

# An Empirical Examination of the CAPM on BSE SENSEX Stocks

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**Abstract:** Investment plays a significant role in the modern economy. The investor understands the importance of investment in wealth creation. But real causing problem for investor is prediction of risk to have assured return in each company shares. It has understood that minimizing the systematic risk is always difficult than unsystematic risk. If we look in to the earlier study done by many researchers, we find that CAPM model would be right technique to know the risk and return relationship in any stock. With the point of view of significance and reliability of CAPM model, we have used CAPM techniques to conclude the results. The first model developed by William Sharpe and other scholars supporting to this model has been used to test the results. This study investigates the validity of CAPM on BSE 30 companies from BSE website. The study considered closing price of 30 companies of BSE stock market from January 2009 to December 2018.

**Keywords :** Investment, BSE Stock, Closing price, wealth creation, CAPM model .

## I. INTRODUCTION

The objective of asset pricing theory is to forecast the functional relationship between stock prices and pricing factors. Sharpe (1964), Lintner (1965) and Mossin (1966) proposed CAPM and it is considered as one of the foremost pricing models in finance literature. The CAPM explain the linear structure between systematic risk and expected return which is symbolically measured as market beta. Beta measures the volatility of the security. Further, the theory assumes that market participants have same level of information; investor can buy and sell risk free class of asset and securities are perfectly marketable with no transaction cost and no taxes. An investor can have high expected return only with high risk apatite. There are several empirical studies criticize CAPM model as it considers market beta is the only the factor in pricing the asset. The critics claim that market beta is not adequate enough to explain the systematic risk. In addition to market beta, other variables such as leverage, price earnings ratio, firm size, book-to-market ratio are also considered and empirically tested by Basu (1977,1983) Fama & French(1992) and others. In spite of many critics, CAPM is still considered one of the important pricing models in modern finance. Any investor expects high return with minimum risk. Investors therefore, maintain a balance between risk and return to minimize the risk and

maximize the return in the process of wealth creation. Meanwhile, in the emerging markets the application of CAPM model brings the positive or negative relationship because of the fact of countries and its company's fundamental factors.

The CAPM model helps to find out securities price after considering its relative risk and stock returns. In CAPM risk factor occurs in two ways such as systematic risk and unsystematic risk. It is difficult to estimate the systematic or market risk because this arises due to external market variable which has the direct control over the ups and down of the economy, indirectly it affects on security prices. The beta co-efficient is the measurement for the market risk which opens up sensitivity of relationship between stock return and market return.  $\beta$  has the greater power of predicting the expected return. The well set of diversification of investment is the main idea behind CAPM theory and that strategy makes to minimisation of risk. This is because a well diversified security reduces the risk and creates well diversified portfolio. It is obvious that emerging markets results with higher return on its securities due to innovation and technological up gradation in the business.

## II. LITERATURE REVIEW

The related literatures are reviewed in this section. Elshqirat & Sharifzadeh (2018) analysed the implication of multi factor capital asset pricing model on Jordian stock market. The sample period is between 2000 to 2015. The study found that only operating leverage has the signifince in changes of expected return. Sreenu, (2018) examined the CAPM model by taking stocks of NSE and fama's three factor model by taking of BSE and NSE stocks. The study found that values of alphas has no equalence to risk free value and there is a significant difences in movement of stock return and risk. Iwaki, (2018) studied the equilibrium of CAPM under the condition of ambiguity in the economy of exchange. The study found out that an excess return in the equilibrium is the result of state price density (SPD) which finds the price of each assets. Karp & Vuuren (2017) tested the validity and accuracy of CAPM model Fama French Three Factor model on Johnnesberg stock exchange. The results reveals that due to some of the economical, stock market restrictions both the models shows the negative poor performance. Karak o c (2016) investigated the relationship between stock beta and profit of Istanbul Stock Exchange. The results show that CAPM can explain the variation in stock returns. The study found that there is a non-linear relationship exists between security return and beta variables. Chaudhary (2016) analysed the suitability of CAPM in the pre and post financial

