	2.40	12.20
Median	14.210	2.930	8.770	0.950	0.01	9.90
Maximum	58.12	102.74	56.880	33.970	36.02	44.69
Minuam	-27.78	-47.13	-31.460	-36.320	-21.9	-20.4
S.D	22.82	34.64	24.944	19.629	16.7	16.17
Skewness	0.199	1.351	-0.068	-0.060	0.50	0.02
kurtosis	2.471	4.49	1.964	2.129	2.44	2.61
Jarque-Bera	0.402	8.753	0.954	0.676	1.16	0.13

Source: Author's calculation.

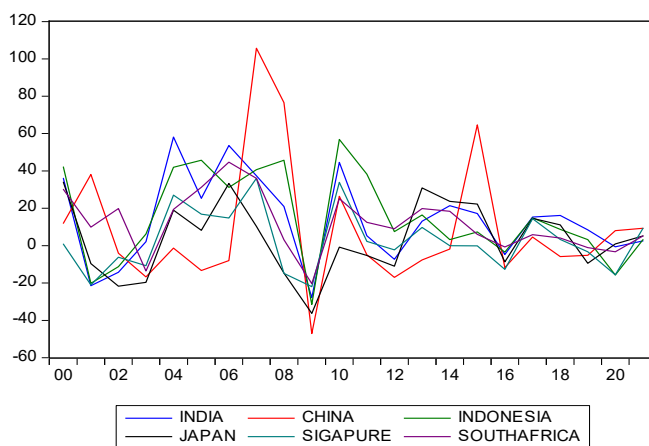
The summary of descriptive data for the NSE and other significant stock indices utilised in the econometric study are shown in Table 2. Particularly noteworthy in the results is the large discrepancy between the NSE of India, which ranges from a minimum of -27.78% to a maximum of 58.12%. Relating to the other major stock indexes, the country with the biggest standard deviation, 34.64%, and the average mean value, 9.12%, is China. The summary statistics show that the stock indices have a normal distribution and that no crucial



variables were left out of the descriptive statistics study, with the Jarque-Bera statistics probability value above the benchmark of 0.05. The Indian market's mean is higher than all other indexes except for Indonesia in terms of absolute value. The South African market index has been the least variable throughout the same observation period, whereas the Chinese market index has been the most volatile. The skewness values for various marketplaces are also shown in Table 2. Indonesia and Japan have negative values. The values of the indices' Kurtosis are all positive. Kurtosis has a higher value in China.

Figure 1 depicts the movement of all six stock market indexes throughout the examined period from 2000 to 2021. Figure 1 illustrates that for the whole time, Indonesia had the greatest mean average return. All stock indexes have either been declining since February 2008 or have seen negative growth. This is a product of the global financial crisis, which began in August 2007 and culminated when most stock markets started to collapse at the same time. Since 2010, all markets have performed quite well.

**Figure 1.** Movement of Indian and other international stock market indices



### Correlation coefficient

When two variables are thought to be associated linearly, their correlation coefficient is used to measure how strongly that link exists. The degree and direction of the association between two variables may be determined using multiple correlation analysis. To gauge the strength of the link between the stock indices in certain Asian and African markets from 2000 to 2021, correlations between the stock indices were estimated. Table 3 displays the fundamental correlation coefficients between the six stock indices under examination.

With correlation coefficients ranging from 0.70 to 0.82, Table 3 shows that South Africa, Indonesia, Japan, and Singapore all have strong relationships with the Indian stock market. As a result, the benefits of diversity would be limited. The results demonstrate strong correlations between South Africa to India and Singapore, with correlation coefficients of 0.70 and 0.69, respectively. The correlation between India and Indonesia is 0.82, which is

also quite strong. Additionally, there is a higher association between Indian stock indices and South African market indices.

**Table 3.** *Correlation of stock indices*

	INDIA	CHINA	INDONESIA	JAPAN	SINGAPORE	SOUTH AFRICA
INDIA	1					
CHINA	0.311827	1				
INDONESIA	0.829494	0.365032	1			
JAPAN	0.710942	0.1865032	0.450264	1		
SINGAPORE	0.785970	0.269009	0.725436	0.547213	1	
SOUTH AFRICA	0.700354	0.295890	0.650797	0.660175	0.696748	1

**Source:** Author's calculation.

China has a lower association with all other countries than India does. A dismal 0.31 correlation coefficient exists between China and India. The result shows that China and the Indonesian stock market have a greater connection, around 0.36. But throughout that time, no evidence of a negative link between the six markets under study was found. In general, the findings of the correlation coefficients provide some insight into the long-term connections between India and other key markets.

### Unit root test

In order to determine the true nature of the time series, unit root tests are used. For this, the stationarity of the time series data is examined using the Augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) tests. The findings show that all of the data series are stationary at level under these tests, which are conducted using the null hypothesis of non-stationarity (unit root) for each data series (refer to Table 4).

