



Study on Determining Whether Stock is Under-Priced or Over-Priced Based on Capm Model (A Case Study of Sensex Companies)

KEYWORDS

Alpha, Beta, Market return, SML (Security Market Line), CAPM(Capital Asset Pricing Model)

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ABSTRACT *The capital asset pricing model (CAPM) of William Sharpe (1964) and John Lintner (1965) marks the birth of asset pricing theory (resulting in a Nobel Prize for Sharpe in 1990). Four decades later, the CAPM is still widely used in applications, such as estimating the cost of capital for firms and evaluating the performance of managed portfolios.*

The objectives of the study are to find out whether market price of each stock of BSE Sensex companies is undervalued and to provide findings/ results based on analysis. In view of the objectives of the study listed above, exploratory research design has been adopted. The study is based on secondary data covering from 2000 to 2014. It consists of closing annual market price of each share of companies under BSE Sensex. They are used for calculating alpha, beta and return on market. The data has been collected from money control.com and various other reports like magazines, journals, published and books .

It is concluded that CAPM is the benchmark model in the real world. Most corporations use it. Everyone will expect to understand the CAPM.

Introduction:

The capital asset pricing model (CAPM) of William Sharpe (1964) and John Lintner (1965) marks the birth of asset pricing theory (resulting in a Nobel Prize for Sharpe in 1990). Four decades later, the CAPM is still widely used in applications, such as estimating the cost of capital for firms and evaluating the performance of managed portfolios. The CAPM is also often used to measure the performance of mutual funds and other managed portfolios. The approach, dating to Jensen (1968), is to estimate the CAPM time-series regression for a portfolio and use the intercept (Jensen's alpha) to measure abnormal performance.

CAPM are based on three implications of the relation between expected return and market beta implied by the model. First, expected returns on all assets are linearly related to their betas, and no other variable has marginal explanatory power. Second, the beta premium is positive, meaning that the expected return on the market portfolio exceeds the expected return on assets whose returns are uncorrelated with the market return. Third, in the Sharpe-Lintner version of the model, assets uncorrelated with the market have expected returns equal to the risk-free interest rate, and the beta premium is the expected market return minus the risk-free rate. Most tests of these predictions use either cross-section or time-series regressions.

To estimate the required expected rate of return for a stock/ asset/project/ firm—that is, the cost of capital—according to the CAPM, three inputs are needed:

1. The risk-free rate of return, r_f
2. The expected rate of return on the overall market, $E r_M$
3. A firm's or project's beta with respect to the market, β_i

The CAPM formula is $E r_i = r_f + \beta_i(r_M - r_f)$

where i is the name of project/asset/stock/firm and $E r_i$ is project/asset/stock/firm's expected rate of return. The dif-

ference between the expected rate of return on the risky (stock) market and the risk-free investment, $(E r_M - r_f)$ is called the equity premium or market risk premium.

The CAPM formula is the standard model in the finance. The SML is just a graphical representation of the CAPM formula which shows the relationship between the expected rate of return of a project and its beta. The slope of this line is the equity premium, $E r_M - r_f$, and the intercept is the risk-free rate, r_f . The CAPM extends the expected rate of return to a world in which investors are risk averse. The CAPM gives the time and risk premiums. It gives an expected rate of return that adds a risk premium (as a reward for your willingness to absorb risk) to the time premium.

Promised Rate of Return = Time Premium + Default Premium + Risk Premium

Actual Earned Rate = Time Premium + Default Realization + Risk Premium

Expected Rate of Return provided by the CAPM = Time Premium + Expected Risk Premium
Expected rate of return (cost of capital) for each stock/asset/project if project's relevant risk characteristics are given. The model states that an investment's cost of capital is lower when it offers better diversification benefits for an investor who holds the overall market portfolio—less required reward for less risk contribution. Market beta is its measure of risk contribution. Projects contributing more risk (market beta) requires higher expected rate of return and projects contributing less risk require a lower expected rate of return. This is the precise relationship that the CAPM gives you.

For practical real-world purposes an asset's given price is compared or expected return relative to what it should be according to the CAPM, and in that context, over/under pricing is discussed. Assets above the SML are underpriced relative to the CAPM, because the assets' "too"

high expected return means their price is "too" low compared to the "fair" CAPM value. Assets below the SML are overpriced relative to the CAPM, because the assets' "too" low expected return means their price is "too" high compared to the "fair" CAPM value.

In case expected return of a share/ asset/ project is greater than that of its estimated return, it is undervalued/ underpriced, otherwise overvalued/ overpriced.

Objectives of the study:

1. To find out whether market price of each stock of BSE Sensex companies are under-valued and
2. To provide findings/ results based on analysis.

Research Design:

In view of the objectives of the study listed above, exploratory research design has been adopted. Exploratory research is one, which largely interprets the already available information, and it lays particular emphasis on analysis and interpretation of the existing and available information and it makes use of secondary data.

Research Methodology:

The study is based on secondary data covering from 2000 to 2014. It consists of annual market price of each share of companies under BSE Sensex. Capital gains are added to dividends to arrive at annual returns of the companies. They are used for calculating alpha, beta and return on market. The data has been collected from money control.com. Various other reports like magazines, journals, published books and official websites are also referred to for the present study. Risk free rate of return is derived from 364 days treasury bills.

Sources of data:

Tools of analysis: The data collected for the study is analysed logically and meaningfully to arrive at meaningful conclusions. The statistical tools applied for data analysis in the present study are standard Deviation, Ratios, Compound Annual Growth Rate.

