

## Assessment of Capital Asset Pricing Model in Indian stock market

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### ABSTRACT

*As an extension of Harry Markowitz diversification and modern portfolio theory, William Sharpe, Jack Treynor, John Lintner and Jan Mossin introduced the CAPM. This exploratory research throws light on the evolution, assumptions, extensions, critiques and practical implications of the Capital Asset Pricing Model. Even today, CAPM is widely used to assess the performance of the portfolios and to estimate the cost of equity for the firms.*

**Keywords:** CAPM, risk, return, investment, stock, beta.

**JEL classification:** G11, G12

### Introduction

Capital market, being an important part of the financial system, provides a platform for the exchange of financial instruments between the buyers and sellers. For a long period of time, the mode of pricing the securities in the capital market has been a serious concern, from the point of view of the company and the investor. Risk and return are the two components of any financial opportunity which has got direct impact on the pricing of any investments. There were not many efforts made in the development of any standardized asset pricing model until the mid-twentieth century. (Sharpe, 1964) pointed out that the traditional investment models were reluctant to evaluate the risk-return relationship of a security along with its pricing behavior and he in turn came up with a model namely Capital Asset Pricing Model, popularly called as CAPM. The model was such that any security can be evaluated using CAPM. Using this model, the security prices can be determined by weighing the expected return against the risk (Ratra, 2017). CAPM shows how expected return of an asset is determined in a securities market (Mukherjee, 2001). Risk factors other than beta can be useful to explain share returns. When the model is used, a cautious approach should be made by investors in evaluating the investment's performance (Laubscher, 2002). In securities such as treasury bills and government bonds, the default risk is considered to be zero. Risk-free return and risk premium which is included in CAPM is used for calculating the total return. Risk premium is determined by the level at which the risk is taken. The excess of return rate over the risk-free return is termed as systematic risk.

### Evolution of CAPM

When we look back to the 1960s it is very striking as to know how a little we understood about the concept of risk – theoretically or empirically. Since 1602 both stock and options had been in reality when the East India Company shares had been traded in Amsterdam (Vega, 1688) and when insurance markets became more organized by 1700s. For centuries insurance companies had been dependent on spreading of risk. After the history of real risk sharing and risk bearing in the systematized capital markets, the emergence of CAPM happened when the fundamental facts about return and risk in the financial markets were not fully explored and when the decision-making concept under unpredictable circumstances were comparatively new. Studies on decision-making under uncertainty and investor risk choices became apparent only in the 1940s-1950s. The concept of portfolio management was developed by (Markowitz, 1952), explained how to consider the risk and return in the process of decision making.

The rigorous measurement of risk and return came into existence when researchers started conducting scientific investigation using the market data. "It is surprising to realize that there have been no measurements of the rates of return on investments in common stocks that could be considered accurate and definitive" quoted by (Lorie, 1964) when they first conducted a study on the securities listed on the NYSE. (Sinquefeld, 1976) brought in the results on long-term returns after taking into account the premium on equity risk.

(Miller, 1958) argued that the cost of an asset is not based on how it is actually financed, which means the cost of capital determines the cost of shareholders capital. He also mentioned that this method is subjective

as the cost of equity is derived from the expected dividend growth rates. Whereas the CAPM proved that there need not exist any relation between future growth rate and cost of capital. During the pre-CAPM period, risk was not regarded as a major constituent in the cost of capital computation. They also cited “No satisfactory explanation has yet been provided . . . as to what determines the size of the risk [adjustment] and how it varies in response to changes in other variables”.

It might be surprising to know that CAPM is also related to religion. (VanderLinden & Lin, 2006) says that in the Bible, a person would find parallels to CAPM in the context of the parables of the kingdom of God. The gain – loss decision making in the theory and practice of finance is comparable to the duality in parables. Parables which give insights into investor’s reaction might be helpful in explaining the premium puzzles in asset pricing. Parables also help by contributing to finance education as it makes complex concepts simple. Financial investment is not distinguished from real investment in the parables. The pattern of financial investment is more volatile than real investment. The fundamentals of investing is discussed in the Holy Bible more than its technical analysis. “Biblical finance” might comprise only a few aspects of financial theories but it is a vital component of finance and makes it more complete and meaningful. If a deep analysis is made, a person can realize that parables contribute to finance education and practice.

