

# Interdependence and Cointegration Between Nifty 50 and Banking Sector Indices: Evidence from the 2025–2026 Shock Period

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**Abstract -** Between April 8, 2025, and April 8, 2026, when there were significant trade and geopolitical shocks, this paper examines the correlation between the Nifty 50 index and two banking sector indices, Private Bank and PSU Bank, their cointegration, and dependence. Using the EViews software, the analysis applies time-series econometric tests including; descriptive statistics, correlation analysis, the Augmented Dickey-Fuller (ADF) unit root test, the Johansen cointegration test and the Granger causality analysis. Research design is quantitative and empirical and the secondary data is used day by day. A lack of normality in the distribution and the occurrence of high values suggest volatility clustering, as well as leptokurtic behaviour, in all of the return series. The correlation results show a weak correlation to PSU Bank, but a strong correlation of the Nifty 50 and the Private Bank indexes. Private banking stocks have a disproportionate impact on market movements, according to Granger causality study, which shows a unidirectional causal link from Private Bank to Nifty 50. PSU bank indices, on the other hand, do not provide any substantial causal impact. Also, when an economy is experiencing uncertain economic times, the Josephsons cointegration test ensures that the indices are not connected to stable long-term relationships. Because even though short-run interactions are significant, long-run integration is disrupted by structural shocks such as trade disputes and geopolitical incidences, albeit the substantial policy implications of the work to policymakers, investors and portfolio diversification strategies.

**Keywords:** Financial market indexes (Nifty50), financial sector indices (FSIs), Granger Causality, Cointegration and geopolitical shocks.

## I.INTRODUCTION AND LITERATURE REVIEW

The stock market plays a very important role in the economical prosperity of a country, as capital generation, investment decisions and resource allocation have all been greatly aided by the stock

market. India has a variety of indexes that are used to gauge the healthiness of various aspects of the financial system in India; the Nifty 50 index is a general index of the market, then the indexes of the Private Bank and PSU Bank are more focused. The banking sector has significant influence in the dynamics of the stock market as a consequence of its policies of liquidity management, investor confidence and expansion of loans. Investors, legislators and scholars have to understand the dynamic relationship between the general market index and indexes that represent the banking industry.

Due to the increase in the complexity of the economic system, the promotion of globalisation, and the integration of the financial system, the interconnection of the financial market and sectoral index has become more apparent in the past years. The existence of geopolitical wars, trading disputes, and economic uncertainty populations is well known in changing market relationships and becoming more volatile. The time frame of the research, between April 8, 2025, to April 8, 2026, is characterized with major events such as trade talks, geopolitical conflict, and a rise in tariffs. These events are likely to have impacted the behaviour and interaction of financial markets. It is important to observe how the inter-index linkages remain constant or become very different since such events occur bringing about structural changes and shocks. Financial time series are often studied for their short-term and long-term links from an econometric standpoint via the lenses of interdependence, causation, and cointegration. Correlation and Granger causality can be applied to short-run dynamics whereas long-run equilibrium relationships are studied using cointegration methods. Regardless of whether or not any such correlations exist, the implications on portfolio

diversification, risk management and market efficiency are significant. Considering the fact that these indicators were subject to considerable econometric and geopolitical shocks over the past few years, this study applies time-series econometric techniques to analyse how they are interdependent and cointegrated.

A significant body of literature has examined the integration and interdependence of stock markets using the methods of econometrics such as correlation, cointegration and causality analysis. Early studies found that there are similar long-run correlations and stochastic tendencies across developing stock markets. Using Asia as an example, some of its markets exhibited signs of cointegration indicating that there are long-term equilibrium linkages between these two (Nath and Verma, 2003). Similarly, Menon et al. (2009) examined the linkage between the Indian stock market and global markets and found that there was a lot of linkage interdependence.

The dynamic relationships between a number of financial variables and the indices of the stock market in India have been the focus of numerous scholarly studies. To find some evidence of the market interdependence and the spillovers volatility features, Karmakar (2009) discussed price discovery of Nifty futures and volatility spillovers on the underlying market index. Emphasis is given to the interconnectivity of financial systems and Vuyyuri (2005) examined the relationship between financial variables and stock market indices of India. He found out unidirectional causality, and cointegration between some of the variables. Other newer studies have also excavated the role of global connections and macroeconomic factors differently on the behaviour of the stock market. An analysis of the interdependence between the Indian and global market is conducted by Mishra et al. (2022) and the results derived according to the research show that the interdependence between the Indian and global market has increased as a result of globalisation, especially during the period of economic uncertainty. Similarly, Keswani et al. (2024) highlighted the importance of cointegration analysis in long-term correlations of the Indian stock prices with macroeconomic factors and the role of dynamic modelling techniques was emphasized.

