A Study on Risk and Return Analysis of Select Sectoral Specific Indices in India

***1 Ms. Kollipara Sri Charitha,** Research Scholar, Department of BBA,

Koneru Lakshmaiah Education Foundation , Vaddeswaram, sricharitha14@gmail.com

***2 Dr. Meda Srinivas Rao,** Professor, Department of BBA, Koneru Lakshmaiah Education Foundation , Vaddeswaram. medasrinivasarao@kluniversity.in

Abstract

The two pillars of equity investment decision making are risk and return, while sectoral indices denote the performance of different segments of the Indian economy in response to policy, regulatory and macroeconomic changes. This study compares the risk-return profile of three Nifty sectoral indices (Nifty Bank, Nifty IT and Nifty Pharma) over two periods of the National Democratic Alliance (NDA) government: Period 1, 2014–2018 (five years, 60 monthly returns), and Period 2, 2019–2026 (eight calendar years, 93 monthly returns up to September 2026), 13 calendar years in all. The study is based on secondary data released by NSE Indices Limited and is benchmarked on the Nifty 50. Average return, compound annual growth rate (CAGR), variance, standard deviation and the Sharpe ratio are calculated for each index and period, and differences between periods are tested using the Welch t-test, the F-test, the Mann-Whitney U test and a Sharpe-ratio z-test. Rolling correlation is used to examine the risk-return relationship, the market model is used to estimate sensitivity to the Nifty 50, and a regression on the CBOE VIX examines the effect of global volatility. In Period 1, Nifty Bank earned the highest CAGR (18.99%) and the highest Sharpe ratio (0.60), while Nifty Pharma's Sharpe ratio was negative (−0.11); in Period 2, Nifty Pharma led on both (CAGR 15.14%, Sharpe ratio 0.52) and Nifty Bank's CAGR fell to 9.44%, below that of the Nifty 50 (9.93%). The differences in mean return and Sharpe ratio between the periods are not significant for any index, and only the variance of Nifty IT rose significantly (F-test $p = 0.016$). The rolling risk-return correlation is significant only for Nifty IT in Period 1 and only for Nifty Pharma in Period 2. Nifty Bank has a beta above one in both periods (1.33 and 1.25), while Nifty Pharma's relationship with the market, not significant in Period 1, becomes significant in Period 2 ($\beta = 0.62$). A rise in the CBOE VIX has a significant negative effect on Nifty Bank in both periods and on all three indices in Period 2. The study shows that the leadership among the three sectors changed between the two periods while the market sensitivity of each sector changed only partly.

Keywords: Risk and return; Sectoral indices; Nifty Bank; Nifty IT; Nifty Pharma; CAGR; NDA government; India.

1. Introduction

The cornerstone of all investment decisions in the equity market is risk and return. It is impossible to value a stock or an index without at the same time valuing the uncertainty attached to its returns, and no investor can make a meaningful appraisal of one without the other. In India, sectoral indices such as Nifty Bank, Nifty IT and Nifty Pharma are important indicators of how individual sectors of the economy respond to policy change, regulatory reform, technological disruption and macroeconomic cycles, while the Nifty 50 reflects the market as a whole. The NDA government took office in May 2014 and has remained in power since, with terms beginning in 2014, 2019 and 2024. The first period of its rule (2014–2018) was marked by structural reforms such as demonetisation, the Goods and Services Tax (GST), the Insolvency and Bankruptcy Code, recapitalisation of public sector banks, "Digital India" and a second push toward foreign direct investment (FDI). The second period (2019–2026) includes the consolidation of public sector banks, the COVID-19 shock of 2020 and the recovery that followed, production-linked incentive schemes, and the global interest-rate tightening that began in 2022. The effects of these developments have differed across sectors. Banking stocks are sensitive to monetary policy, interest-rate cycles and regulatory overhauls, and public and private banks show different risk-return behaviour depending on governance structure and capital adequacy (Sahoo, Das, & Das, 2025). Research on

banking stocks listed in the Nifty shows that beta values, standard deviation and Sharpe ratios differ widely across banks in the same index, so the effect of regulation is not uniform across stocks (Varsha & Baskaran, 2023). The risk profile of the Information Technology sector is different, being influenced more by global demand cycles, currency fluctuations and technology adoption, and its performance relative to large IT firms such as TCS and Infosys can vary with firm-level volatility and alpha generation (Mulimani, 2024). The pharmaceutical industry, represented by Nifty Pharma, is subject to a third set of drivers: export demand, regulatory approval in foreign markets, pricing controls and currency movements, and risk-adjusted measures such as the Sharpe ratio, Treynor ratio and Jensen's alpha allow comparison across companies and over time (Dua & Meena, 2024). Beyond sector-specific studies, the general literature agrees that macroeconomic conditions such as GDP growth, inflation, interest rates, exchange rates and oil prices have a measurable impact on market indices and individual stocks, with sector-specific variables adding to the effect (Kapoor, 2018). The present study therefore compares the risk and return of Nifty Bank, Nifty IT and Nifty Pharma over two periods of NDA rule: Period 1 (2014–2018, five years) and Period 2 (2019–2026, eight calendar years). In total the study covers 13 calendar years, using monthly data from January 2014 to September 2026 (153 monthly returns). The aim is to examine whether the risk-return relationship of each sector changed between the two periods and which sector changed most.

2. Review of Literature

1.Dua and Meena (2024) examined the risk and return of the Nifty Pharma Index and 17 pharmaceutical companies during 2013–2023 using various risk-adjusted performance measures. The study found that Abbott India, Torrent Pharmaceuticals, and Granules India showed strong performance, but the study was limited by the absence of company-specific factors and formal significance testing.

