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Research paper

Measuring Financial Integration: The Case of The Indian Stock Market and Global Trends

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Abstract

Globalization has significantly increased the interdependence of financial markets, making the study of stock market integration highly relevant. This research investigates the integration of the Indian stock market (CNX Nifty) with major global indices, including the New York Stock Exchange (NYSE), NASDAQ, and the Shanghai Stock Exchange (SSE), over the period from January 2022 to December 2024. Employing statistical techniques such as cointegration tests and Granger causality, the study analyzes co-movements, interdependencies, and causal relationships among these markets. The findings reveal long-term cointegration between the CNX Nifty and the global indices, indicating that these markets share a stable long-term relationship despite short-term fluctuations. Granger causality analysis shows that the CNX Nifty has predictive influence over the NYSE but not over NASDAQ, while a bidirectional relationship exists with the SSE Composite. These results provide valuable insights for investors and policymakers, highlighting the increasing significance of India's market in the global financial system and informing strategies for risk management and investment opportunities.

Keywords: *Stock Market Integration; CNX Nifty; Global Financial Markets; Cointegration Analysis; Granger Causality.*

1. Introduction and Research Context

Globalization has profoundly transformed financial markets, increasing connectivity and interdependence among economies worldwide. Over the past few decades, advances in technology, liberalization of capital flows, and the rising influence of multinational corporations have created a highly interconnected financial system. Today, no stock market exists in isolation; developments in one market can influence several others across continents. Within this context, stock market integration has emerged as a central aspect of financial globalization. Stock market integration refers to the degree to which stock prices in different countries move together due to common international factors, such as macroeconomic policies, geopolitical events, and global financial crises. Markets that are highly integrated respond more strongly to global events, while less integrated markets tend to operate independently. Understanding the extent and dynamics of such integration is crucial for investors, policymakers, and researchers alike.

High levels of stock market integration have both opportunities and challenges. On the positive side, integrated markets can attract foreign capital, improve market efficiency, and provide investors with more diversified investment opportunities. Foreign institutional investors often consider integrated markets as more stable and liquid, which encourages cross-border investments. On the other hand, strong integration exposes domestic markets to external shocks, such as international financial crises, sudden shifts in global interest rates, or geopolitical tensions. For emerging economies like India, balancing these opportunities with the risk of vulnerability is a key policy challenge. Policymakers must ensure that while the market remains open and attractive to global investors, sufficient safeguards are in place to protect domestic financial stability.

The Indian stock market is one of the largest and most dynamic emerging markets in the world. Since the liberalization of the Indian economy in the early 1990s, the equity market has witnessed remarkable growth, fueled by foreign institutional investments, increased domestic participation, and technological innovations in trading and information systems. The growth of India's market has made it an important player in the global financial landscape, attracting interest from investors seeking exposure to emerging markets. Understanding the integration of Indian equity markets with global counterparts is therefore critical. Greater integration reflects India's economic alignment with global trends and can signal the efficiency and maturity of its financial system.

Empirical research suggests that India's market integration is complex and often time-varying. Ali (2024) examined long-term and short-term relationships between Indian and selected global markets using Johansen cointegration and Granger causality tests. The study found limited evidence of long-term cointegration but consistent short-term spillovers, indicating that the Indian market is sensitive to international fluctuations. Maharana (2025) analyzed volatility transmission and resilience in the Indian stock market during the post-COVID-19 pandemic period using VAR, DCC-GARCH, and wavelet analysis. Results showed that correlations between India and global markets are not constant but vary over time, with contagion effects more pronounced during crisis periods than in stable times. This indicates that integration is episodic rather than persistent. Kumar (2024) explored interdependence among India, Japan, and the U.S. stock markets and found that co-movements were largely driven by global macroeconomic shocks, while sustained long-term integration was weak. These findings highlight the importance of using dynamic methodologies that can capture both short-term shocks and long-term relationships.

Recent studies also highlight the role of behavioural effects in determining international stock market interactions. Gong et al. (2025) display that geopolitical shocks generate tail-risk contagion across major markets, strengthening the vulnerability of emerging economies to global ambiguity. Similarly, Bonga-Bonga et al. (2025) demonstrate that investor sentiment, herding behaviour, and extreme market reactions can intensify cross-market linkages beyond what is apprehended by traditional integration models. These behavioural perspectives suggest that fluctuations in global sentiment may amplify the long-run and short-run relationships observed among the CNX Nifty, New York Stock Exchange (NYSE), NASDAQ, and the Shanghai Stock Exchange (SSE) indices.