Harry Markowitz’s work- the “mean-variance model” or model of portfolio selection was the base for the CAPM model. This model establishes a connection between the asset price and the expected rate of return if the firms can determine the future cash flows (Elbannan, 2015).

### Assumptions of CAPM

The main assumptions of CAPM given by (Lundgren, 2005) are; return and risk are the only two decision parameters; an investor's choice will depend only on the first two statistical moments of a normally distributed asset return variable; risk-averse investor; investors having expectations which are homogenous; An investor who operates in asset markets is a price taker; asset quantity is given; perfectly divisible assets; Time horizon for investment is similar for all investors; there is a perfect capital market; an investor could lend and borrow money for the same rate of interest; absence of transaction cost, information and taxes. Parameters of CAPM given by (Laubscher, 2002) are return on the market, beta and risk-free rate of return. The efficiency of an asset pricing model rests in its ability to assess the variations in risk and return trends of securities over a period of time (Islam, 2017).

(Sharpe, 1964) also proposed that the total risk can be classified into two parts: systematic risk which cannot be diversified as it will give a higher return as contrasted with the pure interest rate and it is associated to the economic activity and unsystematic risk which could be diversified, where it will earn a risk-free rate of return and is not associated with any economic activity. (Bajpai, June 2015) concluded that for a risky security, there is a linear relation between risk and return.

CAPM provide an understanding that the risk factors except the systematic risk of securities will not be recognized but the same can be diversified. According to the Capital Asset Pricing Model theory, systematic risk holds value in a market where an investor has related expectation about covariance and returns of individual assets, when there are no restrictions on trading and taxes, and where transaction costs do not exist. To evaluate variations on the returns in individual stock, market return plays a key role. But CAPM is a carefully analyzed equilibrium model which is a simplified reality. On the other hand, CAPM is currently a subject for a substantial debate and thorough empirical examination (Saji, 2014).

Asset prices are ought not to be seen as a sufficient motivation to utilize monetary policy for balancing out asset price cycles. The financial steadiness worries from asset price bubbles could be better dealt through small scale and large scale prudential measures, and the productiveness of these measures would improve when actualized in a sound macroeconomic strategy condition (Pattanaik & Singh, 2012).

The conditions on the primitives of a persistent time economy under which there exist equilibrium complying with the Consumption-Based Capital Asset Pricing Model (CCAPM) broadens equilibrium characterization of interest rate of Ingersoll, Ross and Cox (1985) to multi-operator economies (Zame & Duffie, 1989). Also, skewness is one among the most ignored features in security returns distribution. (Metia & Mukherjee, 2001).

Even though the model does not best explain the present world, the same might forecast the future behavior of the investor. CAPM can be used as the benchmark to understand capital market functioning which causes the investors reasoning and the assets prices to deviate from instant solutions. Whereas if an investor can hold diversified portfolios, the CAPM model which focuses on the stand-alone risk proves to be misleading (Perold, 2004).

The National Stock Exchange (NSE) investors extensively use CAPM as it is one of the well known measures of calculating the anticipated return on stock. While making a decision whether to sell or buy a particular

security, individual securities can be assessed to know whether the same is overvalued or undervalued using CAPM. Wherein it was proved to be of not much applicability of CAPM in NSE as the distinction between the actual returns and the anticipated results is very high at moderate level of risk (Ratra, 2017). Also, it is impossible to signify using CAPM that the anticipated returns on low-yielding common stock differ from the anticipated returns on high-yielding common stock (Shveta Singh, 2016).

