# Risk and return evaluation on BSE-SENSEX stocks

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**Abstract**
This research study investigates the risk-return relationship of stocks listed on the BSE SENSEX over a span of 10 years, from January 1st, 2013, to December 31st, 2022. Employing a regression model, the analysis calculates key metrics such as Average Return, Beta, and R-Square to assess the performance and volatility of each stock. The findings reveal positive Average Returns for BSE SENSEX and a less volatile Beta, suggesting lower interaction with the market. However, the study notes that not all stocks exhibit a strong fit with the regression model, as indicated by varying R-Square values. The comprehensive analysis of risk and return facilitates informed decision-making for investors, aiding them in identifying the best-performing stocks and estimating expected returns. Overall, this research contributes valuable insights into the dynamics of the BSE SENSEX, enhancing the understanding of stock behavior for shareholders seeking strategic investment opportunities.

**Keywords:** Risk, return, BSE SENSEX, average return, beta

## Introduction

The stock market serves as a dynamic hub for the buying and selling of stocks and long-term investments, playing a crucial role in economic development. This marketplace, which functions as both a location and a financial platform, has evolved significantly over time, with the growth of share exchanges and the capitalist system contributing to its economic significance. The roots of India's stock market trace back to 1875 when the first stock exchange, regarded as the oldest in Asia, was established in Mumbai. Over the years, the landscape has expanded, and currently, there are 21 stock exchanges in operation across the country. The National Stock Exchange of India (NSE) and the Bombay Stock Exchange of India (BSE) stand out as the two primary securities exchanges, while provincial exchanges, such as those in Ahmedabad and Calcutta, were founded in the 1890s. Since 1988, the Securities Exchange Board of India (SEBI) has played a pivotal role in overseeing and regulating the stock markets. Its mandate is to ensure proper development and regulation of the securities industry, promoting transparency and safeguarding the interests of investors. The stock exchange functions as a catalyst for economic growth, accumulating substantial capital for directing direct and indirect flows towards profitable outcomes. It operates as the nation's economic barometer, reflecting the pulse of economic activities and providing essential insights into market trends and conditions. The theory of risk and reward has gained prominence, especially in the aftermath of global economic crises. Return, in this context, refers to profits or losses during the holding period of securities, while risk pertains to the potential consequences of gaining or losing profit. In equity investment, risk and return are intertwined concepts; a lower return is generally associated with lower risk, and conversely, higher risk is linked with higher returns.

Market volatility plays a crucial role in shaping equity returns, with India's stock market standing out for its dynamic and sometimes volatile nature. The interplay between risk and return in the Indian context reflects the confidence of investors, as they navigate the challenges and opportunities presented by a market known for its fluctuations. In conclusion, the stock market in India, with its historical legacy, regulatory framework, and inherent risk-return dynamics, remains a cornerstone of the nation's economic landscape. Understanding its complexities is crucial for investors, policymakers, and stakeholders alike as they navigate the ever-evolving world of financial markets.

## Literature Review

The literature review encompasses a wide array of studies examining the relationship between risk and return in various stock markets. Here's a summarized overview of the key findings and methodologies from the cited studies:
Rui et al. (2018 [28], Malaysia): CAPM did not perform well in the Malaysian stock market, and the study used regression modeling on a sample of 24 companies. Vo et al. (2019, Four Nations): Markowitz's methodology was applied to assess risk and return in industry diversification portfolios across four nations, aiding in economic policy development. Almahdi & Yang (2017 [5], Portfolio Optimization): Utilizing exchange-traded funds, the study employed recurrent reinforcement learning and dynamic control theory for asset allocation, achieving benchmark results. Mandelker (1974 [20], Market Enterprises): Analyzing integrated enterprises from 1948 to 1967, the study employed CAPM to determine market conditions favoring mergers. Alqise & Alqurrqn (2016 [6], Capital Asset Pricing Model): Examining 60 businesses on the Amman Stock Exchange, the study found CAPM ineffective using Jensen and Black models. Md Isa et al. (2009 [22], Malaysian Stock Market): Monthly return and risk analysis on 60 service-oriented businesses indicated CAPM inadequacy in accounting for all risk and return components. Banz (1981 [8], NASDAQ Stocks): Analyzing NYSE companies from 1926 to 1975, the study used generalized asset stock models and identified size effects. CHOU et al. (2013 [11], China): Examining Chinese companies from 1998

