Original Research Article

Risk and Return Analysis of Sectoral Indices in context of Bombay Stock Exchange

Abstract

For an investor, in making decision about the investment, risk and return plays an important role. The risk and return are inter-related, normally, if the return is small, the risk will also be low and the higher risk will be associated with higher return. The investments in stock markets are risky in nature as it was observed in the performances of several assets. Therefore, it is up to investors that what level of risk could be beard for getting the desired return. Therefore, for smarter decisions, risk and return analysis should be performed before making investments. In the present study an attempt is to be made to analyze and compare the risk and return relationship in the context of Bombay Stock Exchange using the data of selected Sectoral Indices listed in S&P BSE 500 Index. The results revealed that the Indices having higher returns had low risk while the Indices having low returns had higher risk showing weak negative linear relationship between the two variables. It was also obtained that there is no significant difference among the Market returns and the monthly returns of the Indices.

Keywords: *Risk, return, Sectoral Indices, S&P BSE, Market returns.*

1. Introduction

Prices of an asset, fluctuating within minutes, are determined by the supply and demand of an asset which is caused mainly due to the high degree of volatility. To encounter and accomplish the financial objectives, the investors and traders trade on various financial securities in the stock market. Investing in stock market involves upcoming unpredictability which is also known as the risk which every investor has to come across in exchange for the expected returns. Thus, in stock market an investment consists of both the risk as well as returns.

One of the main questions that arise at the time of investment is where to invest? It is upon the desired return and risk tolerance of an investor in selecting the investment area as there are various alternatives present such as stock market, chit fund, insurance, bullion, banks, real estate etc. One of the important indicators which shows the economic performance in a country is stock market, thus investing in stock market occupies a distinct position as it offers an investor the good opportunity to earn higher return in

short period of time. Risk and return are the two important aspects associated with investment. The aftereffects of global economic crisis during the period 2007 to 2010, the concept of risk and return gained the popularity. The term return refers to the income earned from a security after a defined period of time whereas the risk refers to the uncertainty over the future to get this return. The two main forms of risk associated with investment are systematic risk and unsystematic risk. The risk and return are highly interrelated concepts in investment. It is assumed that if the return is low, the risk associated is also low whereas if the return is high then the risk associated will also be high. Thus for better investment decisions, risk and return analysis is performed which is very beneficial for the investors.

There are two main stock markets in India namely, Bombay Stock Exchange (BSE) and National Stock Exchange (NSE). BSE, being the oldest stock exchange in Asia, is also one of the fastest stock exchanges in the world. The previous studies were mainly based on the performance of different securities/companies listed either in BSE or NSE but this study primarily focused on the performance of the Sectoral Indices listed in S&P BSE with an emphasis on the monthly return of individual Indices and the risk associated with it. The S&P BSE 500 (market return) has been used as the benchmark for the study.

2. Literature Review

Vikkraman and Varadharajan (2009) examined the risk and return analysis using the historic data of companies listed in NSE for the period from January 2004 to December 2007 and found high correlation in long period of time. **Bahl and Rani (2012)** examined the performance and comparison of the risk and return of selected stocks listed in BSE and obtained that all the schemes had positive returns and 14 out of 29 schemes performed better than the benchmark return. The Sharpe's ratio as well as Treynor's results showed the performance better than the market. S**harma and Bodla (2012)** examined the risk and return trade-off for South Asian countries like India, Sri Lanka, Bangladesh, Pakistan, Nepal and Maldives and found complicated relation between high returns and rational risk. It was also obtained that Indian stock market emerged as preferable avenue for global investors and Bangladesh and Sri Lanka also was a good choice as investment avenues. **Setiawan and Oktariza (2013)** examined the risk and return relationship of Syariah and conventional stocks listed in Indonesia Stock Exchange for the period from 2009 to 2011 and could not find any significant relation between risk and returns. **Fard et al. (2014)** examined the risk and return analysis of bullish and bearish market using 'A-Y Model'. The result of the study did not found any reliable relation between the expected return of portfolio and risk but using the 'A-Y Model', the performance appears to reduce risk and increase the return of portfolio. **Patjoshi (2016)** examined the relationship between risk and returns of Sensex and banking stock for the period from January 2001 to December 2015 and found statistically significant association between Sensex returns and banking stock returns except for Axis Bank. **Patjoshi and Nandini (2020)** performed the study to analyze the risk and return of Sensex and different steel sectors listed in BSE and obtained that there is