In India the presence of momentum profits during 1995-2006 was strong. Risk-based models like Fama-French and CAPM failed to account the phenomenon. As sources of momentum phenomenon, individualistic risk shows a positive connection with momentum, lending support to behavioral factors. In framing portfolios, choosing the stocks which have been the winners in the last three months and six months can help an investor and fund managers to procure considerable profit. High force returns are not just determined by great execution of victor portfolios yet in addition are created by terrible execution of failure portfolio. Not only great performances by the winner portfolios drive high momentum returns but also the bad performance of loser portfolios (Khan & Ansari, 2012).

The asset pricing model and risk-return factor under CAPM has been confronted by the researchers. The asset pricing models evolved after the CAPM, including Fama and French- five-factor model and Arbitrage Pricing Model, got an edge over the CAPM model, due to its ability in explaining the factors which cannot be measured by CAPM. (Sharma S. B., 2015) evidently expressed that the Arbitrage Pricing Model may enhance the investors insights into their expected rate of return than CAPM, as APT model provides better estimate of return generation process and performs better forecasting.

### CAPM Model

The proposed CAPM model considers 'risk' as a variable that solely affects the returns of a security and the model also justified the differences in the expected returns from varied securities.

CAPM Model is expressed as:

$$E(R_i) = R_z + \beta \{(R_m) - R_z\}$$

- $E(R_i)$  denotes the expected rate of return from an asset;
- $R_z$  represents the return from the risk free assets available in the market or zero-beta portfolio;
- $\beta$  denotes the systematic risk attached to the security;
- $\{(R_m) - R_z\}$  is the additional market premium on the investment on that particular security.

$R_z$  or the zero beta assets are usually those treasury bills or gilt-edged securities issued by the Government of the country which are enclosed with zero risk. CAPM model indicates that the total rate of return expected from an investment avenue is inclusive of the return from the risk-free security plus the additional return expected from it along with the risk, which is specific for each security (Sharpe, 1964).

### Security Market Line

Security Market Line is the graphical representation of the CAPM. The relationship between the risk (measured by the beta coefficient) and the expected return is showed in the graph. The Beta the expected return is represented by the x-axis and y axis respectively. The beginning of the line represents the risk free rate. The market risk premium is determined by the slope of the SML. It is the difference between the risk-free rate and the expected return. The slope will be steeper with the increase in the risk premium.

### Extensions from Capital Asset Pricing Model

The efficiency of an asset pricing model is measured by its capacity to explain all the factors behind the returns of a security over a period of time (Singh & Yadav, 2015). The incapability of the CAPM model was that only one factor i.e., risk, was used to explain the pricing behavior of an asset and also many studies were conducted highlighting the unrealistic assumptions of CAPM which paved way for many other advanced versions of the model.

### Fama-French Three Factor Model

(Fama & French, 1992) introduced an updated model of the existing CAPM by adding two more factors together with market risk to measure the expected returns from a stock. The additional factors introduced were Book-to-Market ratio and Market Capitalization.

It is expressed in the following equation of regression:

$$R_{it} - R_{Ft} = a_i + b_i (R_{Mt} - R_{Ft}) + s_i \text{SMB}_t + h_i \text{HML}_t + e_{it}$$

- $R_{it}$  indicates the return from a security "i" in a time frame of "t",
- $R_{Ft}$  denotes that rate of return which is entirely risk-free,
- $R_{Mt}$  represents weighted average return of a security,

- d)  $SMB_t$  indicates the market capitalization of the diversified portfolio where return from small-cap stocks less return from large-cap stocks,
- e)  $HML_t$  depicts the difference in book-to-market ratio of small-cap and large-cap stocks in the portfolio,
- f)  $e_{it}$  is introduced as a zero-mean residual in order to nullify the effect of residual items in the regression analysis and  $a_i$ , the constant, is zero for all the cases.

Various studies including that of (Liew & Vassalou, 2000) and (Balakrishnan, 2014) supported the Fama and French Three-Factor Asset Pricing model and stated that it has an ability to predict the return from a security and factors behind the returns and even can predict the future business cycle of the respective industry. It also captures the excess return over the mean return which is missed out by the one factor CAPM.