to 2007, the study found a negative impact of financial distress on abnormal returns. Mohan et al. (2021 [24], Mutual Funds): Referring to Jensen and Sharpe, the study advocated mutual funds as the most appropriate option for individual investment. Mehrara et al. (2014 [23], Tehran Stock Market): Examining 50 companies, the study found CAPM not accepted due to its linear performance in the Tehran stock market. Bhuva & Bantawa (2012 [9], Mutual Funds): Evaluating risk-return for large- and mid-cap mutual funds, the study utilized Jensen and Fama approaches to identify optimal investment strategies. Lau et al. (2002 [18], Malaysia and Singapore): Using CAPM, the study found that small emerging markets in Malaysia and Singapore are developing at a rapid rate. Clare & Priestley (1988 [12], Malaysian Stock Market): The study suggested the importance of understanding fund managers' investment choices using asset pricing models. Lee et al. (2016 [2], Malaysia): Employing Markowitz model with CAPM, the study found it easy to estimate risk and return for Malaysia's portfolio investments. Estrada (2000 [13], Global Markets): Analyzing Morgan Stanley indices, the study supported the applicability of CAPM in estimating risk and returns in emerging markets. Pandow & Butt (2017 [27], Mutual Funds): Utilizing NAV method, the study concluded that it works well in determining investment value through mutual funds. Kuhle & Lin (2018 [1], Developed and Emerging Markets): Using the bivariate Ornstein Uhlenbeck process method, the study found unequal impacts of equity in developed and emerging markets. Hong (2014 [16], Emerging Markets): Studying emerging markets, the research highlighted the faster changes in emerging markets compared to developed markets. Supra et al. (2016 [3], BRICS and Emerging Markets): Contrasting developing and established markets, the study suggested that established markets still offer high returns. Sehgal et al. (2019 [29], Venture Capital Investments): Employing CAPM, the study examined venture capital investments from 1987 to 2000. Hodrick & Srivastava (1984 [15], Forward Contracts): Analyzing forward contracts, the study found high risk and profitable returns in the foreign currency markets. Kumar & Misra (2019 [17], Liquidity Risk): Analyzing small-cap, midcap, and large-cap stocks, the study found that individual risk is effective for making investment decisions. Alwi et al. (2022 [7], Inflation Impact): The study using the CAPM model concluded that shares are unable to earn projected profits while having low risk. Gautami & Kalyan (2018 [14], Indian Stock Exchanges): Using data from seven Indian stock exchanges, the study suggested that using CAPM for assessment may complicate predicting stock costs. Lobo & Bhat (2021 [19], BSE SENSEX): Analyzing India's financial industry, the study found limited variance between the return of individual firms and the BSE Index. Moolbharathi & Sugandi (2021 [25], NSE Benchmark Stocks): Examining selected NSE stocks, the study found that these stocks outperformed in terms of performance. Palanismy & Parthasarathy (2011 [26], BSE Sensitivity Index): The study on

BSE-registered companies indicated that investment decisions may be excellent in the short term but not as good over the long term. Mangukiya & Gondaliya (2021, BSE) [21]: Analyzing major indices on BSE, the study concluded that BSE does not follow any particular model. Abhinandan et al. (2018 [4], BSE SENSEX): Using correlation and CAPM, the study found a causal link between risk and earnings of the BSE stock index. Sujatha & Maheswari (2021 [30], BSE SENSEX): Studying data for five firms in three target sectors, the study used descriptive statistics to inspect the tie-up between returns and risk.

In summary, these studies collectively contribute to a nuanced understanding of the complex relationship between risk and return in various stock markets, utilizing diverse methodologies and samples to draw insightful conclusions.

## Objectives
The following are the objectives of the study
1. Analyzing Fluctuations of Risk and Return in BSE SENSEX
2. Comparative Analysis on Return and Risk of BSE SENSEX

## Hypothesis
$H_1$: There is a relationship between the return and risk in the BSE SENSEX.
$H_0$: There is no relationship between the risk and returns in BSE SENSEX.

## Methodology
The study's foundation is secondary information acquired from the source BSE India. From firm data and BSE indices, the daily closing values of the BSE SENSEX are gathered and calculated as dependent (X) and independent(Y) variables over a period of January 2013 to December 2022. Regression model is used in this examination of the connections between risk and return.