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period. The logarithmic return model, market model, cross sectional regression has used to test the validity of CAPM model. The result reveals that alternative model are needed to price the assets than CAPM model. Alam et. al (2015) examined the applicability of CAPM model in Chittagong Stock Exchange. The Sharpe-Linter model 1964 is applied and the result shows that at normal risk level the difference between expected return and actual return is very high therefore the validity of CAPM in CSE is ruled out. Bajpai & Sharma (2015) empirically examined the CAPM in the Indian equity market as well as comparison made between developed model and traditional model for asset pricing. The study reveals that CAPM has greater implication on Indian equity market as well as it is found that developed model performs better than traditional model. Li, Gan, Zhuo, & Mizrach, (2014) empirically analysed the applicability of new model to test the relevance of CAPM model. The sample data for the study is taken from returns of Fama and French 25 portfolios. The study found that with non-normal error distribution and E-GARCH type volatilities' the CAPM is not showing its relevance since they can have only alpha returns. Smith & Walsh (2013) empirically studied importance CAPM model for the present scenarios half right and half wrong. The study found that time value of the money, diversification and arbitrage system is the decider of the risk and return of particular stock. Yu, (2012) investigated the functioning of asset pricing system. It argued the fact of single factor model fails in deciding the appropriate price of share. The study found that by knowing the proper opportunity cost or discount factor CAPM results with right asset investment. Levy (2010) empirically studied the validity of CAPM model and M-V rule. The study found that as per behavioural economists and psychologists framework there is a strong relationship exists between return and risk of security. Fama & French (2004) empirically studied irrelevance of CAPM theory with supportive evidences. The sample data is obtained from CRSP. The monthly returns portfolio of stock from NYSE, AMEX, NASDAQ stock exchanges has accessed. The ten stock return portfolios have constructed. The sample period was taken between 1928-2003. The time series regression model is used to test the results. The study result found that there was a nonlinear relation exist between stock returns as well as beta. Lewellen & Nagel (2003) analysed the validity of conditional CAPM on asset pricing anomalies. The study used three long-short portfolio of NYSE and AMEX stock. The sample period taken for this study is 1964-2001. The short window regression is used to test the data. From the study found that beta varies time to time and conditional CAPM performs as bad as unconditional CAPM. Ansari (2000) studied empirical evidences of CAPM from Indian Market. By examining content and scope of the model the author concluded that evidences are not sufficient to draw conclusion on the use of CAPM model in the Indian context. Further the author opined that one should understand the limitation of studied model. Heaton & Lucas, (2000) examined the relationship between entrepreneurial income risk as well as portfolio choice and asset prices. The sample data for the study is obtained from the survey of consumer finances for the years 1989, 1992 and 1995. With the help of descriptive statistics mean, variances are found. The tax

model and SCF model is used to verify the results. The study found that entrepreneurial income risk has positive relationship on portfolio risk and asset prices. Barber & Lyon (1997) examined the relationship between size, book to market security returns for financial and non financial firms. The data is taken from Center for Research in Security Prices (CRSP) AMEX, NASDAQ, NYSE monthly returns. The study period is between July 1973 to December 1994. Fama French Model of 1992 approach has used to test the data. From the study it is concluded that there is a similar relationship exists between financial and non-financial firms especially in terms of security returns. Campbell (1996) studied the depth of risk and return concept. The two sets of data has used for the study. In the first data set monthly return has taken from January 1952 through December 1990 considering 468 samples and in the second data set annual return run from 1871 through 1920 took 120 samples. Vector autoregressive approach, generalised method of moments approach is applied to find the asset pricing model. The data has obtained from Center for Research in Security Prices (CRSP) and Citi base. The study found that the coefficient of relative risk aversion is much larger than the price of stock market risk. Daniel & Titman (1996) examined practicality of cross sectional behaviour on changes in stock returns. The study revealed that it is firms characteristics is the main reason for the variation in the stock returns than the factor loading variables. Fama & French (1996) studied the CAPM and its validity on positive or negative relationship between expected stock returns and market beta. It supports that survivor bias cannot describe the relationship between stock returns and BE/ME. The data period consists of 1928-1993. The NYSE stocks has considered to test the results. The bivariate cross sectional regression method is used. The study reveals that CAPM hypothesis cannot be justifiable here. Jagannathan & Wang (1996) empirically examined the cross sectional variations in the unconditional expected return on different assets, conditional CAPM, and significance of human capital to measure the stock returns. The data for the study is value weighted portfolio of all non financial firms stocks, listed in NYSE, Amex is used. It is obtained from CRSP. The sample period is from 1962-1990. The Premier-Labour model, cross sectional regression method is used to test the results. The study found that conditional CAPM does better than unconditional CAPM. Chan et al (1995) investigated about sample selection bias has any variations in returns between high book to market ratio and low book to market ratio. The data for the study has taken from the quintile of the largest NYSE-Amex companies. The sample period is from 1968-1991. The study reveals that sample selection bias is due to the presence of foreign and non primary issues on CRSP is the main reason for the deviation between CRSP and Compustat. Porta et. al (1995) investigated the implication of expectational errors in explaining the superior return to value stocks. The sample data is between 1971 to 1992. The data has obtained from CRSP and COMPUSTAT data file. The stocks of NYSE, Amex, and NASDAQ firms are included. The Fama French (1992), Fama Mac Beth (1973) and LSV (1994) approach has used to test the data. The study found that value stocks