Results/ Findings:

1. About 25% of BSE Sensex companies are overvalued.
2. Majority of pharmaceutical companies in BSE Sensex are overvalued.
3. 2/3 of software companies in BSE Sensex are overvalued.
4. All bank, automobile and FMCG companies in BSE Sensex companies are undervalued.
5. Half of the power companies in BSE Sensex are undervalued.
6. All Tata Group companies in BSE Sensex companies are undervalued.
7. Reliance industries and Hindalco companies are undervalued.
8. Nearly 75% of PSUs are undervalued.

Conclusion:

It is concluded that the CAPM is the benchmark model in the real world. Most corporations use it. Everyone will expect to understand the CAPM. Regardless of whether the model holds or not. The empirical evidence suggests that the CAPM is not a great model for predicting expected rates of return. It never offers great accuracy.

Appendix-1

Companies of SENSEX	Rf	Beta	Rm	Estimated Returns as per CAPM
AXIS Bank	0.0782	1.5119	0.2069	0.2727
Bajaj Auto Ltd	0.0782	3.5353	0.2069	0.5331
Bharat Heavy Electricals Ltd	0.0782	1.4620	0.2069	0.2663
Bharti Airtel Ltd	0.0782	1.2224	0.2069	0.2355
Cipla Ltd	0.0782	0.5136	0.2069	0.1443
Coal India Ltd	0.0782	0.4581	0.2069	0.1371
Dr. Reddy's Laboratories Ltd	0.0782	0.7925	0.2069	0.1802
GAIL (India) Ltd	0.0782	1.6379	0.2069	0.2890
HDFC Bank Ltd	0.0782	1.0399	0.2069	0.2120
Hero MotoCorp Ltd	0.0782	0.6977	0.2069	0.1680
Hindalco Industries Ltd	0.0782	1.5863	0.2069	0.2823
Hindustan Unilever Ltd	0.0782	-0.0124	0.2069	0.0766
Housing Development Finance Corporation Ltd	0.0782	0.9941	0.2069	0.2061
ICICI Bank Ltd	0.0782	1.2369	0.2069	0.2374
Infosys Ltd	0.0782	0.7220	0.2069	0.1711
ITC Ltd	0.0782	0.3536	0.2069	0.1237
Larsen & Toubro Ltd	0.0782	1.6606	0.2069	0.2919
Mahindra and Mahindra Ltd	0.0782	2.2186	0.2069	0.3637
Maruti Suzuki India Ltd	0.0782	1.4848	0.2069	0.2693
NTPC Ltd	0.0782	0.6289	0.2069	0.1591
Oil and Natural Gas Corporation Ltd	0.0782	0.9879	0.2069	0.2053
Reliance Industries Ltd	0.0782	0.9254	0.2069	0.1973
Sesa Goa Ltd	0.0782	4.4142	0.2069	0.6462
State Bank of India	0.0782	1.0173	0.2069	0.2091
Sun Pharmaceutical Industries Ltd	0.0782	0.3361	0.2069	0.1215
Tata Consultancy Services Ltd	0.0782	0.4633	0.2069	0.1378
Tata Motors Ltd	0.0782	2.4313	0.2069	0.3911
Tata Power Company Ltd	0.0782	1.5079	0.2069	0.2722
Tata Steel Ltd	0.0782	1.8388	0.2069	0.3148
Wipro Ltd	0.0782	0.9987	0.2069	0.2067

Appendix-2

Companies of SENSEX	Actual Return ($D_1 + P_1 - P_0$)/ P_0	Esti- mated return	Under- valued/ Overval- ued
AXIS Bank	0.4010	0.2727	Under valued
Bajaj Auto Ltd	0.6749	0.5331	Under valued
Bharat Heavy Electricals Ltd	0.3665	0.2663	Under valued
Bharti Airtel Ltd	0.5084	0.2355	Under valued
Cipla Ltd	0.0886	0.1443	Overval- ued
Coal India Ltd	0.0834	0.1371	Overval- ued
Dr. Reddy's Laboratories Ltd	0.1661	0.1802	Overval- ued
GAIL (India) Ltd	0.3634	0.2890	Under valued
HDFC Bank Ltd	0.2518	0.2120	Under valued
Hero MotoCorp Ltd	0.5512	0.1680	Under valued
Hindalco Industries Ltd	0.2608	0.2823	Overval- ued
Hindustan Unilever Ltd	0.3837	0.0766	Under valued
Housing Development Finance Corporation Ltd	0.2129	0.2061	Under valued
ICICI Bank Ltd	0.3132	0.2374	Under valued
Infosys Ltd	0.0871	0.1711	Overval- ued
ITC Ltd	0.2146	0.1237	Under valued
Larsen & Toubro Ltd	0.5113	0.2919	Under valued
Mahindra and Mahindra Ltd	0.4612	0.3637	Under valued
Maruti Suzuki India Ltd	0.3506	0.2693	Under valued
NTPC Ltd	0.1127	0.1591	Overval- ued
Oil and Natural Gas Corpo- ration Ltd	0.3070	0.2053	Under valued
Reliance Industries Ltd	0.1870	0.1973	Overval- ued
Sesa Goa Ltd	1.0222	0.6462	Under valued
State Bank of India	0.3150	0.2091	Under valued
Sun Pharmaceutical Indus- tries Ltd	0.1239	0.1215	Under valued
Tata Consultancy Services Ltd	0.3043	0.1378	Under valued
Tata Motors Ltd	0.5554	0.3911	Under valued
Tata Power Company Ltd	0.3160	0.2722	Under valued
Tata Steel Ltd	0.3537	0.3148	Under valued
Wipro Ltd	0.0748	0.2067	Overval- ued

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