The prediction free data technique is used to assessment this study. The sample used in study are small so parametric model cannot be used and the required information is limited. So CAPM is utilized to check the risk and return relation. This model helps to identify the market risk on the companies expected return, the risk which investors take into consideration while investing is systematic risk because this risk cannot be diversified.
CAPM formula:

$$Ri = R_f + (R_m - R_f)\beta$$

Were,
$R_i$ =Expected rate of interest
$R_f$ = Risk free rate of return
B = sensitivity
$R_m$= Risk free rate of market return.

## Analysis and Interpretation

**Table 1:** Average Return, Beta and R-Square

| S. NO | Name of the Company | Avg Return | Beta | R-Square |
|---|---|---|---|---|
| 1 | RELIANCE INDUSTRIES LTD | -0.00016 | 1.08379 | 0.19324 |
| 2 | HDFC BANK LTD | -0.00012 | 1.06967 | 0.22331 |
| 3 | INFOSYS LTD | 0.0007 | 0.05989 | 0.04518 |
| 4 | HOUSING DEVELOPMENT FINANCE COR | -0.0003 | 0.44194 | 0.54503 |
| 5 | ICICI BANK LTD | 0.00128 | 0.02454 | 0.03352 |
| 6 | TATA CONSULTANCY SERVICES LTD | -0.00014 | 0.58931 | 0.06333 |

| 7 | KOTAK MAHINDRA BANK LTD | -0.00014 | 1.09766 | 0.19985 |
| 8 | HINDUSTAN UNILEVER LTD | -0.00052 | 0.58527 | 0.18744 |
| 9 | ITC LTD | 0.00011 | 0.74758 | 0.19101 |
| 10 | AXIS BANK LTD | 0.00138 | 1.52235 | 0.0391 |
| 11 | LARSEN TOUBRO LTD | 0.00013 | 1.09962 | 0.29144 |
| 12 | BAJAJ FINANCE LIMITED | 0.00229 | 1.20367 | 0.00505 |
| 13 | STATE BANK OF INDIA | 0.00342 | 1.27344 | 0.00574 |
| 14 | BHARTI AIRTEL LTD | -0.00017 | 0.83569 | 0.20703 |
| 15 | ASIAN PAINTS LTD | 0.003 | 1.16796 | 0.00454 |
| 16 | HCL TECHNOLOGIES LTD | 0.00021 | 0.66635 | 0.04539 |
| 17 | MARUTI SUZUKI INDIA LTD | -0.00052 | 1.02786 | 0.37004 |
| 18 | MAHINDRA & MAHINDRA LTD | 0.00021 | 1.00347 | 0.14584 |
| 19 | ULTRATECH CEMENT LTD | -0.00034 | 0.97481 | 0.36461 |
| 20 | SUN PHARMACEUTICAL INDUSTRIES L | 0.00018 | 0.67722 | 0.07326 |
| 21 | TITAN COMPANY LIMITED | -0.00068 | 0.90141 | 0.22906 |
| 22 | TECH MAHINDRA LTD | 0.00082 | 0.78848 | 0.0174 |
| 23 | NESTLE INDIA LTD | -0.00045 | 0.46897 | 0.12198 |
| 24 | BAJAJ FINSERV LTD | 0.00259 | 0.96937 | 0.0033 |
| 25 | POWER GRID CORPORATION OF INDIA | -0.00011 | 0.58662 | 0.13847 |
| 26 | INDUSIND BANK LTD | -0.00009 | 1.47127 | 0.38566 |
| 27 | TATA STEEL LTD | 0.00339 | 0.74784 | 0.00182 |
| 28 | NTPC LTD | 0.00012 | 0.70787 | 0.19909 |
| 29 | BAJAJ AUTO LTD | -0.00008 | 0.79137 | 0.29256 |
| 30 | OIL AND NATURAL GAS CORPORATION | 0.00052 | 1.01457 | 0.21279 |

## Interpretation

The Average Return and Beta table represents Average Returns, Beta And R-Square Results. The Avg Return of BSE SENSEX is having both positive and negative returns. From the above table it is observed that 16 businesses are displaying absolute returns such as Infosys Ltd, ICICI Bank, ITC Ltd, Axis Bank, Larsen & Toubro, Bajaj Finance Limited, State Bank of India, Asian Paints Pvt Ltd, HCL Technologies Ltd, Mahindra & Mahindra Ltd, Sun Pharmaceutical Industries Ltd, Tech Mahindra Ltd, Bajaj FinServ Ltd, Tata Steel Ltd, NTPC Ltd, Oil and Natural Gas Corporation. The highest positive return is of State Bank of India with (0.00342) and the lowest positive return is of ITC Ltd with (0.00011).

