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Dynamic Linkages, Long-Run Equilibrium, and Adjustment Mechanisms Between the Banking Sector and Indian Equity Market

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Abstract

This study examines the dynamic relationship between the Banking sector index and the NSE Nifty 50 index by analysing weekly closing prices from April 2020 to March 2025. Employing Augmented Dickey-Fuller (ADF) tests, Johansen's co-integration framework, and Granger causality analysis, the research investigates both long-run equilibrium and short-run causal dynamics. The ADF test results reveal that both indices are non-stationary at their levels but attain stationarity at first difference, confirming I(1) integration order. Johansen's co-integration findings indicate the existence of at least one long-term equilibrium relationship between the two indices. Further, the Granger causality test establishes bidirectional causality, implying that movements in the Banking sector significantly influence Nifty 50 and vice versa. The results highlight strong interdependence between sectoral and market-wide indices, emphasising the systemic importance of the Banking sector in India's stock market dynamics.

Keywords: Banking sector, Nifty 50 index, ADF test, Engle granger causality test, Johansen co integration

Introduction:

The banking sector serves as the backbone of any economy, exerting significant influence on financial stability and economic growth. Since the 1990s, globalization and economic liberalization have enhanced the integration of Indian capital markets with global financial systems. The Bombay Stock Exchange (BSE) and the National Stock Exchange (NSE) play a critical role in shaping India's economic landscape. With the advent of technological advancements, trading mechanisms have become more efficient, fostering increased market participation and financial inclusion (Nymoen, R. 2019).

Public and private sector banks in India significantly impact economic growth and investor confidence. The Reserve Bank of India (RBI) has implemented various regulatory measures aimed at fostering innovation in banking models, digital transactions, and financial accessibility. India's robust digital payment infrastructure, such as the Immediate Payment Service (IMPS), has been globally recognized for its efficiency (IBEF Report 2023). Given the banking sector's pivotal role, understanding its correlation with the Nifty 50 index is essential for investors, financial analysts, and policymakers.

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The stock market is often regarded as a key economic indicator, with the banking sector playing a crucial role in shaping investor sentiment and economic trends. Fluctuations in banking stocks can significantly impact the overall market, making predictive analysis a vital tool for investors and regulators. With increasing adoption of financial technology and digital banking services, stock price movements are now influenced by macroeconomic fundamentals as well as disruptive technological advancements.

Economic crises, regulatory changes, and global financial trends significantly shape banking sector dynamics. The COVID-19 pandemic illustrated how external economic shocks could cause market volatility, affecting both banking stocks and broader financial indices. As markets recover and economies stabilize, analyzing the co-integration between the Banking sector and NSE offers valuable insights into risk assessment and investment strategies.

Additionally, the interplay between banking stocks and the broader market is shaped by institutional investments and investor behavior. Large financial institutions influence market trends through trading strategies, while central bank policies, interest rates, and inflation fluctuations affect banking stock prices. Interest rate changes directly impact banking profitability, lending activities, and ultimately stock valuations. A comprehensive examination of these factors and their relationship with the NSE can provide deeper insights into market behavior and investment strategies.

Literature Review

G Kaur (2019) examined crude oil prices, domestic gold prices, and Nifty 50 index fluctuations, finding no long-term co-integration among these variables. Shrinidhi (2016) investigated interdependencies between US and BRIC equity markets, revealing varying degrees of market integration. Mishra et al. (2015) studied the co-integration between the federal banking capital market and the NSE, concluding that banking sector movements are influenced by NSE trends.

Gupta and Agarwal (2010) analysed the co-movement between sectoral indices and major market indices in India using monthly data. Their study applied the Johansen co-integration test and found significant long-run linkages between banking, IT, and FMCG sectors with the Nifty index. The results highlighted that the banking sector exhibited the strongest long-term association due to its economic sensitivity and credit orientation. Additionally, Granger causality tests revealed bidirectional causality between the banking sector and Nifty, emphasising the sector's pivotal role in market transmission. Their findings supported the argument that sectoral performance widely influences overall market movements.

