



# IMPORTANCE OF CAPM MODEL IN RISK MANAGEMENT

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## ABSTRACT

It is commonly said that higher the risk higher would be the returns, the questions that remain are, what type of risks are awarded and what is risk premium per unit of risk. A few equilibrium asset-pricing models attempted to answer these questions. Out of these, Capital Asset Pricing Model (CAPM) is the most popular and widely used model. It was independently developed by Sharpe and others proposed further refinements. The CAPM provides a precise prediction of the relationship between the risk of an asset and its expected return.

## I. INTRODUCTION

For making proper investment involving both risk and return, the investor has to make study of the alternative avenues of the investment-their risk and return characteristics, and make a proper projection or expectation of the risk and return of the alternative investments under consideration. He has to tune the expectations to this preference of the risk and return for making a proper investment choice. The process of analyzing the individual securities and the market as a whole and estimating the risk and return expected from each of the investments with a view to identify undervalued securities for buying and overvalued securities for selling is both an art and a science that is what called security analysis.

## II. REVIEW OF LITERATURE

Black et al. (1972) in their study found linear relationship between the average excess portfolio return and beta over the period of 1931-1965. Fama and Macbeth (1973) found a linear and positive relationship between expected return and beta. For the purpose of showing relationship, expected return and beta based on all stocks listed in NYSE. Lakonishok and Shapiro (1986) examined the relationship between stock market return and beta, standard deviation and size for the period from 1962-1981 and concluded that neither beta nor variance or residual standard deviation can explain cross-sectional returns. Ruefli (1990) by applying the mean-variance approach reported that the relationship was inherently unverifiable. Bark (1991) used the Fama-Macbeth methodology to test the CAPM in the Korean market. His study was based on monthly



stock returns for the period of January 1980 to December 1987. This study investigated the positive risk and return trade off. The results of the study indicated that during the study period CAPM was not a predictive model in the Korean market. Jegers (1991) showed for the explanation of risk-return relations at firm prospect theory is useful. Fama & French (1992) by using Sharpe-Lintner Black Model, the study found that no cross-sectional relationship between return and beta. Sauer & Murphy (1992) found CAPM is the better indicator of capital asset pricing in Germany than the CCAPM. On the other hand Weinraub and Kuhlman (1994) examined the effect of the variability of individual common stock betas on the variability of the portfolio beta. The study covered a period from January 1975, to December 1990. A sample of 600 common stocks daily returns has been used in the study. The 37 study found that low beta stock have greater relative beta variability. The study also found that a strong positive relationship between the level of beta and its variability. Eakins et al. (1996) concluded for institutional investment allocation process that market returns is an important factor.

## CAPM MODEL

The Capital Asset Pricing model (CAPM) is a model that describes the relationship between Systematic risk and expected return for assets, particularly stock. In finance the Capital Asset Pricing Model (CAPM) is a model used to determine a theoretically approximate required rate of return of an asset, to make decisions about adding assets to a well-diversified portfolio. They would like to have assets with low beta co-efficient (ie) Systematic risk. Investors would opt for high beta co-efficient only if they provide high rate of return. The capital asset pricing theory helps the investors to understand the risk and return relationship of securities. It also explains how assets should be priced in the capital market. In the CAPM theory, the required rate return of an asset is having a linear relationship with asset's beta value (i.e.) undiversifiable (or) Systematic risk. According to this concept (CAPM) all investors hold only the market portfolio and riskless securities. The CAPM has been useful in the selection of securities and portfolios. Securities with higher returns are considered to be undervalued and attractive for buy. The below normal expected return yielding securities are considered to be overvalued and suitable for sale.

## OBJECTIVES

The paper main objective is to identify undervalued stocks from the selected group of companies' scripts. It also makes an insight into the risk analysis techniques. And studies about correlation based in different sector.

## SCOPE OF THE STUDY

The study is confined to the statistics of the leading companies in NSE. The study helps to predict the future share price of the selected scripts. The BETA is calculated based on the



returns for limited period, i.e., one month (Feb 01 to 28). The data used in this project is extracted from NSE index changes in other index could result in discrepancies in the resulted obtained. The firms selected for analysis are listed.