significant difference between returns of Sensex and steel companies except one company i.e. JSW steel. **Lobo and Bhat (2021)** examined the risk and return analysis of selected financial investment companies listed in S&P BSE Finance Index for the period from January 2020 to July 2021 and obtained that the higher risk yields higher returns. **Suryadi et al. (2021)** performed the study to analyze the risk and return of Islamic stocks listed in Jakarta Islamic Index (JII) with the conventional stocks listed in Indonesian Stock Exchange (IDX) and obtained that the performance of Islamic stocks was better than the conventional stocks.

The objectives of the present study was to analyze and compare the risk and return in context of Bombay Stock Exchange and to check whether the expected rate of return is linearly related with the stock beta i.e. its systematic risk.

3. Data Description and Methodology

The study was conducted using the data, secondary in nature, listed in S&P BSE 500 index taken from BSE for a period of 10 years ranging from April 2011 to March 2021. The data of 10 Sectoral Indices represented as Index 1, Index 2, Index 3 etc. (namely S&P Auto, Bankex, Capital Goods, Consumer Durables, Metal, Oil & Gas, Power, PSU's, Realty, Teck) were considered for which the data was available for the entire period.

The monthly returns (R_{it}) of stocks were calculated using the formula:

$$R_{it} = \frac{P_{1t} - P_{0t}}{P_{0t}} \qquad (1)$$

where, P_{0t} denotes previous closing price of stock, P_{1t} denotes current closing price of stock.

Similarly the returns of the market (R_{mt}) were calculated using the formula:

$$R_{mt} = \frac{P_{1t} - P_{0t}}{P_{0t}} \qquad (2)$$

The beta(β) of the Indices was obtained using the given model:

$$R_{it} = \hat{\alpha} + \hat{\beta}_i (R_{mt}) + \mu_t \qquad (3)$$

where $\hat{\alpha}$ denotes the intercept term, $\hat{\beta}_i$ denotes the estimated beta(β) of index i,

The product moment Karl Pearson's correlation coefficient was used to test whether the two variables i.e. return and risks are linearly related or not. Based on the first objective, we have tested the null hypothesis stating that there is no statistically significant difference between the market returns and the Sectoral Indices against the alternative hypothesis stating that there is statistically significant difference between the market returns and the Sectoral Indices.

4. Results and Discussion

Table 1: Descriptive Statistics of the monthly returns

	Mean	Maximum	Minimum	Std. Dev.	Skewness	Kurtosis
Index 1	0.004	0.214	-0.299	0.082	-0.09	3.99
Index 2	0.007	0.242	-0.323	0.089	0.174	4.193
Index 3	0.009	0.194	-0.22	0.063	0.044	3.765
Index 4	0.013	0.277	-0.211	0.07	0.549	4.732
Index 5	0.0001	0.235	-0.258	0.072	0.289	4.529
Index 6	0.002	0.347	-0.37	0.104	0.099	4.151
Index 7	-0.002	0.239	-0.317	0.071	-0.625	6.298
Index 8	-0.001	0.236	-0.352	0.08	-0.39	5.946
Index 9	0.004	0.191	-0.266	0.07	-0.703	5.011
Index 10	0.008	0.173	-0.158	0.052	0.163	4.176