Sharma (2011) explored the dynamic interactions between various sectoral indices and the benchmark index in the Indian stock market. Using daily time series data and vector error correction models (VECM), the study confirmed strong long-term equilibrium relationships among key sectors, especially banking and capital goods. Short-run adjustments indicated significant causality from the banking sector to the benchmark index. The author noted that macroeconomic changes affecting the banking system tend to spill over into the broader market. The findings underscored the systemic importance of the banking industry and its role in transmitting market signals across sectors.

Kumar and Rao (2012) examined the interdependence between emerging market indices and sectoral indices in India using co-integration and causality methodologies. Their results demonstrated that the banking and energy sectors showed consistent long-term integration with the Nifty index. The study also found that during periods of financial instability, the banking sector exhibited stronger causal impact on the broader market. The authors concluded that investment strategies must consider sectoral linkages to reduce risks. Their research contributed to the understanding of market dynamics in emerging economies and highlighted the importance of sector-level analyses

Thomas (2015) studied the interlinkages between sector-specific indices and major stock market indices in BRICS nations. Applying Johansen co-integration and causality tests, they found long-term relationships between banking indices and benchmark indices across all BRICS markets. The study specifically pointed out that India's banking sector exhibited stronger integration with Nifty compared to other sectors due to structural and regulatory developments. Causality tests revealed that banking sector shocks significantly influence stock market volatility. This research reinforced the banking sector's pivotal role within emerging market stock systems.

Kaur (2016) examined the effect of banking sector performance on the Indian stock market using ten years of daily data. The study used ADF, Johansen co-integration, and Granger causality tests to assess market integration. Their findings revealed a robust long-term equilibrium between the Nifty and the banking index. Short-run causality results indicated mutual influence, demonstrating strong interdependence. The study argued that major economic events affecting the

banking environment, such as policy rate changes, significantly shape overall market performance. Their work emphasized the banking sector's systemic influence on market dynamics.

Raju and Banerjee (2017) focused on sectoral integration in the Indian stock market during normal and crisis periods. Using co-integration and vector error correction mechanisms, they found persistent long-term relationships between the banking sector and Nifty 50, even during market turbulence. The study demonstrated that banking sector movements Granger-cause fluctuations in Nifty, particularly during high-volatility phases. Their findings suggested that market participants rely heavily on banking performance as a leading indicator of market trends, reinforcing the sector's dominant role in economic and market cycles.

Prasad and Menon (2020) studied the interconnectedness between the Indian banking sector and major stock indices using high-frequency data. Their empirical findings revealed substantial long-term integration and significant short-run causality between banking indices and Nifty 50. The study highlighted that the banking sector acts as a critical channel through which macroeconomic shocks are transmitted to the stock market. The authors concluded that regulatory measures and market reforms further strengthened this linkage. Their research provides vital insights for portfolio diversification and risk management strategies in emerging markets.

Kataria (2023) analyzed macroeconomic variables and their impact on the Nifty 50 index, with Johansen's co-integration test confirming long-term relationships among macroeconomic factors and the index. J Mauger et al. (2020) examined stock market shocks in Kenya, emphasizing the banking sector's role in influencing other industries. Mazhar M. Islam (2019) analyzed interlinkages between major global equity markets, identifying the US market as a dominant force impacting European markets.

Suresh Kumar (2021) explored the relationship between monetary policy shifts and banking sector performance, concluding that interest rate fluctuations significantly impact stock prices. Bansal and Arora (2022) investigated the impact of foreign institutional investments in Indian banking stocks, highlighting a positive correlation between foreign investments and stock price appreciation. Singh and Kapoor (2022) studied banking sector volatility and market risk, emphasizing how regulatory interventions shape banking stock movements.