2.Mulimani (2024) examined the risk and return profiles of TCS and Infosys from 2019–2024 using mean return, standard deviation, beta, alpha, Pearson correlation, and paired-sample t-tests. The study found that TCS had more stable returns with lower volatility, while no significant difference was found between the two companies. However, the study was limited to only two companies and did not consider macroeconomic or fundamental factors.

3.Kapoor (2018) examined the relationship between stock market indices and individual stocks in India using responses from 200 participants. The study found that macroeconomic factors such as oil prices, gold prices, GDP, inflation, interest rates, and exchange rates, along with company-specific factors, influence stock performance. However, the study was mainly descriptive and did not conduct detailed historical or sector-wise risk-return analysis.

4.Sahoo, Das, and Das (2025) analysed the risk and return dynamics of selected Indian banking stocks using financial indicators, ESG factors, and risk-adjusted measures over 2010–2025. The study found that private-sector banks had higher average returns, while EPS and ROA were significant predictors of stock returns. However, the study focused only on the banking sector, indicating scope for similar analysis across other sectors and indices.

5.Varsha and Baskaran (2023) analysed the risk and return of six selected Nifty-listed banking stocks using monthly price data from April 2022 to March 2023. The study found that HDFC had a favourable risk-return profile, while IndusInd Bank recorded the highest risk. However, the study was limited to one year of data and did not formally test its hypothesis or examine macroeconomic factors.

6.Lobo and Bhat (2021) examined the risk and return of selected Indian financial-sector stocks and their relationship with the S&P BSE Finance Index using monthly data from January 2020 to July 2021. The study found that IIFL Finance had the highest monthly return and risk, while all selected stocks showed positive correlations with the index. However, the study covered a short COVID-affected period and did not include risk-adjusted performance measures.

7.Nirmala (2025) studied volatility across major Nifty sectoral indices, including Bank, Pharma, FMCG, Metal, and Auto, using sGARCH modelling and annual data from 2015 to 2025. The study found that FMCG had the lowest volatility, while Metal had the highest standard deviation, and sectoral indices showed high positive

correlations. However, the study was limited by a small number of annual observations and excluded macroeconomic variables and other sectors such as IT and Energy.

8. Sumetha, Chauhan, and Dewani (2024) analysed the risk and return of selected Indian FMCG companies during 2016–2022 and compared them with the BSE FMCG Index. The study found that higher returns were generally associated with higher risk, while HUL and Nestlé India showed strong performance. However, the study used a small convenience sample and did not examine beta, correlation, regression, or macroeconomic factors.

9. Savsani and Rathod (2018) examined the risk-return relationship between the Sensex and selected banking stocks using weekly data from 2005–2017. The study found that HDFC had a strong return relative to its risk, while Axis had the highest beta. However, the study was limited to four banking stocks and did not include risk-adjusted measures such as Sharpe and Treynor ratios.

10. Asthana and Ahmed (2023) analysed the risk and return of ten BSE sectoral indices using monthly data from 2011–2021. The study found a weak negative relationship between beta and returns, which did not support the traditional CAPM relationship. However, the study did not identify the sectors by name and did not examine risk-adjusted measures or different sub-periods.

11. Guha, Dutta, and Bandyopadhyay (2016) examined the risk and return of eleven NSE sectoral indices using monthly data and measures such as standard deviation, beta, return-per-beta, regression, and factor analysis. The study found FMCG to be the most defensive sector, while Realty was the most sensitive to market movements. However, the study assumed a linear relationship and did not consider later market events such as demonetisation, GST, and COVID-19.

12. Spencer and Charithra (2025) compared the risk and return of NSE sectoral indices with Nifty 50 using monthly data from 2015–2025. The study found that FMCG and Pharma were relatively defensive, while Auto and Metal were more volatile. However, several risk-adjusted measures were not presented in detail, limiting verification of the findings.

13. Manjunath and Thippeswamy (2025) analysed nine NSE sectoral indices using monthly data from 2013–2023 and examined returns, volatility, distribution, and correlations. The study found FMCG to have the highest mean return with relatively low volatility, while Bank showed the highest volatility. However, the study was mainly descriptive and did not include beta, regression, or risk-adjusted performance measures.

14. Nandini and Patjoshi (2020) examined the risk and return of fifteen BSE sectoral indices using daily data from 2010–2019. The study found that Realty had the highest risk, while Healthcare had the lowest, and identified significant relationships between several sectoral indices and the Sensex. However, it did not use risk-free rates or risk-adjusted measures and did not cover major market events after 2019.