There are 14 companies which shows negative returns such as Reliance Industries Ltd, HDFC Bank Ltd, Housing Development Finance Cor, Tata Consultancy Services Ltd, Kotak Mahindra Bank, Hindustan Unilever Ltd, Bharti Airtel Ltd, Maruti Suzuki India Ltd, Ultratech Cement Ltd, Titan Company Limited, Nestle India Ltd, Power Grid Corporation of India, INDUSIND Bank Ltd, Bajaj Auto Ltd. It is detected that highest negative return is of Titan Company Ltd with the return (-0.00068). The Average Return of the companies is calculated on the basis of dependent variable that is taken from the companies' closing prices by using average formula. But overall comparison of Average Returns is indicating that the BSE SENSEX has a positive return.

The stock's variability can be determined using the beta, which is then collate to the market's overall volatility. These stocks are less vulnerable to market changes when their beta value less than 1 and more than 0, whereas equities with a beta value greater than 1 are more volatile. In the above table it is observed that 18 companies whose Beta is lesser than one are such as Reliance Industries Ltd, HDFC Bank Ltd, Kotak Mahindra Bank Ltd, Axis Bank Ltd, Larsen Toubro Ltd, Bajaj Finance Limited, State Bank of India, Asian Paints Ltd, Maruti Suzuki India Ltd, Mahindra & Mahindra Ltd, INDUSIND Bank Ltd, Oil and Natural Gas

Corporation. The ground last Beta value is (0.02) of ICICI Bank. The Beta value of 12 companies is exceeding than 1 are the companies such as Infosys Ltd, Housing Development Finance Cor, ICICI Bank Ltd, Tata Consultancy Services Ltd, Hindustan Unilever Ltd, ITC Ltd, Bharti Airtel Ltd, HCL Technologies Ltd, Ultratech Cement Ltd, Sun Pharmaceutical Industries Ltd, Titan Company Ltd, Tech Mahindra Ltd, Nestle India Ltd, Bajaj FinServ Ltd, Power Grid Corporation of India, Tata Steel Ltd, NTPC Ltd, Bajaj Auto Ltd. These are the companies that are more sensitive to any change in the market and it will directly affect the stock prices.

The R-Square measures the amount as concerns variation in the data that is explained by the model and how good it fits in the model. A R-Squared that is more than 0.50 and less than 0.99 is the acceptable values in research. The value less than 0.5 is not accepted in research because they are termed to be less effective. In the above table it is observed there is only one value of R-Square that is more than 0.5 and the company is Housing Development Finance Cor that fits the R-Squared model. The remaining 29 companies such as Reliance Industries Ltd, HDFC Bank Ltd, Kotak Mahindra Bank Ltd, Axis Bank Ltd, Larsen & Toubro Ltd, Bajaj Finance Limited, State Bank Of India, Asian Paints Ltd, Maruti Suzuki India Ltd, Mahindra & Mahindra Ltd, INDUSIND Bank Ltd, Oil And Natural Gas Corporation, Infosys Ltd, ICICI Bank Ltd, Tata Consultancy Services Ltd, Hindustan Unilever Ltd, ITC Ltd, Bharti Airtel Ltd, HCL Technologies Ltd, Ultratech Cement Ltd, Sun Pharmaceutical Industries Ltd, Titan Company Ltd, Tech Mahindra Ltd, Nestle India Ltd, Bajaj FinServ Ltd, Power Grid Corporation Of India, Tata Steel Ltd, NTPC Ltd, Bajaj Auto Ltd. These are the companies whose R-Square value is less than (0.50) and terminate the model as they are less effective.

## References

1. Kuhle JL, Lin EC. An evaluation of risk and return performance measure alternatives: evidence from real

estate mutual funds. Review of Business & Finance Studies,2018:9(1):1-18.

2. Lee HS, Cheng FF, Chong SC. Markowitz Portfolio Theory and Capital Asset Pricing Model for Kuala Lumpur Stock Exchange: A Case Revisited. International Journal of Economics and Financial,2016:6(s3):59-65.

3. Supra B, Narender V, Jadiyappa N, Girish G. Speed of Adjustment of Capital Structure in Emerging Markets. in SciRes, 2016. http://www.scirp.org/journal/tel http://dx.doi.org/10.4236/tel.2016.63059, 6, 534-538.

4. Abhinandan Pai HK, Nayak SL. Risk and return analysis of equity shares with specual refrences to companies (BSE) stock index. SSRN,2018:1:1-8.