Studies of the stock market in India have also centered on inter-relation of various industry sectors. Scholars (such as Kumar et al., 2022) have examined the relationship between the Nifty 50 and sectoral

indexes and have found out that the various sectors are intertwined to various degree estimates. An analysis covering sectoral correlations conducted by Florence et al. (2020) found out that the different industries exhibit different patterns of their activity, some being more linked with the overall market. Beyond this, new studies have established that during a crisis or any kind of uncertainty, investor attitude and risk perception are changed, which is reflected in the linkages between the sectoral indices (Sahadudheen & Kumar, 2023). Although much is written on how markets are becoming more integrated and interdependent, very little is known about the relationship that exists between the Nifty 50 and banking sector indexes in relation to each other, and in particular, at times of combined trade and geopolitical shocks. Inadequate research on the variation of PSU Bank indices to those of Private Banks in terms of their influence of the overall market situation has also been lacking. Which serves to fill this gap, this study is undertaken to analyse the short-run and long-run correlations between these indicators during a specific time with significant external perturbations.

## II.METHODOLOGY

Using a quantitative and empirical study approach, the present paper examines how each of the Nifty 50 index and two banking sector indices; the Private Bank and the PSU Bank indices were influenced by each other as well as by the occurrence of trade and geopolitical shocks in a given time. The main aim of the study in the context of the external economic shocks is to study the cause and effect relationships, the long run equilibrium, and the dynamic interaction between these indicators. The research is based on secondary data, such as daily closing prices that were assessed against reputable financial sources during the time period beginning April 8, 2025, and continuing to April 8, 2026. During this period, structural cracks and volatility are expected to come to light in the Indian stock market due to a series of big events, including an increase in tariffs, bilateral trade negotiations, and the Iran-US conflict ending in a ceasefire. The sample design consists of all possible daily observations that occur over the time period during which the study is conducted and is based on a census approach. This makes full analysis ensured and prevents any sampling bias. Attaining stationarity and improved performance to relate market dynamics based on price series is achieved using logarithmic returns. EViews, a

systematic econometric model, is used in this study. We appeal to descriptive statistics to examine the distributional characteristics of the return series, and we appeal to correlation analysis to examine the similarity of series of indexes to each other. The Augmented Dickey-Fuller (ADF) unit root test is utilized to determine whether or not the data is stationary. Supplementarily, the relationship between the variables found by using the Johansen

cointegration test is identified by the direction of causal links between the Nifty 50 and banking sector indices, as determined using the means of the Granger causality test. A rigorous, systematic and credible empirical study is ensured by such comprehensive approach to the methodology which enables the study to capture the dynamics of the short run and the interdependence of long run dynamics.

Table 1: Hypotheses Formulation

Sr. No.	Hypothesis Code	Statement
1	H <sub>01</sub>	There is no significant correlation between Nifty 50 and banking sector indices (Private Bank and PSU Bank).
2	H <sub>02</sub>	The time series of Nifty 50, Private Bank, and PSU Bank indices are non-stationary.
3	H <sub>03</sub>	There is no long-run cointegration relationship among Nifty 50, Private Bank, and PSU Bank indices.
4	H <sub>04</sub>	There is no causal relationship between Nifty 50 and banking sector indices.