superiority in returns are due to the fact of expectational errors in future earning factor. Baur et al. (1994) reviewed the paper relating to the issues of Capital market in India. This review has given information about how systematically one can find the answer for research problem and what are the limitations facing by the researcher. From the study it is found that areas like option pricing, agency theory, signalling theory are research gaps available for researcher. Davis (1994) analysed the cross section of stock returns on fresh data base. The time period taken for this study is July 1943 to 1963. The annual data has collected from Moody's Industrial Manulas as well as monthly stock data from NYSE and Amex stock exchanges. The univariate and bivariate regression method has used to check the data. The study found that book to market has the strong explanatory power to explain stock returns than other factors like earning yields, historical sales growth. Lakonishok et al. (1994) examined the strategies of value stocks which produces higher returns. The sample period is between the April 1963 to April 1990. The sample data has obtained from CRSP data base and NYSE, Amex stock returns have used for the study. The ratio analysis, behavioural analysis, regression method, extrapolation method, contrarian model is used to test the results. The study found that value stocks are not risky one but due to the suboptimal behaviour of investors it gains higher returns than glamour stocks. Chan & Lakonishok (1993) analysed the significance of Beta on changing environment as well as betas impact on stock returns. The sample for the study is taken from CRSP first 3 years monthly observation from Amex and NYSE stocks. The monthly sample period consists between 1926-1991. The market model regression method is used to test the results. The study found that even if beta and stock returns are related to each other, there a selected time period is also the reason for the stock prices. Jegadeesh & Titman (1993) studied the strategies to gain returns in stocks in short term holding period. The sample data is obtained from CRSP daily stock return file, The sample period consists of 1965 to 1989. The acceptance of hypothesis is done based on t-statistics. The study reveals that hypothesis is consistent with delayed price reactions to firms specific information. French (1993) investigated the various risk aspects on stock and bond returns. The sample data has taken from CRSP data base and NYSE, Amex, NASDAQ stock returns has considered. The sample period consists of 1963-1990. The time series regression model of Black, Jensen and Scholes (1972) is used. The study reveals that for stock returns three market factor is responsible and in bond returns two structured risk factors are involved. Fama & French (1992) analysed the cross sectional relationship between average return and market beta. It also studies the application of SLB model. The sample period taken for the study is 1962-1990. The data has obtained from CRSP, of NYSE, Amex, NASDAQ stock returns. To test the result Fama and MacBeth cross sectional regression approach has used. It is concluded that beta does not have explanatory power on stock returns. Even as per SLB model it is found that it is unable to explain average stock return. Fama, (1991) examined the market efficiency hypothesis. The data for the study is obtained from CRSP, daily stock data of NYSE and Amex stock exchange. The period is used between 1962 to

1985. To test the results SLB model as well as multi factor asset pricing model has used. The study found that event studies has the greater contribution towards risk adjusted stock prices accordingly stock return performance varies. La & MacKinlay (1989) examined involvement of data snooping bias in one particular method of financial asset pricing model. With the help of Monte Carlo experiments as well as simulation method results have verified. F-statistics is also applied to check the significance level. It is found that differences between returns on equity shares cannot be judged only through data snooping analysis. Ritter & Chopra (1989) analysed the portfolio rebalancing and the turn of the year effect. This study supports the fact that there is a linear relation exists between risk and return in small firms specially in the month of January. The sample period consists of 1935-1986. The sample has taken from CRSP data base and NYSE securities are used to test the results. The ordinary least square method and the CRSP value weighted portfolio index is used. The study found that there is positive relationship between return and risk of small firm in the month of January irrespective of market return direction. De Bondt & Thaler (1987) examined overreaction of investors and its impact on stock prices as well as season wise stock returns. The sample data of NYSE stocks has used. The time period for the study is between the 1926 to 1982. The regression method as well as statistics has used to test the data. The results concludes that there is a inconsistent hypothesis in firms size and differences in risk factor. Merton (1987) investigated on validity of CAPM with incomplete information. The data for the study is obtained from Compustat data base. The data of market value and market value per shareholder has been considered. The sample data of 1387 firms been used. The cross sectional study is applied to verify the results. The study concluded that incomplete information diffusion has significant contribution towards equilibrium expected returns on smaller firms. Lakonishok & Shapiro (1986) investigated relationship between stock returns and other variables like beta, size and standard deviation. The study period is between 1954-1981. The sample data is all stocks traded in NYSE is used. The generalising linear asset pricing model as well as cross sectional regression method is used to test the results. The study revealed that only size of the firm is the deciding factor for stock returns.

