THE EMPIRICAL STUDY OF CAPITAL ASSET PRICING MODEL IN INDIAN STOCK MARKET

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ABSTRACT

The CAPM is a universally used measure by the investor, to calculate the amount of risk involved and rate of return that he should expect from the investment. This paper aims to find the applicability of CAPM model in the Bombay Stock Exchange (BSE), and also to construct a relationship between risk and return of the portfolio. This paper also evaluates the return of individual securities of the portfolio calculated from the CAPM model to actual return. The portfolio for this study is created by taking the top 10 companies of BSE on the basis of Market Capitalization, for which the time period of 2014 to 2018 is considered. Hence the research finds that the results dropped by CAPM model have a huge difference to the actual return offered by the market. So, the CAPM model is not valid for the Indian stock market.

INTRODUCTION

This CAPM model was given by William F. Sharpe, a financial economist and he was later awarded a Nobel Prize in Economic sciences in the year 1990. He presented this model in his book Portfolio Theory and capital markets, in which he stated that an individual stock or a portfolio contains two types of risks in them, one which can be reduced by diversification of the portfolio and the other whish is not under control. These are Systematic and Unsystematic Risks. Systematic Risk also known as Undiversifiable Risk is the one which an investor cannot control or reduce these are market risk like wars recession change government policy of a country, these types of risk doesn't effect an individual stock but the market as whole. Unsystematic Risks also known as specific risk, these risks can be reduced by diversifying portfolio. These types of risk are applicable on individual company or industry

so can be decreased drastically. Unlike systematic Risk these are avoidable to a great extent. The capm model undertakes only systematic risk in its formula in form of beta.

As per CAPM model, there exist positive direct connection among risk and return. Higher the risk, higher will be the return. Investors lean towards higher return with more riskier securities. The risk on the portfolio depends upon type of company and its industry. There are some securities which are considered as risk free assets such as government bonds, treasury bills etc. In these securities the default risk is zero. Whereas in case of corporate bonds and shares there is risk of default so they are considered as risky investments. As the shares are more risky to bonds, investors expect high return for investing in shares.According to CAPM expected return is equal to the sum of risk free return and risk premium. Security Market Line (SML) is used to find how the individual securities should be priced in relation to their systematic risk. It is the graphical representation of CAPM which shows the different level of systematic risk of various marketable securities plotted against expected return of entire market at a given point of time. X axis of the chart shows the Beta whereas the Y axis shows the expected return.

The capm model states that it helps to identify whether the securities are undervalued or overvalued. when a security is plotted on SML chart, if it appears above the SML, it is considered undervalued because it shows that security offer greater return against its inherent risk .If the security appears below the SML , it is considered as overvalued as it does not overcome the inherent risk.

The equation for the CAPM model or SML line is:

"Expected return= risk free rate of return + Beta(market return- risk free rate of return)"

"E(Ri) = Rf + βi [E(Rm) – Rf"

Here,

E(Ri) = is the expected return on security calculated based on its risk to market portfolio.

Rf = is the risk-free interest rate

E(Rm) = is the expected return on the market portfolio

Bi = indicates the sensitivity of change of return on a security to changes in return on market portfolio.

The equation used for calculating beta for each individual security, βi is as follows:

βi = Cov (Ri, Rm) / σm2

here,

Cov (Ri, Rm) = is the covariance of return on security i (Ri)and return on the market portfolio (Rm), &

σm2 = is the variance of the market portfolio

LITERATURE REVIEW

CudiTuncerGursoy, G. R. (2007) reviewed the validity of CAPM on 10 stocks for the period 1995-2004 on the Turkey market. It has been discovered that there is no connection between beta coefficients and chosen stock ex-post premiums. The findings showed that in up-market circumstances, elevated beta stocks perform better, whereas low-beta portfolio is better down-market investment. However, the slope of the security Market line was found different from the slope of SML indicated by CAPM in present research. Hence the validity of CAPM was rejected in present study.

