

Review of literature of: An empirical testing of multifactor assets pricing model in India

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Abstract

The purpose of this study is critically analysis review of literature of “An Empirical Testing of Multifactor Assets Pricing Models”. The Asset Pricing Model uses to finding average return and show relationship between expected return and risk on securities and stock. The Capital Asset Pricing Model (CAPM) has been long used by academics, financial analyst and practitioners to explain the relationship between risk and expected returns of an asset. This model takes into account only one risk factor which is the excess market portfolio return (Market premium). After that Ross, Eugene F. Fama and Kenneth R French and others had developed the different model of assets pricing as a response to poor performance of the CAPM in explaining realized returns. Eugene F. Fama and Kenneth R French had given three-factor model takes into account market risk premium, size premium and value premium. In 2014, Fama and Kenneth R French had given five-factor model takes into account market risk premium, size premium, value premium, difference between on robust profitability and week profitability and difference between the conservative investment and aggressive investment.

Keywords: assets pricing, CAPM

Introduction

Risk and Return concept are basic to the understanding of the valuation of asset and securities and Risk and Return are directly related to each other. Analyst always use different model of asset pricing to calculate the expected return and to show the relationship between expected return and risk of asset and securities. Researcher also uses these models to know stock performance in different country stock market.

Harry Markowitz (1952) ^[29] developed Modern Portfolio Theory which is based on mean-variance analysis and after that different model of asset pricing have been developed in order to relate excess portfolio return to excess market portfolio return. Capital market model builds on portfolio theory. Capital models the extended portfolio theory and develop a model for price all risky assets.

The Capital Asset Pricing Model (CAPM), developed by William Sharpe (1964) ^[38], John Lintner (1965) ^[28] and Mossin (1966), has been long used by academics, financial analyst and practitioners to explain the relationship between risk and expected returns of an asset. This model takes into account only one risk factor which is the excess market portfolio return (Market premium). The CAPM model explains that covariance of portfolio return with the market portfolio return has an important role in explaining variations on the excess portfolio return. is widely used for estimating the cost of capital for firms, cost benefit analysis and evaluating the performance of managed portfolios.

Eugene F. Fama and Kenneth R French (1992) ^[13] three-factor asset pricing model was developed as a response to poor performance of the CAPM in explaining realized returns. Fama and French (1993) ^[14] argue that anomalies relating to the CAPM are captured by the three-factor model. They base their model on the fact that average excess portfolio returns are sensible to three factors namely:

a) Excess return on market portfolio i.e. market premium.

b) The difference between the return on small stock portfolio and big stock portfolio i.e. size premium (SMB).

c) The difference between returns of high book to market stock portfolios and low book to market stocks portfolio i.e. value premium (HML).

Empirical testing in favour of Fama and French three factors is not means that it is final and perfect asset pricing model. Fama and French (2012) state that the model explanation of average return is far from complete.

Fama and French (2014) ^[21, 22] came with five factor asset pricing model directed at capturing the size, value, profitability and investment pattern in average stock return perform better than three factor model. They base their model on the fact that average excess portfolio return sensible five factor including three factor model and other two factor namely

a) The difference between the return on robust profitability and week profitability i.e. (RMW).

b) The difference between the conservative investment and aggressive investment i.e. (CMA).

The model's main problem is its failure to capture the low average returns on small stocks whose returns behave like those of firms that invest a lot despite low profitability.

Review of Literature

The Asset Pricing Model uses to finding average return and show relationship between expected return and risk on securities and stock. Academicians and researchers always testing these models on stock market index to find applicability and show relationship between expected return and different factor. This resulted in a large number of studies both empirical and theoretical being conducted to investigate the truth behind this hypothesised relationship. The literature on such studies dates back to 1970s. These studies were conducted for different markets, in context of varying time periods, incorporating different asset pricing model and using a range of econometric

models. In light of this, the literature review section has been divided into four sub-parts:

- 1) First part reviews the literature according to different asset pricing model studied.
- 2) Second part examines the studies on market.
- 3) Third part examines according to Indian context.
- 4) Fourth and final part discusses the studies with according research methodology.

According to asset pricing model studies

Finance professionals, researchers, and practitioners have been studying possible ways to explain the relationship between the expected return on an asset and its risk factors, and to find an answer to the question as to what determines assets' prices and to identify the best model explaining the expected return on risky assets. These studies, such as the portfolio selection of Markowitz (1952) ^[29], the Capital Asset Pricing Model (CAPM) of Sharpe (1964) ^[38], Lintner (1965) ^[28], Mossin (1966) and Black (1972) ^[7], the Arbitrage Pricing Theory (APT) of Ross (1976) ^[35], the three-factor model of Fama and French (1993) ^[14], and the five factor model of Fama-French (2014) ^[21, 22] consist of Asset Pricing Theory.