#### ***Carhart's Four Factor Model***

Five years after the evolution of Fama – French three-factor model, Mark Carhart proposed an asset pricing model, which includes momentum as the fourth factor. The study was made on the mutual funds in contrast to the previous versions which were done on stock.

The model is expressed as:

$$R_{it} - R_{Ft} = a_i + b_i(R_{Mt} - R_{Ft}) + s_iSMB_t + h_iHML_t + \beta(WML) + e_{it}.$$

The WML represents the return from the momentum of the asset. Though it was developed with a systematic base for evaluating the returns from an asset, the model was not well received around the investor community (Rehnbj, 2016).

#### ***Fama-French Five Factor Model***

$$R_{it} - R_{Ft} = a_i + b_i(R_{Mt} - R_{Ft}) + s_iSMB_t + h_iHML_t + r_iRMW_t + c_iCMA_t + e_{it}.$$

- a)  $R_{it}$  indicates the return from a security "i" and a time frame of "t",
- b)  $R_{Ft}$  denotes that rate of return which is entirely risk-free,
- c)  $R_{Mt}$  represents weighted average return of a security,
- d)  $SMB_t$  indicates the market capitalization of the diversified portfolio where return from small-cap stocks less return from large-cap stocks,
- e)  $HML_t$  depicts the difference in book-to-market ratio of small-cap and large-cap stocks in the portfolio,
- f)  $RMW_t$  represents the profitability of various stocks in the portfolio, and
- g)  $CMA_t$  indicates conservative or aggressive nature of the stocks in the portfolio
- h) If the sensitivities to the five factors,  $b_i$ ,  $s_i$ ,  $h_i$ ,  $r_i$ , and  $c_i$ , capture all variation in expected returns (Fama & French, 2014).

Later, the CAPM was extended to Inter-temporal Capital Asset Pricing Model (I-CAPM) by Merton. This model was based on a different assumption on the objectives of the investor. The investor's main aim is to maximize their return from the portfolio according to the CAPM, whereas the ICAPM focus on the opportunities throughout the investment along with the concern to get a higher payoff. This model took into consideration variables such as future income, expected price of consumption goods and the future opportunities in the portfolio etc. Therefore, this model enable investors to exploit the benefits of future utility for the ongoing consumption and also to continuously trade. The opportunities in future investment are affected by the present demand, unlike in the case of a one-period model (Merton, 1973). In the US equity market, the primary focus is on the socially responsible investments where the attention is majorly given to the relationship between Corporate Financial Performance (CFP) and Corporate Social Performance (CSP) and. With the evolution of modern portfolio theories, the concepts of shareholders theory and value creation were questioned. To overcome the weaknesses in the CAPM and Carhart models, the ICAPM model provides an interesting solution. It is based on the usage of both market beta and renovation of state variables that predict the future investment opportunities to describe the cross-sectional variations of equity market return.

CAPM does the empiric assessment of the Friedman Hypothesis of inflation. CAPM is often discussed with the covariance effect of Fisher-Friedman capital asset pricing model. FFCAPM describes the variation in equity return. The hypothesis of Friedman is a relationship between positive and negative; the positive relation is inflation adjustment in the economy and the negative impact is the inflation in uncertainty. The Friedman hypothesis of inflation says there is an imperfection in the economic system and it could slow down a rapid action adjustment in inflation. The hypothesized inflation can have an effect on the variability of return, standard return of the economy, inflation on output directly and indirectly, productivity level, real income, etc. In this theory, a positive relationship is seen between the elasticity in output and elasticity in

real investment and the level of uncertainty has negative impact. A negative interest rate in respect of inflation would be shown as the elasticity of output is low than the real investments. It is understood that the elasticity can have both nominal and real negative effects. The purpose of the empirical evidence of the FFCAPM is to minimize the level of economic activity and variability of that particular activity (A.Burnie, 1990).