Choudhary Kapil, S. C. (2010) examined the Indian Stock Market CAPM using monthly BSE 500 company yields chart for the year January 1996 to December 2009. It is discovered that greater beta is not correlated with greater yields. The research concluded contradicts CAPM's assumption. The research found that beta is not enough to determine the anticipated yields of securities Josipa Dzaja, Z. A. (2013) reviewed the applicability of the CAPM model to evolving security markets in Central and South-East Europe using nine-cry monthly stock returns for the span January 2006 to December 2010. The research found that CAPM is not sufficient on specified stock markets to access capital assets. The research found that greater beta does not imply greater yields. The research also found that yields on the stock market are not on the efficient frontier, so they do not constitute effective portfolios.

M. RizwanQamar, S. R. (2014) reviewed the applicability of the capital asset price model on Stock Markets of Pakistan. The research was carried out on Sample's monthly share prices of ten performing Karachi Stock Exchange (KSE) 100 firms were selected for over five-year span from 2006 to 2010. In Pakistani Stock Exchange, the research does not favor CAPM model and demonstrates distinct beta for all specified individual company stock. The research found that CAPM is not a credible model for measuring the risk and return of individual stock in Pakistan.

KSE Khusboo Raheja (2014) used the monthly rates of five new securities from November 2010 to October 2013 to examine the applicability of CAPM in India. It was discovered that there were a huge differences between expected return and actual return.

I.   OBJECTIVES OF THE STUDY

The foremost objective of this research study is to examine the relevance of Capital asset Pricing Model on Securities of Bombay stock exchange. By,

- Firstly, calculating the return and return of specified securities through CAPM model

- Secondly, comparing the expected return to actual return given by the respective securities

- Then, evaluating whether these securities are over or under valued.

II.   HYPOTHESIS

Ho: The return on individual stock is not influenced by the level of risk it undertakes.

H1: The return on individual stock is influenced by the level of risk it undertakes. I.e. risk and return of a stock are associated with

III.   METHODOLOGY

M For testing the CAPM Model on Indian Stock Market in Bombay Stock Exchange, top tem companies of BSE were taken on the bases of market capitalization from January, 2014 to December, 2018.

Each Company's closing adjusted Stock prices were taken on the daily basis for 5 year, which was represented by Rm. These prices were taken from BSE's official website for the given period.

For the calculation of Risk Free Security Return, interest rates of 364 days Treasury bill (Primary) yield were taken for the 5 years. This data was taken from the official Website of Reserve Bank of India.

For the calculation of beta, the co-variance of individual stock against market return (SENSEX) was divided by variance of the stock of a year. Then by placing all the calculated value in the formula expected Return was calculated which was then compared by the actual return of the stock for respective periods to see if the stock was over or under valued.

Table 1: Top 10 companies of BSE with highest Market Capitalization Year-wise from 2014-2018

Company 2014	Market capitalization	Company 2015	Market capitalization	Company 2016	Market capitalization	Company 2017	Market capitalization	Company 2018	Market capitalization
Tata Consultancy Services Ltd	487,972	Tata Consultancy Services Ltd	501,045	Tata Consultancy Services Ltd	471205	Reliance Industrial Ltd.	737,576	Reliance Industrial Ltd.	840,222
Oil and Natural Gas Corporation Ltd	352,970	Reliance Industrial Ltd.	276,995	Reliance Industrial Ltd.	348,859	Tata Consultancy Services Ltd	736,105	Tata Consultancy Services Ltd	802,747
Reliance Industrial Ltd.	320,988	HDFC Bank Ltd	257,538	HDFC Bank Ltd	321,960	HDFC Bank Ltd	532,657	HDFC Bank Ltd	662,989