III. DATA ANALYSIS AND DISCUSSION

Diagram 1: Descriptive Statistics and Graph of Nifty 50 Price

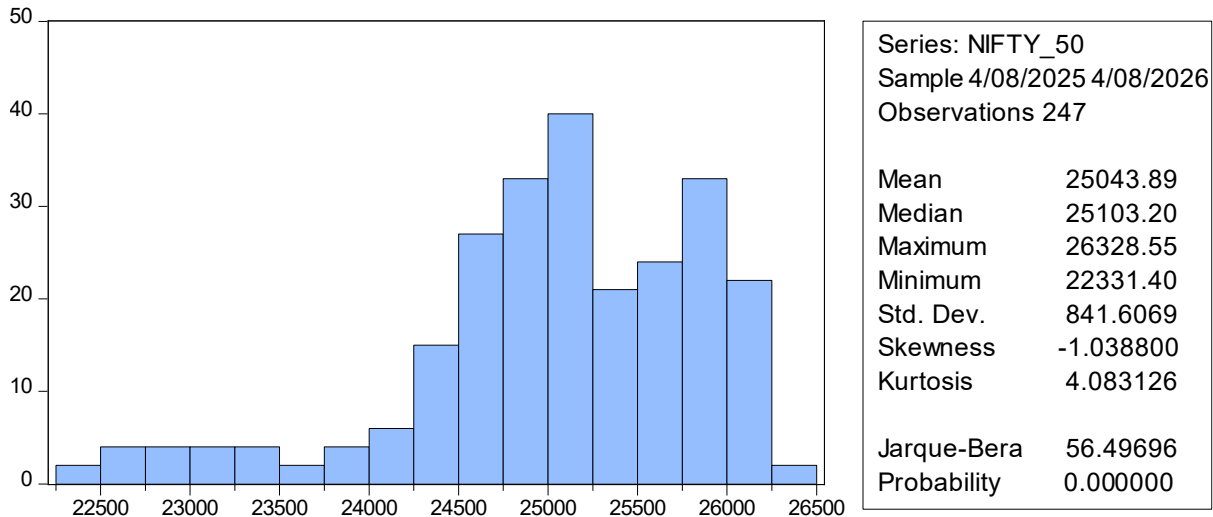


Diagram 2: Descriptive Statistics and Graph of Nifty 50 Returns

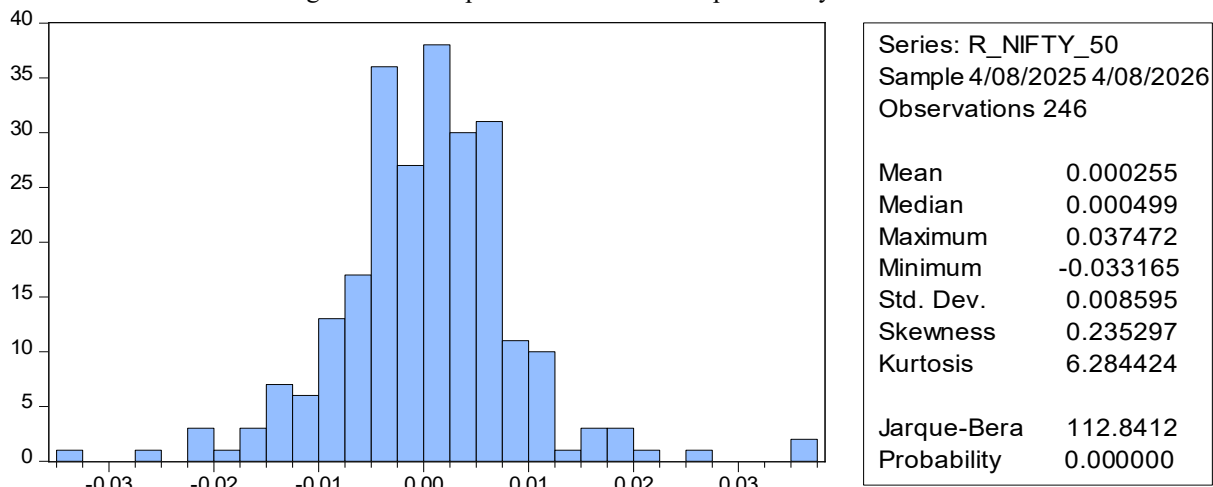


Table 2: Unit Root Test of Nifty 50 Returns

Null Hypothesis: R\_NIFTY\_50 has a unit root

Exogenous: Constant  
Lag Length: 0 (Automatic - based on SIC, maxlag=15)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-15.26688	0.0000
Test critical values:		
1% level	-3.456950	
5% level	-2.873142	
10% level	-2.573028	

\*MacKinnon (1996) one-sided p-values.

The descriptive statistics and the graphical analysis of the Nifty 50 index sheds some light on the behaviour of this index over the period of study. There are mild changes in the index levels shown by the price series' mean value of 25,043.89 and standard deviation of 841.61. This adverse skewness of -1.0388 suggests that it is a skewed distribution with significant extreme negative movements. The value of the kurtosis (= 4.0831) suggests a leptokurtic distribution with heavy tails; and the price series is confirmed with non-normality by the Jarque-Bre spell ( p-value = 0.0000). On the other hand, the return series shows extreme volatility throughout the time period, with a standard deviation of 0.008595 and an extremely tiny mean of 0.000255, which is in line with the daily stock market behaviour. The value or skewness of the return is positive with a slight skew (0.2353), and that implies that there is a slight rightward skew in the returns. On the other hand, the high kurtosis value (6.2844) shows that there is a lot of severe

volatility or leptokurtic behaviour. More so, non-normality is ascertained via lead Jarque-Bera test on returns which is statistically significant (p-value = 0.0000). The histogram of returns shows market sensitivity as it clumps around zero and is fat tailed. Moreover, there is a test known as Augmented Dickey-Fuller (ADF) test to investigate whether the series of returns is stationary. The test statistic = -15.26688 that is much less than the critical values on all levels. The unit root null hypothesis is rejected because the p-value of 0.0000 is below the significant level of 5.0. More econometric analysis and tests, such as correlation, cointegration, and causation tests, can now be performed on the Nifty 50 return series because it has now been demonstrated to be stationary at level. Overall, the results confirm that volatility clustering, non-normal distribution, and consistent statistical properties of returns occurred, which are good reasons to believe that an effective framework can be used to conduct future time-series researches.