5. Almahdi S, Yang SY. An adaptive portfolio trading system: A risk-return portfolio. Expert Systems With Applications,2017:87:267-279.

6. Alqise A, Alqurrqn T. Validity of Capital Asset pricing model of Amman stock exchange. Journal of management research, 2016, 8(1).

7. Alwi M, Ali M, Rahim FR. Analysis o investment risk and return. HJBS,2022:4(1):73-83.

8. Banz RW. The relationship between return and market value of common stocks. Journal of financial ecaonomics,1981:9:3-18.

9. Bhuva KK, Bantawa AR. Risk, return & performance evaluation of selected mutual fund schemes – a study on large & mid cap funds. Journal of Management and Science,2012:44:348-362.

10. Bora B, Adhikary A. Risk and Return - an emperical study of BSE sENSEX companies in India. Universal Journal of Accounting and finance,2015:3(2):44-51.

11. CHOU PL, LIN JJ, YAO CH, KUO HY. Evaluation on financial risk and abnormal return: evidence from China's listed companies. Journal of statistics and management system,2013:12(4):775-791.

12. Clare AD, Priestley R. Risk factors in the Malaysian stock market. Pacific-Basin Finance Journal,1988:6:103-104.

13. Estrada J. The cost of equity in emerging markets: a downside approch. IESE, 2000, 34-93.

14. Gautami D, Kalyan DB. A Comparative study on Risk Analysis of selected stocks in India. Research Aanlysis,2018:4(5):1730-1736.

15. Hodrick RJ, Srivastava S. An investigation of risk and return in forward foreign exchange. International Money and Finance,1984:3:5-29.

16. Hong KJ. Asymmetric Impact of Financial Integration to International Nonsynchronous Trading Effects in Developed and Emerging Equity Markets. SciRes,2014:4:517-525.http://www.scirp.org/journal/tel

17. Kumar G, Misra AK. Liquidity adjusted CAPM- An empirical analysis of Indian stock market. Cognet economics & finance,2019:7:1-15.

18. Lau ST, Lee CT, McInish TH. Stock returns and beta, firms size, E/P, CF/P,book-to-market, and sales growth: evidence from Singapore and Malaysia. Journal of Multinational Financial Management,2002:12:207-222.

19. Lobo S, Bhat SG. Risk and Return analysis of selected stocks of Indian Financial sector. IJCSBE,2021:5(2):111-124.

20. Mandelker G. Risk and Return: The case of merging firms. Journal of Financial Economics,1974:1:303-335.

21. Mangukiya z, Gondaliya D. A study on stock market performances of major indices of BSE. Zenith International Journal of Multidisciplinary Research,2021:11(6):13-29.

22. Md Isa AH, Puah CH, Yong YK. Risk and return Nexus in malaysian stock market:Emperical evidence from capm. Munich personal RePEc Archive, 2009, 12355.

23. Mehrara M, Falahati Z, Zahiri NH. The Relationship between systematic risk and stock returns in Tehran Stock Exchange using the capital asset pricing model (CAPM). International Letters of Social and Humanistic Sciences,2014:21:26-35.

24. Mohan Dm, Rao DA, Chakravarthi D, Rao PN. Risk & Return Anlysis With Performance Evaluation Of Selected Mutual Fund Schemes: An Empirical Study. International Journal of Aquatic Science, 2021, 12(2).

25. Moolbharathi M, Sugandi M. A comparitive study on risk and return analysis of selected companies with benchmark index in NSE. IJBMI,2021:10(10):4-13.

26. Palanismy K, Parthasarathy K. A study on comparitive analysis of risk and return with refrences to selected stocks of BSE SENSEX index, India. The International Journal's research journal of social science & manageent,2011:1(4):101-114.

27. Pandow BA, Butt KA. Risk and Return Analysis of Mutual Fund Industry in India. International Research Dynamics of Economics,2017:1(1):8-19.

28. Rui KX, Rasiah D, Yen YY, Ramasamy S, Pillay SD. An analysis of the relationship between risk and expexcted return in Malaysia stock market. International Journal of Engineering and Technology,2018:21(7):161-170.

29. Sehgal S, Mittal A, Mittal A. Dynamic Linkages between Brics and Other Emerging Equity Markets. https://www.scirp.org/journal/tel,2019:9:2636-2666.

30. Sujatha D, Maheswari MM. Examining the risk and return of selected stocks in BSE SENSEX. IJCRT,2021:9(10):7-b12.