Markowitz (1952, 1959) ^[29, 30] is the father of modern portfolio theory, the first to use mean-variance analysis to emphasize the risk factor of expected returns. In his paper "Portfolio Selection", Markowitz (1952) ^[29] developed his model using mean-variance analysis. Markowitz defines the expected return and variance of returns on a portfolio as the basic criteria for portfolio selection. These two parameters, the expected return and the variance of returns, are crucial for its model.

Sharpe-Lintner CAPM (Sharpe, 1964; Lintner, 1965) ^[28, 38] stated that all investors are assumed to follow the mean variance rule, i.e., they choose mean-variance efficient portfolios. It is used to calculate expected return and show relationship between expected return and risk i.e. systematic risk. CAPM provided a unique point for an efficient portfolio and pave way for the derivation of numerous efficient portfolios as a combination of this single portfolio and Risk Free Asset. Along this line, CAPM states that asset returns are a function of Market Beta (covariance between asset and market portfolio). In short, the CAPM implies that the market portfolio is the tangency portfolio, and therefore for each asset of portfolio of asset.

Black (1972) ^[7] developed a version of The CAPM is zero-beta CAPM without assumption unlimited borrowing or lending on risk free rate. He shows that the CAPM's key result — that the market portfolio is mean variance efficient portfolio can be obtained by instead allowing unrestricted short sales of risky assets.

Merton's (1973) ^[31] developed a inter-temporal capital asset pricing model is a natural extension of the CAPM, but the ICAPM takes into account future state variables. Optimal portfolios are "multifactor efficient", which means they have the largest possible expected returns, given variances and the co-variances of their returns with the relevant state variables. In ICAPM up to four unspecified state variables lead to risk premiums that are not captured by the market factor.

Ross (1976) ^[35] developed the arbitrage pricing theory (APT) for predicts expected return to risk. APT is based on three main propositions: (1) Security return can be described by factor model; (2) well-functioning security market do not allow arbitrage opportunities; and (3) there are sufficient number of

securities for diversify risk. This theory is a multifactor model for asset pricing.

Fama and French (1993) ^[14] developed three factor model to explain cross-section of average return in U.S.A including CAPM one factor model i.e. market return with two other factor size (market capitalization, price times number of share) and value (book to equity ratio). Beta of CAPM is imperfectly measured Beta has no role in explaining cross-section of returns in 1963-1990: clear rejection of CAPM. So, explanatory power of beta captured by other variables that are correlated with beta (for example: size, E/P, Leverage BE/ME) and are measured more precisely. Size and B/M proxy for underlying risks which are associated with the behavior of earnings of small and value firms FF market model which is better than the single factor linear pricing model in terms of explaining returns. According to FF market model

- a) Size and Value – related with economic fundamental;
 - b) Not surprisingly firm that have high BE/ME (a low stock price relative to book values tend to have low earning on stock;
 - c) Size is distributed to profitability controlling for BE/ME small firm tend to have lower earning on asset then big firm.
- Fama and French (2014) ^[21, 22] developed five factor model and extent their set of testing portfolio to include accruals, net share issue, momentum, volatility and market beta. FF five factor model capturing the size, value, profitability and investment pattern in average return perform better than three factor model Fama and French (1993) ^[14]. FF five motivation of the five-factor model based on valuation theory.
- a) FF derives the relations between book-to-market, investment, and profitability only with the internal rate of return (on expected dividends), which is the long term average expected return. These relations do not necessarily carry over to the one-period-ahead expected return. Estimating the internal rate of returns for RMW and CMA using accounting-based valuation models, they showed that these estimates differ greatly from their one-period-ahead average returns. In particular, the estimates for the internal rate of return for RMW are often significantly negative.
 - b) FF argues that the value factor should be a separate factor based on valuation theory, but find it to be redundant in describing average returns in the data.
 - c) FF (2014a) motivates CMA from the negative relation between the expected investment and the internal rate of return in valuation theory. Reformulating the Miller and Modigliani (1961) valuation equation with the one-period-ahead expected return, we show that the theoretical relation between the expected investment and the expected return is more likely to be positive.

According to market studies

Sharpe and Cooper (1972) ^[39] tested of CAPM on US stocks (1931-1967) and find that stocks with higher beta have produced higher future returns and vice versa. There is a positive relationship between return and beta of security of returns. Their findings can be easily interpreted as a positive, strong and linear relationship between beta and returns. But the intercept is much higher than plausible risk-free rate, which the results support the zero-beta CAPM.

