

A Study on Interdependence of SME IPO Indices on Mainboard IPO Indices to Understand Market Dynamics of both Platforms

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Citation: Mathur, D. & Kumar, A. (2026). A Study on Interdependence of SME IPO Indices on Mainboard IPO Indices to Understand Market Dynamics of both Platforms. International Journal of Innovations & Research Analysis, 06(01(II)), 157–169. [https://doi.org/10.62823/IJIRA/06.1\(II\).8908](https://doi.org/10.62823/IJIRA/06.1(II).8908)

ABSTRACT

The MSME sector is considered a vital engine for achieving the vision of a developed India by 2047, envisioned in the concept of “Viksit Bharat 2047”. The MSME sector in India has grown significantly since 1960 – with an average annual growth rate of 4.4% in the number of units and 4.62% in employment (currently employing 30 million). With an estimated 630.52 lakh businesses, the micro sector makes up more than 99% of all MSMEs. The estimated number of MSMEs in the small and medium sectors was 3.31 lakh and 0.05 lakh, respectively, making up 0.52% and 0.01% of the total estimated MSMEs (Chakraborty & Das, 2025).

Keywords: MSMEs, Viksit Bharat 2047, Micro Sector, Employment, IPO.

Introduction

SMEs, due to their size and comparatively larger financing requirements, fall into a different category than consumers or micro businesses and (very) small enterprises (MSEs). SMEs need more individually tailored products than consumers or MSEs, due to which a fully standardized approach and product-offer frequently do not match actual needs of SMEs.

In India, stock exchanges have created special platforms to recognize and provide for growing financing needs of small businesses with the potential to grow and expand. These platforms allow SMEs to list their shares and raise capital in a regulated and organized way. Two key platforms in the Indian stock market introduced exclusive platforms as BSE SME and NSE EMERGE for listing small and medium firms in India the establishment of the BSE SME platform in March 2012 and the NSE SME platform (also known as NSE Emerge) in September 2012 gave chance to raise funds through Public Offerings (IPOs), targeting businesses with a history of profitability and a certain net worth. BSE has also set up a gauge index under the name BSE SME IPO to keep a trail on the performance of SME IPOs in the secondary market. The Free float methodology is used to calculate BSE SME IPO Index in line with other BSE indices. The number of scrips involved in the index is variable. At least 10 companies should be kept in the index. All newly listed companies are included in the index and a company which has completed three years after listing is excluded automatically from it. The index was launched on 14 December 2012 and started trading on 18 Jan 2013. Another SME Index is NSE Emerge which is designed to represent the performance of eligible small and medium enterprises (SMEs) listed on the NSE Emerge platform. This index's elements are ranked on the basis of free-float market capitalization. The index's base value is set at 1000 and its base date is December 1, 2016. Stocks must be listed on the NSE Emerge platform in order to be included in the NSE Emerge Index. They should have traded for at least 25% of the trading days during the quarterly assessment, with at least 10 trading days in the three

months before. There must be at least 20 components in the index. These SME IPO indices are essential because they let investors and analysts compare the performance of specific firms to that of the SME market as an entire group. In order to fully understand the risk and return potential of listed SMEs as well as mainboard listed companies, these indexes are also capable of being compared to the mainboard indices. This will assist in clarifying how well this platform serves the market from the perspectives of both investors and SMEs.

Literature Review

Based on Harwood & Konidaris (2015), India's BSE, SME, and NSE EMERGE platforms have been created to give SMEs an easier route to public listings than large exchanges like the BSE and NSE. In accordance with the rules established by the Securities and Exchange Board of India (SEBI), the first stock exchange in Asia, the Bombay Stock Exchange (BSE), launched the SME Platform. SMEs can raise money from the public sector in a controlled environment thanks to this platform. Additionally, it offers an inviting atmosphere for investors, permitting SMEs from India's unorganized industry to list and participate in regulated markets. Together with NSE Emerge, which was introduced in 2012, the BSE SME platform is crucial in supporting small enterprises in reaching official financial markets. Thakur (2016) examined the function of SME exchanges in India, emphasizing how they could boost profitability by giving smaller businesses a way to transfer to bigger stock exchanges. They contend that markets like the NSE EMERGE and BSE SME can act as stepping stones for SMEs to develop prior to their eventual listing on major exchanges. Similar to other emerging markets, the research shows that while visibility and financial access increase in the short term, long-term sustainability is still dubious. P et al. (2017) also discussed that to understand the long run momentum of SME IPOs with many economic indicators can be studied through SME IPO Indexes like BSE SME IPO Index and NSE EMERGE which act as the barometer on SME platforms.

Jena & Thatte (2017) found that SME exchanges in India have done well since they started in 2012, outperforming other global SME equity markets. They noted that the Indian market has benefited from volatility in international markets such as 'Mothers' and 'TSXV', while volatility in markets such as 'KOSDAQ' and 'CHINEXT' had a negative effect. Specialized platforms, such as BSE SME and NSE EMERGE, have emerged as crucial facilitators in overcoming these barriers by providing customized support to SMEs. These platforms offer a more affordable and simplified route for smaller businesses to list their shares, reducing the complexities of the IPO process and increasing accessibility for underserved SMEs (Glover et al., 2024).