3. Research Gap

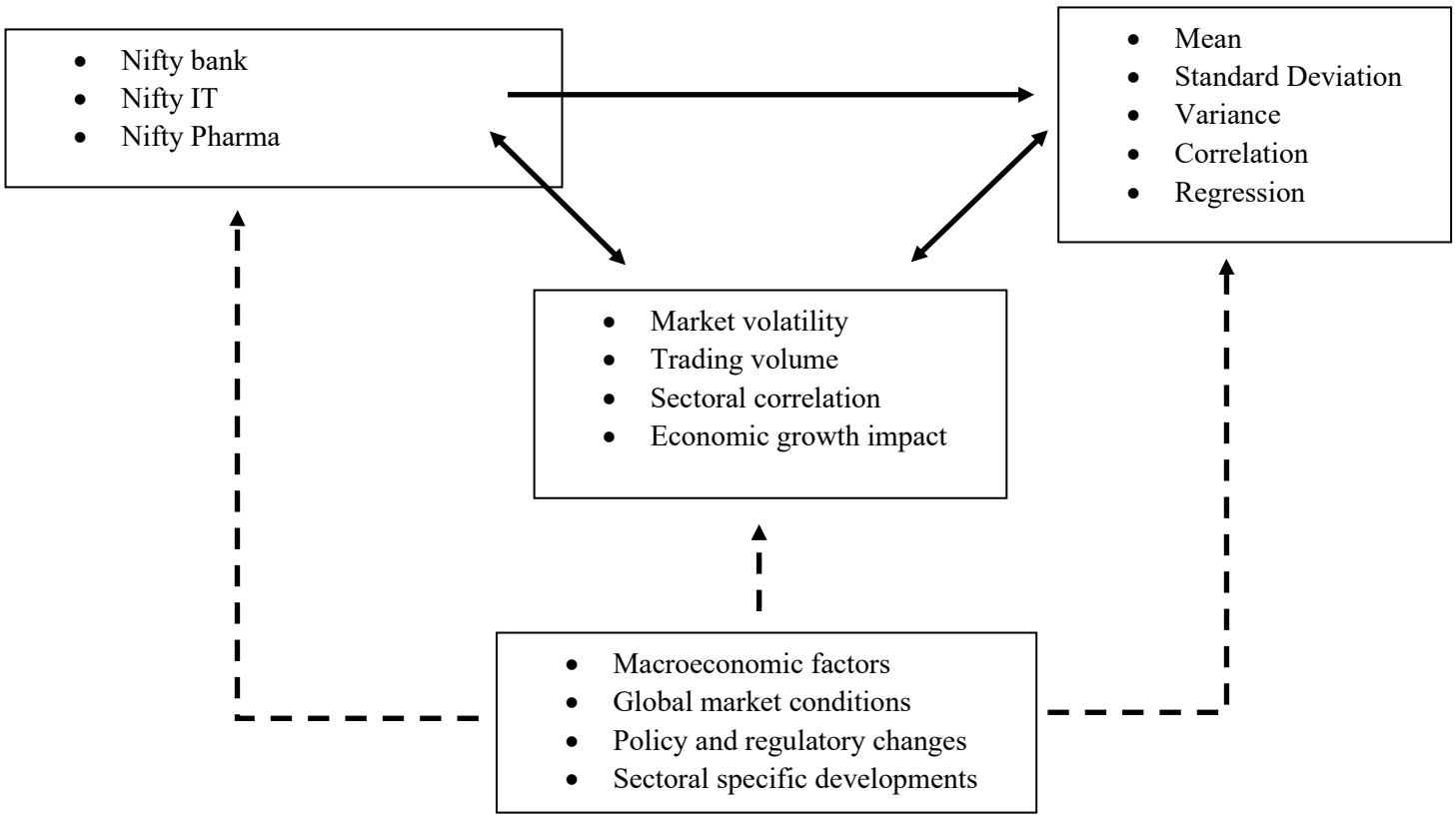
The existing studies have largely been confined to a single sector or to one period, and have provided limited comparisons of sectoral indices in India across successive periods of the same government. Very few studies have compared Nifty Bank, Nifty IT and Nifty Pharma across Period 1 (2014–2018) and Period 2 (2019–2026) of NDA rule, and very few have examined average return, CAGR, variance, standard deviation, the Sharpe ratio and the risk-return relationship together for these periods. This study fills that gap by comparing the risk and return of selected sectoral indices of the Indian stock market over 13 calendar years split into the two periods.

4. Research Questions

- What is the part of Nifty Bank, Nifty IT and Nifty Pharma indices to keep an eye on what is happening in their fields in the Indian stock market?

- What are the differences in return and risk of these indices between 2014–2018 and 2019–2026?
- Are the average return, CAGR, variance, standard deviation and Sharpe ratio statistically significantly different during the two periods for each index?
- Is there a significant relationship between risk and return of these indices in each period?
- To what extent does global market volatility account for the risk and return of such indices in each period?

5. Conceptual Framework



6. Objectives of the Study

- To understand the role of selected sectoral indices and their significance in India.
- To analyse the risk and return of the selected Nifty indices during Period 1 (2014–2018) and Period 2 (2019–2026) of the NDA government.
- To compare the average return, compound annual growth rate, variance, standard deviation and Sharpe ratio of the selected sectoral indices across the two periods.
- To study the relationship between the risk and return of the selected sectoral indices in 2014–2018 and in 2019–2026.
- To analyse how the risk and return performance of the selected indices was across the market and by global market volatility in each period.

7. Hypotheses of the Study

H_{01}: There is no significant role of any selected sectoral indices to represent the performance of various sector in the Indian stock market.

H_{11}: Indexes representing different sectors of the Indian stock market have an important influence on the performance of those sectors.

H_{02}: No significant difference in the risk and return of the selected Nifty sectoral indices between 2014–2018 and 2019–2026.
H_{12}: The risk and return of the selected Nifty sectoral indices differ significantly between 2014–2018 and 2019–2026.
H_{03}: The mean return, CAGR, variance, standard deviation and Sharpe ratio of indices of selected sectors are not different for two periods.
H_{13}: The mean, CAGR, variance, standard deviation and Sharpe ratio of the chosen sectoral indices are significantly different for the two periods.
H_{04}: No significant relationship between risk and return for the selected sectoral indices is found in 2014–2018 and 2019–2026.
H_{14}: There is a significant relationship between risk and return of the selected sectoral indices in 2014–2018 and 2019–2026.
H_{05}: Global market volatility (change in the CBOE VIX) has no significant effect on the returns of the selected sectoral indices in the two periods.
H_{15}: Global market volatility (change in the CBOE VIX) has a significant effect on the returns of the selected sectoral indices in the two periods.

