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An application of CAPM: National stock exchange

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Abstract
This study aims to apply Capital Assets Pricing Model in different sectors of Indian Stock Market. Capital Assets Pricing Model explain the relationship between the Risk and Return in efficient Market. The comparison between Expected Return and Estimated return was made for the total 25 companies listed in National Stock Exchange. These companies are selected from Automobile, IT, Banking and Finance, Pharmaceuticals and Energy sector. Researcher used Nifty Fifty as a benchmark index for calculating the Beta for CAPM. It has also attempted to find whether the securities are underpriced or overpriced and indicating buying signal or selling signal for the investors. Treasury bill rate was considered as Risk free rate. This study is based on secondary data which is one year closing price of the selected stocks from NSE. This paper would aid the investors for selection of the securities in their Portfolio.

Keywords: CAPM, risk and return, risk free rate, underpriced, overpriced

Introduction

Capital Market is the place where investors can buy and sell the various securities in the Market. It plays a vital role in the growth of the economy in India. There are total 19 stock exchanges granted by SEBI in India. Out of which Bombay Stock Exchange and National Stock exchange are the biggest stock exchange in terms of companies listed in the Stock exchanges. Bombay stock exchange contributes the 45% of total stock market and National Stock exchange contributes 62% of total. The index of BSE is Sensex with the 30 listed companies and index of NSE is Nifty with the 50 listed companies.

Investors should be very careful while choosing the company for their investment. There are main two factors which affect the investor's decision about investment i.e. Risk and Return. Risk is the chance that an investment's actual return will be different than expected. Risk means you have the possibility of losing some, or even all, of your original investment. Low levels of uncertainty (low risk) are associated with low potential returns. High levels of uncertainty (high risk) are associated with high potential returns. Investment risks can be divided into two categories: systematic and unsystematic. Systematic risk is the uncertainty inherent to the entire market or entire market segment. Unsystematic risk comes with the company or industry investors invest in and can be reduced through diversification.

Return of the securities: $Ri = \frac{P1-P0}{P0} * 100$

The capital asset pricing model (CAPM) describes the interrelationship between the expected return of risk assets and risk in the equilibrium of investment market and gives the equilibrium price of risky assets. Here, securities were remarked as overpriced and underpriced by analyzing the estimated return and expected return. The CAPM is a model that provides a framework to determine the required rate of return on an asset and indicates the relationship between return and risk of the asset. The required rate of return specified by CAPM help in valuing an asset. One can also compare the expected return and determine whether the asset is fairly valued.

The capital asset pricing model is a set or predictions concerning equilibrium expected returns on risky assets. Harry Markowitz laid down, the foundation of modem portfolio management in 1952. The CAPM was developed 12 years later in articles by William Sharpe, John Linter, and Jan Mission. The model is often referred to as sharpe-lintner-mossin capital asset pricing model.

EMPHERICAL TESTING OF CAPM equation form the mode can be expressed as follows:

$$\mathbf{R_i = R_f + \beta_i(R_m - R_f)}$$

Where,

$\mathbf{R_i}$ = expected rate of return on security 'i'.

$\mathbf{R_f}$ = risk free return

$\boldsymbol{\beta_i}$= Beta coefficient – a risk measure for the non-diversifiable part of total Risk.

$\mathbf{R_m}$ = Return on market portfolio

$\mathbf{R_m - R_f}$ = The excess return for the extra ris

Assumption of CAPM

- Investors make their investment decision on the basis of risk-return assessments measured in terms of expected return and standard deviation of returns.
- The purchase or sale of a security can be undertaken in infinitely divisible units.
- Purchases and sales by a single inventor cannot affect prices. This means that there is perfect competition where investors in total determine prices by their action.
- There are no transaction costs. Given the fact that transaction costs are small they are probably of minor importance in investment decision making and hence they are ignored.
- There are no personal income taxes. Alternatively, the tax rates on dividend income and capital gains are the

same, thereby making the investor indifferent to the form in which the return on the investment is received.
- The investor can lend or borrow any amount of fund desired at a rate of interest equal to the rate for riskless securities.
- The investor can sell short any amount of any shares.
- Investors share homogeneity of expectations.

Security Market Line (SML) & Capital market line (CML)

It is necessary to contrast SML with CML. Both postulate a linear (straight line) relationship between risk and return. In CML the risk is define as total risk and is measured by standard deviation, while in SML the risk is define as systematic risk and is measured by β. Capital market line is valid only for efficient portfolios while security market line is valid for all individual securities as well, CML is the basis of the capital market theory while SML is the basis of the capital asset pricing model.