**Table 4.** *Augmented Dickey-Fuller (ADF) unit root test*

Country	Stationarity
India	I(0)
China	I(0)
Singapore	I(0)
Japan	I(0)
Indonesia	I(0)
South Africa	I(0)

**Source:** Author's calculation.

### Test of Johansen cointegration

When a linear combination of two variables is stable, indicating a long-term link between them, this is when two variables are said to be cointegrated. Lack of cointegration indicates the absence of such a connection. The ideal degree of latency is chosen before running the Johansen Cointegration test. The research employed the Akaike Information Criteria (AIC), Schwarz Information Criteria (SC), and Hannan-Quinn Information Criteria to determine the lag (HQ). The SC displays the ideal lag length of 0, whereas the AIC and HQ display the ideal length of 1. The ideal lag duration for this investigation was determined using AIC, and we employed a lag length of 1 as a result.

**Table 5.** Selection criteria for VAR lag order

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-516.7264	NA	1.68e+14	49.78347	50.08190*	49.84824
1	-469.5125	62.95194*	6.78e+13*	48.71547*	50.80452	49.16885*

Source: Author's calculation.

**Table 6.** Johansen cointegration test

Trend assumption: Linear deterministic trend

Series: INDIA CHINA INDONESIA JAPAN SINGAPORE SOUTH AFRICA

Lags interval (in first differences): 1 to 1

Unrestricted Cointegration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.980283	177.4910	95.75366	0.0000
At most 1 *	0.890820	98.96533	69.81889	0.0001
At most 2 *	0.763531	54.67019	47.85613	0.0100
At most 3	0.537405	25.83143	29.79707	0.1338
At most 4	0.333288	10.41335	15.49471	0.2503
At most 5	0.108875	2.305407	3.841466	0.1289

The trace test indicates 3 cointegrating eqn(s) at the 0.05 level

\* denotes rejection of the hypothesis at the 0.05 level

\*\*MacKinnon-Haug-Michelis (1999) p-values

Unrestricted Cointegration Rank Test (Maximum Eigenvalue)

Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None *	0.980283	78.52570	40.07757	0.0000
At most 1 *	0.890820	44.29514	33.87687	0.0020
At most 2 *	0.763531	28.83876	27.58434	0.0344
At most 3	0.537405	15.41808	21.13162	0.2607
At most 4	0.333288	8.107943	14.26460	0.3678
At most 5	0.108875	2.305407	3.841466	0.1289

Max-eigenvalue test indicates 3 cointegrating eqn(s) at the 0.05 level

\* denotes rejection of the hypothesis at the 0.05 level

\*\*MacKinnon-Haug-Michelis (1999) p-values

Source: Author's calculation.

To determine if there is a long-term link between the chosen nations, the cointegration test is utilised. Three cointegrating equations are present at the 0.05 level, according to the trace statistic and Max-Eigen value statistic. Thus, it can be said that the Indian market and other market indexes have a long-term equilibrium connection.

### Regression analysis

The primary use of Regression Analysis is to determine the precise connection between explained and explanatory variables. A statistical hypothesis test is used to determine if data from one-time series can be used to predict data from another. The outcome suggests that the Indian stock market has a considerable impact on the markets in Japan and Indonesia.

**Table 7. Regression analysis**

Dependent Variable: INDIA

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	4.891952	3.174486	1.541022	0.1429
CHINA	0.002249	0.068269	0.032949	0.9741
INDONESIA	0.485732	0.139829	3.473768	0.0031
JAPAN	0.458327	0.154667	2.963316	0.0092
SOUTHAFRICA	-0.085925	0.227986	-0.376888	0.7112
SIGAPURE	0.331288	0.218412	1.516799	0.1488
R-squared	0.852207	Mean dependent var		13.70682
Adjusted R-squared	0.806022	S.D. dependent var		22.82029
S.E. of regression	10.05073	Akaike info criterion		7.680168
Sum squared resid	1616.274	Schwarz criterion		7.977725
Log-likelihood	-78.48185	Hannan-Quinn criteria.		7.750264
F-statistic	18.45193	Durbin-Watson stat		1.994117
Prob(F-statistic)	0.000004			

**Source:** Author's calculation.

### Research implications

In general, there is a close relationship between stock market activities and the macroeconomic policy framework. The movement of indices is significantly influenced by important macroeconomic variables. The operations of the stock market are nonetheless dependent on those of other major stock exchanges throughout the globe. Major historical events like the US sub-prime crisis, the Asian crisis, and the devaluations of the Chinese Yuan, BREXIT, and the most recent Covid-19 are not an exception to this rule. The results of this research will be very helpful to international investors in making better investment selections. The co-integrating connection suggests that these markets have a large potential for investment and speculating activity. This research will be a useful tool for understanding how policies adopted by other nations affect the Indian Stock Market.

### Conclusion

The dynamics of stock market integration in Asian and African nations were studied in this research study. It has been discovered that these nations' stock markets are still not fully integrated, which presents some potential for portfolio diversification and anomalous market gains. Using econometrics methods like the Johansen Co-integration test and Regression Analysis, the integration of the Indian stock market, with a focus on the NSE, and the main global markets has been studied. The long-term association between the NSE and other indexes of significant stock exchanges across the globe was proven by the findings of the Johansen co-integration test. Therefore, it can be said that during the research period, all of the selected indices were co-integrated with NSE Nifty. The findings of the regression analysis showed that there is some degree of market fragmentation between the Indian and other Asian stock markets. The empirical findings also show that Indonesia and Japan, two Asian capital markets, are connected to the Indian stock market. This implies that there are less chances for foreign investors to diversify their portfolios and make money over the long term by making investments in these nations. This also suggests that over time, the movement in these markets has an impact on the Indian stock market.

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