Black, Jensen, and Scholes (1972) ^[7] considered a different time series model which is written in terms of stock excess return i.e. average return minus the risk-free rate; and show that

returns are positively and linearly related to β , as follows:
 $E(R_{it}) - R_{ft} = \alpha_i + \beta_i [E(R_{mt}) - R_{ft}] + \epsilon_{it}$

Fama and MacBeth (1973) ^[12] stated that CAPM holds but zero-Beta model of CAPM is more consistent in terms of equilibrium conditions than standard CAPM.

Banz (1981) ^[4] stated that Size (market equity) adds to the explanation of the cross-section of average returns provided by market beta. Average returns on small stocks are too high given their beta estimates than average returns on large stocks and relationship between size and return is not linear. The main excess return effect occurs for very small firms. The smallest firms have on average very large unexplained mean returns.

Bhandari (1988) ^[6] stated that CAPM is the positive relation between leverage and average return. Leverage is related to risk and expected return, but in original CAPM, leverage as a risk factor should be absorbed by market beta. Leverage helps explain the cross-section of average stock returns in tests which include size (Market equity) as well as beta.

Stattman (1980) ^[40] find that book-to-market equity ratio (BE/ME) positively related with average returns on US stocks. High BE/ME have high average return than low BE/ME.

Basu (1983) ^[5] stated that earnings-price ratios (E/P) help to explain the cross-section of average returns on U.S. stocks in tests that also include size and market beta. Higher E/P has higher average return than low E/P.

De Bondt and Thaler (1985) ^[10] stated that long term losers outperform long term winners and vice versa. A string of bad news gives a low price and a high B/M. High BE/ME show that stock with low past returns should earn high returns in the future.

Fama-French (1992) ^[13] stated that beta has no role in explaining cross-section of average returns on NYSE, AMEX, and NASDAQ stocks in 1963-1990 for U.S; it is clear rejection of CAPM. Size, E/P, B/M, Leverage are all individually significant in uni-variate tests. But in multivariate tests, only Size and especially B/M are significant. Two of these dimensions of risk are proxy by size and value of common stock. They find that stock returns are negatively related to size (ME) and positively related to book to market ratios, and the relationship between stock returns and beta is not statistically significant and beta has little information average returns.

Jegadeesh and Titman (1993) ^[26] show that U.S. stock returns also exhibit momentum: stocks that have done well over the past year tend to continue to do well.

Lakonishok, Shleifer and Vishny (1994) ^[27], found that firm average stock return is related to other firm specific factors as well. These studies found that a firm's average stock return is related to firm's size (market capitalization), book to market equity (Book value of common equity/Market value), Earning to Price (E/P), cash flow to price (C/P) and past sales growth. High BE/ME ratio expose the investor to overreact good and bad times. Investor over estimate stock price for low BE/ME and underestimate stock price for high BE/ME.

Fama-French (1996) ^[16] show that the three-factor model works with other 'anomalies' that not explained by CAPM. These are cash flow-to-price (CF/P) portfolios, earning-to-price (E/P) portfolios, past sales growth portfolios, long-term past returns (reversal) portfolios, size and value. It does not work short-term past returns (momentum) portfolios. High E/P, CF/P and B/M, have had a string of bad news.

Fama-French (1998) ^[17] tested size and value effect by using sample test of international evidence. Their study is based on

sixteen developed and thirteen emerging market for the period 1975-1995. Value stock outperform growth (glamour) stock in thirteen major developed market and out of sample test based on emerging economy have small value effect than size effect. Ajili (2002) tested the explanatory power of the FF Model and Capital Asset Pricing Model on French Stock Market for finding variation in common stock returns. The results of the study emphasized that the FF Model has explanatory power on CAPM on cross-section analyses common stock returns.

Gaunt (2004) ^[23] tested FF model on Australian market for finding size and value effect. Risk is greater for small size firm and high BE/ME ratio. He finds that FF model has explanatory power on CAPM and his study is improvement on some prior study in Australian market.

Bundoo (2006) ^[8] tested FF model for finding size and value effect on emerging African market. He finds that size and BE/ME are statistically significant. He finds that FF model holds for maturities stock exchange.

Fama-French (2011) tested size, value, and momentum in international stock returns in the four regions (North America, Europe, Japan, and Asia Pacific) and find that there are value premiums in average stock returns that, except for Japan, decrease with size. Except for Japan, there is return momentum everywhere, and spreads in average momentum returns also decrease from smaller to bigger stocks. Integrated pricing across regions does not get strong support in their tests and three regions (North America, Europe, and Japan) local models that use local explanatory returns provide passable descriptions of local average returns for portfolios formed on size and value versus growth. Even local models are less successful in tests on portfolios formed on size and momentum.