Bondt & Thaler (1984) empirically analysed that if violation of rules by the investor in the stock market has any impact on movement of stock prices. The sample data has obtained from NYSE its monthly returns of common stocks. The study period is between January 1926 to December 1982. The t-statistics has used to accept the hypothesis. The result found that it is consistent with overreaction hypothesis. Stambaugh (1982). The study examined the sensitivity in the test of CAPM in the set of assets. The sample data is taken from NYSE, value weighted monthly stock returns. The study period is between February 1953 to December 1976. The Monte carlo test, the Wald test and the Lagrangian tests were used. The study revealed that CAPM is more sensitive to select the assets than the composition of the market index. Dybvig & Jr (1982) empirically analyses mean variance theory on complete markets. To prove the

study they have considered economy with a single good for consumption and investment. The study found the failure of CAPM model on financial assets and success of CAPM on primary asset. This is the fact of unconstrained pareto-optimal allocation of risk varies in these two assets. Reinganum, (1982) empirically examined Roll's conjecture that because of size effect estimation of beta will not result with right estimation. The study concluded that direction of the bias in beta estimation is consistent with Roll's conjecture so explanation for firm size effect is not sufficient. Banz, (1981) investigated the relationship between the total market value of the common stock and its return. The result concluded that, the common stock of small firm has high risk adjusted returns than the common stock of larger firms. Breeden, (1979) this study improved the time model as developed by Merton's 1973 and its implication on uncertain consumption and investment opportunities. The consumption rates of weekly, monthly, quarterly and annual rates have taken. The economic time model and Pareto-optimal model has used to test the results. The study found that if the capital market is of constraint less Pareto optimal then, results will be of perfectly correlated with changes in all individuals' optimal consumption rates. Roll (1977) examined the validity of CAPM model. From the study it is found that testing the two parameter asset testing is difficult task and to find right return each asset return has to be tested individually. Modigliani & Pogue (1973) empirically examined the risk and return concept. Randomly selected portfolios which consists of 20 stocks, A+ quality stocks have selected from NYSE. The sample for the study is for the period consists of 1945 to 1970 (security beta) and 1960 to 1971 (mutual fund beta) To measure the portfolio return and risk R-squared co-efficient and standard deviation is used. As per CAPM model beta is the deciding factor to find the total risk. The study concludes that there is linear relationship exists for tested data and beta is the right measure for find the risk. Fama & Macbeth (1973) empirically tested the relationship between return and risk on New York common stock. The sample data has obtained from CRSP, NYSE common stock has used. The sample period is from January 1926 through 1968. Two parameter model has applied to test the results. It is found that there a positive relationship between risk and return in efficient market. Lintner, (1965) Analysed the significance relationship between diversification in investment and its impact on security prices, degree of risk and stock gains. The sample data consists of annual rate of return of large industrial stock prices. The Markowitz model has used to test the data. The study concluded that common stocks are risky investments as well as it found that there is an inverse relationship exist between risk and other observed variables. Sharpe (1964) examined the capital market equilibrium when asset risk exists. The data of expected return and standard deviation of risky assets are considered. Through capital market line it is able to find out the results. The study found that because of active in over all economic activity, rate of return from efficient combinations are perfectly correlated. Markowitz, (1952) analysed about best way for portfolio selection process. This study gave first prominence to investors belief on stock performance in near future makes the portfolio selection. Through the descriptive statistics results have

verified. The study concluded that well established investors judgemental behaviour as well as rational thinking and action derives the well performed stock returns and variance.

