

UNLOCKING THE SECRETS OF SENSEX RETURNS: THE CRUCIAL ROLE OF VALUATION IN DIFFERENT TIME HORIZONS

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Abstract

The study attempts to analyse the return generated by BSE Sensex for the past 24 years and the risk associated with investments in different periods. The study also explores the relationship between valuation ratios and Sensex returns. For this purpose, Sensex data (Index value, Price-earnings ratio, Price-to-book value) for 24 years (1998 to 2022) is taken. The data is analysed using Compounded Annual Growth Rate (CAGR) for different time periods along with standard deviation to assess the return and risk. The association between valuation ratios and index return is analysed using correlation analysis and ANOVA. The results show that risk of investment can be substantially reduced by increasing the holding period of security. The study also reveals that index returns will vary based on the valuation ratio at the point of entry.

Keywords: Index Valuation, Price Earnings Ratio, Price to Book Ratio

JEL Code : G11,G12

1 Introduction

Historically equity investments have performed better than any other asset class in India and across the world. Investors in equity will normally invest with an objective of capital appreciation and dividends. But the volatility in stock prices poses a significant risk for investors. Many times, low stock returns are associated with higher volatility (Bae et al., 2007). The volatility in the returns discourages investors from participating in the equity market. Identification of factors which drive stock return is always an area of research interest. Stock price movements are influenced by both fundamental factors and behavioural factors (Natthinee et al., 2020). Fundamental factors include metrics like leverage, capital efficiency, profitability asset utilisation etc. Behavioural factors are more complex in nature and difficult to predict. These factors often influence the valuation metrics.

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The valuation and growth of a company influence stock returns. Traditionally different valuation metrics such as Price-Earnings Ratio (P/E Ratio), Price-to-book Ratio (PB Ratio) and Enterprise Value/ Earnings Before Interest, Taxes, Depreciation, and Amortisation (EV/EBITDA) are considered for valuing a company on a relative basis. Growth is normally measured in terms of growth in revenue, earnings or cash flow. The market price of the stock can oscillate up and below its intrinsic value. The success of an investor lies in the ability to buy it below its intrinsic value and sell it above its intrinsic value. There is empirical evidence to prove that accounting-based fundamental financial strategy applied in high book-to-market stocks helped to improve the returns considerably (Piotrosky, 2000). If the investors are able to buy stocks below the intrinsic value the risk associated with investment can be minimised.

BSE Sensex is one of the most popular indices of Bombay Stock Exchange (BSE). It comprises 30 leading large cap companies from different sectors. The weightage of companies is determined based on the free float market capitalisation. Sectors like Financial, Energy, Information Technology Consumer staples are part of the current index. The upward or downward movement of index reflects the unpredictability in the stock market. The broad trend in the market can be captured through Sensex movement. The study intends to analyse the 24 years (July 1998 to June 2022) of BSE Sensex data to identify the returns generated by the index in different time periods. This period is long enough to reveal the depth and resilience of Indian market. In this period Indian market has gone through major shocks like Dotcom bubble (2000), Global Financial Crisis (2007-08) and Covid crisis (2020). The study can explore the opportunity and risk in staying back in the Indian market. This will enable the investors to understand the optimum time period required to generate the intended return. The study also explores the risk associated with an investment in each time period. The study also intends to identify the effect of different valuation ratios on stock returns. The important valuation ratios considered for the study are the price-to-book ratio and the price-earnings ratio.

It is important to recognise the influence of external economic events on market dynamics. Macroeconomic indicators, geopolitics and global economic developments can have a significant impact on both stock prices and market performance. Historical events have shown that financial markets are sensitive to external shocks. These events not only underscore the importance of market awareness but highlights the need for investors to

navigate and adjust to changing economic circumstances. By analysing BSE Sensex data spanning 24 years, this study aims to provide insights into the resilience of the Indian market and the optimal timing for desired returns. Furthermore, the study seeks to shed light on the relevant risks at different points in time, allowing investors to gain a fuller understanding of market dynamics to make informed decisions.