Review of Literature

- Shweta Bajpai, Anil K sharma (2015) studied an empirical Testing of Capital Asset Pricing Model in India. The study was conducted for 10 years daily data from 2004 to 2013, a comparison between the developed model and the traditional model, has been made. The results show that CAPM is very much significant in the Indian equity market and the model developed in this study, performs better than the traditional model.
- Nenavath Sreenu (2018) has conducted study on An Empirical Test of Capital Asset-pricing Model Indian Stock Exchange. The research article's intention is to find whether the relationship between expected return and risk is linear, if beta is a complete measure of the risk and if a higher risk is compensated by a higher expected return. The results confirm that the intercept is statistically insignificant, upholding theory, for both individual assets and portfolios.
- Jianhua Dai, Jian Hu and Songmin Lan (2015) study on capital asset pricing model empirical in China market. Stocks data and combined data of Shanghai Stock Exchange were selected as research subjects in this paper. Empirical analysis of these data has been carried out by way of t-statistics and joint test to verify whether CAPM model would be true of China's stock market. Conclusion was reached that CAPM model is essential in China's stock market.
- William coffie, Osita Chukwulobelu (2012) has conducted study on the application of capital asset pricing model (capm) to individual securities on Ghana stock exchange. The purpose of this study is to examine whether or not the Capital Asset Pricing Model (CAPM) reasonably describes the return generating process on the Ghanaian Stock Exchange using monthly return data of 19 individual companies listed on the Exchange during the period January 2000 to December 2009. The results show that market beta contributes to the variation in equity returns in Ghana, its contribution is not as significant as predicted by the CAPM, and in some cases very weak.
- Mohammed Rafiqu, Emon Kalyan Chowdhury, Tasnim Uddin Chowdhury (2015) studied Application of Capital Asset Pricing Model evidence from Chittagong Stock Exchange and found that no applicability of CAPM in CSE as the difference between expectations and the actual results is very high at normal risk level.
- Abhya Raja, Priya Chocha, Nita Lalakia (2017) examine Testing Capital Assets Pricing Model as a Tool for Predicting Stock Returns:An Empirical Study in the Indian Context. The study was carried out on the sample of 12 companies representing 3 prominent sectors of the Indian economy i.e. Banking, IT and Automobile. The conclusions reveal weak correlation between realized excess returns (i.e. actual returns over and above the risk-free rate) and the expected return as per CAPM.
- Dr. Poornima and Swathiga P (2017) studied on relationship between risk and return analysis of selected stocks on NSE using capital asset pricing model. 10 Companies from NSE was taken into the consideration. A study revealed that automobile sector showing positive return and low risk and IT sector showing negative return and high risk during the study period.

Reaeach Methodology

This study aims to find the Risk and Return of selected individual Securities and it has also tried to know whether securities are underpriced or overpriced. The data has been collected from the official web site of National Stock Exchange. The time period of study is Daily closing price of one year 2019-20. The sample size of study is limited to 25 companies from NSE, whereby 5 companies were selected from 5 sectors namely Automobile, IT, Banking and finance, pharmaceutical and Energy sector.

Data Collection

1. Automobile Sector

Table 1

Automobile Sector							
Company	**RF**	**RM**	**RM-RF**	**BETA**	**Expected Return**	**Estimated Return**	**Valuation**
Eichermot	5.73282	0.01694	-5.71588	1.35908	-0.04766	-2.03550	underpriced
Maruti	5.73282	0.01694	-5.71588	1.29754	-0.02297	-1.68375	underpriced
Tata	5.73282	0.01694	-5.71588	2.08622	-0.07226	-6.19175	underpriced
Hero moto	5.73282	0.01694	-5.71588	1.16437	-0.08955	-0.92255	underpriced
Bajaj auto	5.73282	0.01694	-5.71588	0.67187	0.01337	1.89252	overpriced

The above table shows that Tata company has the highest beta of 2.08622 and as per risk return relation Bajaj Auto must have earn highest return i.e. 0.01337. The estimated return by CAPM is 1.89252 which is higher than the expected return it means that share is overvalued. It also shows that all the selected companies of automobile sector

were providing negative return except Bajaj Auto.