The results revealed that average monthly returns for all the indices obtained are positive except Index 7 and 8. The highest average monthly return was obtained for Index 4 and minimum average monthly return was obtained for Index 7. The standard deviation (SD) close to 0 (low SD) indicates that the data points are close to mean (more stable and less volatile) whereas SD far from 0 (high SD) indicates that the data points are away from mean i.e. data points are more spread out (more fluctuations and more volatile). The SD obtained for all the 10 indices are close to 0, hence close to mean. From table 1, the SD of Index 10 obtained is 0.052 which is lowest which means it is more stable and less volatile whereas SD of Index 4 obtained is 0.104 which is highest which means more fluctuations and less volatile. The skewness value obtained for Indices 1, 7, 8 and 9 obtained are negative which means frequent low returns or high risk. The skewness value obtained for Indices 2, 3, 4 5, 6 and 10 obtained are positive which means low risk and high returns. The kurtosis value of 3 represents the normal distribution. The kurtosis value obtained for all Indices are greater than 3 which means leptokurtic. In finance, the assets/sectors having leptokurtic distribution are considered to be risky whereas assets/sectors having mesokurtic distribution are considered to have moderate risk. (Table 1)

Considering the returns data with market return as independent variable, the beta of the individual indices were estimated using equation 3. The range of beta obtained is 1.339 with the minimum value 0.480 and maximum value 1.819. (Table 2)

Table 2: Average returns and beta (β) of the selected Sectoral Indices

Indices	Return	Beta(β)	Rank of Returns	Rank of Beta(β)	Correlation
Index 1	0.004	1.474	6	2	-0.215

Index 2	0.007	1.148	4	6
Index 3	0.009	1.400	2	3
Index 4	0.013	0.999	1	9
Index 5	0.0001	1.119	8	7
Index 6	0.002	1.013	7	8
Index 7	-0.002	1.233	10	4
Index 8	-0.001	1.219	9	5
Index 9	0.004	1.819	5	1
Index 10	0.008	0.480	3	10

The beta value obtained for all Indices are greater than 1 except for Index 4 and 10. The beta value greater than 1 means the asset is more volatile than the market. The beta value of 1 means the asset is as volatile as the market. The beta value less than 1 but greater than 0 (except Index 4 and 10) means the asset is less volatile than the market. The higher the value of beta, the riskier is the asset.

Also it can be seen that the index having higher returns have lower beta and lower returns have higher beta. The correlation coefficient value obtained is -0.215(weak negative relationship) which means as the value of beta increases, the value of returns decreases and vice-versa. (Table 2).