### Criticism of CAPM

Several research studies undertaken including (Fama & French, 2004) pointed out the failure of Capital Asset Pricing Model in the developed capital markets and suggested that majority of the applications of CAPM model is invalid.

The Capital Asset Pricing Model (CAPM) is criticized as it is not capable to account for long-term prior returns pattern. Whereas the same is explained by other models. The study reveals that the 24 month expanding formation window in Indian market do not pay off. Among all the long term portfolio formation techniques, the Capital Asset Pricing Model tends to be a poor indicator of prior return patterns (Jain & Sehgal, 2014). While (Laubscher, 2002) criticizes CAPM as the assumptions underlying the CAPM are unrealistic and the absence of a fair market portfolio makes it impossible to test CAPM. Therefore it holds a restrained practical value. All the factors affecting the return on the investment is not captured by CAPM which is also criticized in the study.

CAPM is a failure in explaining the returns on winner portfolio as the profits are surviving even after adjustments for the risk. The winners are found to be growth stocks and low  $\beta$ , which is against the risk story (Sehgal & Jain, 2015). (Sehgal & Vasishth, 2015) in their study criticized CAPM as the past price and volume variations in stock returns are not fully explained by CAPM as price and volume momentum factors do play a role in explaining some of these return patterns. CAPM is not capable to explain the portfolio returns and the multifactor model better describes the cross section of stock returns than one factor CAPM.

(Magni, 2008) suggests in his study for decision making purposes, the disequilibrium NPV should be deducted from the CAPM. He states that the disequilibrium NPV should not be used for valuation because it is not safe to use for decision making as it leaves the investors open to arbitrage losses. The use of disequilibrium NPV for decision making maybe theoretically valid but in practice, it is unsafe.

(Sciubba, 2006) states that the economy with a diverse population who invests their money into various portfolios, and prove that investors who either believe in CAPM and apply it as a rule of thumb, or are supported with true mean-variance preferences, under some very weak conditions, will extinct in the long run. As investors aided with logarithmic utility functions enter the market, the situation created is sufficient enough to lead CAPM or mean-variance traders' wealth shares to nil.

- CAPM states that return distribution and the probable thought process of potential as well as active shareholders match. There are also chances wherein there is a possibility for the expectation of potential as well as active shareholders to be biased leading to an inefficient market price determination. These studies on behavioral finance has lead to the emergence of much alternate feasible models to CAPM such as asset pricing model based on overconfidence (Daniel, Hirshleifer, & Subrahmanyam, 2001).
- The possible fluctuations in returns of shares are inadequately explained in CAPM. As mentioned earlier, CAPM constantly failed in the empirical tests. The empirical researches bring out the result that it is the low beta stocks that offer higher returns which are way over the ones estimated to earn under CAPM (de Silva, 2012).
- One of the basic assumptions of CAPM is that the optimization of economic agents is on short term horizon and those investors who has long term investment perspective will most likely choose bonds that are inflation-linked and long term instead of short term horizons since these investments are comparatively risk-free to such agents (Campbell J, 2002).
- Market anomalies such as value effect, size etc. are not possible to be explained by CAPM. These variables are revealed while doing the empirical test (Fama & French, 1992).
- The major drawback of CAPM is that it makes an assumption that there involves no transaction cost and taxes. More advanced and complicated versions of CAPM has relaxed this assumption based on the drawbacks of this model (E. J. Elton, 2009).
- The CAPM model is based on stock return try not to validate the practice of estimating the cost of capital. It implies that CAPM gives a logical explanation of the option-adjusted stock return at the individual stock level and provides for a reasonable assessment of the cost of capital and the alternative expansion of continues use of CAPM in professional finance (Zhi Da, 2012).

Even though, many of the studies conducted had outcomes against the CAPM model, there were studies revealing the positive outcomes of the CAPM models from different dimensions. For instance, (Choudhary, 2010) pointed out the significance of CAPM in the study of the cross-sectional data and stated that CAPM was efficient enough in explaining risk-return characteristics of stocks to a great extent. (Sharma S. B., 2015) suggested that as the studies in the field of Asset Pricing models relevant in India are less in numbers, it is too early to conclude that the other Asset Pricing models are superior to CAPM, because the results may vary depending on the sample, time frame and the methods of estimation adopted.