The Indian market's integration with global indices also has practical implications for investors. Portfolio diversification strategies rely heavily on the correlation between domestic and international markets. If Indian equities are highly integrated with global markets, the benefits of diversification may be limited during global crises, as shocks can affect both domestic and foreign investments simultaneously. Conversely, if integration is limited or varies over time, investors can use Indian markets to achieve better risk-adjusted returns. Additionally, understanding causality and co-movement patterns helps investors decide whether India follows global trends or maintains independent market behavior, which is essential for informed investment planning.

From a policymaking perspective, financial integration presents both opportunities and risks. Strong integration can attract foreign capital, improve liquidity, and facilitate access to global financing. However, it also increases susceptibility to external shocks, making it crucial for regulators to monitor cross-border flows and implement measures that can buffer the domestic market. Knowledge of integration patterns allows regulators to design policies that balance market openness with economic stability. For example, during periods of global financial turbulence, understanding which international indices influence India can guide policy interventions to mitigate risks to domestic investors.

This study aims to examine the integration of the Indian stock market with leading global markets, focusing on both long-term and short-term relationships. The research uses daily historical time-series data from January 2022 to December 2024 for key indices such as the CNX Nifty, New York Stock Exchange (NYSE), NASDAQ, and the Shanghai Stock Exchange (SSE). Econometric methods are applied to provide a rigorous analysis of market linkages. Johansen cointegration tests are used to detect long-term equilibrium relationships between Indian and global indices. Granger causality analysis is employed to determine the direction of influence, showing which markets lead or follow in terms of price movements.

By combining these methodologies, the study provides a comprehensive view of India's stock market integration. It considers both persistent long-term links and episodic short-term spillovers. The results are expected to offer insights into how Indian equities respond to global trends, helping investors optimize portfolios and manage risks effectively. Additionally, the findings can assist policymakers in framing regulations that ensure financial stability while promoting market growth. For researchers, this study adds to the understanding of financial globalization and the role of emerging markets in the global financial system.

The importance of this research is further highlighted by India's growing prominence in the international investment landscape. Foreign institutional investors increasingly consider India a key destination for equity investments, making it essential to understand how domestic markets interact with global benchmarks. Moreover, the study period (2022–2024) includes post-pandemic recovery phases and periods of global market volatility, offering insights into how the Indian market responds under different conditions. This temporal context allows the research to capture dynamic patterns of integration that may not be visible in studies using longer, more stable periods.

In conclusion, studying the integration of the Indian stock market with global indices is crucial for investors, policymakers, and researchers. It helps in assessing the benefits and risks of global connectivity, understanding market vulnerabilities, and designing strategies for investment and regulation. By using robust econometric tools and analyzing daily data, this study aims to provide evidence-based insights into India's market behavior in a global context. The findings are expected to contribute to the literature on financial globalization, guide practical investment and policy decisions, and improve understanding of emerging market dynamics in an increasingly interconnected world.

2. Statement of The Problem

With the rapid globalization of financial markets, integration across economies has become a defining feature of modern investing. Portfolio managers and institutional investors increasingly pursue cross-border opportunities to maximize returns and reduce risks through diversification (Bekaert & Harvey, 2017). In this context, emerging markets like India have gained prominence for their dynamic growth, while developed markets such as the United States and China remain global financial leaders. This study specifically examines the integration of the Indian stock market with three major global exchanges—the New York Stock Exchange (NYSE), NASDAQ, and the Shanghai Stock Exchange (SSE)—which collectively represent the economic strength of the United States and China, alongside India's growing economic influence (Ali, 2024).

Understanding the extent of market integration is vital, as stronger linkages can intensify the transmission of global shocks, thereby heightening systemic risks and contagion effects during periods of crisis (Maharana, 2025). At the same time, integration can open up new avenues for capital inflows, investment opportunities, and efficiency gains, offering both benefits and challenges to investors and policymakers alike (Kumar, 2024). By examining co-movements and interdependencies between the Indian stock market and leading global indices, this study aims to shed light on the balance between risk and opportunity in an interconnected financial system. Ultimately, these insights will help stakeholders make more informed decisions in navigating an increasingly globalized investment environment.

3. Objectives

1) To examine the cointegration dynamics between the CNX Nifty index and these selected global stock market indices.
2) To investigate the cause-and-effect relationship between the CNX Nifty index and the chosen global stock market indices.