### III. OBJECTIVES OF THE STUDY

The purpose of the study is to test the validity or reliability of CAPM in 30 stocks listed in Bombay Stock Exchange. This study also examined the descriptive statistics of individual stocks. This gives the scope for the investors as well as for researchers to understand the reality of each stock about different financial variables.

### IV. DATA, SAMPLE AND METHODOLOGY

To test the validity of CAPM, BSE SENSEX stocks are considered in the study. For this Daily adjusted closing prices of 30 companies have been considered for the period from 1 January 2009 to 31 March 2018. The risk free return of 91 days treasury bills is considered, which is obtained from RBI data file. BSE SENSEX is taken as market proxy. Beta for various companies has been obtained for the study period by using CAPM model. Estimated prices for companies stocks have calculated from calculated beta values. From BSEs 30 stocks 13 portfolios have formed based on different industries such as Banking Portfolios, Financial services portfolios, FMCG portfolios, Pharmaceutical portfolios, Chemical portfolios, Automobile portfolios, Mining portfolios, oil portfolios, power portfolios, Information technology portfolios, construction portfolios, Tele communication portfolios and steel portfolios respectively. For each set of portfolios estimated prices as well as actual prices are calculated to find the relationship between the variables.

### V. METHODOLOGY

CAPM model provides the information of total return of companies stock. It consists of risk free rate of return and risk premium. Risk premium interprets that as risk increases return also increases; this character is the uniqueness of the CAPM theory. The CAPM model is based on certain assumptions, such as investors are risk avoider, market information are easily available, funds are easily available at risk free rate of return, shares are divided in many units and there is marketability to the companies stocks. In the above mentioned beliefs CAPM proves its reliability of relationship between variables like stock return and risk.

The CAPM model is as follows:

$$E(r_i) = r_f + \beta_i(r_m - r_f)$$

Where,

E(r<sub>i</sub>)=expected return of the company stock,

R<sub>f</sub>=risk free rate of return

B=beta coefficient

R<sub>m</sub>=market return

$$\beta_{iM} = \frac{cov(R_i, R_M)}{\sigma^2(R_M)}$$

VI. RESULTS AND DISCUSSION

Table 1: Descriptive statistics of BSE SENSEX Stocks

Company Name	Mean	Median	Standard Deviation	Kurtosis	Skewness	Minimum	Maximum
ASIAN PAINTS LTD ..	1778.98	1177.83	1228.64	-0.18	1.00	390.90	5214.50
AXIS BANK LTD...	875.32	850.40	390.24	-0.88	0.46	279.90	2022.15
BAJAJ AUTO LTD. ...	2097.38	2077.20	627.55	-0.36	-0.29	406.10	3408.50
BAJAJ FINANCE LIMITED	1979.43	1289.70	2037.44	3.70	1.94	46.75	11388.75
BHARTI AIRTEL LTD	368.19	345.00	97.48	9.38	2.84	241.30	936.60
COAL INDIA LTD.	319.14	316.85	42.30	-0.62	0.25	234.85	441.85
HCL TECHNOLOGIES LTD.	768.99	794.55	391.66	0.47	0.74	88.70	2066.35
HDFC Bank Ltd	1267.55	1099.45	591.92	-1.19	0.35	405.05	2563.95
HERO MOTOCORP LTD.	2390.41	2106.85	752.78	-0.89	0.35	772.95	4046.30
HINDUSTAN UNILEVER LTD	687.37	592.05	402.61	0.22	0.94	215.50	1855.80
HOUSING DEVELOPMENT FINANCE CORP.LTD	1322.32	1198.75	637.24	0.03	0.96	589.90	3115.50
ICICI BANK LTD	702.87	795.35	395.82	-1.09	0.29	182.35	1792.10
INDUSIND BANK LTD	709.34	465.75	556.86	-0.66	0.78	26.35	2020.55
INFOSYS LTD	2089.80	2282.00	914.97	-1.26	0.07	619.45	4365.90
ITC LTD.	271.12	272.45	57.99	-0.89	-0.21	150.60	398.55
KOTAK MAHINDRA BANK LTD	776.93	729.95	268.29	-0.23	0.59	215.30	1444.75
LARSEN & TOUBRO LTD	1432.69	1456.45	281.16	0.56	-0.53	560.80	2170.25
MAHINDRA & MAHINDRA LTD	965.77	914.35	282.71	-0.94	0.00	263.70	1553.50
MARUTI SUZUKI INDIA LTD	3320.55	1690.60	2628.35	-0.28	1.02	514.35	9819.35
NTPC LTD.	163.12	160.80	24.75	-0.36	0.41	110.50	234.70
ONGC	438.25	278.35	364.29	0.62	1.51	136.25	1456.50
POWER GRID CORPORATION OF INDIA LTD	133.91	116.60	38.73	-0.78	0.80	72.05	224.90
RELIANCE INDUSTRIES LTD	1038.56	967.00	307.11	5.12	2.27	675.20	2358.20
STATE BANK OF INDIA	1362.10	1686.65	984.59	-1.59	0.00	150.90	3488.55
SUN PHARMACEUTICAL INDUSTRIES LTD	821.60	698.65	380.78	2.11	1.59	397.10	2330.90
TATA CONSULTANCY SERVICES LTD	1768.70	1954.45	762.58	-1.25	-0.10	365.20	3603.80
TATA MOTORS LTD	476.50	404.35	270.12	1.56	1.47	130.50	1364.60
TATA STEEL LTD	449.28	440.60	133.75	-0.74	0.05	151.10	782.20
VEDANTA LIMITED	224.04	209.60	83.01	-0.19	0.35	60.65	489.75
YES BANK LTD	535.66	359.50	392.25	1.35	1.44	40.45	1877.55

