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Sectoral Differences in Beta Stability: An Empirical Study of the Indian Stock Market

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Abstract- Purpose: ***This study examines the stability of beta in the Indian stock market by analysing selected BSE sectoral indices during the period 2021–2025. The study evaluates the consistency of beta values across different sectors and examines variations in beta over time.***
Design/Methodology/Approach: ***The study adopts a descriptive research design based on secondary data collected from BSE publications and other financial databases. Ten selected BSE sectoral indices were analysed using descriptive statistical techniques. Microsoft Excel and EViews were used for data analysis.***
Findings: ***The study found that beta stability differs across the selected sectors. While some sectors exhibited relatively stable beta values, others showed noticeable fluctuations during the study period.***
Practical Implications: ***The findings provide useful information for investors, researchers and market analysts in understanding beta behaviour across different sectors of the Indian stock market.***
Originality/Value: ***The study contributes to the existing literature by examining the stability of beta across selected BSE sectoral indices for the period 2021–2025.***

Keywords: Beta Stability, Beta Coefficient, BSE Sectoral Indices, Indian Stock Market, CAPM.

I. INTRODUCTION

The Indian stock market has become an integral part of the country's financial system by supporting capital formation and providing investment opportunities across different sectors of the economy. Over the past few years, improvements in market infrastructure, digital trading platforms and increased investor participation have contributed to the expansion of the Indian equity market. The Bombay Stock Exchange (BSE) represents a broad range of industries and offers valuable information for analysing market trends and sectoral performance.

Beta is a commonly used financial measure that explains how the movement of a stock or sector compares with the movement of the overall market. It is widely applied in market analysis and forms an important component of the Capital Asset Pricing Model (CAPM). Since beta is estimated from historical market data, its value may vary over different periods because of changes in market conditions and sector-specific developments. Therefore, examining whether beta remains consistent over time has become an important area of financial research.

The concept of beta stability focuses on the consistency of beta values over a specified period. A stable beta indicates that the relationship between a sector and the market remains relatively unchanged, whereas noticeable fluctuations suggest that beta behaviour varies over time. Understanding this behaviour is useful when comparing sectors and evaluating changes in market performance under different economic conditions.

The present study analyses the stability of beta in the Indian stock market using ten selected BSE sectoral indices for the period 2021–2025. The selected sectors include BSE 100 ESG Index, BSE Auto, BSE BANKEX, BSE Commodities, BSE Energy, BSE Industrials, BSE Metal, BSE Oil & Gas, BSE Power and BSE Realty. Using secondary data and descriptive statistical analysis, the study examines the consistency of beta values across these sectors and presents a comparative assessment of their behaviour during the study period.

II. LITERATURE REVIEW

Regaïeg, Moussa, and Mgadmi (2026) examined the impact of geopolitical shocks on BRICS financial markets and found that beta changes significantly during periods of market uncertainty, indicating that beta is dynamic over time. Dai, Wang, and Zheng (2026) proposed a structural break estimation model and concluded that identifying structural changes improves the analysis of time-varying financial relationships. Francisco (2026) investigated corporate growth opportunities and found that firms with stronger growth prospects exhibit relatively stable beta, whereas capital-intensive firms show higher beta values. Bradrania, Veron, and Wu (2026) analysed the beta anomaly in the Australian stock market and reported that investor behaviour influences the preference for low-beta and high-beta stocks. Fama and French (2026) reviewed the development of CAPM and concluded that beta remains an important market measure, although its behaviour varies across different market condition s.Morelli and Nicolosi (2026) examined ESG performance and observed that firms with higher ESG scores generally exhibit more stable beta values over time. Messis, Alexandridis, and Zapranis (2026) found that incorporating qualitative information improves beta estimation and explains changes in beta behaviour across market conditions. Katagiri, Shino, and Takahashi (2025) studied the effect of ETF purchase programmes and found that policy interventions reduce market beta and improve its stability. Liu and Luo (2025) developed a downside beta forecasting model and concluded that multi-horizon information improves the accuracy of beta estimation. Francisco (2025) analysed labour intensity and found that firms with higher labour intensity generally exhibit higher beta values, particularly during market downturns. Ejaz and Volkov (2025) examined firm opacity and reported that greater information opacity leads to larger variations in beta over different investment horizons. Wang and Chen (2025) investigated beta uncertainty in the Taiwan stock market and concluded that uncertainty in beta contributes to stock mispricing. Rutkowska-Ziarko et al. (2024) extended CAPM using accounting-based beta measures and found that accounting information improves the explanation of beta behaviour.