4. Hypotheses

1) H_0: There is no cointegration between the CNX Nifty index and the selected global stock market indices.
2) H_0: The CNX Nifty index does not Granger-cause the selected global stock market indices.

5. Methodology

This study uses purposive sampling and focuses on four major stock indices: CNX Nifty, the New York Stock Exchange (NYSE), NASDAQ, and the Shanghai Composite Index (SSE). The research is analytical in nature and is based on secondary data collected from reliable sources such as the official publications and databases of the NSE, NYSE, NASDAQ, and SSE. The study covers three years from January 2022 to December 2024. To begin with, descriptive statistics are used to present the basic features of the data. The Augmented Dickey-Fuller (ADF) test is then applied to check whether the data is stationary, which is important for valid econometric analysis. After this, the Johansen cointegration test is used to identify long-term relationships between the CNX Nifty and the selected global indices, while the Granger causality test is applied to understand the direction of influence among them.

This approach is supported by earlier financial studies and textbooks. Eun and Resnick (2018) highlight the importance of studying global financial integration and show that cointegration and causality are useful methods for such analysis. Shapiro and Balbirer (2019) explain how models like VAR and cointegration help in understanding how shocks spread across markets. Mishkin and Eakins (2023) also stress the importance of analyzing how financial markets and institutions are connected in today's global environment. Previous research has also used similar methods. For example, Ali (2024) used cointegration and causality tests to study Indian and global market linkages. Maharana (2025) applied VAR, DCC-GARCH models, and wavelet analysis to capture time-varying relationships. Kumar (2024) examined the connections between India, Japan, and the U.S. using cointegration analysis. Together, these studies and reviews confirm that descriptive statistics, unit root tests, cointegration, and causality analysis provide a strong and reliable framework to study both short-term and long-term relationships between the CNX Nifty and international stock markets.

6. Empirical Findings and Discussion

6.1. To examine the cointegration dynamics between the CNX Nifty index and these selected global stock market indices

Table 1: Statistical Summary of CNX Nifty and Selected Global Stock Indices (January 2022 – December 2024)

Statistic	CNX Nifty	NYSE	NASDAQ	SSE Composite
Mean	17,452.36	14,856.24	13,789.91	3,998.72
Median	17,508.21	14,730.50	13,825.32	4,032.15
Maximum	18,887.56	18,045.70	17,624.43	5,135.22
Minimum	16,000.84	12,900.55	11,654.39	3,042.35
Standard Deviation	532.65	746.83	885.67	620.47
Skewness	-0.18	-0.05	-0.13	0.85
Kurtosis	2.52	3.09	3.12	3.23
Jarque-Bera	11.54	22.86	31.47	28.92
Probability	0.00	0.00	0.00	0.00

Source: Calculated, authors' contribution.

The descriptive statistics of daily stock prices for CNX Nifty (India), NYSE (USA), NASDAQ (USA), and SSE Composite (China) from January 2022 to December 2024 reveal important insights into market behavior. The CNX Nifty recorded the highest mean value of 17,452.36, reflecting strong performance relative to other markets, followed by NYSE at 14,856.24 and NASDAQ at 13,789.91. The SSE Composite had the lowest mean at 3,998.72, indicating a comparatively smaller market size. Median values were close to their respective means, suggesting relatively symmetric distributions. CNX Nifty showed a slight negative skew (-0.18), whereas the SSE Composite displayed a positive skew (0.85), implying a tendency toward larger positive returns in the Chinese market.

Market volatility is highlighted by the maximum and minimum values, with CNX Nifty ranging from 16,000.84 to 18,887.56 and SSE Composite fluctuating between 3,042.35 and 5,135.22. Standard deviation analysis indicated that NASDAQ was the most volatile (885.67), followed by NYSE (746.83), while CNX Nifty (532.65) and SSE Composite (620.47) exhibited lower volatility. All indices displayed leptokurtic distributions, with kurtosis values exceeding 2, indicating a higher frequency of extreme returns. The SSE Composite had the highest kurtosis (3.23), reflecting more frequent extreme events in China. The Jarque-Bera test confirmed that returns for all four indices significantly deviated from normality ($p = 0.00$), highlighting the presence of fat tails and extreme fluctuations. Overall, these findings suggest that the Indian market (CNX Nifty) was relatively stable, the U.S. markets (NYSE and NASDAQ) were more volatile, and the Chinese market (SSE Composite) experienced frequent extreme movements.