Diagram 3: Descriptive Statistics and Graph of Private Bank Price

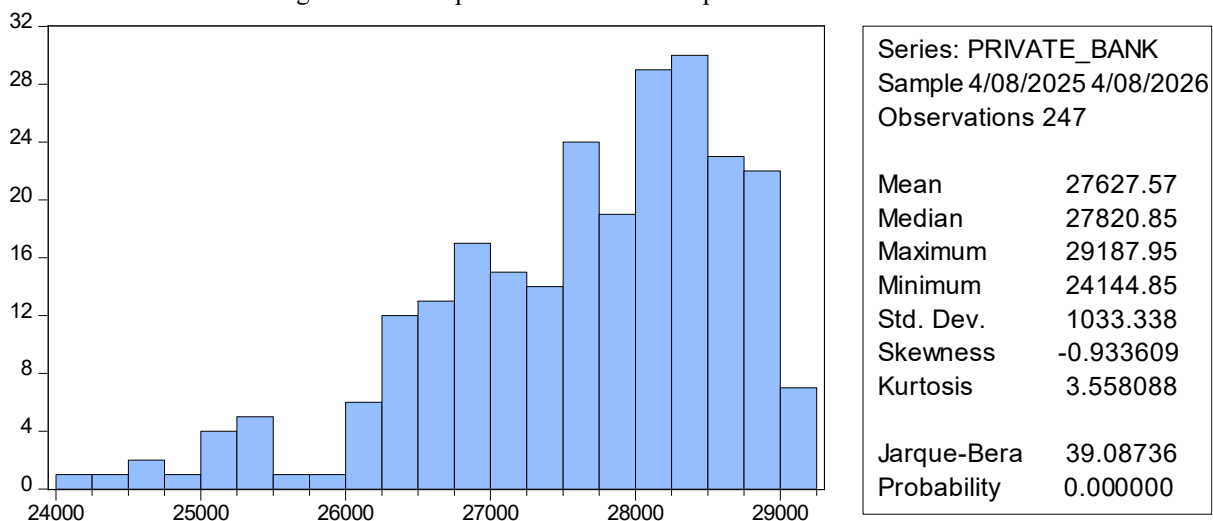


Diagram 4: Descriptive Statistics and Graph of Private Bank Returns

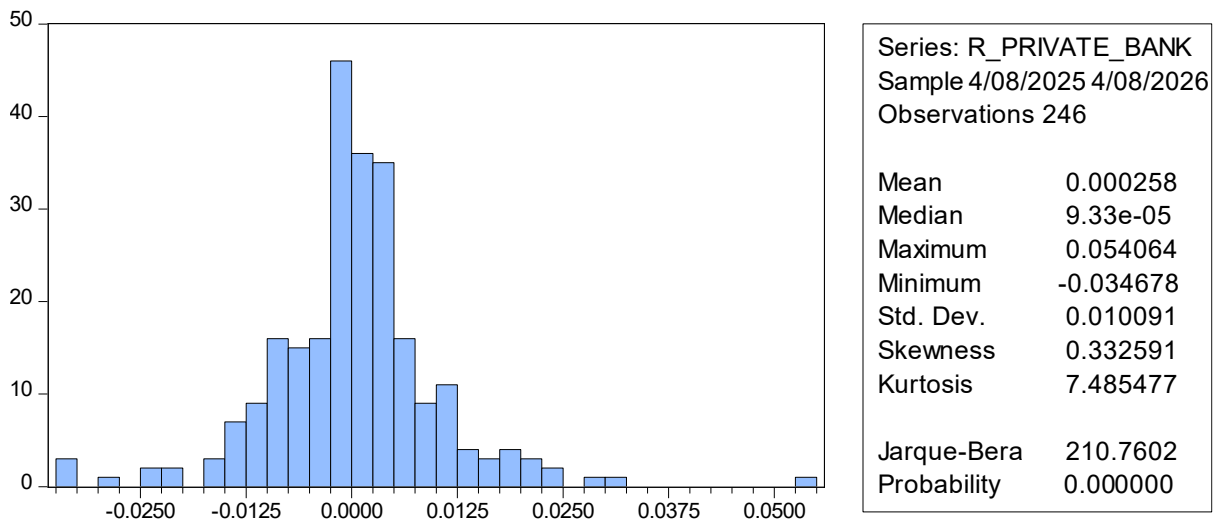


Table 3: Unit Root Test of Private Bank Returns

Null Hypothesis: R\_PRIVATE\_BANK has a unit root  
 Exogenous: Constant  
 Lag Length: 0 (Automatic - based on SIC, max lag=15)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-13.79414	0.0000
Test critical values:		
1% level	-3.456950	
5% level	-2.873142	
10% level	-2.573028	

\*MacKinnon (1996) one-sided p-values.

Much information on the behaviour of the Private Bank index during the study period can be obtained by looking at its descriptive statistics and a graphical analysis. A mean value of 27,627.57 and a standard deviation of 1,033.34 are shown in the price series of the Private Bank index, suggesting that there are substantially bigger volatility when compared to the wider market index. Worse negative price movements would be expected as indicated by the negative skewness (-0.9336), which indicates a left-skewed distribution. This value of the kurtosis (3.5581) suggests the presence of a leptokurtic distribution, with quite heavy tails. The price series is not normally distributed as the Jarque-Bra statistic (0.0000) is significant. Moreover, the histogram indicates that there is indeed a concentration towards the higher index values, which leads to the conclusion that the distribution is somewhat uneven. A comparison of the return series of the Private Bank index with that of the Nifty 50 shows that it is more volatile with a standard deviation of 0.010091 and a very small mean of 0.000258, which is in line with the behaviour of daily financial returns. A marginal

preponderance of positive returns is shown by the return distribution's minor positive skewness (0.3326). The kurtosis value of 7.4855 shows a very leptokurtic value distribution with extreme values and large volatility concentrated around the values. To establish that the series of returns is not normally distributed, the Jarque-Bra test gave a statistically significant value (p-value = 0.0000). The tail is large and the peak near zero in the return history is strong, indicating the susceptibility to market shocks, particularly in times of trade and geopolitical unpredictability. Moreover, the augmented Dickey-Fuller (ADF) test is employed to test whether or not the Private Bank series of returns is stationary. At the 1%, 5% and 10% levels, the ADF test statistic (-13.79414) is much less than the critical values and the null hypothesis of a unit root is rejected because of the p-value (0.0000). That the Private Bank return series is level and stationary is confirmed by this. Depending upon the result, the data can be further analyzed using econometric analysis, including Granger causality, correlation, and cointegration. Consistent with stable statistical features needed for

sophisticated time-series analysis, the results show that returns exhibit non-normality, high volatility, and leptokurtic behaviour.

