

A Study on the Comparative Performance and Risk–Return Efficiency of Nifty 50 and BSE Sensex as Benchmark Indices in India

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Abstract: The stock market plays an important role in economic development by facilitating capital formation and providing investment opportunities. Stock market indices serve as key indicators of overall market performance. In India, benchmark indices such as the Nifty 50 and BSE Sensex are widely used to evaluate trends and movements in the equity market. These indices represent leading large-cap companies listed on the National Stock Exchange and the Bombay Stock Exchange and are considered major barometers of the Indian stock market. This study aims to evaluate and compare the performance of Nifty 50 and Sensex by examining their risk–return characteristics. The study is based on secondary data collected from the official databases of NSE and BSE. Daily closing price data for the period 1 January 2021 to 31 December 2025 were used for the analysis. Statistical tools such as mean return, standard deviation, coefficient of variation, and correlation analysis were applied to assess the performance and volatility of the indices. The results indicate that Nifty 50 recorded slightly higher mean returns compared to Sensex during the study period. The standard deviation results show that both indices exhibit similar levels of volatility, although Sensex experienced marginally higher fluctuations. The coefficient of variation suggests that Nifty 50 provides better risk–return efficiency. In addition, correlation analysis reveals a very strong positive relationship between the two indices, indicating that they move closely together. Overall, the findings suggest that both indices effectively represent the performance of the Indian equity market.

Keywords: Nifty 50, BSE Sensex, Risk–Return Analysis, Volatility, Indian Stock Market.

I. INTRODUCTION

The stock market plays a significant role in economic development by facilitating capital formation, mobilizing savings, and providing investment opportunities for individuals and institutions. Stock market indices serve as important indicators of market performance and reflect the overall movement of share prices in an economy. In India, benchmark indices help investors, analysts, and policymakers understand the trends and dynamics of the capital market (Bodie, Kane & Marcus, 2018). Among the major indices, Nifty 50 and BSE Sensex are the most widely followed indicators of the Indian equity market. The Nifty 50 represents 50 large-cap companies listed on the National Stock Exchange across various sectors, while the Sensex comprises 30 prominent companies listed on the Bombay Stock Exchange. Both indices are considered key barometers of the Indian stock market and are commonly used for evaluating market trends, portfolio performance, and investment decisions.

Evaluating the performance of these indices is essential for understanding their risk–return characteristics and their role as market benchmarks. Financial measures such as mean return, standard deviation, coefficient of variation, correlation, Sharpe ratio, and regression analysis help assess the efficiency and relationship between the indices. Therefore, this study aims to empirically examine the performance of Nifty 50 and Sensex using daily market data to provide insights into their comparative risk and return characteristics in the Indian stock market.

II. LITERATURE REVIEW

Research on the Indian stock market since the early 2000s has largely focused on market efficiency, volatility, and the behavior of benchmark indices. Early studies examined how stock indices reflect market dynamics and economic conditions. For instance, studies on market volatility highlighted that fluctuations in stock indices such as the Sensex are strongly associated with investor participation and market-wide factors, demonstrating the relationship between index movements and overall market volatility (Kulkarni & Deo, 2005). Later research on market efficiency analyzed daily closing values of major indices and found that the Indian stock market shows varying degrees of weak-form efficiency,

indicating that price movements may sometimes be predictable based on past information (Jain et al., 2020). These studies established that benchmark indices are reliable indicators of market behavior but may still reflect short-term inefficiencies in emerging markets.

In recent years (2015–2025), research has increasingly focused on the performance, risk, and investment characteristics of major Indian indices such as the Nifty 50 and BSE Sensex. Empirical studies using time-series analysis and rolling return methods show that these indices exhibit strong long-term performance with relatively stable returns for long-term investors, although short-term investments tend to experience higher volatility (Sebastian & Vinod, 2025). Other studies analyzing the relationship between the two indices found a strong positive association, indicating that both markets move in a similar direction due to overlapping constituents and shared macroeconomic influences (Bhinde & Shukla, 2019). These findings suggest that benchmark indices play an important role as indicators of market performance and as tools for portfolio evaluation and investment decision-making.