The descriptive statistics been calculated to find the different variables. Such as mean, median, standard deviation, minimum and maximum values as well as skweness and kurtosis. These all information interprets the 30 BSE companies' descriptive data to find the movement of stock prices from last ten years time period. This also gives the insights about performance and volatility of companies' variables. From the skweness data it understood that average mean of the stock return are positively skewed which means

that mean returns are not symmetrically distributed but returns are positive in nature. This forms the right longer tails on normal distribution. Kurtosis measures the peakdness of a distribution. If the value of kurtosis is 3 then is the normal kurtosis. If kurtosis is higher than 3, then it indicates the excess kurtosis. The above calculated kurtosis has higher peakdness of distribution in its stock returns

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results with much fluctuation in stock prices.

Above table also gives the information about standard deviation. The standard deviation of the stocks measures the variability in the stock prices on monthly basis. From the above table it is found that Maruti Suzuki India Ltd (2628.34) has highest standard deviation, Bajaj Finance Limited (2037.43) has next highest standard deviation and with least standard deviation companies are NTPC LTD.

(24.75), COAL INDIA LTD. (42.30) .To analyze the average stock return performance of companies , Maruti Suzuki India Ltd (3320.55) has highest return and Hero Moto Corp Ltd. (2390.41) has second highest in average stock returns and Power Grid Corporation Of India Ltd (133.911374), NTPC LTD. (163.116) are the least performer in BSE stock list in the chosen study period.