8. Research Methodology

Data and sources

The study uses secondary data as its sole data source. Daily closing values of Nifty Bank, Nifty IT, Nifty Pharma and Nifty 50 (all price indices) were downloaded from NSE Indices Limited (niftyindices.com) for 1 January 2014 to 30 September 2026. The last trading day's close of each month was used to build monthly series. The Nifty 50 is the market benchmark. The CBOE Volatility Index (VIX), taken as the last available daily value of each month from the Federal Reserve Bank of St. Louis (FRED, series VIXCLS), is used to gauge global market volatility. The risk-free rate for the Sharpe ratio is the monthly average of the daily yield on the 3-month Government of India bond (Investing.com), used for the whole study period; it averages 7.14% a year in Period 1 and 5.83% in Period 2. Liquidity, bank credit, the exchange rate and economic growth are not included in this study.

Selected sectoral indices

Three Nifty sectoral indices are selected to represent different major sectors of the Indian stock market:

(1) Nifty Bank

(2) Nifty IT

(3) Nifty Pharma.

Duration of the study

The study covers 13 calendar years of NDA rule, divided into two periods: Period 1, January 2014 – December 2018 (five years, 60 monthly returns), and Period 2, January 2019 – September 2026 (eight calendar years, 93 monthly returns, September 2026 being the latest complete month at the time of the study). The January 2019 return is measured from the December 2018 close. The January 2014 return is measured from the close of 1 January 2014, the first date in the downloaded series for Nifty Bank and Nifty Pharma, and the same base is used for all four indices. The periods are defined by calendar year, so January–May 2014 and January–May 2019, which fall before the start of the first and second terms of the government in May of those years, are included in the respective periods. Because the two periods have different lengths, CAGR and annualised measures are used for comparison, and the tests of difference allow for unequal sample sizes.

Methods used

The study compares two periods with 60 and 93 monthly returns. Monthly return: the percentage change in the value of the index from the previous month-end to the current month-end; $R_t = [(P_t - P_{t-1}) / P_{t-1}] \times 100$ Mean: The average return of each index for each period is Average = $\Sigma R / N$, where R is the individual monthly return and N is the number of periods. Annualised return / CAGR. Annualised return = $[(1 + \text{Mean}/100)^{12} - 1] \times 100$. The formula for CAGR is [(P_end / P_start) ^ (12/N) − 1] x 100, where P_start and P_end are the values of the index at the beginning and end of the period, respectively, and N is the number of months.

Variance and standard deviation: Variance = $\Sigma(R - \bar{R})^2 / N$, which is the square root of the variance. The larger the standard deviation, the more volatile the values are. The monthly standard deviation times $\sqrt{12}$ are the annualised standard deviation.

Sharpe ratio: Sharpe ratio = $(\bar{R}_p - R_f) / \sigma_p$, where $\bar{R}_p$ is the mean monthly return, R_f is the monthly risk-free rate (the annual yield divided by 12) and σ_p is the standard deviation of monthly returns. Ratio is annualised by multiplying by $\sqrt{12}$.

Tests of difference: The mean return differences between the two periods are tested using the Mann-Whitney U test (without assuming normality) and the Welch t-test (without assuming equal variances). The F-test is used to test for differences in variance; this is the two-sided test $F = s_1^2 / s_2^2$, with Period 1 in the numerator and 59 and 92 degrees of freedom. The Sharpe ratios are compared using a z-test based on the large-sample variance of the Sharpe ratio, $Var(SR) \approx (1 + SR^2/2) / N$ (Lo, 2002), computed with each period's own number of observations. Because the periods have 60 and 93 observations, all tests allow for unequal sample sizes. The level of significance is 5 per cent.

Correlation: The relationship between risk and return is explored by calculating Pearson's $r = Cov(X, Y) / (\sigma_x \sigma_y)$ between the 12-month rolling mean return and the 12-month rolling std deviation for each period (49 windows in Period 1 and 82 in Period 2). The correlation between each index and the Nifty 50 is calculated on monthly basis. The p-values of the risk-return correlation are indicative due to the overlap of the rolling windows.

Regression analysis: The relationship with the market is estimated using the market model $R_{it} = \alpha + \beta R_{mt} + \varepsilon_t$, where R_m is the monthly return on the Nifty 50. The effect of global volatility is studied with the single-factor regression $R_{it} = a + b_1(\Delta VIX) + \varepsilon_t$, where ΔVIX is the monthly percentage change in the month-end CBOE VIX. Standard errors robust to heteroscedasticity (HC3) are used in the volatility regression. Both models are estimated separately for each index and period.