ITC Ltd	278,781	ITC Ltd	254,442	ITC Ltd	291,423	ITC Ltd	366,512	Hindustan Unilever Ltd	383,704
Coal India Ltd	227,401	Infosys Ltd	252,702	Oil and Natural Gas Corporation Ltd	238,144	Hindustan Unilever Ltd	357,166	ITC Ltd	376,339
Infosys Ltd	204,020	Coal India Ltd	211,552	Infosys Ltd	235,984	Infosys Ltd	314,698	HDFC Bank Ltd	364,488
HDFC Bank Ltd	198,307	Sun Pharmaceutical Industries Ltd.	209,698	Housing Development finance corporation	216,966	HDFC Bank Ltd	309,848	Infosys Ltd	315,611
State Bank Of India	182,524	Oil and Natural Gas Corporation Ltd	196,857	Coal India Ltd	201,002	State Bank Of India	247,917	State Bank Of India	307,542
ICICI Bank Ltd	173,100	Housing Development finance corporation	185,517	State Bank Of India	199,578	Kotak Mahindra Bank	242,213	Kotak Mahindra Bank	286,719
Sun Pharmaceutical Industries Ltd.	167,492	State Bank Of India	177,643	Hindustan Unilever Ltd	184,838	Maruti Suzuki Ltd	232,602	ICICI Bank Ltd	262,967

Table 2: 2014

Companies	Rf	Rm	Rm - Rf	Beta	beta(Rm- Rf)	Expected Return Rf+beta (Rm- Rf)	Actual Return	Valuation
Reliance Industrial Ltd.	8.69	0.08	-8.61	0.09	-0.77	7.92	4.92%	overvalued
Housing Development finance corporation	8.69	0.73	-7.96	0.17	-1.35	7.34	43.73%	undervalued
Hindustan Unilever Ltd	8.69	0.59	-8.1	-0.06	0.49	9.18	34.56%	undervalued
Icici Bank Ltd.	8.69	-0.56	-9.25	0.06	-0.56	8.14	-66.43%	overvalued
Infosys Ltd.	8.69	-0.58	-9.27	0.05	-0.46	8.23	-44.23%	overvalued
ITC Ltd.	8.69	0.31	-8.38	-0.05	0.42	9.11	17.06%	undervalued
Kotak Mahindra Bank	8.69	1.12	-7.57	0.14	-1.06	7.63	74.23%	undervalued
Oil and Natural Gas Corporation Ltd	8.69	0.46	-8.23	0.07	-0.58	8.11	23.28%	undervalued
State Bank Of India	8.69	-0.65	-9.34	0	0.00	8.69	-81.79%	overvalued
Tata Consultancy Services Ltd	8.69	0.38	-8.31	-0.03	0.25	8.94	12.73%	undervalued

Table 3: 2015

Companies	Rf	Rm	Rm - Rf	Beta	beta(Rm-Rf)	Expected Return Rf+beta (Rm- Rf)	Actual Return	Valuation
Reliance Industrial Ltd.	7.64	0.3	-7.34	0.11	-0.81	6.83	14.99%	undervalued
Housing Development finance corporation	7.64	0.26	-7.38	0.27	-1.99	5.65	12.48%	undervalued
Hindustan Unilever Ltd	7.64	0.33	-7.31	0.07	-0.51	7.13	13.82%	undervalued
Icici Bank Ltd.	7.64	-0.42	-8.06	0.13	-1.05	6.59	-27.25%	overvalued
Infosys Ltd.	7.64	-0.67	-8.31	-0.04	0.33	7.97	-44.82%	overvalued
ITC Ltd.	7.64	-0.18	-7.82	0.04	-0.31	7.33	-11.83%	overvalued
Kotak Mahindra Bank	7.64	-0.64	-8.28	-0.02	0.17	7.81	-44.19%	overvalued
Oil and Natural Gas Corporation Ltd	7.64	-0.61	-8.25	0.05	-0.41	7.23	-32.07%	overvalued
State Bank Of India	7.64	-0.46	-8.1	0.08	-0.65	6.99	-26.79%	overvalued
Tata Consultancy Services Ltd	7.64	-0.02	-7.66	0.02	-0.15	7.49	-3.13%	overvalued