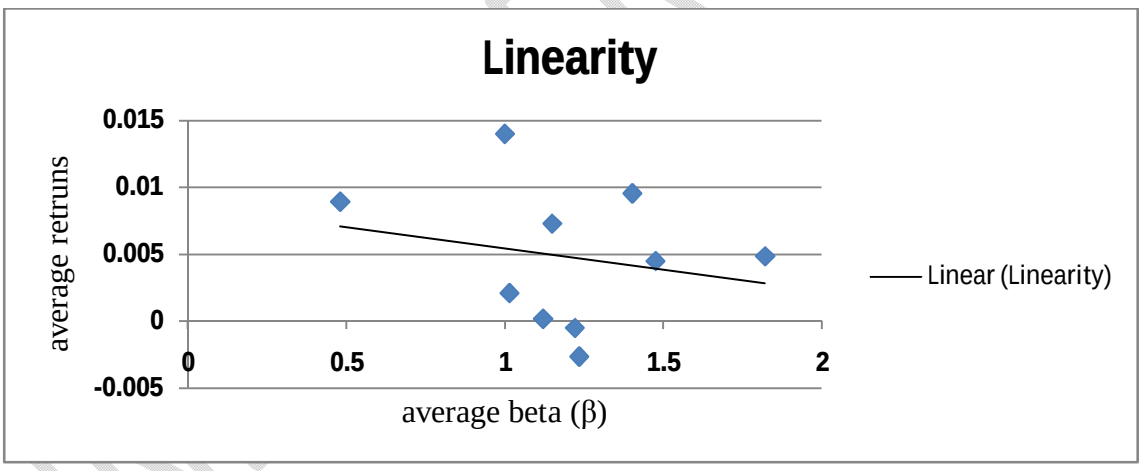

Figure 1: Plot for average returns against average beta

The plot showed a weak negative linear relationship between the average beta (risk) and average return. The negative slope of the trend line shows weak negative relationship as the data points are more scattered about the trend line. (Figure 1)

The average monthly returns of Market obtained are greater than all the Indices except for Index 10, which means that all the other Indices provided lower returns than the Market Returns. Also the variance

of Market (0.0027) is lesser than all the other Indices except for Index 10 which reports that Market returns are more reliable than the Indices. (Table 3)

Table 3: T-Test analysis of market returns and Sectoral Indices

	Mean	Variance	t statistic	p value
Index 1	0.0045	0.0068	-0.305	0.3801
Index 2	0.0073	0.0051	0.009	0.4964
Index 3	0.0095	0.0064	0.2673	0.3947
Index 4	0.013	0.0049	0.8469	0.1989
Index 5	0.0001	0.0079	-0.747	0.2277
Index 6	0.0021	0.004	-0.684	0.2473
Index 7	-0.0021	0.0052	-1.213	0.113
Index 8	-0.0013	0.005	-0.964	0.1678
Index 9	0.0049	0.0108	-0.222	0.412
Index 10	0.0089	0.0026	0.2534	0.4001
Market Returns	0.0072	0.0027		

The p-value obtained for all the Indices are greater than 0.05, hence we accept our null hypothesis stating that there is no statistically significant difference between the average monthly market returns and the returns of the selected Sectoral Indices. (Table 3)

5. Suggestions

Following are the suggestions from analysis which an investor should keep in mind:

1. It is suggested that if an investor wants positive returns with lower risk then those stocks/sectors should be chosen whose beta is less than 1 because the stocks/sectors having beta value less than 1 are considered to be more defensive.
2. From the results of the study, it is suggested to investors that investing in Index 2, 3, 4, 9, 10 etc. would be suitable as they generated positive returns as compared to Index 7 and 8 as they generated negative returns.
3. An investor could prefer to invest in positively skewed securities (Index 2, 3, 4, 10 etc.) as the higher returns obtained may counterbalance the frequent low risk suffered. However, an investor may also choose to invest in negatively skewed securities (Index 1, 7, 8 and 9) if they prefer regular small returns over few big risk.
4. Based on the observations for the period under study, an investor could invest in Index 3, 4, 10 etc. as they generated higher returns while having lower risk.

5. An investor before investing should conduct elementary analysis of risk and returns instead of depending totally on technical analysis.

Availability of data and materials: The data used in the study that support the findings of this study have downloaded from BSE (https://www.bseindia.com/indices/IndexArchiveData.html) and RBI (https://www.rbi.org.in/Scripts/BS_NSDPDisplay.aspx?param=4) websites which is publically accessible.

Conclusion

Risk and return are interrelated concepts and important before any making investment decision. For making the decision better, an investor should perform the risk and return analysis. The present study compared and analyzed the risk and return relationship in the Indian stock market using the data of selected Sectoral Indices listed in S&P BSE 500 Index. It was concluded that the Index 4 obtained the highest return but lower risk. The return obtained by Index 7 was the lowest but higher return. In other words, the Index 9 having highest risk obtained the lower return and the Index 10 having the lowest risk obtained the higher return. These results contradict the assumption of CAPM. The correlation coefficient between the risk and return obtained was -0.215, which means weak negative correlation. As the value of beta increases slightly, the value of return decreases slightly. From the t-test results, it was revealed that there is no significant difference between the market returns and the monthly returns of the Indices.

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