9. Results and Discussion

Descriptive statistics and performance measures

Table 1: Risk and Return of Selected Indices, 2014–2018 and 2019–2026

Measure	Nifty Bank		Nifty IT		Nifty Pharma		Nifty 50 (benchmark)	
	2014–18	2019–26	2014–18	2019–26	2014–18	2019–26	2014–18	2019–26
Mean monthly return (%)	1.63	1.02	0.83	0.94	0.41	1.33	0.99	0.92
Annualised return (%)	21.44	12.88	10.49	11.85	5.03	17.12	12.53	11.58
CAGR (%)	18.99	9.44	8.82	8.77	2.95	15.14	11.51	9.93
Variance (%²)	35.14	49.07	25.79	46.92	33.50	30.47	15.43	24.31
Std. deviation, monthly (%)	5.93	7.01	5.08	6.85	5.79	5.52	3.93	4.93
Std. deviation, annualised (%)	20.53	24.27	17.59	23.73	20.05	19.12	13.61	17.08
Skewness	0.21	-0.99	0.13	-0.05	0.10	1.36	-0.11	-0.99
Excess kurtosis	0.61	6.51	-0.51	0.95	-0.60	6.09	-0.44	5.25
Sharpe ratio (annualised)	0.60	0.26	0.16	0.23	-0.11	0.52	0.34	0.30

Source: Computed from NSE Indices Limited data. All four indices are price indices. Variance, skewness and kurtosis are computed with N in the denominator. Sharpe ratio = mean monthly excess return ÷ standard deviation × √12; the average risk-free rate (3-month Government of India bond yield) was 7.14% a year in 2014–2018 and 5.83% in 2019–2026.

Over 2014–2018, Nifty Bank delivered the highest CAGR at 18.99%, ahead of the Nifty 50 (11.51%), while Nifty IT (8.82%) and Nifty Pharma (2.95%) fell well below the benchmark. Nifty Bank also had the highest monthly standard deviation (5.93%), followed closely by Nifty Pharma (5.79%) and Nifty IT (5.08%), against 3.93% for the Nifty 50, so in this period higher return was accompanied by higher risk for the banking index. On the Sharpe ratio, Nifty Bank ranked first (0.60), ahead of the Nifty 50 (0.34) and Nifty IT (0.16), while Nifty Pharma's ratio was negative (−0.11), meaning its average monthly return was below the risk-free rate. The ranking changed in 2019–2026. Nifty Pharma delivered the highest CAGR (15.14%), ahead of the Nifty 50 (9.93%), Nifty Bank (9.44%) and Nifty IT (8.77%); Nifty Bank's CAGR was about half its earlier level and fell below the benchmark. Nifty Bank remained the most volatile index (monthly standard deviation 7.01%), followed by Nifty IT (6.85%), Nifty Pharma (5.52%) and the Nifty 50 (4.93%); the standard deviation rose for Nifty Bank, Nifty IT and the Nifty 50 but fell slightly for Nifty Pharma (from 5.79% to 5.52%). Nifty Pharma also led on the Sharpe ratio (0.52), ahead of the Nifty 50 (0.30), Nifty Bank (0.26) and Nifty IT (0.23), and moved from a negative to the highest value among all four indices.

The return distributions in 2014–2018 are close to symmetric, with skewness between −0.11 and 0.21 and excess kurtosis between −0.60 and 0.61 for the three sector indices and the Nifty 50. In 2019–2026, Nifty Bank (skewness −0.99, excess kurtosis 6.51), Nifty Pharma (1.36 and 6.09) and the Nifty 50 (−0.99 and 5.25) have heavy tails. This reflects the COVID-19 episode: in March 2020 Nifty Bank fell by 34.32% and the Nifty 50 by 23.25% in a single month, and the best month of Nifty Pharma in the whole study was a gain of 29.97% in April 2020. Because of these tails, the Mann-Whitney U test, which does not assume normality, is reported next to the Welch t-test.

Comparison between the two periods

Table 2: Tests of Difference between Periods

Index	Measure and test	Test statistic	p-value	Decision on H_0
Nifty Bank	Mean return (Welch t-test)	0.580	0.563	Do not reject H_0
Nifty Bank	Mean return (Mann-Whitney U)	2935	0.589	Do not reject H_0
Nifty Bank	Variance (F-test)	0.720	0.177	Do not reject H_0
Nifty Bank	Sharpe ratio (Lo z-test)	0.590	0.555	Do not reject H_0
Nifty IT	Mean return (Welch t-test)	-0.106	0.916	Do not reject H_0
Nifty IT	Mean return (Mann-Whitney U)	2727	0.815	Do not reject H_0
Nifty IT	Variance (F-test)	0.553	0.016	Reject H_0
Nifty IT	Sharpe ratio (Lo z-test)	-0.114	0.909	Do not reject H_0
Nifty Pharma	Mean return (Welch t-test)	-0.966	0.336	Do not reject H_0
Nifty Pharma	Mean return (Mann-Whitney U)	2543	0.357	Do not reject H_0
Nifty Pharma	Variance (F-test)	1.106	0.657	Do not reject H_0
Nifty Pharma	Sharpe ratio (Lo z-test)	-1.104	0.270	Do not reject H_0

Source: Computed by the authors. Test statistics are for Period 1 (2014–2018, n = 60) relative to Period 2 (2019–2026, n = 93). Significance judged at the 5 per cent level. The Sharpe-ratio test uses the large-sample variance of the Sharpe ratio (Lo, 2002), which assumes independent returns.

The difference in mean return between the two periods is not significant for any index: the Welch t-test p-values are 0.563 (Nifty Bank), 0.916 (Nifty IT) and 0.336 (Nifty Pharma), and the Mann-Whitney U test agrees (p = 0.589, 0.815 and 0.357). The Sharpe ratios do not differ significantly either (p = 0.555, 0.909 and 0.270). The large shifts in CAGR, such as the fall for Nifty Bank from 18.99% to 9.44% and the rise for Nifty Pharma from 2.95% to 15.14%, do not become significant differences in mean monthly return because month-to-month variability is large relative to the means.

The variance of Nifty IT is significantly higher in 2019–2026 than in 2014–2018 (F = 0.553, p = 0.016), whereas the changes in the variance of Nifty Bank (p = 0.177) and Nifty Pharma (p = 0.657) are not significant. The variance of the Nifty 50 also did not change significantly (F = 0.638, p = 0.066), so the rise for Nifty IT is not simply a market-wide effect. Accordingly, H_{02} and H_{03} are rejected only for the variance of Nifty IT and are not rejected for any other index or measure.