Diagram 5: Descriptive Statistics and Graph of PSU Bank Price

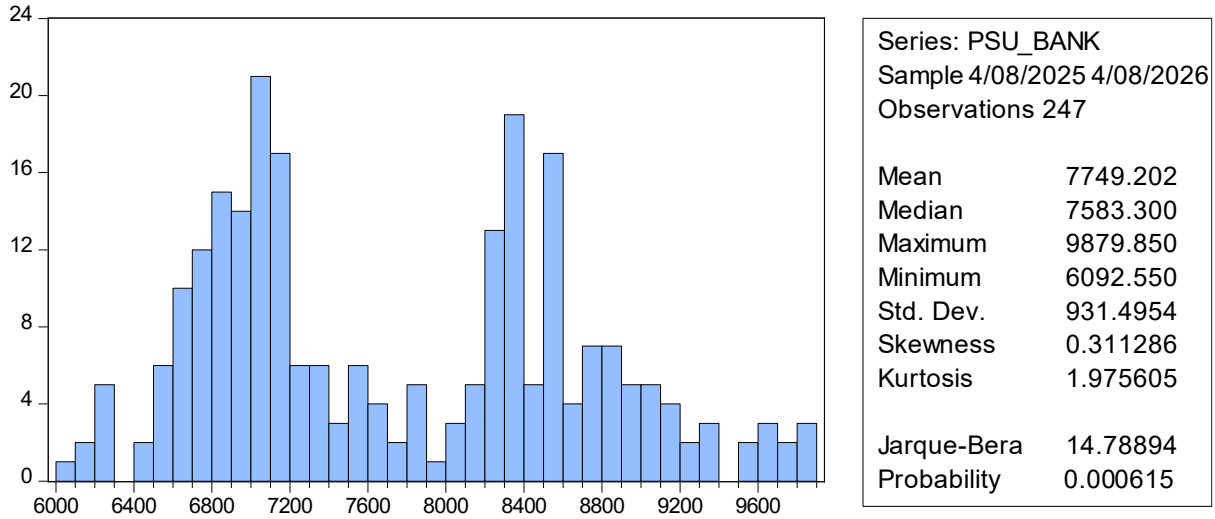


Diagram 6: Descriptive Statistics and Graph of PSU Bank Returns

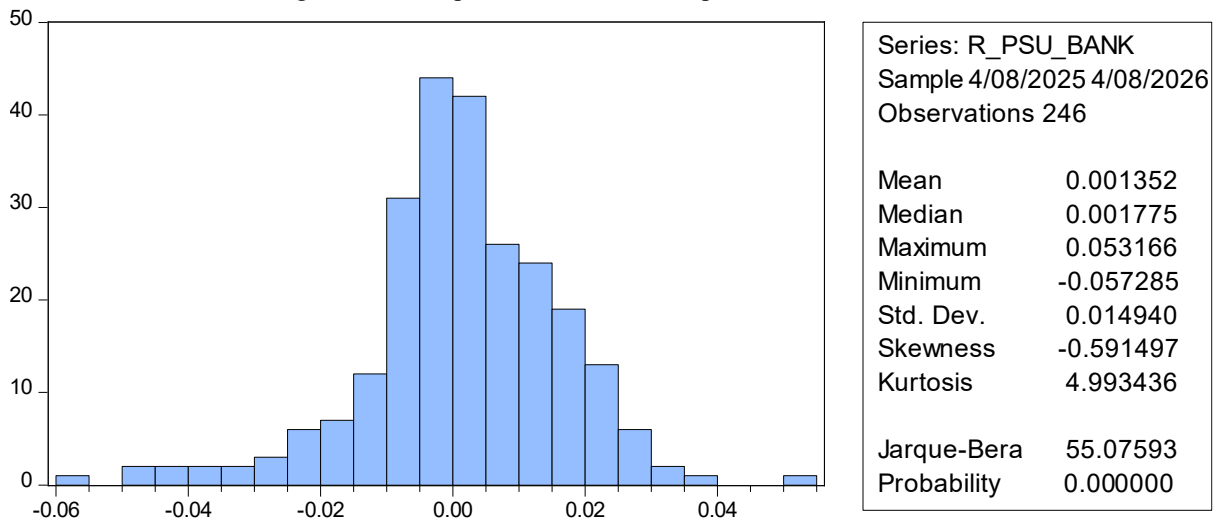


Table 4: Unit Root Test of PSU Bank Returns

Null Hypothesis: R\_PSU\_BANK has a unit root  
 Exogenous: Constant  
 Lag Length: 0 (Automatic - based on SIC, maxlag=15)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-16.22747	0.0000
Test critical values:		
1% level	-3.456950	
5% level	-2.873142	
10% level	-2.573028	

\*MacKinnon (1996) one-sided p-values.

The graphical analysis and descriptive statistics of the PSU bank index have indicated significant

attributes of how the index behaved in the study period. The price series reveals that the mean value

of 7,749.20 with a standard deviation of 931.50 indicates that the PSU banking stocks experience a significant amount of fluctuations. The positive skewness (0.3113) indicates that the distribution is skewed to the right that is, the number of extreme positive movements compared to extreme negative movements are relatively many. The value of kurtosis of 1.9756 however indicates that the distribution was platykurtic (heavy tails and more extreme values than a normal distribution). The Jarque-Bra value is statistically significant (p-value = 0.00615) and this confirms that the price series is not normally distributed. The histogram also reveals that there is rather a spread distribution and moderately skewed across price levels. Conversely, the mean return of the series on returns of PSU Bank index is 0.001352, which is slightly high as compared to other indices stating that the average performance