## LIMITATIONS OF THE STUDY

This study is based on secondary data taken from published annual report and websites. The reliability and the finding are contingent upon the data published in annual report. Present study is undertaken for a particular period of time. So findings cannot be applicable for a very long period of time.

## Efficient Markets

Market efficiency is the basic assumption for asset pricing models. Cohen *et al.* (2009) proved that a joint hypothesis between the CAPM and market efficiency approximates the pricing of stocks well at price level for both growth and value securities. Therefore, this dissertation discusses the development and recent findings about the most important theories, the Random walk hypothesis and efficient-market hypothesis.

## Random Walk Hypothesis (RWH)

The RWH finds its origin in the early works of Bachelier (1900). Extended and translated into English by Cootner (1964) this theory submits that stocks at the end of a certain time period largely show future prices.

These seem to be generated by a random process and show independent (Gaussian or normal standard) distributions. Other chartist theories however share the common assumption that history repeats itself and therefore historical stock price behaviours can be used to predict a share's price (Fama 1965). Bachelier (1900) and later Osborne (1959) inductively transferred botanic observations like the Brownian motion to build a mathematical model to explain price fluctuations on the stock market. Even though both tried to justify this theory empirically, they felt short as they only used cross-sectional data. Moore (1962), analyzing only eight shares from the U.S. Stock market (NYSE), and Kendall (1953), examining 19 British industrial indices, deductively proved that successive stock prices cannot be predicted by adjusting historical prices. They observed an approximately normal distribution; however they acknowledged that most of the distributions were leptokurtic which weakens their findings. To provide more reliable facts, Fama (1965) analysed the whole Dow-Jones Industrial Average index (30 stocks). He was also able to explain the "fat tails" within his sample by using the findings of Mandelbrot (1963), who states that distributions show a stable Paretian (Levy 1925) shape with characteristic exponents smaller than 2.

The efficiency of information also plays a major role within this research area. If any information is distributed or accessible to/from each investor there would not be any



fluctuation or variation in stock prices. Only when new information is created the market reacts (Fama 1965). If the market (buyers and sellers) knows about a company's future, this would already be reflected in the current stock price (Samuelson 1965). As information is processed in different ways and there is existing disagreement about a company's intrinsic value stock prices fluctuate randomly. Fama (1965) calls it the market's "noise" and forms a fundament for short-term behavioural models like the one of Barberi *set al.* (1998). According to Fama(1998) this does not contradict the long-term market efficiency but underline its power. One of the best established investment strategies, the long-term focused *buy and hold* approach, is based on this idea. It issued to create an optimized portfolio according to the major aim of this dissertation.

Even though there is strong evidence provided by several renowned academics supporting the market efficiency of the RWH (Jensen 1978), Lo&MacKinlay (1988) rejected it with their quantitative analysis of 625US stocks during a 1,216-week time period by applying a variance-ratio test. However, by increasing the observation interval from one to four weeks they were not able to reject the hypothesis. These findings raise the question if information is not incorporated fast enough or if there is too little information on small firms available to the market.

## **Efficient-Market Hypothesis (EMH)**

As Jensen (1978) states in his symposium the EMH has become an accepted fact within the financial literature. The major contribution of this hypothesis can be described as follows: "It is not possible to make economic profits in an efficient market by trading on the basis on information set at which is already given in the moment of trading."

The definition of the information set is the reason for different versions of the EMH: weak, semi-strong and strong. They were first mentioned by Roberts (1967) and have been tested and reviewed widely by various academics since (Jensen 1978, Dim son & Muss avian 1998, Fama 1998, Sewell 2011). The typology is defined as follows (Fama 1970, LeRoy1989, Spemann 2008).

The information set in the weak form includes all historical stock prices at the time of the appraisal, public or private information is excluded. As this is given for all markets this form is not under consideration within the literature.

In the semi-strong set contains besides the historical prices all publicly available information (e.g. annual reports). Private information is excluded from this set.

A strong form of efficiency exists if the set comprises historical prices, public information and private knowledge (e.g. inside information).The model of a strong form of market efficiency has generally been rejected and only used "...as a benchmark against which the importance of deviations from market efficiency can be judged" (Fama 1970, p.414). It has been pointed out by the early example of market making specialists at the New York Stock Exchange. Niederh offer& Osborne (1966) proved that "insiders" with private knowledge (positions within the order book) are able to gain excessive returns in more than 80% of the



under taken transactions. This contradicts the core idea of a strong-form-efficient market where all information is given and accessible to all investors.