To further understand the literature, Jain et al. (2013) explained that the BSE SME IPO Index is crucial in ensuring greater visibility and access to capital markets for SMEs in India. Its adaptable process of adding and removing companies allows more SMEs to join the financial system, improving their credibility, making it simpler and more effective for them to raise funds through IPOs, and contributing to broader financial inclusion efforts. Luthra (2024) also analysed the market performance of the IPOs listed on NSE and NSE Emerge in his thesis and observed these two markets experience divergent market dynamics which reflects in their performance whereas this is not observed in the performance of IPOs on BSE SME and NSE Emerge which advocates a consistent performance between SME Exchanges in comparison to Mainboard Exchanges.

The viability of SME IPO indexes, such the BSE SME IPO Index, was studied by Sharma & Gupta (2018) as a crucial measure of how well SMEs use IPOs as a source of financing. The BSE SME IPO Index, which emphasizes market visibility and financial development for SMEs after becoming public, monitors the success of firms listed on the BSE SME platform. IPOs can have a major effect on SME finance in the nation, as seen by the index's astounding 1085.2% increase between 2013 and 2017. Anbukarasi et al. (2024) illustrate the effective usage of IPOs for developing firms by showing a substantial rise in the trend and growth of SME IPOs on the BSE SME platform, particularly after 2019. These SMEs' higher liquidity and good profits after going public demonstrate that listing on the exchange improves their access to funding. All things considered, the BSE SME IPO Index is an essential component of how much SMEs use IPOs to boost their market presence and increase financial inclusion. In accordance with Anand and Singh (2024), the BSE SME IPO Index surpasses both the Nifty and Sensex indices, and SME IPOs in India often generate positive returns on the day of listing. The BSE SME IPO Index's market-adjusted abnormal returns (MAAR) indicated how well these IPOs raised money and aroused investor interest. According to the research, the majority of SMEs listed on the BSE SME platform often exceed the larger market indices on the day of their listing, making the BSE SME IPO

Index an accurate measure of how well SMEs utilize public markets to get finance. The above discussion clearly encourages to understand the matrix between the SME IPO Indices (BSE SME IPO Index and NSE SME EMERGE Index) and the mainboard IPO indices (BSE IPO Index and NIFTY IPO Index) as it will help investors in strategizing their investments in more efficient manner by decoding the movement of both the platforms with each other and taking advantage of the same.

Objectives of the Study

- To analyzing the performance of SME IPO Indices (BSE SME IPO and NIFTY SME EMERGE IPO) with mainboard IPO Indices (BSE IPO and NIFTY IPO).
- To evaluate the dynamics between mainboard IPOs and SME IPOs to understand their interdependence.

Research Methodology

The research is predominantly reliant on secondary data sources. The data was obtained from bseindia.com and niftyindices.com. This study examines interdependence of SME IPO Indices with Mainboard IPO Indices. The study encompasses the time frame spanning from Jan 1st,2017 to Dec 31st, 2024. Descriptive statistics like average returns, risk levels, skewness, and kurtosis offer valuable insights for comparing SME IPO indices with mainboard IPO indices. These factors can determine if there are notable differences in performance, risk, and distribution characteristics between the two groups. The Augmented Dickey-Fuller (ADF) test is used to evaluate a time series has a unit root, which would suggest non-stationarity. VAR analysis involves stationarity checks, lag selection, model estimation, impulse response analysis, variance decomposition, and Granger causality testing to predict and understand the interdependence of selected variables over time.

Analysis and Interpretation

Table 1: Descriptive Statistics

	BSE_IPO	BSE_SME_IPO	NIFTY_IPO	NIFTY_SME_EMERGE
Mean	6757.85	4562.21	1279.36	2211.56
Median	5210.90	1754.48	1219.06	1536.78
Maximum	13650.45	24325.25	2005.10	6645.99
Minimum	3371.46	1080.61	748.42	1046.95
Std. Dev.	2785.79	5593.36	236.12	1426.07
Skewness	0.88	1.75	0.84	1.57
Kurtosis	2.52	4.78	3.19	4.27
Jarque-Bera	207.95	958.88	176.65	712.06
Probability	0.00	0.00	0.00	0.00
Sum	10048928.00	6784001.00	1902411.00	3288586.00
Sum Sq. Dev.	11500000000.00	46500000000.00	82845096.00	3020000000.00
Observations	1487.00	1487.00	1487.00	1487.00