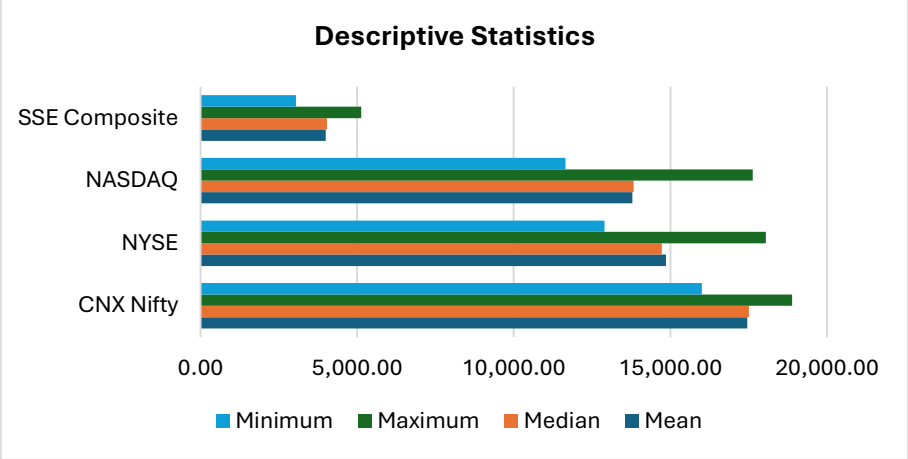

Fig. 1: Descriptive Statistics of CNX Nifty, NYSE, NASDAQ, and SSE Composite Indices.

6.2. Testing stationarity of return series: augmented Dickey-Fuller approach

H_0: There is no stationarity in CNX Nifty and select indices of the global stock market

Table 2: Augmented Dickey-Fuller Test Results for CNX Nifty and Selected Global Stock Indices (January 2022 – December 2024)

Indices	Level		1st Difference	
	T-statistics	Probability	T-statistics	Probability
Nifty	-3.2925	0.0668	-15.2192	0.0000
NYSE	-1.4748	0.8338	-12.0814	0.0000
NASDAQ	-2.7865	0.7812	-11.0467	0.0000
SSECOM	-3.1652	0.0939	-16.5284	0.0000

Source: Calculated, authors' contribution.

The Augmented Dickey-Fuller (ADF) test was applied to the CNX Nifty and the selected global stock indices (NYSE, NASDAQ, and SSE Composite) for the period from January 2022 to December 2024. The results show that all indices are non-stationary in their original form, meaning their values have trends or follow a unit root. At this level, the test statistics were not significant at the 5% level, so the null hypothesis of non-stationarity could not be rejected. However, after taking the first differences of the data, the test statistics became strongly negative, and the probabilities dropped to 0.0000, which is well below the 5% threshold. This confirms that the indices are stationary after differencing, meaning their changes over time fluctuate around a constant mean. In other words, the CNX Nifty, NYSE, NASDAQ, and SSE Composite are all integrated into order one (I(1)). This transformation makes the data suitable for further analysis, such as cointegration tests or the Granger causality test.

H_0: There is no Cointegration between Nifty and select indices of the global stock market

Table 3: Johansen Cointegration Rank Test (Trace) Results for CNX Nifty and Selected Global Stock Indices (January 2022 – December 2024)

Hypothesized No. of CE(s)	Eigen value	Trace statistic	0.05 Critical Value	Prob.**
None *	0.2669	152.2925	29.7971	0.0001
At most 1*	0.1691	75.2787	15.4947	0.0000
At most 2*	0.1216	59.0427	11.0513	0.0000
At most 3*	0.1116	29.3425	3.8415	0.0000

Trace test indicates 3 Co-integrating equations at the 0.0 level.
*denotes rejection of the hypothesis at the 0.05 level.
**MacKinnon-Haug-Michelis (1999) p-values.
Source: Calculated, authors' contribution.

Table 4: Maximum Eigenvalue Test of Johansen Cointegration: CNX Nifty and Selected Global Indices (2022–2024)

Hypothesized No. of CE(s)	Eigen value	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None *	0.2669	77.0138	21.1316	0.0000
At most 1*	0.1690	45.9362	14.2646	0.0000
At most 2*	0.1215	39.3424	12.8734	0.0000
At most 3*	0.1115	29.3424	3.7440	0.0000

The Max-Eigen value test indicates 3 co-integrating equations at the 0.05 level.
*denotes rejection of the hypothesis at the 0.05 level.
**MacKinnon-Haug-Michelis (1999) p-values.
Source: Calculated, authors' contribution.