Gorgi and Koopman (2023) proposed time-varying beta models and found that beta changes continuously with market conditions, requiring periodic estimation. Ciciretti, Dalò, and Dam (2023) examined sectoral beta behaviour and concluded that beta stability differs across industries because of sector-specific characteristics. Ejaz and Volkov (2025) examined the effect of firm opacity on beta across investment horizons and found that greater opacity increases beta variation, particularly over longer periods. Wang and Chen (2025) investigated beta uncertainty in the Taiwan stock market and concluded that beta uncertainty creates stock mispricing and improves arbitrage opportunities. Rakhyani, Sehgal, and Deisting (2025) analysed the time-varying performance of the Betting Against Beta (BAB) strategy and found that BAB returns fluctuate across market cycles, indicating that beta-related anomalies are not stable. Rutkowska-Ziarko et al. (2024) extended the traditional CAPM using accounting-based beta measures and found that accounting information improves the explanation of beta behaviour during changing market conditions.

Kolokolova and Xu (2024) combined stochastic dominance with the BAB strategy and reported that it improves portfolio performance and strengthens beta-based investment decisions. Ejaz and Volkov (2024) examined opacity and frequency-dependent beta and found that higher information opacity leads to greater beta variation across investment horizons. Lee et al. (2024) investigated the relationship between beta and stock returns around earnings announcements and found that the beta-return relationship changes significantly before and after announcements. Chakrabarti and Das (2023) studied time-varying beta in India and the United States and concluded that beta changes with market volatility, making dynamic beta more reliable than constant beta. Gorgi and Koopman (2023) developed dynamic beta models and found that beta changes continuously with financial market conditions, improving forecasting accuracy. Montone (2023) examined investor behaviour and beta and reported that behavioural factors influence beta anomalies and differences

between value and growth stocks. Insana (2023) analysed different beta estimation frequencies and found that intraday beta provides better risk-adjusted performance than daily beta estimates. Liao et al. (2023) studied index tracking and beta arbitrage and found that inclusion in market indices significantly changes stock beta through investor trading behaviour. Molero-González et al. (2023) examined the effectiveness of market beta using Random Matrix Theory and concluded that beta remains an important measure under normal market conditions. Tan et al. (2023) investigated ESG-integrated smart beta strategies and found that ESG alone does not consistently improve returns but complements conventional beta strategies. Bradrania et al. (2023) analysed the beta anomaly across international stock markets and concluded that stock quality helps explain differences between low-beta and high-beta stock performance. Ciciretti, Dalò, and Dam (2023) examined ESG characteristics and beta and found that ESG characteristics explain stock return differences more effectively than ESG beta measures. Huynh (2023) investigated unemployment beta and concluded that unemployment-related beta provides additional information for explaining stock return behaviour beyond traditional beta measures. Rakhyani, Sehgal, and Deisting (2023) examined the time-varying performance of the Betting Against Beta (BAB) strategy in Asian markets and found that BAB returns vary across market cycles, indicating that beta anomalies are not stable. Saha, Chakrabarti, and Basu (2023) analysed time-varying currency beta in Indian industries and found significant variations across industries and market regimes, confirming the dynamic nature of beta. Lehnert (2022) investigated the influence of investor fund flows on BAB performance and concluded that investor behaviour contributes to beta anomalies and changes in beta-based returns. Asgharian et al. (2021) examined short-term and long-term factor betas and found that beta varies across economic conditions, with short-term beta increasing during downturns. Nazaire, Pacurar, and Sy (2021) studied smart-beta diversification and concluded that combining different beta factors improves diversification and investment performance. Antypas et al. (2020) investigated conditional beta models and found that macroeconomic variables significantly influence changes in beta over time. The study on estimating beta for unlisted banks (2020) concluded that beta can be estimated using comparable listed firms, providing reliable beta estimates where market data are unavailable. The study on time-varying CAPM (2020) found that dynamic beta estimates improve the measurement of changing market behaviour compared with constant beta models. Frazzini and Pedersen (2014) examined the Betting Against Beta strategy and reported that low-beta assets consistently generated higher risk-adjusted returns than high-beta assets. Glova (2014) analysed country beta variations and found that global market conditions significantly influence beta behaviour, particularly during financial crises. Chochola, Hušková, Prašková, and Steinebach (2014) developed a robust beta estimation approach and concluded that it effectively detects structural changes in beta over time. The study on robust portfolio beta estimation (2014) reported that robust statistical methods improve the accuracy of monitoring beta by reducing the effect of outliers.