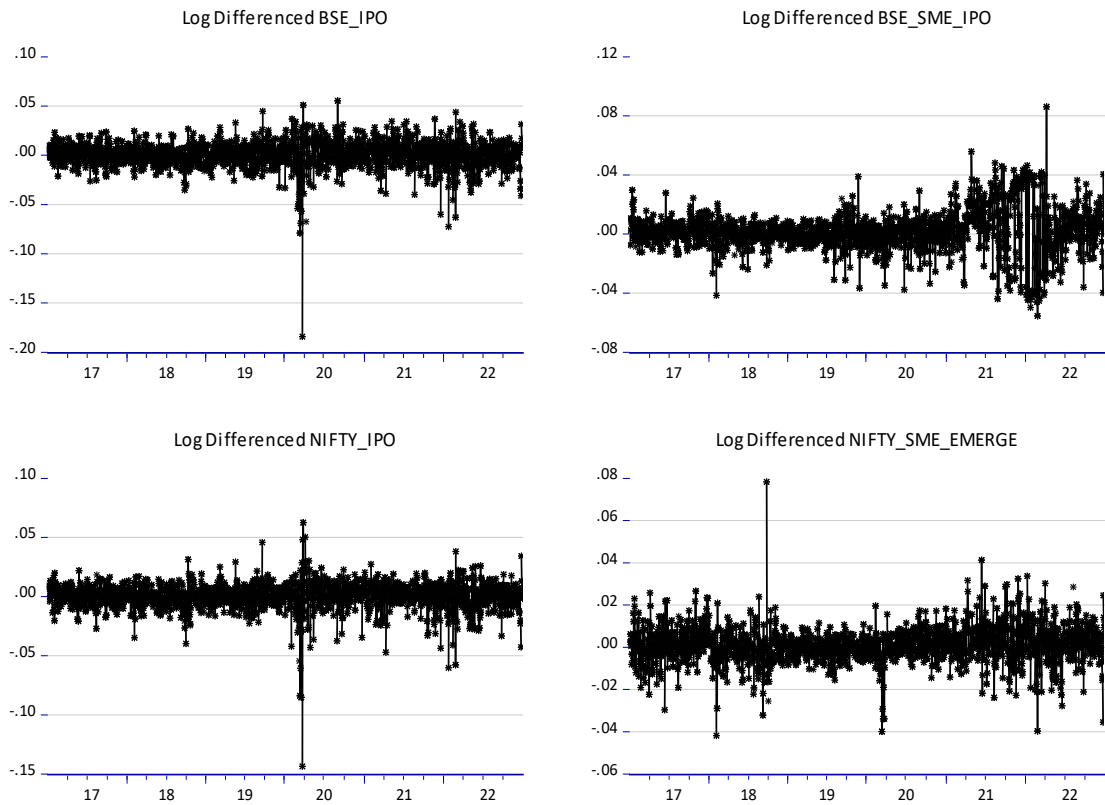
Source: Compiled using eviews test results

As per table 1, the descriptive test statistic indicates differences in performance and variability across the indices. In comparison to the others, the BSE IPO has the greatest mean and median values, indicating its bigger average and central tendency. The largest maximum value and standard deviation, however, are displayed by the BSE SME IPO, suggesting notable fluctuation and extreme extremes. While NIFTY SME EMERGE has moderate variability, NIFTY IPO has the smallest standard deviation, indicating it is the least variable. All distributions are positively skewed, according to skewness values, with the BSE SME IPO and NIFTY SME EMERGE exhibiting the highest levels of asymmetry. Kurtosis shows that NIFTY SME EMERGE and BSE SME IPO have leptokurtic behavior, which is characterized by heavy tails and sharp peaks. With a probability value of 0, the Jarque-Bera test verifies non-normality for all indices, suggesting notable deviations.

Graph 1, depicts the log-differenced series of BSE IPO, BSE SME IPO, NIFTY IPO, and NIFTY SME EMERGE are shown in the graphs, demonstrating stationarity after differencing. The fluctuations around the mean seem to be consistent over time, suggesting no discernible trend or seasonality; however, notable spikes during certain periods, particularly around 2020, indicate market disruptions likely caused by external shocks like the COVID-19 pandemic. The BSE SME IPO and NIFTY SME

EMERGE series exhibit volatility clustering, with periods of high volatility followed by relative calm, indicating varying market dynamics and highlighting the influence of external events on these indices.

Graph 1: Log Differenced Charts of Indices



Source: Eviews Analysis

The fluctuations around the mean appear consistent over time, indicating no observable trend or seasonality. However, noticeable spikes during specific periods, especially around 2020, suggest market disruptions likely caused by external shocks such as the COVID-19 pandemic. Volatility clustering is visible in the BSE SME IPO and NIFTY SME EMERGE series, with periods of high volatility followed by relative calm. This indicates varying market dynamics, highlighting the impact of external events on these indices.

Stationarity Check – Augmented Dickey Fuller Test

Table 2: Augmented Dickey Fuller Test Results

Indices	At Level	Prob.	At First Difference	Prob.
BSE_IPO	-1.29	0.89	-32.95	0.00
BSE_SME_IPO	0.64	1.00	-25.73	0.00
NIFTY_IPO	-1.65	0.77	-33.27	0.00
NIFTY_SME_EMERGE	1.63	1.00	-29.95	0.00

Source: Compiled using eviews test results

As per table 2, given that the probability are higher than 0.05, the results of the unit root test imply that all indices are non-stationary at their levels. Nevertheless, they exhibit integration of order one I(1) when they become stable at first differences with probabilities of 0.00. This suggests that the indices are appropriate for co-integration tests and other time-series analysis.

Granger Causality Test

Significant connections between the indices are revealed by the Granger causality results as per Table 3.

The table 4, presents the results of a GARCH (Generalized Autoregressive Conditional Heteroskedasticity) model estimation for different IPO indices: D BSE IPO, BSE SME IPO, NIFTY IPO, and NIFTY SME EMERGE. The dependent variable in each case is modelled by a GARCH equation involving past residuals (RESID) and past volatility (GARCH), which capture the time-varying volatility of these indices.