Relationship between risk and return

Table 3: Correlation between Rolling Risk and Return, and Correlation with Nifty 50

Index	Risk–return r (2014–18)	Risk–return r (2019–26)	r with Nifty 50 (2014–18)	r with Nifty 50 (2019–26)
Nifty Bank	-0.010 (0.948)	-0.089 (0.425)	0.878* (<0.001)	0.878* (<0.001)
Nifty IT	0.538* (<0.001)	0.011 (0.921)	0.458* (<0.001)	0.569* (<0.001)
Nifty Pharma	0.210 (0.148)	0.500* (<0.001)	0.189 (0.148)	0.552* (<0.001)

*Source: Computed by the authors. * significant at the 5 per cent level; p-values in brackets. Risk-return r is between the 12-month rolling mean and standard deviation (49 windows in Period 1 and 82 in Period 2); p-values for it are indicative because the windows overlap.*

In 2014–2018 the correlation between rolling risk and return is positive and significant only for Nifty IT (0.538); it is close to zero for Nifty Bank (−0.010) and not significant for Nifty Pharma (0.210, p = 0.148). The pattern changes in 2019–2026: the relationship is positive and significant only for Nifty Pharma (0.500), while it is not significant for Nifty Bank (−0.089) or Nifty IT (0.011). H_{04} is therefore rejected in two of six index–period cases (Nifty IT in 2014–2018 and Nifty Pharma in 2019–2026) and not rejected in the other four.

The correlation of Nifty Bank with the Nifty 50 is high in both periods (0.878 and 0.878). That of Nifty IT is moderate and rises from 0.458 to 0.569, and that of Nifty Pharma rises from a low and not significant 0.189 (p = 0.148) to a moderate and significant 0.552. The market-model regression in Table 4 gives the same picture.

Table 4: Market-Model Regression (Dependent Variable: Monthly Index Return; Independent Variable: Nifty 50 Return)

Index and period	Alpha, α (p-value)	Beta, β (std. error)	R^2	F-statistic	p-value
Nifty Bank, 2014–18	0.321 (0.405)	1.326* (0.095)	0.772	196.11	<0.001
Nifty Bank, 2019–26	-0.129 (0.718)	1.247* (0.071)	0.771	305.99	<0.001
Nifty IT, 2014–18	0.249 (0.685)	0.593* (0.151)	0.210	15.43	<0.001
Nifty IT, 2019–26	0.213 (0.724)	0.790* (0.120)	0.323	43.46	<0.001
Nifty Pharma, 2014–18	0.134 (0.862)	0.278 (0.190)	0.036	2.15	0.148
Nifty Pharma, 2019–26	0.759 (0.126)	0.618* (0.098)	0.305	39.86	<0.001

*Source: Computed by the authors. * significant at the 5 per cent level (alpha: p-value in brackets; beta: standard error in brackets). N = 60 in Period 1 (F has 1 and 58 degrees of freedom) and N = 93 in Period 2 (F has 1 and 91 degrees of freedom).*

Nifty Bank has a beta above one in both periods (1.33 and 1.25), with the market explaining about 77% of its variation in each, so it amplifies market movements, slightly less in Period 2. The beta of Nifty IT rises from 0.59 to 0.79 (R^2 from 0.21 to 0.32). Nifty Pharma moves from an insignificant relationship with the market (β = 0.28, R^2 = 0.036, p = 0.148) to a significant one (β = 0.62, R^2 = 0.305, p < 0.001). No index earns a significant alpha in either period (p ≥ 0.126). H_{01} is therefore rejected in five of the six index–period cases, the exception being Nifty Pharma in 2014–2018.

Global volatility and index returns

The influence of global market volatility on monthly index returns is examined in Table 5, using the monthly percentage change in the CBOE Volatility Index (VIX) as the explanatory variable.

Table 5: Regression Results (Dependent Variable: Monthly Index Return, %)

Index and period	Intercept a (p-value)	Global volatility b_1 (ΔVIX) (p-value)	R^2	Adj. R^2	F-test p-value	n
Nifty Bank, 2014–18	1.987* (0.007)	-0.086* (<0.001)	0.162	0.148	0.001	60
Nifty Bank, 2019–26	1.227 (0.079)	-0.084* (0.008)	0.095	0.085	0.003	93
Nifty IT, 2014–18	0.951 (0.163)	-0.028 (0.221)	0.024	0.007	0.238	60
Nifty IT, 2019–26	1.181 (0.077)	-0.096* (<0.001)	0.131	0.121	<0.001	93
Nifty Pharma, 2014–18	0.356 (0.643)	0.013 (0.645)	0.004	-0.013	0.633	60
Nifty Pharma, 2019–26	1.523* (0.008)	-0.078* (<0.001)	0.132	0.122	<0.001	93

*Source: Computed by the authors from NSE Indices Limited data and the CBOE VIX (FRED, series VIXCLS). Model: $R = a + b_1(\Delta VIX) + \varepsilon$, where ΔVIX is the monthly percentage change in the month-end VIX. p-values for the coefficients use HC3 heteroscedasticity-robust standard errors; * significant at the 5 per cent level. R^2 and the F-test are from ordinary least squares.*

In 2014–2018 global volatility has a significant influence only on Nifty Bank: its coefficient is −0.086 ($p < 0.001$), so a 10 per cent rise in the VIX in a month is associated with a fall of about 0.9 percentage point in the monthly return, and changes in the VIX explain 16% of the variation in its returns. For Nifty IT (−0.028, $p = 0.221$) and Nifty Pharma (0.013, $p = 0.645$) the coefficient is not significant, and the VIX explains under 3% of the variation in their returns.