Although previous studies have examined beta estimation, dynamic beta, and beta behaviour, limited research has focused on the stability of beta in the Indian stock market using the BSE 100 ESG Index and selected BSE sectoral indices during 2021–2025. Moreover, existing findings on beta stability are inconsistent. Therefore, this study aims to provide recent empirical evidence on the stability of beta across selected BSE sectoral indices.

III. RESEARCH OBJECTIVES

The study was undertaken with the following objectives:

1. To analyse the beta values of selected BSE sectoral indices.
2. To examine the stability of beta during the study period.

IV. RESEARCH METHODOLOGY

Research Design

The study adopts a descriptive research design to examine the stability of beta in the Indian stock market. The descriptive approach is used to analyse

the beta values of selected BSE sectoral indices and examine their stability over the study period. This research design is appropriate for understanding the behaviour of beta across different sectors and identifying variations in beta values over time.

Data Source

The study is based entirely on secondary data. Historical beta values of the selected BSE sectoral indices were collected from the Bombay Stock Exchange (BSE), Capitaline Database, and other reliable financial publications. The data cover the period from 2021 to 2025, enabling an analysis of beta stability across the selected sectors.

Sample Selection

The sample consists of ten selected BSE sectoral indices, namely BSE 100 ESG Index, BSE Auto, BSE BANKEX, BSE Commodities, BSE Energy, BSE Industrials, BSE Metal, BSE Oil & Gas, BSE Power, and BSE Realty. These sectoral indices were selected to examine and compare the stability of beta across different sectors of the Indian stock market.

Analytical Tools

The collected data were analysed using descriptive statistical techniques to examine the behaviour and stability of beta values during the study period. Microsoft Excel and EViews software were used for data processing, statistical analysis, and interpretation of the results.

Scope of the Study

The study focuses on examining the stability of beta among the selected BSE sectoral indices during the period 2021–2025. It provides a comparative assessment of beta behaviour across different sectors and contributes to understanding the consistency of beta in the Indian stock market.

V. DATA ANALYSIS AND INTERPRETATION

Table 5.1 Descriptive Statistics of Beta Values of the Selected BSE Indices

Statistics	BSE 100 ESG Index	BSE Auto	BSE BANKEX	BSE Commodities	BSE Energy	BSE Industrials	BSE Metal	BSE Oil & Gas	BSE Power	BSE Realty	BSE Telecom.
Mean	0.9811	0.9389	1.0890	1.0191	1.0324	1.0094	1.1400	0.9813	0.9896	1.2603	0.9854
Standard Error	0.0067	0.0735	0.0486	0.0395	0.0725	0.0862	0.0521	0.1080	0.1157	0.0844	0.0845
Median	0.9819	0.9676	1.0760	0.9889	0.9839	1.0031	1.1399	0.8863	0.8419	1.2567	0.9360
Standard Deviation	0.0150	0.1645	0.1088	0.0883	0.1622	0.1928	0.1164	0.2415	0.2587	0.1888	0.1889
Sample Variance	0.0002	0.0270	0.0118	0.0078	0.0263	0.0372	0.0136	0.0583	0.0669	0.0357	0.0357
Kurtosis	0.8696	2.5891	2.0371	-1.6391	3.1865	-0.2641	-2.0633	1.4883	-0.8693	1.9720	1.1134
Skewness	0.7723	-1.0676	0.8607	0.4759	1.7258	-0.6644	-0.2228	1.3481	0.9362	-0.0691	1.1417
Range	0.039	0.455	0.3002	0.2156	0.408	0.4766	0.269	0.605	0.616	0.533	0.4835

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Minimum	0.9643	0.6748	0.9588	0.9215	0.8996	0.7262	0.9906	0.7658	0.7536	0.9909	0.7999
Maximum	1.0039	1.1299	1.2590	1.1371	1.3083	1.2028	1.2598	1.3712	1.3699	1.5245	1.2834
Sum	4.9057	4.6945	5.4451	5.0954	5.1619	5.0469	5.6998	4.9066	4.9478	6.3016	4.9271
Count	5.0000	5.0000	5.0000	5.0000	5.0000	5.0000	5.0000	5.0000	5.0000	5.0000	5.0000

Table 5.1 presents the descriptive statistics of the selected BSE sectoral indices for the period 2021–2025. The analysis includes measures such as mean, standard deviation, skewness, kurtosis, minimum value, maximum value, and range to evaluate the stability of beta across different sectors. The mean beta values of most sectoral indices are close to one, indicating that their movements were broadly aligned with the overall market during the study period. Among the selected sectors, BSE Realty recorded the highest mean beta value (1.2603), whereas BSE Auto reported the lowest mean beta value (0.9389).