- **D BSE IPO:** The GARCH model indicates that the constant (C) is highly significant with a coefficient of 4.29, suggesting a stable mean value for the index. The lagged value of the dependent variable (D_BSE_IPO(-1)) has a positive coefficient of 0.19, indicating that past values of the index have a significant positive effect on the current value. The variance equation shows that past squared residuals (RESID(-1)²) have a coefficient of 0.1, which is significant, suggesting that past shocks (errors) have a notable impact on future volatility. The GARCH coefficient of 0.9 is also highly significant, indicating strong persistence in volatility.
- **BSE SME IPO:** The constant (C) is 0.5613, which is less significant with a p-value of 0.1238. The lagged dependent variable (D_BSE_SME_IPO(-1)) has a significant positive effect (0.2358) on the current value. In the variance equation, past squared residuals have a coefficient of 0.15, which is significant, and the GARCH coefficient of 0.86 indicates a strong persistence in volatility similar to the previous model.
- **NIFTY IPO:** The constant term is 0.53, with a p-value of 0.07, indicating marginal significance. The lagged dependent variable (D_NIFTY_IPO(-1)) also has a significant positive effect with a coefficient of 0.21. In the variance equation, past residuals (RESID(-1)²) have a significant impact with a coefficient of 0.16, and the GARCH coefficient of 0.82 indicates a moderately high persistence in volatility.
- **NIFTY SME EMERGE:** The constant term is 0.91, which is significant. The lagged dependent variable (D_NIFTY_SME_EMERGE (-1)) has a positive effect of 0.25, and past residuals have a significant impact on future volatility with a coefficient of 0.12. The GARCH coefficient of 0.89 indicates the highest level of volatility persistence among the models.

The R-squared values for all models range from 0.02 to 0.02, suggesting that the models explain a small proportion of the variation in the dependent variables, which is typical for volatility modeling. The Durbin-Watson statistics indicate that autocorrelation issues are not significant, with values close to 2 for all models. Overall, the results show that for all four IPO indices, past residuals and past volatility are significant in explaining current volatility, with varying degrees of persistence in volatility. The GARCH models seem to capture the time-varying nature of volatility well for these indices.

Johansen's Co-integration Test

Table 5: Johansen's Co-integration Test Results
(D_BSE_IPO D_BSE_SME_IPO D_NIFTY_IPO D_NIFTY_SME_EMERGE)

Hypothesized No. of CE(s)	Eigenvalue	Unrestricted Co-integration Rank Test (Trace)			Unrestricted Co-integration Rank Test (Maximum Eigenvalue)		
		Trace Statistic	0.05 Critical Value	Prob.**	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None *	0.17	878.75	47.86	0.00	277.27	27.58	0.00
At most 1 *	0.16	601.49	29.80	0.00	251.70	21.13	0.00
At most 2 *	0.13	349.79	15.49	0.00	202.97	14.26	0.00
At most 3 *	0.09	146.82	3.84	0.00	146.82	3.84	0.00

Source: Compiled using eviews test results

The Johansen co-integration test results as per table 5, suggest a long-run relationship among the four IPO indices (D BSE IPO, D BSE SME IPO, D NIFTY IPO, and D NIFTY SME EMERGE). The Trace test and Maximum Eigenvalue test both indicate the presence of four co-integrating equations at the 0.05 significance level, as the null hypotheses of no co-integration and at most one co-integrating equation are rejected. In the normalized co-integrating coefficients, the significant relationships are evident, particularly between the variables D BSE IPO, D NIFTY IPO, and D NIFTY SME EMERGE. The adjustment coefficients show significant error correction dynamics, with variables like D BSE IPO adjusting to long-run equilibrium at a relatively fast rate (around -0.7558 in the first equation). Therefore, we can conclude that the four indices are co-integrated, indicating the presence of a stable long-term

relationship among them. This implies that any deviations from the long-run equilibrium will eventually correct themselves, suggesting a dynamic long-term relationship between the indices.

Lag Selection Criteria

Table 6: VAR Lag Order Selection Criteria

Lag	LR	FPE	AIC	SC	HQ
0	NA	1.05E+13	41.33801	41.35235	41.34336
1	412.9912	8.14E+12	41.07929	41.15098*	41.10602*
2	37.11383	8.11E+12	41.07567	41.20473	41.12379
3	37.38717	8.08E+12	41.0718	41.25822	41.1413
4	69.15118	7.87E+12	41.04612	41.28989	41.137
5	45.34115	7.80E+12	41.03665	41.33778	41.14892
6	28.47746	7.82E+12	41.03871	41.39719	41.17235
7	50.85788*	7.71e+12*	41.02526*	41.4411	41.18029
8	14.6318	7.80E+12	41.03678	41.50999	41.2132

Source: Compiled using eviews test results

Based on the results of the VAR Lag Order Selection Criteria, the recommended lag order to select would be 7.

Vector Error Correction Model (VECM)

Table 7: Vector Error Correction Estimates

Cointegrating Eq:		CointEq1	
D_BSE_IPO(-1)		1	
D_BSE_SME_IPO(-1)		-0.0363	
		-0.0167	
		[-2.17164]	
D_NIFTY_IPO(-1)		-8.0147	
		-0.2118	
		[-37.8453]	
D_NIFTY_SME_EMERGE(-1)		1.3441	
		-0.1236	
		[10.8775]	
C		-5.9484	