### Practical Implications

The Capital Asset Pricing Model has the following practical implications.

At a given level of systematic risk, CAPM is used to find the present value of a security using the required rate of return. When plotted on CAPM, the coefficients of systematic risk and required rate of return will be on the same point in equilibrium. The asset is either underpriced or overpriced when the required rate of return is different from the asset's expected rate of return. For this implication to hold value, the Beta should remain stable over time. The Beta coefficient varies with the earning capacity of the assets. Therefore, an analyst should find disequilibrium priced assets to make a profit buying the underpriced assets and selling the overpriced assets.

An investor can analyse the securities and construct an optimum portfolio. Though the investors have the same efficient set they choose different portfolios is due to the difference in the indifference curves. The expected utility will increase from lower indifference curve to a higher indifference curve. For the risk averters the indifference curve will be convex and positively sloped, horizontal for the risk neutrals and concave for the risk takers. The portfolios are chosen based on their preference for return and risk. Therefore, an investor will always spread his/her funds among risky and risk free securities to form an optimum combination of risk and return.

The CAPM considers the market portfolio as an efficient set consists of an investment in the market portfolio with the amount of risk-free lending or borrowing.

$$\text{Relative market value of a security} = \frac{\text{Aggregate market value of the security}}{\text{Sum of aggregate market values of the securities}}$$

For an individual investor, the quantities can be varied while the security return and prices remain fixed. The prices of the securities are adjusted till the quantity available is consistent with the quantity desired. Hence the historical returns must be examined to understand if the securities have been priced in equilibrium as suggested by the CAPM.

### Conclusion

Capital Asset Pricing Model has been studied extensively as it is one among the most useful and easy asset pricing models in spite of all its major drawbacks. (Tapon, 1983) stated, Capital Asset Pricing Model is a "useful conceptual framework for viewing the problem of long term strategic planning in diversified, decentralized companies". Capital budgeting process of the company can take greater help from the CAPM which in turn is a significant strategic management tool. The merits of each expansion project should be considered before heading into any major decisions. The trade-off between systematic risk and expected return were the two major components that are to be taken care of while considering CAPM for pricing and other strategic management (Carruthers, 1985). CAPM allows all the strategic planners to compare the risk associated with various business avenues. Hence in this way, CAPM helps in bringing about a change in the traditional way of acquiring a business only by analyzing if expected return exceeds the weighted average cost of capital.

The blooming of CAPM has been covered through several stages such in 1965 when Sharpe and Lintner considered it as a single factor CAPM, which says that there is a positive and linear relationship between their market betas and their expected returns. In 1993, Fama and French introduced a three-factor model which has market premium, B/M, size etc. where this factor performed better than single model SAPM. Now the growth of CAPM has reached to a five-factor model which was proposed in 2015 which has factors which was not included in three factor and four-factor (Zhou & Li, 2016).

Even after the evolution of five-factor model, three-factor model continued to be the most preferred model over CAPM. Studies suggest that not only the market values are to be considered for financial market investments, but also other factors in addition to these factors should be considered. Sharpe has popularized the market factor but adequate care should be replaces by giving thorough attention to additional factors. The need for a change, focus is necessary because of the never static and ever changing nature of stock markets.

If somebody attempt to modify CAPM, it need not be viewed as contradiction rather it is just an expansion to an already existing model. Moreover, CAPM is widely used in their practical researches. Thus it has transformed, improved and modified the decision making process of the investors. CAPM is still considered to be the backbone of the financial market price theories. And this will help individuals to develop a more efficient capital market.

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### CONFLICT OF INTEREST

The authors declare no conflict of interest.