The standard deviation indicates the extent of variation in beta values during the study period. BSE 100 ESG Index recorded the lowest standard deviation (0.0150), indicating highly stable beta values. In contrast, BSE Power (0.2587) and BSE Oil & Gas (0.2415) exhibited comparatively higher variability, suggesting greater fluctuations in beta over time. The range values also support this observation, with BSE Power showing the highest variation and BSE 100 ESG exhibiting the lowest variation among the selected indices.

The skewness values indicate differences in the distribution of beta values across sectors. Most indices displayed positive skewness, whereas BSE Auto and BSE Industrials recorded negative skewness, indicating slight differences in the distribution of observations. Similarly, the kurtosis values varied across sectors, reflecting differences in the concentration of beta values around their respective means. These statistical measures indicate that the behaviour of beta was not uniform across all sectoral indices.

Overall, the descriptive statistics reveal that the stability of beta differs across the selected BSE sectoral indices. BSE 100 ESG demonstrated the highest stability with minimal variation, while BSE Power, BSE Oil & Gas, and BSE Realty exhibited relatively greater fluctuations. The findings suggest that although most sectors maintained beta values close to one, the degree of stability varied across sectors during the period 2021–2025.

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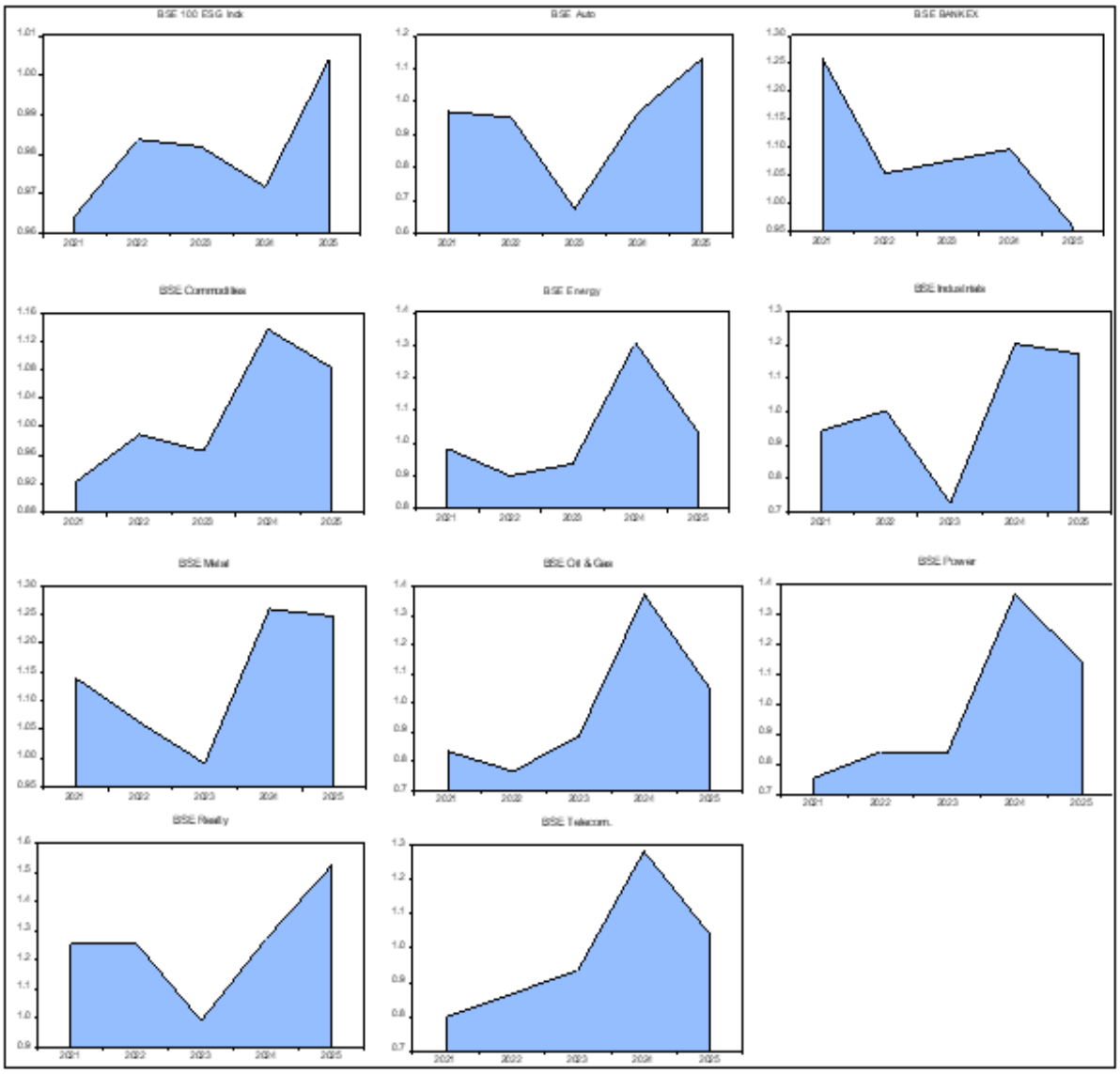