Error Correction:	D(D_BSE_IPO)	D(D_BSE_SME_IPO)	D(D_NIFTY_IPO)	D(D_NIFTY_SME_EMERGE)
CointEq1	-0.47	-0.05	0.03	-0.10
	-0.06	-0.08	-0.01	-0.01
	[-8.16621]	[-0.65472]	[4.11517]	[-7.65542]
D(D_BSE_IPO(-1))	-0.25	0.08	-0.03	0.06
	-0.05	-0.07	-0.01	-0.01
	[-5.00165]	[1.22383]	[-3.81169]	[4.99203]
D(D_BSE_SME_IPO(-1))	-0.01	-0.37	0.00	0.01
	-0.02	-0.03	0.00	0.00
	[-0.54138]	[-14.5012]	[-0.21236]	[1.94068]
D(D_NIFTY_IPO(-1))	-1.45	-0.63	-0.23	-0.44
	-0.37	-0.52	-0.05	-0.09
	[-3.86677]	[-1.21482]	[-4.25874]	[-4.99247]
D(D_NIFTY_SME_EMERGE(-1))	0.29	0.48	-0.04	-0.35
	-0.12	-0.17	-0.02	-0.03
	[2.32359]	[2.84172]	[-2.43355]	[-12.2058]
C	0.05	0.06	-0.01	0.03
	-3.17	-4.41	-0.45	-0.74
	[0.01541]	[0.01286]	[-0.02052]	[0.04555]
R-squared	0.22	0.13	0.21	0.19

Source: Compiled using eviews test results

As per the results of table 7 the first equation represents the long-term relationship between the variables. It tells us how the variables (BSE IPO, Nifty IPO, Nifty SME Emerge, etc.) move together over time. The coefficients in this equation show how much change in one variable affects the others in the long run. The error correction coefficients represent the speed at which the system returns to equilibrium after a short-term shock. Essentially, they tell us how quickly the stock indices will adjust to any deviations from their long-term relationship:

- **D (BSE IPO):** The coefficient is **-0.470430**, with a t-statistic of **-8.16621**. This means that if there is a deviation from the long-term relationship between the BSE IPO index and the others, the BSE IPO index adjusts negatively by 47% in the next period to correct the deviation. A high negative value shows that the BSE IPO index reacts quickly to correct its position.
- **D (BSE SME IPO):** The coefficient is **-0.052438**, with a t-statistic of **-0.65472**. This is a small and statistically insignificant value, indicating that the BSE SME IPO index does not adjust much to correct any deviation from the long-term relationship. The adjustment is very slow or almost negligible.
- **D (NIFTY IPO):** The coefficient is **+0.033698**, with a t-statistic of **4.11517**. This is a positive and significant value, showing that NIFTY IPO makes an adjustment of about 3% in the next period if there's any deviation from the long-term equilibrium. The positive sign suggests that, when there's a deviation, the Nifty IPO index tends to move toward correcting the deviation positively.
- **D (NIFTY SME EMERGE):** The coefficient is **-0.103014**, with a t-statistic of **-7.65542**. This shows that the Nifty SME Emerge index adjusts negatively by 10% in the next period to correct deviations from the long-term relationship. It reacts strongly, indicating that this index makes a significant adjustment toward equilibrium when there's a discrepancy.

These findings indicate that the Nifty-related indices are more responsive to market shocks, while the BSE SME IPO index is less sensitive to deviations from long-term equilibrium. D(BSE IPO(-1)) has a coefficient of -0.245523, which is significant with a t-statistic of -5.00165, meaning a past change in the BSE IPO index negatively affects its current change. D (NIFTY SME EMERGE (-1)) has a coefficient of 0.285055, indicating a positive impact from the past change in the Nifty SME Emerge index. The model shows that while some indices like NIFTY IPO and BSE IPO adjust significantly, others like BSE SME IPO barely react to deviations.

Least Square Method

Dependent Variable: BSE IPO

Equation: $D_BSE_IPO = C(1)*D_BSE_IPO(-1) + C(2)*D_BSE_IPO(-2) + C(3)*D_BSE_IPO(-3) + C(4)*D_BSE_IPO(-4) + C(5)*D_BSE_IPO(-5) + C(6)*D_BSE_IPO(-6) + C(7)*D_BSE_IPO(-7) + C(8)*D_BSE_SME_IPO(-1) + C(9)*D_BSE_SME_IPO(-2) + C(10)*D_BSE_SME_IPO(-3) + C(11)*D_BSE_SME_IPO(-4) + C(12)*D_BSE_SME_IPO(-5) + C(13)*D_BSE_SME_IPO(-6) + C(14)*D_BSE_SME_IPO(-7) + C(15)*D_NIFTY_IPO(-1) + C(16)*D_NIFTY_IPO(-2) + C(17)*D_NIFTY_IPO(-3) + C(18)*D_NIFTY_IPO(-4) + C(19)*D_NIFTY_IPO(-5) + C(20)*D_NIFTY_IPO(-6) + C(21)*D_NIFTY_IPO(-7) + C(22)*D_NIFTY_SME_EMERGE(-1) + C(23)*D_NIFTY_SME_EMERGE(-2) + C(24)*D_NIFTY_SME_EMERGE(-3) + C(25)*D_NIFTY_SME_EMERGE(-4) + C(26)*D_NIFTY_SME_EMERGE(-5) + C(27)*D_NIFTY_SME_EMERGE(-6) + C(28)*D_NIFTY_SME_EMERGE(-7) + C(29)$

Table 8: Dependent Variable: BSE IPO

	Coefficient	Std. Error	t-Statistic	Prob.
C(1)	0.111	0.046	2.419	0.016
C(2)	0.005	0.046	0.105	0.916
C(3)	-0.052	0.046	-1.124	0.261
C(4)	-0.002	0.046	-0.047	0.963
C(5)	0.058	0.046	1.255	0.209
C(6)	-0.039	0.046	-0.858	0.391
C(7)	0.041	0.045	0.904	0.366
C(8)	-0.002	0.019	-0.081	0.936
C(9)	-0.019	0.020	-0.949	0.343
C(10)	-0.072	0.020	-3.561	0.000