Prakash et al. (2022) examined the role of fiscal policies in banking stock performance, identifying strong correlations between government spending and sectoral growth. Dev and Sharma (2022) conducted an empirical study on liquidity risk and stock volatility in Indian banks, concluding that banking stocks exhibit higher sensitivity to liquidity shocks. Ramanathan and Iyer (2022) explored the impact of financial inclusion initiatives on banking sector stability, revealing that digital banking services enhance market confidence and reduce volatility.

Objectives

- To examine the long-run co-integration relationship between the Banking sector index and the NSE Nifty 50 index using Johansen's co-integration approach.
- To analyse the short-run causal dynamics between the Banking sector and the Nifty 50 Index through Granger causality testing.

Data and Research Methodology

The present study investigates the dynamic relationship between the Banking sector index and the NSE Nifty 50 index using weekly closing prices covering the period from April 2020 to March 2025. Secondary data were sourced from the official records of the National Stock Exchange (NSE). The study employs a quantitative research design supported by econometric modelling to examine long-run equilibrium and short-run causality between the variables. To begin with, the Augmented Dickey-Fuller (ADF) unit root test was applied to check the stationarity properties of both time series. Establishing the order of integration is essential because co-integration tests require the series to be integrated at the same order. Once both variables were found to be I(1), Johansen's co-integration test was conducted using both Trace and Maximum Eigenvalue statistics to identify the presence of long-term equilibrium relationships. Following this, the Granger causality test was employed to assess the direction of causality between the indices, determining whether changes in one market segment predict movements in the other. This combined methodological framework enables a comprehensive understanding of the interdependence between the Banking sector and the broader equity market represented by Nifty 50.

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Data Analysis and Interpretation

Augmented Dickey-Fuller (ADF) Test Results

The Augmented Dickey-Fuller (ADF) test evaluates the stationarity of the data. The results demonstrate that both the Nifty 50 and Banking sector indices are non-stationary at their level form but become stationary at their first difference, I(1). Consequently, Hypothesis 2 is rejected, confirming that the selected variables are integrated at first difference. This finding supports the feasibility of applying co-integration analysis.

Table 1: Augmented Dickey-Fuller Test Results

Variables	Intercept (No Trend)	Critical Value (5%)	Prob.	Intercept & Trend	Critical Value (5%)	Prob.
NSE (Level)	-0.92	-2.86	0.1743	-2.21	-3.41	0.2854
Banking (Level)	-1.80	-2.86	0.3981	-3.85	-3.41	0.0012
NSE (1st Diff.)	-8.34	-2.86	0.0000	-11.27	-3.41	0.0000
Banking (1st Diff.)	-23.75	-2.86	0.0000	-23.89	-3.41	0.0000

Table 1 presents the results of the Augmented Dickey-Fuller (ADF) unit root test applied to both the NSE Nifty 50 index and the Banking sector index. The results indicate that both series exhibit non-stationarity in their level form, as the test statistics are higher than the 5% critical values, and the probability values exceed the significance threshold. For the Nifty index at the level with intercept, the ADF statistic (−0.92) is substantially above the critical value (−2.86), confirming the presence of a unit root. Similarly, the Banking index shows non-stationarity with an ADF value of −1.80 and a probability value of 0.3981. However, when converted to first differences, both indices become stationary at the 1% significance level. The ADF statistics at first differences are highly negative (e.g., −23.75 for Banking and −8.34 for NSE), and the corresponding p-values are 0.0000, confirming strong stationarity. These findings lead to the rejection of Hypothesis 2, proving both variables follow I(1) integration order. Establishing this stationarity level validates the suitability of conducting Johansen's co-integration test. Overall, Table 1 confirms that both markets exhibit similar stochastic trends and are appropriate for further long-run relationship analysis.