This study makes unique contributions to the existing literature. Firstly, it provides a comprehensive analysis of the BSE Sensex data over 24 years, capturing the impact of major economic shocks on the Indian market. Secondly, it explores the relationship between valuation ratios and stock returns, providing insights into the ideal timing for investment. Finally, the study's focus on the Indian market fills a significant gap in the existing literature, which has largely focused on developed markets. By probing the Indian market's resilience and risk dynamics, this study provides valuable insights for investors seeking to navigate the intricacies of emerging markets.

Objectives

The important objectives behind the study are

- to analyse the long-term return generated by equity index vis-à-vis the risk.
- to assess the impact of valuation on Sensex returns across time.

2 Literature Review

The relationship between valuation ratios and stock returns has been a subject of deep research for decades, Yu et al. (2023) explored the predictive power of these ratios for identifying investment opportunities and mitigating risks. They are derived from the concept of absolute and relative valuation models. The idea of intrinsic value, which denotes a company's actual value based on its potential for future growth and cash flows, is the foundation of absolute valuation. According to Damodaran (2012), the Discounted Cash Flow (DCF) model is a widely recognized framework for stock valuation. As per DCF, the intrinsic value of a stock is equal to the present value of its expected future cash flows, discounted at a suitable rate of return.

Relative valuation ratios, such as price-to-earnings (P/E), price-to-book (P/B), and price-to-cash-flow (P/CF), serve as proxies for measuring a company's intrinsic value relative to its

market price. Penman (2013) identified that a smaller valuation ratio often implies that a stock is cheap, whereas a greater ratio may signal overvaluation. One of the most popular valuation metrics is the price to earnings (P/E) ratio, which compares a company's stock price to its EPS. It indicates how much investors are willing to pay for each unit of a company's earnings. A lower P/E ratio may signal an undervalued stock, as investors are paying less for each dollar of earnings (Basu, 1977).

Fama and French (1992) found that the P/B ratio, which compares a company's market capitalization to its book value is particularly useful for valuing asset-intensive companies and can indicate whether a stock is trading above or below its accounting value.

Heer and Koller (2000) explained the significance of the price to cash-flow ratio (P/CF ratio) which measures a company's market value relative to its operating cash flow. It provides insights into a firm's ability to generate cash and its potential for future growth and profitability.

Research, by Basu (1983) and Johnson et al. (1989), established a relationship between earnings yield, price-earnings ratios, and stock returns. These studies confirmed that firms with high earnings yield and lower price-earnings ratios tend to generate superior returns, particularly among smaller companies. This early evidence suggested that investors could potentially enhance their returns by focusing on undervalued stocks based on these valuation metrics.

Based on this foundation, Piotroski (2000) investigated the role of financial stability and book-to-market ratios on stock performance. The research found that investing in financially stable companies with high book-to-market ratios could increase average returns, highlighting the importance of considering both financial health and valuation metrics when making investment decisions.

Further research extended the scope of analysis, examining the predictive power of valuation ratios across different firm characteristics and market conditions. Danielson and Dowdell (2001) identified price-to-book and price-to-earnings ratios as indicators capable of predicting the future cash flow pattern of firms, while also demonstrating that the operational performance associated with a given stock return varies among different firm life cycle stages (Growth, Mature, Turnaround, and Declining).

More recent studies have explored the limitations of traditional valuation models and the emergence of new approaches. Singh et al. (2016) found that the market outperformed the predictions of the Capital Asset Pricing Model (CAPM), suggesting that traditional models might not fully capture the potential for outperformance. Liu et al. (2018) examined the role of growth options in business valuation and their impact on forecasting potential shifts in valuation trends, suggesting that companies with growth potential might be undervalued by traditional metrics.

Sorge et al. (2020) analysed the Cyclically Adjusted Price-Earnings ratio (CAPE) and its predictability of US stock returns, reinforcing the importance of considering valuation ratios in long-term investment strategies. Dergiades et al. (2020) used a Mixed-Frequency VAR to examine the impact of four valuation ratios on the US stock market, finding that all ratios significantly influenced stock market returns at both long and short horizons.