In 2019–2026 the effect is negative and significant for all three indices: −0.084 ($p = 0.008$) for Nifty Bank, −0.096 ($p < 0.001$) for Nifty IT and −0.078 ($p < 0.001$) for Nifty Pharma, so a 10 per cent rise in the VIX is associated with a fall of about 0.8 to 1.0 percentage point in the monthly return, and R^2 lies between 0.095 and 0.132. The sensitivity of Nifty Bank is almost unchanged between the periods, but Nifty IT and Nifty Pharma, which did not respond to global volatility in 2014–2018, became sensitive to it in 2019–2026. H_{05} is therefore rejected in four of the six index–period cases (Nifty Bank in both periods, and Nifty IT and Nifty Pharma in 2019–2026). These results are associations and not causal effects; the VIX captures global risk sentiment only, and other factors such as liquidity, interest rates and the exchange rate are not controlled for.

Summary of hypothesis testing

Table 6: Summary of Hypothesis Tests

Null	Statement (brief)	Test used	Decision
H_{01}	Sectoral indices do not represent their sectors significantly	Market-model regression on Nifty 50, correlation	Rejected in 5 of 6 index–period cases; not rejected for Nifty Pharma, 2014–18 ($p = 0.148$)
H_{02}	No difference in risk and return between periods	Welch t-test, F-test	Partly rejected: only the variance of Nifty IT differs between the periods ($p = 0.016$); mean return and Sharpe ratio do not differ for any index
H_{03}	No difference in mean, CAGR, variance, SD, Sharpe between periods	Welch t-test, F-test, Mann-Whitney U, Sharpe z-test	Partly rejected: only the variance of Nifty IT differs ($p = 0.016$); differences in mean return and Sharpe ratio are not significant (smallest p-value, Nifty Pharma Sharpe ratio: 0.270)
H_{04}	No significant risk–return relationship	Pearson correlation (rolling 12-month)	Rejected in 2 of 6 cases (Nifty IT, 2014–18; Nifty Pharma, 2019–26); not rejected in the other four
H_{05}	Global market volatility has no significant effect on index returns	Single-factor regression on ΔVIX (robust)	Rejected in 4 of 6 cases (Nifty Bank in both periods; Nifty IT and Nifty Pharma in 2019–26)

Source: Computed by the authors.

10. Findings of the Study

- Return: In 2014–2018 Nifty Bank earned the highest CAGR (18.99%), ahead of the Nifty 50 (11.51%), while Nifty IT (8.82%) and Nifty Pharma (2.95%) fell below it. In 2019–2026 Nifty Pharma earned the highest CAGR (15.14%), and Nifty Bank's CAGR fell to 9.44%, below the Nifty 50 (9.93%).
- Risk: Nifty Bank was the most volatile index in both periods (monthly SD 5.93% and 7.01%). In 2014–2018 it was followed by Nifty Pharma (5.79%) and Nifty IT (5.08%); in 2019–2026 by Nifty IT (6.85%) and Nifty Pharma (5.52%). The risk of Nifty Pharma was the only one to decline.
- Risk-adjusted performance: In 2014–2018 the order by Sharpe ratio was Nifty Bank (0.60), Nifty IT (0.16) and Nifty Pharma (−0.11, negative). In 2019–2026 it was Nifty Pharma (0.52), Nifty Bank (0.26) and Nifty IT (0.23); the Nifty 50 had 0.34 and 0.30 in the two periods.
- Difference between periods: No significant difference was found between the periods in mean return or Sharpe ratio for any index. Only the variance of Nifty IT was significantly higher in 2019–2026 (F-test $p = 0.016$).
- The risk-return relationship: It was positive and significant only for Nifty IT in 2014–2018 (0.538) and only for Nifty Pharma in 2019–2026 (0.500); it was not significant in the other four cases.
- Linkage: Nifty Bank had a beta above one in both periods (1.33 and 1.25), Nifty IT's beta rose from 0.59 to 0.79, and Nifty Pharma's relationship with the Nifty 50, not significant in 2014–2018 ($\beta = 0.28$), became significant in 2019–2026 ($\beta = 0.62$).
- Global volatility: A rise in the CBOE VIX had a significant negative effect on Nifty Bank in both periods (−0.086 and −0.084) and on Nifty IT (−0.096) and Nifty Pharma (−0.078) in 2019–2026 but not in 2014–2018.

11. Implications and Suggestions

The leadership among the three sectors changed between the two periods, so past sector performance is not a reliable guide, and investors should review sector allocations from time to time. Risk-adjusted measures must be used together with raw returns and CAGR. Nifty Bank carried the highest risk and a beta above one in both periods but earned a higher risk-adjusted return than the market only in 2014–2018; in 2019–2026 its Sharpe ratio (0.26) was below that of the Nifty 50 (0.30), so its extra risk was not rewarded. Nifty Pharma had a weak link with the market in 2014–2018 and was a useful diversifier, but by 2019–2026 its correlation with the Nifty 50 (0.55) was similar to that of Nifty IT, so its diversification benefit was smaller even though its Sharpe ratio was the best. In 2019–2026 all three sector indices fell when the VIX rose, so spreading money across these three sectors does not protect a portfolio against global volatility shocks. Policymakers can use the behaviour of these indices as one indicator of how reforms and shocks affect individual market segments, with the proviso that index movements also reflect global and cyclical factors.