of the index is probably relatively superior during the period. The standard deviation of 0.014940 indicates that PSU Bank returns are more volatile in comparison to both Nifty 50 and Private Bank indexes. The negative skewness (-0.5915) shows that the observed distribution is skewed to the left and this means that we have a greater number of more extreme negative returns. The value of kurtosis

of 4.9934 is a confirmation that this is a leptokurtic distribution, thus a fat-tailed distribution, which does exist, which is consistent with the volatility clustering in financial time series. The JarqueBra test is very significant (p-value = 0.0000) and it further confirms that the series of the returns are not a normal series. Histogram of returns: It is sensitive to market shocks and external market events, with the effect concentrated around zero with a broader dispersion and longer fat tails. Moreover, the test of the stationarity of PSU Bank return series is performed by applying the unit root test, the Augmented Dickey-Fuller (ADF) unit root test. p (ADF test value -16.22747) is well below the critical values of the test ( 1, 5 and 10) and the p-value (0.0000) is significantly lower than the critical value of the test ( 1, 5 and 10 ). This establishes that the PSU Bank return series can be considered to be at the stationary, at level. The outcome justifies the adequacy of the data in other econometric studies like correlation, cointegration, and the Granger causality tests. The overall results are that there is non-normal distribution, high volatility, and asymmetric return behaviour, and stable statistical properties needed to use advanced time-series models.