### References

1. A.Burnie, D. (1990). An Empirical Evaluation of the Friedman Hypothesis of Inflation on Capital Asset Pricing, the financial review , 297-319.
2. Bajpai, A. K. (June 2015). Capital Asset Pricing Model and Industry Effect: Evidence from Indian Market. IUP Journal of Financial Risk Management; Hyderabad Vol. 12, Iss. 2 , 30-40.
3. Balakrishnan, A. (2014). Multifactor Explanations of CAPM Anomalies: An Evidence for Indian Stock Market. Asian Journal of Finance & Accounting , 337-366.
4. Campbell J, V. M. (2002). Strategic Asset Allocation: Portfolio Choice for Long Term Investors. Clarendon Lectures in Economics.
5. Carruthers, A. E. (1985). A Note on the Use of the CAPM As a Strategic Planning Tool. Management Science , 1589-1592.
6. Choudhary, K. C. (2010). Testing Capital Asset Pricing Model: Empirical Evidences from Indian Equity Market. Eurasian Journal of Business and Economics , 3 (6) , 127-138.
7. Daniel, K. D., Hirshleifer, D., & Subrahmanyam, A. (2001). Overconfidence, Arbitrage, and Equilibrium Asset Pricing. Journal of Finance , 921-965.
8. de Silva, H. (2012). Exploiting the Volatility Anomaly in Financial Markets. CFA Institute Conference Proceedings Quarterly , 47-56.
9. Elbannan, M. A. (2015). The Capital Asset Pricing Model: An Overview of the Theory. International Journal of Economics and Finance; Vol. 7, No. 1 , 216-228.
10. Elton, E. J., Gruber, M. J., Brown, S. J., & Goetzmann, W. N. (2009). Modern portfolio theory and investment analysis. John Wiley & Sons , 347.
11. Fama, E. F., & French, K. R. (1992). The Cross-Section of Expected Stock Returns, Journal of Finance , 427-465.
12. Fama, E. F., & French, K. R. (2014). A five-factor asset pricing model. Journal of Financial Economics , 1-22.
13. Fama, E. F., & French, K. R. (2004). The Capital Asset Pricing Model: Theory and Evidence. Journal of Economic Perspectives , 25-46.
14. Islam, S. H. (2017). Is the Capital Asset Pricing Model valid in the Indian context? Pacific Business Review International Volume 9 Issue 7 , 115-124.
15. Jain, S., & Sehgal, S. (2014). Long-term prior return patterns in stock and sector returns in India. Journal of Advances in Management Research , 192-210.
16. Khan, S., & Ansari, V. A. (2012). Momentum anomaly: evidence from India. Managerial Finance , 206-223.
17. Laubscher, E. (2002). A review of the theory of and evidence on the use of the capital asset pricing model to estimate expected share returns. Meditari Accountancy Research , 131-146.
18. Liew, J., & Vassalou, M. (2000). Can book-to-market, size and momentum be risk factors that predict economic growth? Journal of Financial Economics , 221-245.
19. Lorie, L. F. (1964). Rates of Return on Investments in Common Stocks. Journal of Business , 1-21.
20. Lundgren, T. (2005). Assessing the Investment Performance of Swedish Timberland: A Capital Asset Pricing Model Approach. Land Economics , 353-362.
21. Magni, C. A. (2008). CAPM-based capital budgeting and nonadditivity. Journal of Property Investment & Finance , 388-398.
22. Markowitz, H. (1952). Portfolio Selection. Journal of Finance , 77-91.
23. Merton, R. C. (1973). An intertemporal capital asset pricing model. Econometrica , 41(5) , 867-887.
24. Metia, S., & Mukherjee, D. (2001). Capital Asset Pricing Model When Data Is Skewed. The Indian Journal of Statistics , 108-121.
25. Miller, F. M. (1958). The Cost of Capital, Corporation Finance, and the Theory of Investment. American Economic Review , 261-97.
26. Mukherjee, S. a. (2001). Capital Asset Pricing Model When Data Is Skewed, The Indian Journal of Statistics , 108-121.
27. NWANI, C. (2015). CAPM beta and the UK stock return. International journal of science and research , 1117-1123.