However Rozeff&Zaman (1988) provide the scarce counter evidence. They proved in their quantitative study of 679 outsiders and 722 corporate insiders that corporate insiders could not gain excessive returns any different to outsiders.

Regarding the semi-strong form, Fama (1970) states that there is no relevant counter-evidence to reject this hypothesis. This implies that stock prices fully reflect all available information after having them rapidly incorporated and consequently lead to an efficient adjustment. The quantitative “event” study of Fama et al. (1969), using data from the NYSE of 940 stock splits (collected by the CRSP), proves that after the announcement of stock splits (public information) abnormal returns cannot be gained. After a prompt price adjustment at the moment of the announcement (new information) there will not be any further trends and the prices will fluctuate randomly. This confirms the semi-strong hypothesis.

In conclusion, the semi-strong form is the generally accepted pattern of thought, if the meaning of “publicly available” is accurately defined (Jensen1978). In non-collegiate surroundings this form represents the basic understanding of an efficient market. As possible contradictions to market efficiency have been proven false and explained by scientists, research became as popular as Behavioural Finance and will which will be discussed later.

## **Modern Portfolio Theory (MPT)**

With his pioneering work Markowitz (1952, 1956, 1959) laid the foundation for MPT, for which he was lauded with the Nobel Prize in 1990. His theory is the conceptual framework for portfolio management methods used by practitioners. It is also the groundwork for evolutionary theories of renowned academics including the Single-Index-Model (Sharpe 1963), the Capital Asset Pricing Model (Sharpe 1964, Linter 1965, Mossin,1966), and the Arbitrage Pricing Theory (Ross 1976).

Markowitz (1952) explains that the biggest challenge for an investor is to find the perfect combination of stocks (“risky assets”) in regards to expected return and variance of return; in other words an efficient portfolio in terms of yield and risk.

## **RESEARCH DESIGN**

The formidable problem that follows the task of defining the research problem is the preparation of the design of the research project, popularly known as the “research design”. Decisions regarding what, where, when, how much, by what means concerning an enquiry or a research study constitute a research design.

A research design is the arrangement of conditions for collection and analysis of data in a manner that aims to combine relevance to the research purpose with economy in procedure. Statistical tools used in this paper are Capital Asset Pricing Model (CAPM), Moving Average, ANOVA and Regression. Lupin ltd, Cadila ltd, NHPC ltd, JSW Energy ltd, Torrent Power ltd,

Tata Power, Adani Power ltd, Reliance Infrastructure ltd, Jaiprakash Associates ltd, IRB Infrastructure ltd, GMR Infrastructure ltd, Asian Paints ltd, Berger Paints ltd, Shalimar Paints, Kansainer Paints ltd, Nitco, Sun Pharmaceutical ltd, Cipla ltd, Torrent Pharmaceutical ltd.

#### IV.FINDINGS & SUGGESTION

Calculated beta value and expected returns:

	<b>BETA:</b>	<b>EXPECTED RETURN CALCULATION</b>
	$\beta = \frac{\text{Cov}(rs, rm)}{\sigma^2 m}$	$E(R_i) = (R_f + \beta*(R_m - R_f))$
1	$\beta = 1.561078$	$E(R_i) = -0.04649$
2	2.829904	-0.11679
3	7.546373	-0.3781
4	2.831581	-0.11688
5	1.412662	-0.03827
6	1.072805	-0.01944
7	1.056541	-0.01854
8	3.578889	-0.15828
9	1.878307	-0.06407
10	1.732863	-0.05601
11	3.441472	-0.15067
12	0.363237	0.019875
13	0.21192	0.028259
14	56.91256	-3.11318
15	14.36561	-0.75591
16	1.115238	-0.02179
17	1.092939	-0.02055
18	-0.14582	0.048079
19	1.554044	-0.0461
20	1.28442	-0.03116