III. RESEARCH GAP

Although several studies have examined the efficiency, volatility, and long-term investment performance of Indian stock market indices, most research has either focused on individual indices, sectoral indices, or limited time periods. Few studies provide a comprehensive comparative evaluation of both Nifty 50 and Sensex using recent market data and multiple risk-return performance measures simultaneously. Moreover, earlier research often emphasized market efficiency or volatility rather than analyzing mean return, standard deviation, coefficient of variation, correlation, Sharpe ratio, and regression together in a single empirical framework. Therefore, this study attempts to fill this gap by conducting a comparative empirical analysis of Nifty 50 and Sensex using daily data from 2021–2025, applying multiple statistical techniques to evaluate their risk, return, and interrelationship. The findings of this study will provide updated insights for investors, researchers, and policymakers regarding the relative performance and efficiency of India's leading stock market indices.

IV. METHODOLOGY

This study adopts a quantitative and empirical research approach to evaluate the performance of India's leading stock market indices, Nifty 50 and BSE Sensex. The main objective of the study is to examine and compare the risk–return characteristics and interrelationship between these two benchmark indices. Specifically, the study aims

- to analyze the average returns of Nifty 50 and Sensex.
- to measure and compare the volatility of the indices using standard deviation.
- to evaluate the relative risk per unit of return using the coefficient of variation.
- to examine the degree of relationship between the two indices through correlation analysis.

The study is based on secondary data, which were collected from reliable financial sources such as the official databases of the National Stock Exchange (NSE) and the Bombay Stock Exchange (BSE). The analysis uses daily closing price data for the period from 1 January 2021 to 31 December 2025, which provides sufficient observations to analyze recent trends in the Indian stock market. Daily returns for both indices were calculated using the percentage change in closing prices.

To evaluate the performance of the indices, several statistical tools were employed. Mean return was calculated to measure the average return generated by the indices during the study period. Standard deviation was used to measure the volatility or risk associated with index returns. The coefficient of variation was computed to compare the relative level of risk per unit of return between the indices. Correlation analysis was applied to examine the strength and direction of the relationship between the returns of Nifty 50 and Sensex. To analyse risk-adjusted return Sharp Ratio is also calculated.

V. RESULTS AND DISCUSSION

Mean Daily Returns

The mean return was then calculated using:

Mean Return = $\frac{\sum R_i}{n}$, where R_i represents daily returns and n is the number of observations.

The results indicate that the mean daily return of Nifty 50 is 0.000542, whereas the mean daily return of BSE Sensex is 0.000505 during the period 2021–2025. The findings suggest that Nifty 50 generated slightly higher average returns

compared to Sensex during the study period. Although the difference between the two indices is relatively small, the result indicates that the Nifty 50 performed marginally better in terms of average daily return. One possible reason for this difference is the broader composition of the Nifty 50 index, which includes 50 large-cap companies across multiple sectors, while the Sensex consists of 30 major companies listed on the Bombay Stock Exchange. The wider diversification of the Nifty 50 may contribute to its slightly improved performance (Bodie et al., 2018). The positive mean returns observed for both indices indicate that the Indian equity market experienced an overall upward trend during the study period. Positive average returns imply that investors tracking these benchmark indices could benefit from long-term capital appreciation. However, the difference in mean returns between the two indices is minimal, suggesting that both indices exhibit similar return characteristics. This similarity arises because several companies included in the Sensex are also part of the Nifty 50, resulting in strong co-movement between the indices (Gupta & Basu, 2007). Overall, the results indicate that both indices effectively represent the performance of the Indian capital market, while Nifty 50 shows marginally higher average return performance during the period of analysis.

Standard deviation

Standard deviation is widely used in finance to measure volatility or risk associated with returns. A higher standard deviation indicates greater fluctuation in returns and therefore higher investment risk (Bodie, Kane & Marcus, 2018). The standard deviation was calculated using the formula:

$$\sigma = \sqrt{\frac{\sum(R_i - \bar{R})^2}{n - 1}}$$

Where:

- σ = standard deviation
- R_i = individual daily return
- \bar{R} = mean return
- n = number of observations

The results reveal that the standard deviation of Nifty 50 is 0.008799, while the standard deviation of BSE Sensex is 0.008832 during the period 2021–2025.