The beta values of the selected BSE sectoral indices indicate varying levels of market sensitivity during the study period. The BSE Auto, BANKEX, Commodities, Energy, and Industrials indices exhibited relatively stable beta values with only moderate fluctuations, suggesting consistent market risk. The BSE Metal Index maintained comparatively higher beta values, indicating greater sensitivity to market movements while remaining relatively stable.

In contrast, the BSE Oil & Gas and BSE Power indices showed noticeable fluctuations in beta values, reflecting higher variability in market risk over the study period. Among all the selected sectors, the BSE Realty Index consistently recorded the highest beta values, indicating that it was the most responsive to changes in the overall market. Overall, while most sectoral indices demonstrated moderate stability in beta values, the Realty, Power, and Oil & Gas sectors exhibited comparatively higher market sensitivity and variation during the study period.

VI. FINDINGS OF THE STUDY

Based on the analysis of beta values of the selected BSE sectoral indices during the period 2021–2025,

the study found that most of the selected sectoral indices recorded mean beta values close to 1, indicating that their movements were generally aligned with the overall market. The BSE 100 ESG Index exhibited the highest stability by recording the lowest standard deviation (0.0150), whereas the BSE Realty Index recorded the highest mean beta value (1.2603), indicating greater responsiveness to market movements. The BSE Power and BSE Oil & Gas indices showed comparatively higher standard deviations, reflecting greater fluctuations in beta values during the study period. In contrast, the BSE BANKEX and BSE Commodities indices exhibited relatively stable beta values with lower variation. Further, the analysis of skewness and kurtosis revealed that the distribution of beta values varied across the selected sectors, indicating differences in the behaviour of beta over time. Overall, the findings suggest that beta stability was not uniform across the selected BSE sectoral indices, as some sectors maintained more consistent beta values while others experienced greater variability in their sensitivity to market movements during the study period.

VII. CONCLUSION

The present study examined the stability of beta across selected BSE sectoral indices during the period 2021–2025 using descriptive statistical analysis. The findings indicate that although most sectoral indices recorded mean beta values close to one, the degree of beta stability differed across sectors. The BSE 100 ESG Index exhibited the highest level of stability with minimal variation in beta values, whereas BSE Power, BSE Oil & Gas, and BSE Realty experienced comparatively greater fluctuations.

The study demonstrates that beta does not remain equally stable across all sectors, as sector-specific characteristics and market conditions influence its behaviour over time. These variations highlight the importance of periodically examining beta rather than assuming it remains constant. The findings contribute to a better understanding of beta stability in the Indian stock market and provide useful evidence for researchers and market participants interested in sectoral analysis.

Overall, the study concludes that the stability of beta varies among the selected BSE sectoral indices, emphasizing the need for continuous evaluation of beta while analysing sector-wise market behaviour.

VIII. LIMITATIONS OF THE STUDY

The present study has certain limitations. It is based entirely on secondary data collected from published sources, and therefore the accuracy of the findings depends on the reliability of the available data. The analysis is limited to ten selected BSE sectoral indices, which may not fully represent the performance of the entire Indian stock market. Further, the study covers only the period 2021–2025, and the results may differ for other time periods due to changing market conditions. In addition, the study focuses solely on the stability of beta values and does not consider other factors, such as macroeconomic variables, company-specific characteristics, or other market indicators, which may also influence beta values and market risk.

IX. SCOPE FOR FUTURE RESEARCH

Future research can be extended in several directions to provide a more comprehensive understanding of beta stability. Studies may include a larger number of BSE sectoral indices or individual companies to achieve broader market coverage. The study period may also be extended to examine the long-term behaviour and stability of beta under different market conditions. Comparative studies between BSE and NSE sectoral indices can provide additional insights into differences in beta behaviour across the two major stock exchanges. Furthermore, future research may investigate the relationship between beta stability and macroeconomic variables, such as inflation, interest rates, exchange rates, and GDP growth, to better understand the factors influencing beta. Advanced statistical and econometric techniques can also be applied to analyse beta stability more effectively under varying market conditions.

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