Chattopadhyay et al. (2021) developed a framework linking accounting "valuation anchors" to anticipated stock returns, providing a more nuanced approach to valuation analysis that corrects for stale accounting data and accommodates variations in information quality. Lu et al. (2021) devised an early warning system for predicting stock market crises using market indicators and mixed-frequency investor sentiments, offering a valuable tool for mitigating risks in the market.

However, recent research has also identified challenges in relying solely on traditional valuation ratios. Choi et al. (2021) found that the book-to-market ratio has become increasingly detached from other valuation ratios and less effective in forecasting returns, suggesting that investors may need to consider alternative valuation metrics in conjunction with the book-to-market ratio.

3 Methodology

The study is conducted using the BSE Sensex data from July 1998 to June 2022 (24 yrs). The index readings are taken on a half-yearly basis. The compounded annual growth rate (CAGR) of index returns is calculated for diverse time periods (1 year/ 3 years /5 years / and 10 years).

The Price earnings ratio and the price-to-book ratio are the valuation ratios considered for the study. Price earnings ratio is a commonly used valuation ratio used to assess over valuation or under-valuation of a stock or index. It is the relationship between the market price of a

security and earnings per share or otherwise market capitalisation of a company and its net income. The price-to-book ratio is another common measure of valuation. It is the relationship between market price and book value per share or market capitalisation to shareholder's fund. Even though multiple factors contribute to higher or lower PE/PB ratios a higher PE/PB ratio is normally interpreted as over-valuation and a lower PE/PB ratio can be interpreted as a lower valuation. It is more relevant in the case of indices. Market cycles will influence the valuation of indices at different points in time. Analysing the relationship between market valuation and equity returns for different periods will help in understanding when to buy the stock/index and when to sell it. It also can help in deciding on a preferred holding period for security to minimise its risk. The relationship between valuation ratios and stock returns in different periods is assessed using correlation analysis. This will help in understanding the change in the effect of valuation ratios on stock returns at different periods.

To assess whether the entry at a lower valuation ratio generates a superior return, the index returns are classified into three categories (High, Medium, and Low) based on the valuation ratios (PE and PB) and the data is used to analyse any significant difference in the returns. These three groups of market return based on the low medium and high valuation ratios (PE and PB) are analysed using Analysis of Variance (ANOVA) to recognise whether there any significant difference in the returns.

The 24-year period (July 1998 to June 2022) captures diverse market cycles and allows a complete analysis. Analysing data across time provides a more comprehensive view of price movements across different market cycles. P/E and P/B ratios are chosen as they are widely used metrics to assess relative value and potential over/undervaluation. Analysing these specific time periods and valuation ratios aims to provide a holistic understanding of the relationship between market valuation and equity returns.

Hypothesis 1

H₀: There is no significant change in returns generated by index at different levels of PE Ratios.

H₁: There is a significant change in returns generated by index at different levels of PE Ratios.

Hypothesis 2

H₀: There is no significant change in returns generated by index at different levels of PB Ratios.

H₁: There is a significant change in returns generated by index at different levels of PB Ratios.

The hypothesis is tested at different time periods of investments

4 Data Analysis

The results of the analysis are given below.

Table 1: Index Return and Risk

	Stock Returns (Yearly)	Stock Returns (3 yrs)	Stock Returns (5 yrs)	Stock Returns (10 yrs)
Min	-52.45%	-12.29%	-0.86%	5.32%
Max	81.03%	45.38%	43.13%	19.12%
Range	133.48%	57.67%	43.99%	13.80%
Mean	16.13%	12.97%	13.71%	12.95%
Median	14.38%	10.96%	11.88%	13.35%
Standard deviation	26.46%	13.48%	9.65%	3.95%

The analysis of twenty-four years of index data shows significant difference in the risk-return dynamics in different time periods.