Table 5: Covariance and Correlation Analysis

Covariance Analysis: Ordinary

Date: 04/14/26 Time: 00:21

Sample: 4/09/2025 to 4/08/2026

Included observations: 246

Balanced sample (list wise missing value deletion)

Covariance	R_NIFTY_50	R_PRIVATE_BANK	R_PSU_BANK
R_NIFTY_50	7.36E-05		
R_PRIVATE_BANK	7.83E-05	0.000101	
R_PSU_BANK	8.56E-05	0.000100	0.000222
Correlation	R_NIFTY_50	R_PRIVATE_BANK	R_PSU_BANK
R_NIFTY_50	1.000000		
R_PRIVATE_BANK	0.906719	1.000000	
R_PSU_BANK	0.669503	0.667594	1.000000
Probability	R_NIFTY_50	R_PRIVATE_BANK	R_PSU_BANK
R_NIFTY_50	-----		
R_PRIVATE_BANK	0.0000	-----	
R_PSU_BANK	0.0000	0.0000	-----

The analysis on the covariance and correlation indicates that the degree of association between the series of returns of the Nifty 50, Private Bank and PSU Bank indices is very high over the course of the

study. All the pairs of covariance are positive, which means that the indices are likely to vary in the same direction. This finding is further enhanced by the results of correlation, which indicate that there is a

very high positive correlation between Nifty 50 and the Private Bank returns (0.9067), thus, indicating that, the stocks of a private bank follow exactly like the overall movements in the market. Likewise, the PSU bank returns have a moderate positive correlation with Nifty 50 (0.6695) and Private Bank (0.6676), which implies that although PSU bank moves coincide with the market, their relationship is

relatively weaker. The p-values (p-value = 0.0000) of all the correlations affirm that these correlations are statistically significant. In the aggregate, the results show strong market integration especially between Nifty 50 and Private Bank indices, and PSU banks portray moderate yet significant co-movement in association with the market-at-large and the banking sector, in general.

Table 6: Granger Causality Analysis

Pair wise Granger Causality Tests

Date: 04/14/26 Time: 00:23

Sample: 4/08/2025 to 4/08/2026

Lags: 2

Null Hypothesis:	Obs	F-Statistic	Prob.
R_PRIVATE_BANK does not Granger Cause R_NIFTY_50	244	4.46176	0.0125
R_NIFTY_50 does not Granger Cause R_PRIVATE_BANK		2.68585	0.0702
R_PSU_BANK does not Granger Cause R_NIFTY_50	244	1.18399	0.3078
R_NIFTY_50 does not Granger Cause R_PSU_BANK		0.53293	0.5876
R_PSU_BANK does not Granger Cause R_PRIVATE_BANK	244	1.65052	0.1941
R_PRIVATE_BANK does not Granger Cause R_PSU_BANK		2.06875	0.1286

The directional relationship between the returns of Nifty 50, Private Bank and PSU Bank during the period of research may be better explained using the results of the Granger causality tests. Since the null hypothesis (which is: Private Bank does not Granger cause Nifty 50) is rejected at the 5% level of significance (p = 0.0125), the data suggest that there is a one way causal relationship at the 5% significant level going through the returns of Private Bank to the returns of Nifty 50. It also does not appear that Nifty 50 has a significant effect on the returns of the Private Banks, as the negative correlation is not

statistically significant at the 5% level (p = 0.0702). Statistically The statistical analysis demonstrates that in both directions, PSU Bank and Nifty 50 are not correlated with each other (p > 0.05). Similarly, there is no definite directionality in the indexes of the Private Bank and PSU Bank. Put together, the data indicates that the main driver of market changes is the actions of the private banks, yet indexes of the banks of the public sector failed to demonstrate any predictable capacity to foretell any market change throughout the period being examined.