28. Pacho, f. (2014). capital asset pricing model testability and its validity in stock market : evidence from previous literature. *research journal of finance and accounting* , 192-198.
29. Pattanaik, S., & Singh, B. (2012). Monetary Policy and Asset Price Interactions in India: Should Financial Stability Concerns from Asset Prices be Addressed Through Monetary Policy? *Journal of Economic Integration* , 167-194.
30. Perold, A. F. (2004). The Capital Asset Pricing Model. *The Journal of Economic Perspectives*, Vol. 18, No. 3 , 3-24.
31. Ratra, D. (2017). Application of Capital Asset Pricing Model in Indian Stock Market. Volume-7, Issue-2 *International Journal of Engineering and Management Research* , Page Number: 1-7.
32. Rehnby, N. (2016). Does the Fama-French three-factor model and Carhart four-factor model explain portfolio returns better than CAPM? *Karlstad: Karlstad Business School*.
33. Saji, T. G. (2014). Is CAPM Dead in Emerging Market? *IUP Journal of Financial Risk Management*; Vol. 11, Iss. 3 , 7-17.
34. Sciuibba, E. (2006). The evolution of portfolio rules and the capital asset pricing model. *Springer, Economic Theory* , 123-150.
35. Sehgal, S., & Jain, K. (2015). Dissecting sources of price momentum: evidence from India. *International Journal of Emerging Markets* , 801-819.
36. Sehgal, S., & Vasishth, V. (2015). Past price changes, trading volume and prediction of portfolio returns. *Journal of Advances in Management Research* , 330-356.
37. Sharma, S. B. (2015). An Empirical Testing of Capital Asset Pricing Model in India. *Procedia - Social and Behavioral Sciences* 189 , 259 – 265.
38. Sharma, S. B. (2015). Capital Asset Pricing Model and Industry Effect: Evidence from Indian Market. *IUP Journal of Financial Risk Management*; Hyderabad Vol. 12, Iss. 2 , 30-40.
39. Sharpe, W. F. (1964). A Theory of Market Equilibrium under Conditions of Risk. *The Journal of Finance* , 425-442.
40. Shveta Singh, P. K. (2016). Expected Rates of Equity Returns: Evidence from Indian Stock Market. *Journal of Financial Management & Analysis*; Vol. 29, Iss. 1, (Jan-Jun 2016) , 48-64.
41. Singh, H., & Yadav, S. (2015). Indian stock market and the asset pricing models. *Procedia Economics and Finance* , 294-304.
42. Sinquefeld, R. G. (1976). Stocks, Bonds, Bills, and Inflation: Year by-Year Historical Returns (1926–1974). *Journal of Business* , 11-47.
43. Tapon, T. H. (1983). Erratum to 'The Capital Asset Pricing Model: An Evaluation of its Potential as a Strategic Planning Tool. *Management Science* , 633.
44. VanderLinden, D., & Lin, H.-J. (2006). The parables, premium puzzles, and the CAPM. *Managerial Finance* , 792-801.
45. Vega, J. P. (1688). *Confusion de Confusiones*. English translation by H. Kallenbenz, No. 13. Cambridge, Mass.: The Kress Library Series of Publications, The Kress Library of Business and Economics, Harvard University.
46. yuchao xiao, r. f.-k. (2017). the financial performance of social responsible investments: insights from the intertemporal CAPM. *JOURNAL OF BUSINESS ETHICS* , 353-364.
47. Zame, W., & Duffie, D. (1989). The Consumption-Based Capital Asset Pricing Model. *Econometrica* , 1279-1297.
48. Zhi Da, R.-J. G. (2012). CAPMfor estimating the cost of equity capital: interpreting the empirical evidence. *journal of financial economics* , 204-220.
49. Zhou, W., & Li, L. (2016). A New Fama-French 5-Factor Model Based on SSAEPD Error and GARCH-Type Volatility. *Journal of Mathematical Finance* , 711-772.