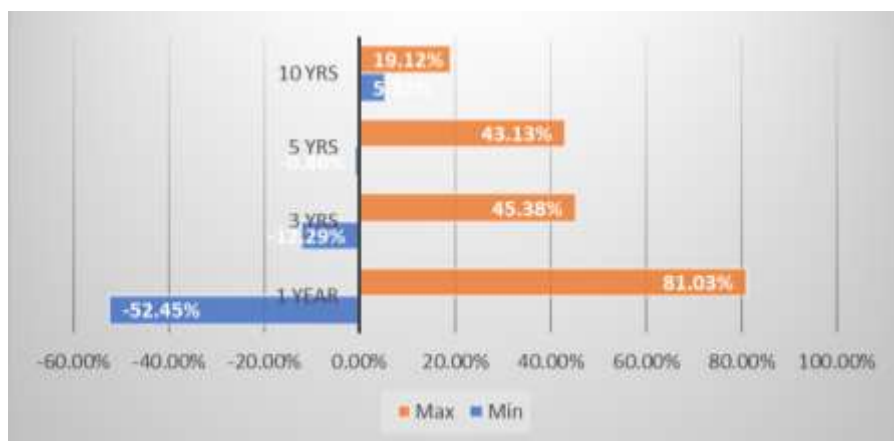


Figure 1 : Index Returns Minimum – Maximum

The maximum stock returns reported in the 24 years on a yearly basis was 81.03% and the minimum is -52.45%. The range, in this case, is 133%. But as the period of investment increases the gap between maximum and minimum values decreases resulting in a decrease in the range. The maximum return CAGR reported on a 10-year basis is only 19.12% and the minimum CAGR for the same period is 5.32%. Another important observation is the probability of negative returns decreases significantly when the investment time horizon increases to 5 years or more. In the period under study under no circumstances, investors have lost capital if the holding period is more than 10 years. The decrease in the volatility in market returns are gradual and consistent along with increase in the holding period.

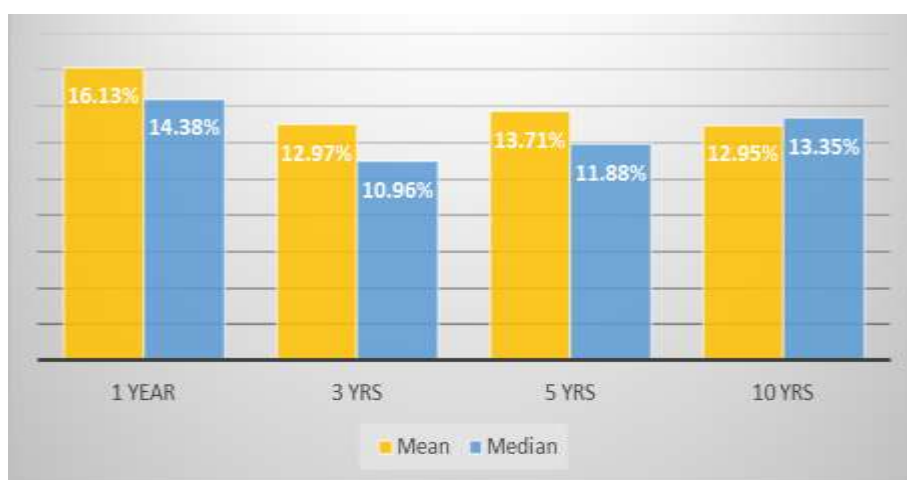


Figure 2: Index Returns Mean - Median

Median is a better measure of central tendency when the data is skewed. The mean and median return for one year holding period is 16.13% and 14.38% respectively and the same consolidates around 13% for both mean and median if the time of holding index is for 10 yrs.

The mean value of index return is hovering between 13 % to 16% and median is between 11% 13%. This is far superior than the risk-free return showing the capability of Indian markets to generate a high risk-premium. Even though Indian markets have performed consistently in long term the short-term volatility is making the investors doubtful about the market returns.