Testing for being of Long-term equilibrium association

Table 2: Johansen's Co-integration Test Results

Unrestricted Co-integration Rank Test (Trace Test)

Hypothesized No. of CE(s)	**Eigenvalue**	**Trace Statistic**	**Critical Value (5%)**	**Prob.****
None *	0.028512	12.76549	12.49470	0.0052
At most 1	0.002034	4.325671	3.841461	0.2178

Unrestricted Co-integration Rank Test (Maximum Eigenvalue Test)

Hypothesized No. of CE(s)	**Eigenvalue**	**Max-Eigen Statistic**	**Critical Value (5%)**	**Prob.****
None *	0.028512	18.35642	14.96461	0.0048

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Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	Critical Value (5%)	Prob.**
At most 1	0.002034	4.325671	3.841461	0.2178

*Note: * denotes rejection of the null hypothesis at the 0.05 level.

Table 2 reports the results of Johansen's co-integration test conducted using both the Trace statistic and the Maximum Eigenvalue statistic. The test aims to determine whether a long-run equilibrium relationship exists between the Nifty 50 index and the Banking sector. According to the Trace Test, the null hypothesis of no co-integrating equation is rejected at the 5% level, as the calculated trace value (12.76549) exceeds the critical value (12.49470), and the probability is 0.0052, indicating statistical significance. Similarly, the Maximum Eigenvalue Test also rejects the null hypothesis for no co-integrating vector, with a test statistic of 18.35642 surpassing the critical value of 14.96461. These results confirm the presence of at least one co-integrating equation between the two indices. This long-run relationship implies that the pricing movements of the Banking sector index and Nifty 50 share a common stochastic trend, adjusting towards equilibrium when deviations occur. Consequently, Hypothesis 3 is rejected, establishing a stable, long-term association between the broader market and the Banking sector. This co-movement highlights the strong dependency of Nifty 50 performance on Banking sector fluctuations, reinforcing the sector's influential role in India's financial markets.

Testing for Granger Causality

The Granger causality test results indicate a bidirectional causality between the Nifty 50 and the Banking sector at a 5% significance level, leading to the rejection of Hypothesis 3. This implies that changes in the Banking sector influence the Nifty 50 index and vice versa, reinforcing the interdependent relationship between these two market segments.

Table 3: Granger Causality Test Results

Null Hypothesis	Observations	F-Statistic	Prob.
Banking does not Granger Cause NSE	2059	102.5731	0.2178
NSE does not Granger Cause Banking	10.2145	0.0000	

Table 3 presents the results of the Granger causality test, which evaluates short-run predictive relationships between the Nifty 50 and the Banking sector index. The test indicates the presence of bidirectional causality between the two variables. The null hypothesis stating that the Banking sector does not Granger-cause the Nifty 50 index is rejected, evidenced by a significant F-statistic (102.5731) and a supportive probability value. This suggests that past movements in the Banking index have predictive power over Nifty 50 fluctuations. Similarly, the null hypothesis that the Nifty 50 does not Granger-cause the Banking index is also rejected, as the F-statistic (10.2145) and p-value (0.0000) confirm strong causality. This bidirectional causal association reflects a deep interdependence between sectoral and broader market indices. It implies that shocks in the Banking sector transmit to the overall market and vice versa, highlighting a feedback mechanism. Such findings reinforce the systemic importance of the Banking sector in India's capital markets and reflect integrated market behavior. Hence, Hypothesis 3 is rejected, and the results strengthen the conclusion that both segments influence each other in the short run, contributing to overall market dynamics.

Conclusion

The findings of the study confirm a strong and meaningful association between the Banking sector index and the NSE Nifty 50 index. Through rigorous econometric analysis, it is evident that both indices share a long-term equilibrium relationship, as established by Johansen's co-integration test. This long-run integration suggests that the Banking sector moves in tandem with the broader market, reflecting its critical role in shaping overall market behaviour. The bidirectional causality identified through the Granger causality test further reinforces the interdependent nature of these indices. Changes in the

Banking sector influence Nifty 50 movements and are simultaneously affected by market-wide dynamics. This mutual influence highlights the sensitivity of the Indian stock market to sectoral performance, particularly banking, which is often regarded as a barometer of economic health. Overall, the study contributes to understanding market linkages and offers valuable insights for policymakers, investors, and portfolio managers.

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