Standard deviation measures the dispersion of returns around the mean, thereby indicating the level of volatility associated with an investment (Bodie et al., 2018). A higher value of standard deviation implies greater variability in returns and consequently higher investment risk.

The results indicate that both indices exhibit very similar volatility levels, reflecting the integrated nature of the Indian equity market. However, the standard deviation of Sensex is slightly higher than that of Nifty 50, suggesting that Sensex experienced marginally greater fluctuations in daily returns during the study period.

One explanation for this minor difference is the broader diversification of Nifty 50, which includes 50 large-cap companies across various sectors, compared with the 30 companies included in Sensex. Greater diversification tends to reduce volatility in portfolio returns (Markowitz, 1952). The close similarity between the volatility levels of the two indices can also be attributed to the overlapping composition of companies, as many firms included in Sensex are also part of the Nifty 50. This overlap results in strong co-movement between the indices and similar risk characteristics (Gupta & Basu, 2007). Overall, the findings suggest that both indices provide comparable risk exposure for investors, although Nifty 50 demonstrates slightly lower volatility, making it marginally less risky during the study period.

Coefficient of Variations

The Coefficient of Variation measures the relative risk per unit of return and is widely used in financial analysis to compare the risk-return efficiency of different investments (Bodie, Kane & Marcus, 2018).

The coefficient of variation is calculated using the formula:

$$CV = \sigma / \bar{R}$$

Where:

- CV = Coefficient of Variation
- σ = Standard deviation of returns
- \bar{R} = Mean return

The results indicate that the coefficient of variation of Nifty 50 is 16.24, while the coefficient of variation of BSE Sensex is 17.49 during the study period 2021–2025. The coefficient of variation measures the amount of risk taken for each unit of return. A lower CV indicates better risk–return efficiency, meaning that investors obtain higher returns relative to the level of risk involved (Sharpe, 1966). The findings show that Nifty 50 has a lower coefficient of variation compared to Sensex, which suggests that Nifty 50 provides better risk-adjusted performance during the study period. In other words, investors in Nifty 50 experience slightly lower volatility relative to the returns generated. The higher coefficient of variation observed for Sensex indicates that investors face relatively higher variability in returns per unit of average return. Although the difference is not extremely large, it suggests that Sensex carries slightly higher relative risk compared to Nifty 50. One possible explanation for this result is the greater diversification of the Nifty 50 index, which includes 50 companies from different sectors of the economy, whereas Sensex consists of only 30 companies. According to modern portfolio theory, increased diversification helps reduce portfolio risk and improve risk-adjusted returns (Markowitz, 1952).

Despite these differences, both indices exhibit similar CV values, reflecting the high degree of integration and co-movement in the Indian equity market. Many companies listed in Sensex are also part of the Nifty 50 index, which results in comparable performance patterns (Gupta & Basu, 2007). Overall, the analysis suggests that Nifty 50 offers slightly better risk-return efficiency than Sensex, making it a marginally more efficient benchmark for investors during the period of analysis.

Correlation Analysis

Using your dataset (daily closing prices from 1 January 2021 to 31 December 2025; 1239 observations), the correlation coefficient between the daily returns of Nifty 50 and BSE Sensex was calculated. Correlation analysis measures the degree and direction of relationship between two variables. In financial markets, it helps determine how closely two indices move together (Bodie, Kane & Marcus, 2018).

The Pearson correlation coefficient (r) was computed using:

$$r = \frac{\sum(X_i - \bar{X})(Y_i - \bar{Y})}{\sqrt{\sum(X_i - \bar{X})^2 \sum(Y_i - \bar{Y})^2}}$$

Where:

- X_i = returns of Nifty 50
- Y_i = returns of Sensex
- \bar{X}, \bar{Y} = mean returns
- r = correlation coefficient

The value of r ranges between -1 and $+1$.

- $+1$ = perfect positive correlation
- 0 = no relationship
- -1 = perfect negative correlation (Gujarati & Porter, 2009).