Table 2. List of Overvalued and Undervalued Stocks

S. No	Company Name	Intercept	Beta	Actual Return	Expected Return	Difference	Over/Under Valued
1	ASIAN PAINTS LTD	-0.0001	0.5767	0.4363	0.7453	-0.3090	Undervalued
2	AXIS BANK LTD.	-0.0007	1.4111	0.1809	1.8232	-1.6423	Undervalued
3	BAJAJ AUTO LTD.	0.0004	0.6952	1.8923	0.8990	0.9933	Overvalued
4	BAJAJ FINANCE LIMITED	0.0011	0.8585	3.7139	1.1059	2.6079	Overvalued
5	BHARTI AIRTEL LTD	-0.0007	0.7911	-0.8328	1.0217	-1.8545	Undervalued
6	COAL INDIA LTD.	-0.0004	0.6700	-0.3521	0.3655	-0.7175	Undervalued
7	HCL TECHNOLOGIES LTD.	0.0004	0.8426	2.0615	1.0895	0.9720	Overvalued
8	HDFC BANK LTD	-0.0002	0.9007	0.7402	1.1641	-0.4239	Undervalued
9	HERO MOTOCORP LTD.	0.0002	0.6323	1.3405	0.8174	0.5231	Overvalued
10	HINDUSTAN UNILEVER LTD	0.0006	0.4452	1.9815	0.5761	1.4054	Overvalued
11	HOUSING DEVELOPMENT FINANCE CORP.LTD	-0.0005	1.0763	0.2694	1.3906	-1.1213	Undervalued
12	ICICI BANK LTD	-0.0009	1.5153	-0.2539	1.9577	-2.2116	Undervalued
13	INDUSIND BANK LTD	0.0009	1.1591	3.7098	1.4991	2.2107	Overvalued
14	INFOSYS LTD	-0.0006	0.7267	-0.5533	0.9387	-1.4921	Undervalued
15	ITC LTD.	-0.0001	0.6698	0.4967	0.8656	-0.3690	Undervalued
16	KOTAK MAHINDRA BANK LTD	-0.0001	1.1734	1.2188	1.5166	-0.2978	Undervalued
17	LARSEN & TOUBRO LTD	-0.0004	1.2248	0.5599	1.5827	-1.0227	Undervalued
18	MAHINDRA & MAHINDRA LTD	-0.0001	0.9828	1.0450	1.2702	-0.2252	Undervalued
19	MARUTI SUZUKI INDIA LTD	0.0006	0.7931	2.6095	1.0258	1.5837	Overvalued
20	NTPC LTD.	-0.0004	0.6858	-0.2038	0.8860	-1.0898	Undervalued
21	OIL AND NATURAL GAS CORPORATION LTD	-0.0011	0.9404	-1.5166	1.2144	-2.7310	Undervalued
22	POWER GRID CORPORATION OF INDIA LTD	0.0000	0.6496	0.8655	0.8397	0.0258	Overvalued
23	RELIANCE INDUSTRIES LTD	-0.0007	1.1962	-0.1118	1.5454	-1.6572	Undervalued
24	STATE BANK OF INDIA	-0.0013	1.2696	-1.4930	1.6397	-3.1328	Undervalued
25	SUN PHARMACEUTICAL INDUSTRIES LTD	-0.0007	0.5731	-0.8949	0.7401	-1.6349	Undervalued
26	TATA CONSULTANCY SERVICES LTD	0.0002	0.6929	1.3383	0.8957	0.4426	Overvalued
27	TATA MOTORS LTD	-0.0008	1.4679	0.0096	1.8965	-1.8869	Undervalued
28	TATA STEEL LTD	-0.0004	1.4305	0.8248	1.8485	-1.0238	Undervalued
29	VEDANTA LIMITED	-0.0004	1.3924	0.7812	1.7993	-1.0182	Undervalued
30	YES BANK LTD	-0.0004	1.3907	0.8459	1.7971	-0.9512	Undervalued

From the above stock table it is clear that total 7 banking stocks are available in BSEs 30 stocks. The results of each bank are inconsistent with beta co-efficient and company returns. It is found that six banking companies such as Axis

Bank Ltd, HDFC Bank Ltd, ICICI Bank Ltd , Kotak Mahindra Bank Ltd, State Bank Of India, Yes Bank Ltd are undervalued and one bank

i.e, Indusind bank ltd is overvalued. It is observed that ICICI Bank ltd and State Bank of India's stocks returns negative correlated between their beta and returns. As per the above table two financial services companies are found in total of BSEs 30 stocks. The result shows Bajaj Finance Limited is overvalued. Its beta coefficient and returns shows the negative correlation. This disapproves with CAPM theory. The Housing Development Housing Corp. Ltd stocks are undervalued and results are inconsistent to CAPM model. From the above analysed table two FMCG companies are found. In this Hindustan Unilever stocks are overvalued and ITC Ltd stocks are undervalued. The betas of both the stocks are not proportionate to its stock returns. The table provides the data about sun pharmaceutical company. The returns are undervalued and negative correlation exists between stock return (-0.8949) and beta coefficient of stocks (0.5731). The Portfolio explores the results of Asian paints ltd which is grouped as chemical industries. This company stocks are undervalued. The beta and returns are not consistent as comparing to other industries stocks. From the above table, five automobile industries are found. The result discloses the Bajaj Auto Ltd, Hero Moto corp. Ltd, Maruti Suzuki India Ltd stocks are overvalued and The Mahindra & Mahindra's stocks are undervalued. From the above Mining industries it is clear that VEDANTA COMPANY have better/positive performance as comparing to COAL LTD which shows the negative performance in stock returns. The return and beta of both the stocks are inconsistent in nature. From the above table we find the result of oil industries such as Reliance industries Ltd and ONGC. It is clear from the table that ONGC and Reliance Industries stocks are undervalued. The relationship between risk and returns are negatively correlated. From the above power industries table we found the results of two power generating companies such as NTPC Ltd and Power Grid Corporation Ltd. The power Grid Corporation shows the more return with the same level risk comparing to the NTPC Ltd which shows the negative performance of stock returns. From the above information technology industries table we found the results of three companies. These are HCL, Infosys Ltd and Tata consultancy Services Ltd. The two companies shows the better results i.e; HCL Ltd with highest return with less amount of risk and Tata Consultancy Services with positive return with less amount of risk Therefore, these stocks are overvalued. The stocks of Infosys are undervalued due to the fact that performance of risk and returns are negatively correlated. From the above table we found the result of Construction Company Larsen and turbo ltd. The result reveals the negative correlation between stock return as well as beta-coefficient. The stock returns show the undervaluation in its performance. From the above industry of telecommunication we found company Bharati Airtel Ltd. It is analysed that company's returns are inconsistent to beta values and these stocks are undervalued. From the above steel industry it is clear that inverse relationship exists between beta and return. The stock returns are undervalued.