2. IT Sector

Table 2

IT Sector							
Company	**RF**	**RM**	**RM-RF**	**BETA**	**Expected Return**	**Estimated Return**	**Valuation**
Hcltech	5.73282	0.01694	-5.71588	0.46785	-0.18816	3.05867	overpriced
Infy	5.73282	0.01694	-5.71588	0.33500	0.01071	3.81803	overpriced
Techm	5.73282	0.01694	-5.71588	0.32934	-0.03569	3.85034	overpriced
Tcs	5.73282	0.01694	-5.71588	0.22851	0.01164	4.42667	overpriced
Wipro	5.73282	0.01694	-5.71588	0.27670	-0.19450	4.15123	overpriced

From the above table we can interpret that estimated return of all the companies of IT sector has provided Positive return. The beta of HCLTECH is highest i.e. 0.46785. Also, we can interpret that all IT sector company has overvalued.

3. Banking and Finance Sector

Table 3

Banking Sector							
Company	**RF**	**RM**	**RM-RF**	**BETA**	**Expected Return**	**Estimated Return**	**Valuation**
ICICIBANK	5.73282	0.01694	-5.71588	1.40932	0.15483	-2.32269	underpriced
INDUSINDBK	5.73282	0.01694	-5.71588	1.69333	-0.09415	-3.94605	underpriced
HDFCBANK	5.73282	0.01694	-5.71588	1.29767	-0.14788	-1.68452	underpriced
AXISBANK	5.73282	0.01694	-5.71588	1.29660	0.01068	-1.67840	underpriced
KOTAKBANK	5.73282	0.01694	-5.71588	0.95996	0.12460	0.24579	overpriced

In Banking and Finance Sector, INDUSINDBK has highest beta i.e. 1.69333 but the estimated return of INDUSINDBK is less i.e. -3.94605. The shares of KOTAK bank are overvalued. It indicates the best time for the investors who want to do short sell.

4. Pharmaceutical Sector

Table 4

Pharmaceutical Sector							
Company	**RF**	**RM**	**RM-RF**	**BETA**	**Expected Return**	**Estimated Return**	**Valuation**
UPL	5.73282	0.01694	-5.71588	0.78167	-0.16665	1.26488	overpriced
CIPLA	5.73282	0.01694	-5.71588	0.56498	-0.11914	2.50344	overpriced
DRREDDY	5.73282	0.01694	-5.71588	0.34016	0.05144	3.78849	overpriced
SUNPHARMA	5.73282	0.01694	-5.71588	0.65038	-0.05690	2.01532	overpriced
LUPIN	5.73282	0.01694	-5.71588	0.55858	-0.07194	2.54004	overpriced

From the above data it was found that estimated return of all the company of Pharmaceutical sector are more than the expected share price so all the company namely UPL, CIPLA, DRREDDY, SUNPHARMA and LUPIN are overpriced so here investors go with short sell.

5. Energy Sector

Table 5

Energy Sector							
Company	**RF**	**RM**	**RM-RF**	**BETA**	**Expected Return**	**Estimated Return**	**Valuation**
ADANITRANS	5.73282	0.01694	-5.71588	0.95709	0.12039	0.26222	overpriced
POWERGRID	5.73282	0.01694	-5.71588	0.38384	0.00670	3.53883	overpriced
NTPC	5.73282	0.01694	-5.71588	0.55653	-0.10283	2.55174	overpriced
HINDPETRO	5.73282	0.01694	-5.71588	1.67748	-0.03549	-3.85546	underpriced
RELIANCE	5.73282	0.01694	-5.71588	1.00010	0.04728	0.01636	underpriced

The above table shows that Adani, Powergrid, NTPC, and reliance have the positive return. HINDPETRO has highest risk of 1. 67748.with the actual return of (0.160748) and its expected return is (0.03549). As the estimated return of reliance is lower than the expected return indicates that investors should buy the share which price may increase in future.

Findings and Suggestion

- From the study it was found that all the selected companies of automobile sector were providing negative return except BAJAJAUTO it means that investor should not invest in these companies of automobile sector.
- All selected company In IT sector are overpriced. So here investor select short sell option for trading.
- In Banking and Finance Sector ICICIBANK, INDUSINDBK, HDFCBANK and AXISBANK are

underpriced which is favourable for buy signal.
- In pharmaceutical sector all the selected company are overpriced which is favourable for short sell.
- In energy Sector RELIANCE has underpriced share so here investor should invest in this company here expected return is more than the estimated return.

Conclusion

The purpose of the study was to test the applicability of CAPM in selected companies of National Stock Exchange. From the analysis it was concluded that out of 25 Companies, 15 Companies' share price are overvalued and 10 Companies' share price are undervalued. We can also conclude that if the Investor will buy the share of ICICI bank, AXIS bank, RELIANCE power then there is a possibility to increase the price of shares in future. If investors would like to earn profit by short selling then they should prefer HCLTECH, TCS, WIPRO, KOTAKBNAK, LUPIN, SUNPHARMA, NTPC Persistent companies.

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