C(11)	0.055	0.020	2.700	0.007
C(12)	0.017	0.021	0.834	0.404
C(13)	-0.051	0.021	-2.419	0.016
C(14)	0.072	0.020	3.679	0.000
C(15)	0.431	0.329	1.310	0.190
C(16)	0.142	0.333	0.428	0.669
C(17)	0.175	0.333	0.526	0.599
C(18)	0.429	0.332	1.292	0.196
C(19)	0.306	0.332	0.922	0.357
C(20)	-0.280	0.330	-0.848	0.396
C(21)	0.063	0.327	0.192	0.848
C(22)	0.035	0.129	0.270	0.787
C(23)	-0.096	0.132	-0.729	0.466
C(24)	0.141	0.132	1.074	0.283
C(25)	-0.233	0.132	-1.769	0.077
C(26)	-0.083	0.133	-0.620	0.535
C(27)	0.011	0.138	0.078	0.938
C(28)	-0.223	0.134	-1.663	0.096
C(29)	4.505	2.807	1.605	0.109

Source: Compiled using eviews test results

The regression equation estimates the relationship between the dependent variable, D BSE IPO, and various independent variables as shown in table 8, including lagged values of BSE IPO, BSE SME IPO, NIFTY IPO, and NIFTY SME EMERGE. Among the significant coefficients, C (1) is positive and significant (p-value = 0.016), indicating that the first lag of BSE_IPO has a positive effect on the current value of D BSE IPO. C (10) and C (14) also have significant negative and positive relationships, respectively, with p-values of 0.000 and 0.000, showing their strong influence. C (11) and C (13) have significant p-values of 0.007 and 0.016, respectively, which further support their relevance in explaining variations in D BSE IPO. The final constant term (C (29)) has a p-value of 0.109, indicating it is marginally significant and warrants additional investigation.

Dependent Variable: BSE_SME_IPO

Equation: $D_BSE_SME_IPO = C(30)*D_BSE_IPO(-1) + C(31)*D_BSE_IPO(-2) + C(32)*D_BSE_IPO(-3) + C(33)*D_BSE_IPO(-4) + C(34)*D_BSE_IPO(-5) + C(35)*D_BSE_IPO(-6) + C(36)*D_BSE_IPO(-7) + C(37)*D_BSE_SME_IPO(-1) + C(38)*D_BSE_SME_IPO(-2) + C(39)*D_BSE_SME_IPO(-3) + C(40)*D_BSE_SME_IPO(-4) + C(41)*D_BSE_SME_IPO(-5) + C(42)*D_BSE_SME_IPO(-6) + C(43)*D_BSE_SME_IPO(-7) + C(44)*D_NIFTY_IPO(-1) + C(45)*D_NIFTY_IPO(-2) + C(46)*D_NIFTY_IPO(-3) + C(47)*D_NIFTY_IPO(-4) + C(48)*D_NIFTY_IPO(-5) + C(49)*D_NIFTY_IPO(-6) + C(50)*D_NIFTY_IPO(-7) + C(51)*D_NIFTY_SME_EMERGE(-1) + C(52)*D_NIFTY_SME_EMERGE(-2) + C(53)*D_NIFTY_SME_EMERGE(-3) + C(54)*D_NIFTY_SME_EMERGE(-4) + C(55)*D_NIFTY_SME_EMERGE(-5) + C(56)*D_NIFTY_SME_EMERGE(-6) + C(57)*D_NIFTY_SME_EMERGE(-7) + C(58)$

Table 9: Dependent Variable: BSE_SME_IPO

	Coefficient	Std. Error	t-Statistic	Prob.
C(30)	0.017	0.066	0.259	0.795
C(31)	0.004	0.067	0.062	0.950
C(32)	0.066	0.067	0.986	0.324
C(33)	0.100	0.067	1.499	0.134
C(34)	-0.062	0.067	-0.935	0.350
C(35)	0.118	0.066	1.776	0.076
C(36)	0.011	0.066	0.172	0.864
C(37)	0.351	0.028	12.662	0.000
C(38)	0.079	0.029	2.692	0.007
C(39)	0.046	0.029	1.550	0.121
C(40)	-0.115	0.029	-3.901	0.000
C(41)	0.061	0.030	2.022	0.043

C(42)	-0.037	0.031	-1.202	0.230
C(43)	0.040	0.028	1.402	0.161
C(44)	-0.525	0.476	-1.102	0.270
C(45)	0.027	0.482	0.057	0.955
C(46)	-0.068	0.482	-0.140	0.888
C(47)	-0.412	0.481	-0.856	0.392
C(48)	0.879	0.480	1.832	0.067
C(49)	-0.563	0.478	-1.177	0.239
C(50)	-0.408	0.473	-0.863	0.388
C(51)	0.490	0.187	2.627	0.009
C(52)	-0.459	0.191	-2.405	0.016
C(53)	-0.205	0.190	-1.075	0.282
C(54)	0.599	0.191	3.142	0.002
C(55)	0.259	0.193	1.338	0.181
C(56)	-0.208	0.199	-1.043	0.297
C(57)	-0.265	0.194	-1.366	0.172
C(58)	7.535	4.064	1.854	0.064

Source: Compiled using eviews test results

In the table 9 the significant coefficients include C(37), with a value of 0.351 and a p-value of 0.000, indicating a strong positive impact of the first lag of D BSE SME IPO on the dependent variable. Similarly, C (38) (p-value = 0.007) and C (41) (p-value = 0.043) have positive coefficients and significant relationships. C (40), with a negative coefficient of -0.115 and a p-value of 0.000, significantly negatively affects the dependent variable. C (51) and C (54) also show significance, with p-values of 0.009 and 0.002, respectively.

