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Risk–Return Analysis of Nifty 50, Nifty 100, Nifty 200 and Nifty 500: Evidence from India, 2021–2026.

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Abstract

The study examines the risk and return characteristics of Nifty 50, Nifty 100, Nifty 200 and Nifty 500 over the period from 1 April 2021 to 31 March 2026. The analysis uses 1,239 daily price-index return observations for each index. Descriptive statistics, annualised volatility, compounded returns and paired-samples t-tests are employed to compare their performance. The results indicate that Nifty 500 recorded the highest mean daily return of 0.0459%, followed by Nifty 200 at 0.0449%, Nifty 100 at 0.0394% and Nifty 50 at 0.0379%. Nifty 500 also recorded the highest compounded cumulative return of 67.76%, while Nifty 50 recorded the lowest annualised volatility of 13.78%. However, none of the paired-samples t-tests revealed a statistically significant difference in mean daily returns at the 5% significance level. All four return distributions exhibited negative skewness and positive excess kurtosis. The study concludes that the broader indices recorded higher observed price returns alongside modestly higher volatility, but the differences in average daily returns were not statistically significant under the conventional paired t-tests.

Keywords: Risk, return, Nifty 50, Nifty 100, Nifty 200, Nifty 500, volatility, paired t-test, Indian stock market.

1. Introduction

The stock market plays a significant role in economic development by facilitating capital formation, mobilising savings and providing investment opportunities. However, investment in equities involves uncertainty because market prices fluctuate in response to economic conditions, corporate performance, investor expectations, interest rates and other market-related factors. Consequently, investors must evaluate both risk and return when making investment decisions. Markowitz (1952), through his portfolio selection theory, emphasised the importance of considering expected returns and variance in portfolio construction. Similarly, Sharpe (1964) established a theoretical relationship between expected returns and systematic risk through the Capital Asset Pricing Model. These contributions provide the foundation for the comparative analysis of equity market performance.

In India, the National Stock Exchange (NSE) provides several benchmark indices representing different segments of the equity market. Nifty 50 represents 50 major companies, whereas Nifty 100, Nifty 200 and Nifty 500 provide progressively broader market coverage. A comparative assessment of these indices is useful for understanding whether broader market exposure is associated with differences in historical returns and volatility. Nevertheless, a higher average return does not necessarily indicate superior investment performance, as it may be accompanied by greater volatility and downside risk. Therefore, the relationship between risk and return must be examined using appropriate statistical measures.

The present study examines the risk and return characteristics of Nifty 50, Nifty 100, Nifty 200 and Nifty 500 over the period from 1 April 2021 to 30 March 2026. Using daily price-index return data, the study compares average returns, standard deviation, compounded cumulative returns, annualised performance, skewness and excess kurtosis. Paired-samples t-tests are employed to determine whether the mean daily returns of Nifty 100, Nifty 200 and Nifty 500 differ significantly from those of Nifty 50, while the Holm correction is applied to account for multiple comparisons. The study provides a further empirical assessment of the relationship between market coverage, historical price returns and volatility in the Indian equity market. The findings are intended to contribute to a better understanding of comparative index performance and support evidence-based investment analysis.

2. Review of Literature

The literature review incorporates relevant studies on Indian stock-market volatility, sectoral indices and comparative risk–return performance. Some of the reviews are:

1. **Vikkraman and Varadharajan (2009):** Their study examined risk and return in the Indian automobile industry during 2004–2007. The research used beta and statistical measures to evaluate investment performance, emphasising the importance of assessing risk alongside returns.
2. **Sharma et al. (2012):** Their study, *Rewards and Risks in Stock Markets: A Case of South Asia*, examined the relationship between risk and return in South Asian stock markets. The findings highlighted the complexity of the risk–return trade-off across markets.
3. **Gahan et al. (2012):** Their research investigated volatility in the Indian stock market during the pre- and post-derivatives periods using daily BSE Sensex and NSE Nifty data. The study reported lower volatility in the post-derivatives period and identified changes in the influence of market information.
4. **Shanmugasundram and Benedict (2013):** Their study examined the volatility of Indian sectoral indices using statistical techniques including t-tests and ANOVA. The research is relevant to the present study because it demonstrates the use of comparative statistical tests in evaluating index performance.
5. **Lakshmi (2013):** The study, *Volatility Patterns in Various Sectoral Indices in Indian Stock Market*, employed an ARCH model to investigate sectoral volatility during 2008–2012. It reported comparatively high volatility in the realty sector and lower volatility in the banking sector during the study period.
6. **Setiawan (2013):** The study compared the performance of Shariah-compliant and conventional stocks listed on the Indonesian Stock Exchange. The findings, as summarised by Patjoshi (2022), did not identify a significant relationship between risk and weekly returns.
7. **Ansar et al. (2014):** Their research developed a risk–return-based model for evaluating portfolio management performance. It examined portfolio performance under different market conditions, demonstrating the relevance of evaluating returns alongside risk.
8. **Patjoshi and Tanty (2016):** Their study examined stock-market volatility patterns in the BSE and NSE. This research is relevant to the present investigation because it focuses on the behaviour of Indian market benchmarks and the measurement of volatility.
9. **Patjoshi and Tanty (2017):** Their empirical analysis investigated volatility patterns in BSE Sensex constituent stocks using daily returns. The study contributes to the literature on the behaviour of equity returns and the assessment of market risk.
10. **Patjoshi and Mishra (2021):** Their study examined the effect of crude-oil price volatility on the share prices of major petroleum companies in the Indian stock market. It illustrates how external economic factors can influence stock-price behaviour and volatility.
11. **Pramod Kumar Patjoshi** (2022): His study made an attempt to analyse the risk and return of national stock exchange Nifty 50 and other Nifty indices.

Research Gap

The reviewed studies examine different dimensions of risk and return, including sectoral volatility, market-wide fluctuations, portfolio performance and external economic influences. There was not even a single study on the comparison of returns of nifty indices.The present study made an attempt of comparison of various Nifty indices daily price-index returns from April 2021 to March 2026, focusing on descriptive statistics, compounded performance and paired-samples t-tests. It therefore provides a period-specific assessment of whether the broader indices exhibited significantly different mean daily returns from Nifty 50.

3. Objectives and Hypotheses

The objectives are:

1. To compare the mean daily returns of the four selected indices.

2. To measure and compare historical volatility.
3. To evaluate compounded cumulative returns and annualised performance.
4. To examine the skewness and kurtosis of the return distributions.
5. To test whether the mean daily returns of Nifty 100, Nifty 200 and Nifty 500 differ significantly from those of Nifty 50.

The null hypotheses are:

- **H_{01}:** There is no significant difference between the mean daily returns of Nifty 50 and Nifty 100.
- **H_{02}:** There is no significant difference between the mean daily returns of Nifty 50 and Nifty 200.
- **H_{03}:** There is no significant difference between the mean daily returns of Nifty 50 and Nifty 500.

4. Research Methodology

The study adopts a quantitative, descriptive and comparative research design using secondary data supplied in an Excel workbook. The study period extends from 1 April 2021 to 31 March 2026, with 1,239 daily return observations for each index.

The analysis uses **price-index returns**, which exclude dividend income. Daily percentage returns are calculated as:

Return (%) = [(Ending Price – Starting Price) ÷ Starting Price] × 100

The study employs mean, median, standard deviation, minimum and maximum returns, skewness, excess kurtosis, compounded cumulative return and CAGR. Annualised volatility is calculated by multiplying daily standard deviation by (\sqrt{252}), while approximate annualised arithmetic return is calculated as mean daily return multiplied by 252.

Paired-samples t-tests are used to compare matched daily returns. The tests are two-tailed at a 5% significance level. The Holm correction is applied to the three comparisons to control the family-wise error rate. The analysis reports conventional paired t-test results without HAC/Newey–West adjustments.

5. Data Analysis and Interpretation

5.1 Descriptive Statistics

Table 1: Descriptive statistics of daily returns

Measure	Nifty 50	Nifty 100	Nifty 200	Nifty 500
Observations	1,239	1,239	1,239	1,239
Mean daily return (%)	0.0379	0.0394	0.0449	0.0459
Median daily return (%)	0.0551	0.0739	0.0912	0.1046
Standard deviation (%)	0.8679	0.8830	0.9026	0.9056
Minimum return (%)	−5.93	−6.59	−6.79	−6.76
Maximum return (%)	3.82	3.86	3.90	3.86
Skewness	−0.509	−0.667	−0.758	−0.828
Excess kurtosis	3.769	4.591	4.747	4.737

Source: Author's calculations from the compiled dataset.

Nifty 500 recorded the highest mean daily return of approximately 0.0459%, followed by Nifty 200, Nifty 100 and Nifty 50. Standard deviation increased from 0.8679% for Nifty 50 to 0.9056% for Nifty 500, indicating somewhat higher historical volatility among the broader indices.