## VII. FINDINGS OF THE STUDY

The application of CAPM Model has done on BSEs 30 stocks. The portfolios have created to find the overvalued and undervalued stocks with the help of beta co-efficient and

differences between expected returns and stock returns. From 13 grouped portfolios 6 portfolios companies has the mix of overvalued and undervalued companies, In Banking industries only Indusind Bank Ltd stocks are overvalued, In Financial services companies Bajaj Finance Limited stocks are overvalued, In FMCG portfolios Hindustan Unilever Ltd stocks are overvalued, In automobile industries Bajaj Auto Ltd, Hero Motocorp Ltd, Maruti Suzuki India Ltd are overvalued, In power portfolios Power Grid Corporation Of India Ltd stocks are overvalued and In Information Technology portfolio HCL Technologies Ltd, Tata Consultancy Services Ltd Stocks Are Overvalued. The 7 grouped portfolios are fully undervalued in nature such as Pharmaceutical portfolios (Sun Pharmaceutical Industries Ltd), Chemical Industries (Asian Paints Ltd), Mining Industries (Coal India Ltd, Vedanta limited ), Oil industries (Reliance Industries Ltd, ONGC) Construction Industries (Larsen & Toubro Ltd), Telecommunications Industries (Bharti Airtel Ltd), Steel Industries (Tata Steel Ltd). In terms of stock return Bajaj Finance Limited has highest returns 3.7139 against 0.8585 beta, the second highest return is Maruti Suzuki India Ltd has 2.6095 against beta of 0.7931, third highest is HCL Technologies Ltd. With stock returns of 2.0615 against beta co-efficient of 0.8426. Least Performer Company is ONGC with -1.5166 returns and company Hindustan Unilever Ltd has least beta co-efficient 0.4452. We find that company with more risk(beta) has the actual return less than expected return which results with stocks undervalued. If actual returns are greater than expected values then, stock returns are overvalued which considers beta factor. It is observed that in portfolio automobile industries and Information Technology most of their stocks are performed well therefore their stocks are overvalued. This study justifies that returns are not proportionate with beta-coefficient in the most of the portfolios except Indusind Bank Ltd, Bajaj Finance Limited., Hindustan Unilever Ltd, Bajaj Auto Ltd, Hero Moto Corp Ltd., Maruti Suzuki India Ltd, Power Grid Corporation Of India Ltd, HCL Technologies Ltd, and TATA Consultancy Services Ltd. Through the help of graphical representation it is very clear to understand the degree of risk and return relationship of each portfolio. Therefore, application of CAPM model to select the company's stock may results with wrong predictions to the prospective investors. Investors' needs to understand that there are many other factors needs to be considered during the process of selection of stocks.

## VIII. CONCLUSION

CAPM is one of the widely used techniques to find the stock returns, based on risk characteristics of stocks. Many researchers have researched the applicability of CAPM and found positive correlation for sample data and CAPM Model. But this study has not given suitability of CAPM for 30 BSE Stock for the study period of 1 January 2009 to 31 December 2018. In this study six portfolios companies are mix of overvalued and undervalued stocks and seven grouped portfolios are purely of undervalue stocks of portfolios. The Bajaj Finance limited which is of Financial Services portfolio has performed better comparing to other portfolios and least performer portfolio is Oil

industries i.e., ONGC. As per this study analysis it is clear that beta alone will not be the reason to enhance or reduce the stock return prices, rather there may be many other governing factors equally responsible for the movement of stock prices. Therefore, investor should not predict the stock return based on beta co-efficient alone of each stock, but it needs to be checked even from other perspectives too.

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