The results indicate that the correlation coefficient between Nifty 50 and Sensex returns is 0.9948, which is very close to $+1$. This demonstrates an extremely strong positive relationship between the two indices. A high positive correlation means that both indices tend to move in the same direction at almost the same time. When the Nifty 50 increases, the Sensex also tends to increase, and when one declines, the other usually declines as well. The extremely high correlation observed in this study can be explained by the overlapping composition of companies included in both indices. Many large-cap companies such as major banking, IT, and energy firms are part of both indices. As a result, changes in the performance of these companies simultaneously influence both market benchmarks. Furthermore, both indices represent the overall performance of the Indian equity market, which naturally leads to strong co-movement in their returns (Bodie et al., 2018). Previous empirical studies on emerging markets have also reported strong correlations among major stock indices within the same market due to common macroeconomic and market factors (Gupta & Basu, 2007).

The implication of this finding is that diversification benefits between Nifty 50 and Sensex are extremely limited, because both indices behave very similarly. Investors seeking diversification would need to consider different asset classes, sectors, or international markets rather than relying solely on these two indices. Overall, the results confirm that Nifty 50 and Sensex exhibit almost identical market movements, reinforcing their role as reliable indicators of the Indian stock market's performance.

Sharp Ratio

The Sharpe Ratio measures risk-adjusted return, indicating how much excess return an investor earns for each unit of risk taken (Sharpe, 1966). A higher Sharpe Ratio indicates better performance after adjusting for volatility. The Sharpe Ratio is calculated using:

$$\text{Sharpe Ratio} = \frac{R_p - R_f}{\sigma}$$

Where:

- R_p = mean return of the portfolio/index
- R_f = risk-free rate of return
- σ = standard deviation of returns

For this study, a 2% annual risk-free rate (converted to daily rate) was used, which is commonly applied in empirical financial studies (Bodie et al., 2018).

The results indicate that the Sharpe Ratio of Nifty 50 is 0.0526, while the Sharpe Ratio of BSE Sensex is 0.0482 during the period 2021–2025.

The Sharpe Ratio evaluates how effectively an investment compensates investors for the level of risk undertaken. A higher Sharpe Ratio indicates superior risk-adjusted performance, meaning that the index generates higher returns relative to its volatility (Sharpe, 1966).

The findings show that Nifty 50 has a slightly higher Sharpe Ratio compared to Sensex, suggesting that Nifty 50 provides better risk-adjusted returns during the study period. This implies that investors tracking Nifty 50 receive slightly greater excess returns per unit of risk compared to those tracking Sensex.

One possible explanation for this difference is the broader diversification of the Nifty 50 index, which includes 50 large-cap companies across various sectors of the economy. According to modern portfolio theory, diversification helps reduce unsystematic risk and improves portfolio efficiency (Markowitz, 1952). Although the difference between the Sharpe Ratios of the two indices is relatively small, the results indicate that Nifty 50 demonstrates marginally better efficiency in converting risk into returns. This suggests that Nifty 50 may serve as a slightly more effective benchmark for evaluating portfolio performance in the Indian equity market. However, the close values of the Sharpe Ratios also reflect the high similarity in risk-return characteristics between the two indices, which is expected because many companies included in Sensex are also constituents of Nifty 50 (Gupta & Basu, 2007).

Overall, the analysis suggests that both indices offer comparable investment performance, but Nifty 50 shows slightly superior risk-adjusted returns during the study period.

VI. CONCLUSION

This study evaluated the performance of Nifty 50 and BSE Sensex using daily data from 2021–2025. The results show that both indices exhibit very similar risk–return characteristics, reflecting the integrated nature of the Indian stock market. Nifty 50 recorded slightly higher mean returns and marginally lower relative risk compared to Sensex, indicating better risk–return efficiency during the study period. The correlation analysis revealed a very strong positive relationship between the two indices, suggesting that they move almost simultaneously due to overlapping constituents and common market factors.

Overall, both indices serve as reliable indicators of the Indian equity market, although Nifty 50 demonstrates marginally better performance in terms of return and risk efficiency. The findings provide useful insights for investors and researchers in understanding the comparative performance of India's leading stock market benchmarks.

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