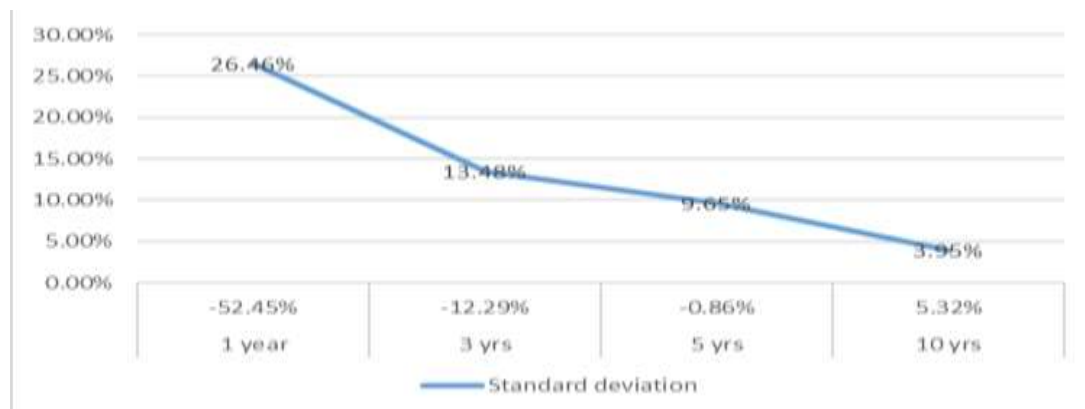


Figure 3: Standard Deviation

Standard deviation represents the degree of variation from the mean value. In equity investments this represents the volatility in return or risk. The noteworthy observation related to risk in this analysis is that the standard deviation in returns will decrease drastically as the time of holding increases. The maximum standard deviation (26.46%) is reported at 1 year period and the minimum standard deviation is reported at 10-year period. The trend in the reduction in standard deviation is consistent and significant. This explains the advantage of long-term investing over short term investing. This reinforces the significance of staying in the market. The long-term investors will be able to capitalise the compounding effect of market return at a significantly lower risk.

Table 2: Index Valuation

		1year	3years	5 years	10 years
PE	Max	32.77	29.39	29.39	29.39
	Min	11.65	11.65	11.65	11.65
	Mean	19.95	19.14	18.56	18.3
	Median	19.37	18.58	18.15	17.9
PB	Max	6.54	6.54	6.54	6.54

Min	2.16	2.16	2.16	2.16
Mean	3.25	3.27	3.3	3.46
Median	3.02	2.99	2.97	3.34

Table 2 shows the valuation BSE Sensex at different time periods. In the study period the maximum PE value reported is 32.77 and minimum value is 11.65. The lowest PB value in the study period is 2.16 and maximum PB value is 6.54. The mean and median value of Sensex is between 18 to 20 across different time periods. The mean and median PB values are between 2.97 to 3.46. This data helps in identifying the under valuation and over valuation of index. It will help in understanding oversold and overbought territories of the market. Investors can take logical decision using this information.

The correlation matrix (Table 3) shows the relationship between valuation ratios (Price Earnings Ratio and Price to Book Ratio) and stock returns. The Price-earnings ratio shows a medium negative correlation with returns across the time periods but the Price-to-book ratio explanatory power increases as the time of investment increases. The PB ratio shows very high negative correlation with returns at 10-year period. This shows that buying the index at

Table 3: Correlation Matrix

Index Returns	PE	PB
1 Year	-0.5272	-0.3620
3 Years	-0.4309	-0.3510
5 Years	-0.4883	-0.5333
10 Years	-0.5333	-0.7611

lower valuation ratios are capable of generating higher returns.

Table 4: ANOVA

	1 yr		3 yrs		5 yrs		10 yrs	
	<i>P-value</i>	F	<i>P-value</i>	F	<i>P-value</i>	F	<i>P-value</i>	F
PE	0.007418	5.523625	0.005288	6.014622	0.005517	6.028864	0.002961	7.493474
PB	0.021781	4.197539	0.046211	2.912983	0.0006	9.182023	0.000563	10.38473

The above given (Table 4) is the statistical test results of the Analysis of Variance of groups formed based on high, medium and low valuation ratios (PE and PB). The null hypothesis is rejected as the p-value is below statistically significant levels. The results show that valuation (both PE and PB) influences stock returns. There is a significant difference in the returns generated if the investment is low medium or high valuation.

The study's conclusions, which highlight the significance of long-term investing and valuation knowledge, are consistent with those of earlier studies. For example, value stocks—stocks with lower P/E ratios—tend to do better than growth stocks—stocks with higher P/E ratios—over the long run, according to a study by Fama and French (1993). Furthermore, research by Basu (1983), Johnson et al. (1989) and Graham and Dodd (1951) emphasised the significance of purchasing equities below their true value.