Table 4: 2016

Companies	Rf	Rm	Rm - Rf	Beta	beta(Rm-Rf)	Expected Return Rf+beta (Rm- Rf)	Actual Return	Valuation
Reliance	6.78	0.11	-6.67	0.01	-0.07	6.71	5.19%	overvalued
HDFC	6.78	0.19	-6.59	-0.15	0.99	7.77	3.72%	overvalued
hindustan unilever	6.78	-0.12	-6.9	-0.18	1.24	8.02	-6.57%	overvalued
ICICI	6.78	0.01	-6.77	0.04	-0.27	6.51	-2.80%	overvalued
INFOSYS	6.78	-0.16	-6.94	-0.06	0.42	7.20	-9.03%	overvalued
ITC	6.78	-0.55	-7.33	0.04	-0.29	6.49	-30.72%	overvalued
KOTAK MAHINDRA	6.78	0.05	-6.73	-0.15	1.01	7.79	0.61%	overvalued
ONGC	6.78	-0.22	-7	1.07	-7.49	-0.71	-20.69%	overvalued
SBI	6.78	0.26	-6.52	-0.03	0.20	6.98	10.48%	undervalued
TCS	6.78	-0.07	-6.85	-0.04	0.27	7.05	-3.51%	overvalued

Table 5: 2017

Companies	Rf	Rm	Rm - Rf	Beta	beta (Rm-Rf)	Expected Return Rf+beta (Rm- Rf)	Actual Return	Valuation
Reliance Industrial Ltd.	6.31	0.19	-6.12	-0.03	0.18	6.49	-15.20%	overvalued
Housing Development finance corporation	6.31	0.93	-5.38	0.07	-0.38	5.93	56.80%	undervalued
Hindustan Unilever Ltd	6.31	1.04	-5.27	-0.04	0.21	6.52	63.93%	undervalued
Icici Bank Ltd.	6.31	0.53	-5.78	0	0.00	6.31	25.66%	undervalued
Infosys Ltd.	6.31	0.15	-6.16	0.07	-0.43	5.88	3.67%	overvalued
ITC Ltd.	6.31	0.36	-5.95	0.05	-0.30	6.01	9.81%	undervalued
Kotak Mahindra Bank	6.31	0.7	-5.61	0.05	-0.28	6.03	41.24%	undervalued
Oil and Natural Gas Corporation Ltd	6.31	-0.03	-6.34	0.05	-0.32	5.99	0.52%	overvalued
State Bank Of India	6.31	0.62	-5.69	0.01	-0.06	6.25	31.30%	undervalued
Tata Consultancy Services Ltd	6.31	0.31	-6	0.09	-0.54	5.77	11.90%	undervalued

Table 6: 2018

Companies	Rf	Rm	Rm - Rf	Beta	beta(Rm-Rf)	Expected Return Rf+beta (Rm- Rf)	Actual Return	Valuation
Reliance Industrial Ltd.	7.02	0.44	-6.58	0.09	-0.59	6.43	22.98%	undervalued
Housing Development finance corporation	7.02	0.26	-6.76	-0.08	0.54	7.56	14.29%	undervalued
Hindustan Unilever Ltd	7.02	0.59	-6.43	-0.04	0.26	7.28	34.95%	undervalued
Icici Bank Ltd.	7.02	0.32	-6.7	0.08	-0.54	6.48	15.92%	undervalued
Infosys Ltd.	7.02	-0.47	-7.49	0	0.00	7.02	-36.22%	overvalued
ITC Ltd.	7.02	0.16	-6.86	0.04	-0.27	6.75	7.11%	undervalued
Kotak Mahindra Bank	7.02	0.45	-6.57	0.07	-0.46	6.56	25.27%	undervalued
Oil And Natural Gas Corporation Ltd	7.02	-0.4	-7.42	0	0.00	7.02	-21.93%	overvalued
State Bank Of India	7.02	-0.06	-7.08	0.06	-0.42	6.60	-3.71%	overvalued
Tata Consultancy Services Ltd	7.02	-0.19	-7.21	0	0.00	7.02	-28.67%	overvalued