12. Limitations and Scope for Further Research

The study covers three sectoral indices and two periods of unequal length (60 and 93 monthly observations). All indices are price indices and exclude dividends. The January 2014 return is measured from the close of 1 January 2014, as the downloaded series for Nifty Bank and Nifty Pharma begin on that date. The split by calendar year does not isolate the effect of government policy from other events: Period 1 includes demonetisation (2016), GST (2017) and the months of 2014 before the government took office, while Period 2 includes the COVID-19 shock of 2020, the recovery after it, the global tightening cycle from 2022 and a change in the government's term in 2024. Period 2 ends in September 2026, so 2026 is covered only up to that month. The volatility measure is the US CBOE VIX, which reflects global risk sentiment, and not India VIX. The only external factor studied is global volatility; liquidity (M3), bank credit, the exchange rate and economic growth are not included, so H_{05} is tested for global volatility only. The risk-free rate is a 3-month government bond yield. The data are monthly, and daily data with GARCH-family models would capture volatility clustering better. Because the rolling windows overlap, the p-values shown for the rolling risk-return correlation are indicative, and the test of the Sharpe ratio assumes independent returns. Further research could add liquidity, bank credit, the exchange rate and economic growth, extend the analysis to other sectors such as FMCG, Auto, Metal and Realty, add the Treynor ratio and Jensen's alpha, and examine sub-periods around specific events such as demonetisation, GST and COVID-19.

13. Conclusion

Average return, CAGR, variance, standard deviation, correlation and regression were used to compare the risk and return of Nifty Bank, Nifty IT and Nifty Pharma during Period 1 (2014–2018) and Period 2 (2019–2026) of the NDA government. Nifty Bank led on return and risk-adjusted performance in 2014–2018 (CAGR 18.99%, Sharpe ratio 0.60), whereas Nifty Pharma led in 2019–2026 (CAGR 15.14%, Sharpe ratio 0.52) after a negative Sharpe ratio in 2014–2018. Even so, the differences in mean return and Sharpe ratio between the periods are not statistically significant for any index, and only the variance of Nifty IT increased significantly. Nifty Bank's sensitivity to the market and to global volatility was similar in both periods, while Nifty IT and Nifty Pharma became more closely tied to the market and more sensitive to global volatility in 2019–2026. The results indicate that the leadership among sectors changes over time while the statistical evidence of change in the average level of return is weak. The study therefore provides a comparison of Indian sectoral indices across two periods of NDA government and a basis for further research on additional sectors, a wider set of macroeconomic variables and more sophisticated volatility modelling.

14. References

1. Kapoor, L. (2018). Relationship of stock market indices and individual stocks: A descriptive study. *Psychology and Education, 55*(1), 528–536. https://doi.org/10.48047/pne.2018.55.1.65

2. Mulimani, C. M. (2024). A study on analysing risk and return profiles of top two companies in Nifty 50. *International Journal of Scientific Research in Engineering and Management, 8*(10). https://doi.org/10.55041/IJSREM37975

3. Sahoo, R., Das, J. K., & Das, K. K. (2025). Risk and return dynamics of Indian banking stocks: A cross-sectoral empirical study. *European Economic Letters, 15*(3), 736–748. http://eelet.org.uk

4. Lobo, S., & Bhat, G. S. (2021). Risk return analysis of selected stocks of Indian financial sector. *International Journal of Case Studies in Business, IT, and Education, 5*(2), 111–124. https://doi.org/10.5281/zenodo.5463885

5. Nirmala, J. (2025). Market volatility across major Nifty sector indices: An empirical study. *International Journal of Advance Research in Multidisciplinary, 3*(4), 166–171. https://doi.org/10.5281/zenodo.18129695

6. Varsha, B. R., & Baskaran, S. (2023). Risk and return analysis of banking sectors with reference to Nifty. *International Journal for Multidisciplinary Research, 5*(5). https://doi.org/10.36948/ijfmr.2023.v05i05.6236

7. Asthana, A., & Ahmed, S. S. (2023). Risk and return analysis of sectoral indices in the context of the Bombay Stock Exchange. *Asian Journal of Probability and Statistics, 22*(2), 40–46. https://doi.org/10.9734/AJPAS/2023/v22i2482

8. Guha, B., Dutta, A., & Bandyopadhyay, G. (2016). Measurement of risk vs return of Indian sectoral indices. *Journal of Advanced Management Science, 4*(2), 106–111. https://doi.org/10.12720/joams.4.2.106-111

9. Savsani, M., & Rathod, U. (2018). Comparative risk return analysis of Bombay stock market with selected banking stocks in India. *International Journal of Scientific Research in Science and Technology, 4*(5), 908–916. https://doi.org/10.32628/IJSRST1845177

10. Sumetha, M., Chauhan, D. V., & Dewani, D. K. S. (2024). A study on risk & return analysis of selected FMCG companies in India. *International Journal of Scientific Research in Engineering and Management, 8*(6). https://doi.org/10.55041/IJSREM35304

11. Sanath Spencer, S., & Charithra, C. M. (2025). A comparative study on risk and return of NSE sectoral indices with NIFTY 50 as benchmark. *IRE Journals, 9*(3), 783–786. https://doi.org/10.64388/IREV9I3-1710637-1129

12. Dua, S., & Meena, S. (2024). Risk and return trade off: A study of Indian pharmaceutical sector's stocks. *Anusandhan-NDIM's Journal of Business and Management Research, 6*(1), 51–62. https://doi.org/10.56411/anusandhan.2024.v6i1.51-62