Gaining insight into valuation ratios such as P/E and P/B can help investors in recognising situations when the market may be overvalued or undervalued. The results show that buying at lower values can result in higher returns. The significance of market timing is further highlighted by the study's findings. Even though it's hard to time the market perfectly, investors can use valuation ratios to help them decide when to enter and quit the market. Portfolio performance can be improved by purchasing at lower valuations and selling at higher prices.

5 Practical Implication

The research provides investors with practical understanding of the risk-return dynamics of equity investing over different time periods. It demonstrates that return volatility tends to decrease as the investment horizon increases, supporting the core idea of risk management in long-term investing. A long-term perspective is advantageous for investors who want to generate steady profits since it effectively reduces the danger of capital loss by staying in the market for comparatively longer periods of time. This research highlights the benefits of long-term investment techniques and offers factual proof of their effectiveness.

The analysis of the P/E and P/B ratios of the Sensex index in relation to historical averages provides insightful information about whether the index is overvalued or undervalued. With this information at their disposal, investors may determine when the market may be

overbought or oversold and use that information to decide whether to enter and exit their investments.

From a wider angle, the study has useful ramifications for regulatory agencies and legislators. Through illuminating the dynamics of valuation ratios and their capacity for forecasting, policymakers can acquire a better understanding of market efficiency and possible hazards associated with mispricing. This knowledge may be used to guide the creation of laws and rules that will increase market transparency, safeguard investor interests, and maintain a sound financial system. The results of the study can also be useful to other stakeholders, like market analysts, portfolio managers, and financial advisors. By using the findings, these professionals may improve risk management procedures, invest more strategically, and give their clients and constituents better advice.

6 Limitations

Though the study offers insightful information, there are a few limitations to take into account. A significant constraint is that the analysis is limited to the BSE Sensex, which limits its relevance to other significant indices or specific equities. The efficacy and predictive capacity of valuation ratios may be impacted by the differences in the dynamics and features of various indices as well as individual stocks. To improve the generalisability of the results, future study should expand the scope by looking at a wide range of indexes and individual companies across different sectors and market capitalization levels.

Although the 24-year period under study is relatively long period, it might not fully account for all market cycles and economic developments that could have an impact on the correlation between valuation ratios and stock returns. Due to their intrinsic complexity, market cycles can be impacted by a wide range of variables, such as investor sentiment, regulatory changes, geopolitical developments, and economic situations. An extended period of time covering many market cycles and economic regimes may offer a more thorough comprehension of the enduring patterns and possible cyclical tendencies in the valuation measures' forecasting capacity.

Moreover, the P/E and P/B ratios—which are popular and significant—may not cover all of the valuation signals that investors can access, despite their widespread use. Price-to-sales,

price-to-cash-flow, and enterprise value multiples are a few other valuation indicators that could provide further information and strengthen the analysis's validity.

Although the statistical procedures employed in the study are sound, it is important to keep in mind that they can have underlying assumptions or restrictions that affect the precision and dependability of the findings. Other modelling strategies or statistical techniques could be investigated to support and validate the results.

7 Future Research

Comparative research with foreign markets may offer insightful information about the trends and variations in the worldwide market. Additionally, there are opportunities to do sector-specific analysis and investigate how valuation ratios and returns relate to one another in other industries. This could provide insightful information for investing plans tailored to a certain industry. Furthermore, incorporating the ideas of behavioural finance into the analysis may lead to a better comprehension of investor psychology and how it influences market behaviour.

8 Conclusion

The results of the study reinforce some of the previous findings. The results show that Sensex has created superior returns in the period of study in comparison with other asset classes. The consistency of returns improves along with the time. The results display that the investors will be able to reduce the risk substantially if they increase the investment horizon. The results also establish the association between index valuation at the time of entry and the stock returns. The relative out performance or under performance of index based on valuation can be explained in the context of investors over reaction (De Bondt, W. F., & Thaler, R. H. 1987). There is a substantial difference in the mean return based on the valuation ratio at the time of entry. The study will help investors to take investment decisions by optimising the risk-return aspects.

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