From the tables shows that,

In 2014,

the highest beta holder was HDFC with 0.17 and its calculated expected rate of return was 7.34 that means according to the CAPM model HDFC should have given return of about 7.34 but the actual return given by HDFC in that year was 43.73 and wasn't the highest. Highest return was given by Kotak Mahindra which was about 74.23.

similarly, the lowest beta holder was Hindustan Unilever with -0.06 and its calculated

expected rate of return was 9.18 that means according to the CAPM model Hindustan Unilever should have given return of about 9.18 but the actual return given by Hindustan Unilever was in that year was 34.56 and wasn't the lowest. The lowest return was given by State Bank of India which was about -81.79.

In 2015,

the highest beta holder was HDFC with 0.27 and its calculated expected rate of return was 5.65 that means according to the CAPM model HDFC should have given return of about 5.65 but the actual return given by HDFC in that year was 12.48 and wasn't the highest. Highest return was given by Reliance Industries Ltd. which was about 14.99.

Similarly, the lowest beta holder was Infosys with -0.04 and its calculated expected rate of return was 7.97 that means according to the CAPM model Infosys should have given return of about 7.97 but the actual return given by Infosys was in that year was -44.82 and that was lowest among the portfolio.

In 2016,

the highest beta holder was ONGC with 1.07 and its calculated expected rate of return was -0.71 that means according to the CAPM model ONGC should have given return of about -0.71 but the actual return given by ONGC in that year was -20.69 and wasn't the highest. Highest return was given by State Bank of India which was about 10.48.

similarly, the lowest beta holder was Hindustan Unilever with -0.18 and its calculated expected rate of return was 8.02 that means according to the CAPM model Hindustan Unilever should have given return of about 8.02 but the actual return given by Hindustan Unilever was in that year was -6.57 and wasn't the lowest. The lowest return was given by ITC which was about -30.72.

In 2017,

the highest beta holder was Tata Consultancy Services Ltd. with 0.09 and its calculated expected rate of return was 5.77 that means according to the CAPM model Tata Consultancy Services Ltd. should have given return of about 5.77 but the actual return given by Tata Consultancy Services in that year was 11.90 and wasn't the highest. Highest return was given by Hindustan Unilever which was about 63.93.

similarly, the lowest beta holder was Hindustan Unilever with -0.04 and its calculated expected rate of return was 6.52 that means according to the CAPM model Hindustan Unilever should have given return of about 6.52 but the actual return given by Hindustan Unilever was in that year was 63.93 and wasn't the lowest it was the highest return. The lowest return was given by Reliance Industries Ltd. which was about -15.20.

In 2018,

the highest beta holder was Reliance Industries Ltd. with 0.09 and its calculated expected rate of return was 6.43 that means according to the CAPM model Reliance Industries Ltd. should have given return of about 6.43 but the actual return given by Reliance Industries Ltd in that year was 22.98 and wasn't the highest. Highest return was given by Hindustan Unilever which was about 34.953.

similarly, the lowest beta holder was HDFC with -0.08 and its calculated expected rate of return was 7.56 that means according to the CAPM model HDFC should have given return of about 7.56 but the actual return given by HDFC was in that year was 14.29 and wasn't the lowest. The lowest return was given by Infosys which was about -36.22.

ɪᴠ. CONCLUSION

The main objective of the reseaech study was to find the aptness of Capital Assrt Pricing model on Bombay Stock Exchange by taking into consideration the top ten companies of BSE on the basis of market capitalization form the period of five years. The outcome of this research were that there was a huge difference between the actual and expected return of individual securities, and therefore the investor should not relay on the forecast of the security based on capm model because the results will be misleading. From Capm model either the securities were underrated or over reated. Hence CAPM model is not suitable in the Indian Stock Market.

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