All four indices exhibited negative skewness, suggesting asymmetry towards negative returns. Positive excess kurtosis indicates heavier tails than a normal distribution. These characteristics highlight the importance of considering extreme daily movements alongside average returns and standard deviation.

5.2 Annualised Returns and Volatility

Table 2: Annualised performance and compounded returns

Index	Annualised arithmetic return (%)	Annualised volatility (%)	Cumulative return (%)	CAGR (%)
Nifty 50	9.54	13.78	52.55	8.82
Nifty 100	9.93	14.02	55.22	9.20
Nifty 200	11.32	14.33	65.81	10.66
Nifty 500	11.56	14.38	67.76	10.92

Source: Author's calculations. CAGR is annualised over the interval from 1 April 2021 to 31 March 2026.

Nifty 500 recorded the highest compounded cumulative price return of 67.76% and a CAGR of approximately 10.92%. Nifty 50 recorded the lowest cumulative return of 52.55% and a CAGR of approximately 8.82%. Annualised volatility was lowest for Nifty 50 and highest for Nifty 500.

These results suggest that the broader indices recorded higher observed price returns accompanied by modestly higher volatility. However, descriptive differences do not establish superior risk-adjusted performance.

5.3 Paired-Samples t-Test

Table 3: Paired-samples t-test results

Comparison	t-statistic	Degrees of freedom	p-value	Decision at 5%
Nifty 50 vs Nifty 100	−0.5020	1,238	0.6157	Not significant
Nifty 50 vs Nifty 200	−0.2748	1,238	0.7835	Not significant
Nifty 50 vs Nifty 500	−1.2028	1,238	0.2293	Not significant

Source: Author's paired-samples t-test results.

All three p-values exceed 0.05. Therefore, the null hypotheses are not rejected. The results do not provide sufficient statistical evidence of a difference in mean daily returns between Nifty 50 and any of the other three indices.

Although Nifty 200 and Nifty 500 recorded higher observed mean daily returns, the differences were not statistically significant under the conventional paired t-tests.

5.4 Holm Correction

Table 4: Holm-adjusted p-values

Comparison	Raw p-value	Holm-adjusted p-value	Conclusion
Nifty 50 vs Nifty 100	0.6157	1.0000	Not significant
Nifty 50 vs Nifty 200	0.7835	1.0000	Not significant
Nifty 50 vs Nifty 500	0.2293	0.6879	Not significant

All Holm-adjusted p-values exceed 0.05. The conclusions remain unchanged after correcting for multiple comparisons.

6. Major Findings

1. Nifty 500 recorded the highest mean daily return, followed by Nifty 200, Nifty 100 and Nifty 50.
2. Nifty 500 recorded the highest compounded cumulative price return, while Nifty 50 recorded the lowest.
3. Annualised volatility was lowest for Nifty 50 and highest for Nifty 500.
4. All four return distributions exhibited negative skewness and positive excess kurtosis.
5. None of the three paired-samples t-tests identified a statistically significant difference in mean daily returns at the 5% significance level.
6. Holm correction did not change the conclusions of the three hypothesis tests.

7. Conclusion

This study compared the risk–return characteristics of the Nifty 50, Nifty 100, Nifty 200 and Nifty 500 over the period from April 2021 to March 2026 using daily price-index returns. The descriptive results indicate that Nifty 500 recorded the highest observed cumulative return, followed by Nifty 200 and Nifty 100, while Nifty 50 recorded the lowest cumulative return and the lowest annualised volatility.

The paired-samples t-tests did not identify statistically significant differences in mean daily returns between Nifty 50 and the other three indices at the 5% significance level. The conclusions remained unchanged after Holm correction for multiple comparisons. Accordingly, the observed differences in mean daily returns should be interpreted as descriptive differences rather than evidence of a statistically established return advantage.

All four indices exhibited negative skewness and positive excess kurtosis, indicating asymmetric return distributions with heavier tails than a normal distribution. These characteristics underline the importance of evaluating volatility and extreme returns alongside average performance.

The findings are limited to the selected five-year period and to price-index returns, which exclude dividends. Further research could incorporate total-return indices, downside-risk measures and robust statistical tests of mean return differences. Overall, the study provides a period-specific comparison of four major Indian equity indices and highlights the importance of distinguishing observed performance differences from statistically supported conclusions.

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