Dependent Variable: NIFTY_IPO

Equation: $D_NIFTY_IPO = C(59)*D_BSE_IPO(-1) + C(60)*D_BSE_IPO(-2) + C(61)*D_BSE_IPO(-3) + C(62)*D_BSE_IPO(-4) + C(63)*D_BSE_IPO(-5) + C(64)*D_BSE_IPO(-6) + C(65)*D_BSE_IPO(-7) + C(66)*D_BSE_SME_IPO(-1) + C(67)*D_BSE_SME_IPO(-2) + C(68)*D_BSE_SME_IPO(-3) + C(69)*D_BSE_SME_IPO(-4) + C(70)*D_BSE_SME_IPO(-5) + C(71)*D_BSE_SME_IPO(-6) + C(72)*D_BSE_SME_IPO(-7) + C(73)*D_NIFTY_IPO(-1) + C(74)*D_NIFTY_IPO(-2) + C(75)*D_NIFTY_IPO(-3) + C(76)*D_NIFTY_IPO(-4) + C(77)*D_NIFTY_IPO(-5) + C(78)*D_NIFTY_IPO(-6) + C(79)*D_NIFTY_IPO(-7) + C(80)*D_NIFTY_SME_EMERGE(-1) + C(81)*D_NIFTY_SME_EMERGE(-2) + C(82)*D_NIFTY_SME_EMERGE(-3) + C(83)*D_NIFTY_SME_EMERGE(-4) + C(84)*D_NIFTY_SME_EMERGE(-5) + C(85)*D_NIFTY_SME_EMERGE(-6) + C(86)*D_NIFTY_SME_EMERGE(-7) + C(87)$

Table 10: Dependent Variable: NIFTY_IPO

	Coefficient	Std. Error	t-Statistic	Prob.
C(59)	-0.009	0.006	-1.446	0.148
C(60)	0.003	0.007	0.400	0.689
C(61)	-0.007	0.007	-1.139	0.255
C(62)	0.007	0.007	1.007	0.314
C(63)	0.007	0.006	1.066	0.287
C(64)	0.001	0.006	0.215	0.830
C(65)	0.005	0.006	0.765	0.444
C(66)	-0.002	0.003	-0.668	0.504
C(67)	-0.003	0.003	-1.044	0.297
C(68)	-0.004	0.003	-1.315	0.189
C(69)	0.003	0.003	1.011	0.312
C(70)	0.003	0.003	1.176	0.240
C(71)	-0.008	0.003	-2.521	0.012
C(72)	0.011	0.003	4.078	0.000
C(73)	0.201	0.046	4.322	0.000
C(74)	0.005	0.047	0.100	0.920
C(75)	0.019	0.047	0.398	0.691

C(76)	0.036	0.047	0.761	0.447
C(77)	0.038	0.047	0.810	0.418
C(78)	-0.078	0.047	-1.664	0.096
C(79)	-0.014	0.046	-0.294	0.769
C(80)	0.006	0.018	0.335	0.738
C(81)	0.018	0.019	0.982	0.326
C(82)	-0.003	0.019	-0.159	0.874
C(83)	-0.040	0.019	-2.143	0.032
C(84)	0.009	0.019	0.486	0.627
C(85)	0.010	0.019	0.539	0.590
C(86)	-0.025	0.019	-1.309	0.191
C(87)	0.218	0.396	0.549	0.583

Source: Compiled using reviews test results

The table 10 represents the relationship between the dependent variable, D NIFTY IPO, and various independent variables as shown in table 8, including lagged values of BSE IPO, BSE SME IPO, NIFTY IPO, and NIFTY SME EMERGE. Coefficients C(71) (p-value = 0.012), C(72) (p-value = 0.000), and C(73) (p-value = 0.000) show statistically significant positive coefficients, indicating that these variables have a notable impact on D_NIFTY_IPO. Specifically, C(71) suggests that a lagged value of BSE_SME_IPO has a significant negative effect, while C(72) indicates a positive influence of the same lagged variable. C(73), with a positive coefficient of 0.201, also shows a strong positive relationship with D_NIFTY_IPO. Additionally, C(83) (p-value = 0.032) has a negative coefficient and is statistically significant, highlighting a negative relationship with D_NIFTY_IPO. The constant term, C(87), is not statistically significant (p-value = 0.583), suggesting that the model may not benefit significantly from its inclusion. Overall, the results indicate that specific lags of BSE_SME_IPO and NIFTY_IPO, particularly those around lag 1, 2, and 7, play important roles in explaining the variation in NIFTY_IPO, while other variables show weaker or no impact.