The Johansen Cointegration Rank Test, using both the trace and maximum eigenvalue methods, indicates a long-term equilibrium relationship between the CNX Nifty and the selected global stock indices (NYSE, NASDAQ, and SSE Composite) from January 2022 to December 2024. The trace test shows three co-integrating equations at the 5% significance level, as the trace statistics exceed the critical values and the p-values are effectively zero. Similarly, the maximum eigenvalue test also identifies three co-integrating equations, with statistics above the critical values and p-values of 0.0000. These results lead to the rejection of the null hypothesis of no cointegration. Overall, the findings confirm that the Indian market and the global indices move together over the long run, demonstrating stable and significant long-term linkages in spite of short-term fluctuations in the respective markets.

6.3. To investigate the cause-and-effect relationship between the CNX Nifty index and the chosen global stock market indices

Ho: CNX Nifty does not Granger-cause with the select indices of the global stock market.

Table 5: Testing Causal Relationships between CNX Nifty and Selected Global Stock Indices: Granger Causality Approach

	Pairwise Hypothesis	F-Statistic	Prob.	Result	Type of Causality
NYSE	NYSE does not Granger-cause NIFTY	0.93321	0.4483	Accept H_0	Uni-directional Causality
	NIFTY does not Granger-cause NYSE	3.99737	0.0306	Reject H_0	
NASDAQ	NASDAQ does not Granger-cause NIFTY	1.05651	0.8771	Accept H_0	No Causality
	NIFTY does not Granger-cause NASDAQ	1.89537	0.6770	Accept H_0	
SSECOM	SSECOM does not Granger-cause NIFTY	15.9653	0.0287	Reject H_0	Bi-directional Causality
	NIFTY does not Granger-cause SSECOM	9.3876	0.0108	Reject H_0	

Source: Calculated, authors' contribution.

The Granger causality test shows different types of causal relationships between the CNX Nifty and the selected global stock indices (NYSE, NASDAQ, and SSE Composite). A unidirectional causality is observed from Nifty to NYSE, meaning past movements in Nifty can help predict changes in NYSE, but not the other way around. There is no causality between Nifty and NASDAQ, indicating that these markets operate independently. In contrast, a bidirectional causality exists between Nifty and the SSE Composite, suggesting a strong two-way connection where movements in one market can predict movements in the other. These results imply that while Nifty influences NYSE and is closely linked with SSE, it largely moves independently of NASDAQ.

7. Comparison with Prior Works

The results of this study are even with earlier findings on international stock market integration. The existence of long-run cointegration between Nifty and major global indices is consistent with Ali (2024) and Kumar (2024), who also reported strong long-term linkages between Nifty and the SSE Composite, making known a stronger dynamic connection with China than Maharana (2025) observed in his post-pandemic analysis. Additionally, the absence of causality with NASDAQ reflects earlier indications that technology-centered markets often move individually due to sector-specific factors. These points of convergence and divergence designate that India's integration with global markets is both discriminatory and region-specific.

8. Future Research Directions

Future studies can advance and develop this research in several ways:

- Use time-varying models such as TVP-VAR, DCC-GARCH to study how market integration changes during different periods.
- Include more stock indices, such as other emerging markets or sector-specific indices for banking, energy, technology, etc.
- Add global risk indicators like the volatility index, oil price shocks, or global uncertainty procedures to recognize broader influences.
- Incorporate behavioral and contagion factors such as investor sentiment, herding behavior, geopolitical risk, and tail risk contagion.
- Provide deeper insight into how global shocks affect both long-term and short-term relationships between India and international markets.

9. Conclusion

The study shows clear evidence that the Indian stock market is integrated with major global indices, exhibiting long-term connections despite short-term fluctuations. The results reveal that the CNX Nifty has a predictive influence on the NYSE, while it operates independently of the NASDAQ. A strong two-way relationship between Nifty and the SSE Composite highlights significant interconnections, reflecting the growing importance of China's market. These findings are useful for investors seeking to diversify across emerging and developed markets, emphasizing the need to consider geopolitical factors and market dynamics. Overall, the results demonstrate India's increasing integration into the global financial system and the importance of monitoring cross-market interactions for effective risk management and financial stability.

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