Table 7: Cointegration Analysis

Date: 04/14/26 Time: 00:25

Sample (adjusted): 4/17/2025 to 4/08/2026

Included observations: 242 after adjustments

Trend assumption: Linear deterministic trend

Series: NIFTY\_50 PRIVATE\_BANK PSU\_BANK

Lags interval (in first differences): 1 to 4

Unrestricted Cointegration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None	0.053883	22.31235	29.79707	0.2815



NIFTY_50	PRIVATE_BANK	PSU_BANK
1.000000	0.000000	0.690231 (0.36972)
0.000000	1.000000	0.347739 (0.42776)

Adjustment coefficients (standard error in parentheses)

D(NIFTY_50)	-0.022481 (0.02856)	-0.013442 (0.02864)
D(PRIVATE_BANK)	0.018243 (0.03697)	-0.056392 (0.03707)
D(PSU_BANK)	0.007609 (0.01698)	-0.013337 (0.01703)

The cointegration test is the Johnson reverend test that is applied to analyze the presence of a long-run equilibrium relationship among Nifty 50, Private Bank and PSU Bank indices during the study period. Both the Trace test and Maximum Eigenvalue test results show that there is no cointegration among the variables in the 5% significance level. Specifically, the trace statistics of all the hypotheses (None, At most 1, and At most 2) have small values than the corresponding critical values and the p-values of the corresponding values are above 0.05. The statistics on the maximum eigenvalue are also not able to pass the critical values and ultimately prove the fact that there are no cointegrating relationships. Hence, it is impossible to reject a null hypothesis of no cointegration. It means that there is neither the relationship between the Nifty 50, Private Bank, and PSU Bank indices and the variables nor the movement of these variables in the long-run. The results indicate that although short-run relationships might exist among these indices, their dynamics are not coupled with some stable long-term relations during the period of trade and geopolitical shocks.

#### IV.MAJOR FINDINGS

1. Nifty 50, Private Bank, and PSU Bank Nifty 50, Private bank, and PSU bank have the return series that are not normally distributed, and the series show behaviour of leptokurtosis, indicating the presence of volatility clusters and extreme values.
2. According to all the indices, PSU Bank returns can be seen to be the most volatile, followed by the Private Bank and then Nifty 50.
3. ADF unit root test confirms that all the returns series were at level suggesting that the returns series were suitable to further examination using time-series analysis.
4. strongly positive relationship between Nifty 50 and Private Bank exists (0.9067), showing high market integration.
5. PSU Bank exhibits the moderate positive relationship with both Nifty 50 and Private Bank indicating relatively weak yet significant interrelationships.
6. Granger causality results show that there is a unidirectional causal relationship in which the stock of the private bank affects the general movement of stocks in the market.
7. PSU Bank does not show significant causality with other indices implying a limited ability of the PSU banks to predict.
8. Confirmation of non-existence of long-run equilibrium relationship between Nifty 50, Private Bank, and PSU Bank indices.

Table 8: Hypotheses Testing Results

Sr. No.	Hypothesis Code	Statement	Test Used	Result
1	H <sub>01</sub>	There is no significant correlation between Nifty 50 and banking sector indices	Correlation Analysis	Rejected (Significant positive correlation found)
2	H <sub>02</sub>	The time series are non-stationary	ADF Unit Root Test	Rejected (Series are stationary at level)
3	H <sub>03</sub>	There is no long-run cointegration relationship among indices	Johansen Cointegration Test	Accepted (No cointegration found)

4	H04	There is no causal relationship between Nifty 50 and banking indices	Granger Causality Test	Partially Rejected (Causality from Private Bank → Nifty 50 only)
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### V.CONCLUSION

The research concludes that the Nifty 50, Private Bank or PSU Bank indices follow a strong short run dynamics but lack any relationship with long run equilibrium in the period of the trade and geopolitical shocks. The non-normality of the returns of all indices and the leptokurtic behaviour of the indices indicate that volatility is concentrated that extreme market movements occur. PSU Bank has the highest volatility compared to others, namely, Private Bank and Nifty 50, which are more sensitive to fluctuations in the market. The fact that all the return series are stationary (as the ADF test confirms) is indicative of the healthiness of the econometric analysis. The results of the correlation display a high market integration, specifically among Nifty 50 and PSU banks, with the latter having a moderately but significantly high correlation. The Granger causality results indicate that a directional impact exists between Private bank and Nifty 50, and that the directional influence of the stock market by individual banks is a predictive model, but it is not a predictive model that a PSU bank can make. Moreover, there is no cointegration between these indices, which means that there is no stable long term relationship between these indices particularly in situations of economic uncertainty. In general, the findings suggest that although the Indian banking industry, especially, private banks have a significant effect on the short-term market behaviour, the absence of long-run integration is an indication of the impact of structural shocks and the changing market dynamics during the study period.

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