Dependent Variable: NIFTY_SME_EMERGE

Equation: $D_NIFTY_SME_EMERGE = C(88)*D_BSE_IPO(-1) + C(89)*D_BSE_IPO(-2) + C(90)*D_BSE_IPO(-3) + C(91)*D_BSE_IPO(-4) + C(92)*D_BSE_IPO(-5) + C(93)*D_BSE_IPO(-6) + C(94)*D_BSE_IPO(-7) + C(95)*D_BSE_SME_IPO(-1) + C(96)*D_BSE_SME_IPO(-2) + C(97)*D_BSE_SME_IPO(-3) + C(98)*D_BSE_SME_IPO(-4) + C(99)*D_BSE_SME_IPO(-5) + C(100)*D_BSE_SME_IPO(-6) + C(101)*D_BSE_SME_IPO(-7) + C(102)*D_NIFTY_IPO(-1) + C(103)*D_NIFTY_IPO(-2) + C(104)*D_NIFTY_IPO(-3) + C(105)*D_NIFTY_IPO(-4) + C(106)*D_NIFTY_IPO(-5) + C(107)*D_NIFTY_IPO(-6) + C(108)*D_NIFTY_IPO(-7) + C(109)*D_NIFTY_SME_EMERGE(-1) + C(110)*D_NIFTY_SME_EMERGE(-2) + C(111)*D_NIFTY_SME_EMERGE(-3) + C(112)*D_NIFTY_SME_EMERGE(-4) + C(113)*D_NIFTY_SME_EMERGE(-5) + C(114)*D_NIFTY_SME_EMERGE(-6) + C(115)*D_NIFTY_SME_EMERGE(-7) + C(116)$

Table 11: Dependent Variable: NIFTY_SME_EMERGE

	Coefficient	Std. Error	t-Statistic	Prob.
C(88)	0.000	0.011	0.014	0.989
C(89)	-0.008	0.011	-0.682	0.495
C(90)	0.011	0.011	0.984	0.325
C(91)	-0.003	0.011	-0.245	0.807
C(92)	-0.002	0.011	-0.206	0.837
C(93)	0.008	0.011	0.759	0.448
C(94)	-0.013	0.011	-1.202	0.229
C(95)	0.015	0.005	3.171	0.002
C(96)	-0.010	0.005	-2.094	0.036
C(97)	-0.009	0.005	-1.833	0.067
C(98)	0.009	0.005	1.771	0.077
C(99)	0.014	0.005	2.826	0.005
C(100)	-0.013	0.005	-2.581	0.010
C(101)	0.017	0.005	3.645	0.000

C(102)	0.000	0.079	0.004	0.997
C(103)	0.103	0.079	1.299	0.194
C(104)	-0.053	0.079	-0.663	0.508
C(105)	0.014	0.079	0.171	0.864
C(106)	0.019	0.079	0.243	0.808
C(107)	0.006	0.079	0.072	0.942
C(108)	-0.029	0.078	-0.371	0.711
C(109)	0.223	0.031	7.232	0.000
C(110)	0.028	0.031	0.896	0.370
C(111)	0.058	0.031	1.860	0.063
C(112)	0.003	0.031	0.082	0.935
C(113)	0.083	0.032	2.590	0.010
C(114)	0.020	0.033	0.619	0.536
C(115)	-0.091	0.032	-2.849	0.004
C(116)	2.201	0.670	3.284	0.001

Source: Compiled using eviews test results

The regression results for D_NIFTY_SME_EMERGE in table 11, reveal several statistically significant coefficients: C(95) (lag 6 of BSE_SME_IPO) has a positive coefficient of 0.015 with a p-value of 0.002, C(96) (lag 7 of BSE_SME_IPO) shows a negative relationship with a coefficient of -0.010 C(99) (lag 1 of NIFTY_IPO) has a positive coefficient of 0.014 and a p-value of 0.005, C(100) (lag 2 of NIFTY_IPO) demonstrates a negative relationship with a coefficient of -0.013 and a p-value of 0.010, C(101) (lag 1 of NIFTY_SME_EMERGE) has a positive coefficient of 0.017 and a p-value of 0.000, C(113) (lag 4 of NIFTY_SME_EMERGE) has a positive coefficient of 0.083 and a p-value of 0.010, C(115) (lag 6 of NIFTY_SME_EMERGE) shows a negative coefficient of -0.091 with a p-value of 0.004, indicating a significant positive impact on D_NIFTY_SME_EMERGE.

Conclusion

The analysis highlights the intricate relationships and volatility dynamics of the indices under consideration. The findings from the Granger Causality and VECM tests underscore the interdependencies in the market, especially among SME-related indices. Volatility persistence, confirmed through the GARCH model, and the co-integration results suggest a stable long-term relationship among the indices, while short-term deviations are corrected through varying adjustment speeds. Volatility clustering is visible in BSE SME IPO and NIFTY SME EMERGE, where high volatility periods are followed by calmer phases. The presence of an ARCH effect is confirmed by the autocorrelation in squared residuals, indicating time-varying volatility and the need for GARCH modeling. The GARCH models for all indices indicate strong volatility persistence, especially for BSE SME IPO and NIFTY SME EMERGE, with coefficients close to 0.9. This highlights that past shocks significantly influence future volatility. These insights are crucial for understanding the behavior and interconnectivity of the IPO and SME markets. D_BSE_IPO has a high GARCH coefficient of 0.9, showing strong persistence of volatility, while the constant term indicates a stable mean value. The Johansen co-integration test suggests that there is a long-run relationship among the four IPO indices. D_BSE_IPO reacts strongly to deviations, adjusting quickly. D_BSE_SME_IPO reacts very little to deviations, showing slow adjustment. D_NIFTY_IPO and D_NIFTY_SME_EMERGE adjust positively and negatively, respectively, in response to deviations from long-term equilibrium. The Least Squares Method (LSM) estimates the relationship between BSE IPO and the lags of other indices. Significant positive coefficients for C(1) suggest that the previous value of BSE IPO positively affects its current value, while C(10) and C(14) indicate strong relationships with other indices.

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