#### CAPM analysis

S.NO	SCRIPT	CAPM analysis	Trend analysis	Suggestion
1	NHPC ltd	-0.04 it is considered to be an overvalued share	Based on the trend analysis it is positive	Based on these two analysis it suitable for sell the stock and it is not suitable for hold the stock
2	JSW energy ltd	-0.11 it is considered to be an overvalued share	Based on this analysis it is	Compared to this two analysis it is not suitable

			positive	for hold the stock
3	Torrent power ltd	0.37 based on this CAPM analysis it is consider to be an undervalued hare	Based on this the trend will be goes down. So it is negative.	Compared to this two analysis it is suitable for hold the stock.
4	TATA power ltd	-0.11 it is considered to be an below normal expected return.	Based on this analysis the trend will be negative	Both the analysis the stock will be not suitable for hold, but it is suitable for sell the stock.
5	Adani power ltd	In this analysis the expected return is - 0.03and also it is considered to be an undervalued share.	Here the trend analysis also positive	Both the CAPM & trend analysis should providing increasing trend so, it is suitable for hold the stock
6	Reliance infrastructure ltd	-0.019 in this stock has lower expected return at the midlevel of the month. After that it will increases to reached at undervalued share	In this analysis shows that the increasing trend. So it is called as positive trend.	Here both the trend values are positive and the investors adversely to hold the stock
7	Larson&Tubro ltd	-0.018 compared to reliance infrastructure it is considered to be overvalued share.	Based on the trend analysis it is tends to be negative.	Compared to this two analysis it is not suitable for hold the stock. itis only suitable for sell the stock.
8	Jaiprakash associates ltd	According to this analysis stock has higher expected return and undervalued share.	Trend analysis also positive.	So the stock will be attractive for buy or hold.
9	GMR infrastructure ltd	Compared to previous shares it is very low value of expected return.	Based on the trend analysis it is positive trend (i.e) upward trend.	Based on the CAPM analysis it is not suitable for hold the stock but, based on the trend analysis it is favour to buy the stock.
10	IRB Infrastructure ltd	-0.05 in this stock has higher expected return and it is considered to be an undervalued share.	Based on the trend analysis it is going to be a downward trend, then it is called as negative trend.	Compared to both the analysis it is suitable for sell the stock.
11	Sun Pharmaceutical	Based on the CAPM analysis it has below	Based on the trend analysis it is	Compared to both the analysis it has only

	ltd	normal expected return and it is called as overvalued share.	increased to upward trend i.e positive trend.	similar differences, so the investors considered the trend analysis and to hold the stock.
12	Cipla ltd	In this stock has 0.019 expected return and it is called undervalued share.	Trend analysis basis it is downward trend i.e negative trend.	Based on the two analysis it is suitable for sell the stock.
13	Torrent Pharmaceutical ltd	It has a higher expected return.	In this stock has trend analysis also positive.	Compared to all the pharmaceutical ltd, the torrent pharmaceutical is most favour and suitable for hold the stock.
14	Lubin ltd	Based on the CAPM analysis it has below normal expected return so it is called as overvalued share.	But the trend analysis it is going to be an upward trend, i.e positive trend.	It is not suitable for hold the stock.
15	Cadila Healthcare ltd	It has good expected return but the smaller negative value.	Considered to be it is positive trend.	Both the analysis it is suitable for sell the stock.
16	Asian Paints ltd	Based on this analysis it is near positive so, it is considered to be an undervalued share.	According to this analysis it is increased to upward trend.	In this stock has similar differences so, it is suitable for buy.
17	Berger paints ltd	It is similar to Asian paints ltd.	Trend also same.	It is also suitable for hold but depending upon the trend it is not fully favored.
18	Shalimar paints ltd	0.048 in this stock has higher expected return and it is called as undervalued share.	Here the trend will be downward i.e negative trend.	Based on the CAPM it suitable for hold the stock.
19	Nitco ltd	In this stock has below normal value of expected return.	In this stock the trend also negative.	It is not suitable for hold but it only suitable for sell the stock.
20	Nerolac paints ltd	It has very lowered expected return.	Then the trend also negative.	So it is not suitable for hold the stock. Investors can adversely to sell the stock.

## V.CONCLUSION





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Though CAPM model is a very good tool in analyzing the stock value, Investors often tries to use other technical analysis mostly simple moving average and trend analysis. From this study it is always good to use CAPM model along with other technical analysis. In practical behaviours of the investors always tends to change.

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