Eraslana (2013) ^[11] studied Fama-French three factor model on Istanbul Stock Exchange by using sample of 274 companies listed for the period January 2003 to December 2010. Estimation results show that the Fama and French three-factor model has a limited potential to explain variations on the return of portfolios which are constructed by using stocks operating on ISE during the years from and found that less powerful results for the validity of the model than the others which have been carried out on ISE. The reason for this is that different time periods are used in each study. Moreover, in each study different indices and different numbers of portfolios are used for the analysis. Economic crisis is also an important factor affecting the results of the studies. All crisis affected macroeconomic variables and stock prices from different perspectives. Despite all these factors, it can be seen that the results of this study are consistent with those of other studies undertaken in Turkey and abroad. Stocks on ISE can be divided into subsectors in order to capture the individual effects of the three risk factors more precisely on the sector base. Additionally, the validity of the CAPM on ISE can be tested against the Fama and French model.

Abbas, Khan, Aziz and Sumrani (2015) ^[1] Studied Fama-French three factor model to Check the applicability in Pakistan by using sample of companies listed on KSE 100-Index from 2004-2014 for cross-sectional average return. They used same methodology of FF three factor model. Their results show that the slope of small stocks is higher than the slope of big stocks and average return on SMB is also found to be positive. They also find that value stocks (High B/M stocks) have higher return than growth stocks (low B/M stocks). Their estimation results show that all three-factors are significant in

explaining cross-sectional variation in average stock returns.

According to Indian empirical testing

Conner and Seghal (2001)^[9] empirically tested for finding the applicability of Fama and French three factor model in Indian stock market and find that market, size and book to market factors are capturing the cross sectional mean return of the stock.

Bhal (2006)^[3] studied Fama and French three factor model along with the CAPM in Indian stock market for 79 stocks listed on BSE-100 stock market index and FF three factor model better explaining the returns on stock as compare to CAPM without cleared ranking. He also checked for seasonal effect in India and found no seasonal effect. The study concluded that the Fama and French three factor model performs better in explaining the cross-section of returns in the portfolios than its variants and the CAPM in India.

Tripathi (2008)^[42] examined Fama-French three factor model in Indian stock market by using sample of monthly price data for 455 companies forming part of S&P CNX 500 Index over the period June 1997 to June 2007. She shows the relationship between four company fundamental variables (viz. market capitalization, book equity to market equity ratio, price earnings ratio and debt equity ratio) and equity returns on Indian stock. She concluded that the FF model (market risk premium, size premium and value premium) is better explain cross sectional variations on Indian equity returns a much better than the single factor CAPM

Taneja (2010)^[41] tested CAPM and Fama-French three factor model in India by using sample of 187 listed companies in Indian stock market for five year (June 2004- June 2009). He found that efficiency of Fama and French cannot be ignored in Indian context and concluded that size and value plays an important role in cross-section of return in India due to high degree of correlation between these factors.

Jain (2013)^[25] studied Fama-French three factor model for measuring the performance of Indian Stocks by using sample of 27 stocks including in SENSEX listed on Bombay Stock Exchange. She concluded that FF three factor model better explain the performance in India.

Summary and Conclusion

This CAPM model takes into account only one risk factor which is the excess market portfolio return (Market premium). The CAPM model explains that covariance of portfolio return with the market portfolio return has an important role in explaining variations on the excess portfolio return is widely used for estimating the cost of capital for firms, cost benefit analysis and evaluating the performance of managed portfolios.

Fama and French three-factor asset pricing model was developed as a response to poor performance of the CAPM in explaining realized returns. Fama and French (1993)^[14] argue that anomalies relating to the CAPM are captured by the three-factor model. They base their model on the fact that average excess portfolio returns are sensible to three factors namely: market premium, size premium (SMB) and value premium (HML)

In India only few studies have done on empirical testing of multifactor asset pricing model in India. Connor and Sehgal (2001)^[9], Bahl (2006)^[3], Tripathi (2008)^[42], Taneja (2010)^[41], Jain (2013)^[25], and Sehgal and Balakrishnan (2013)^[37] these

studies are based on empirical testing of Fama and French three factor model in Indian context. The Empirical tests on asset pricing suggest that Fama and French (1992)^[13] three factor model have explanatory power on single factor model i.e. CAPM. India is a emerging economy. Indian stock market increased tremendously and it is today one of the most prominent emerging stock markets in the world, not Indian invest in Indian market but also foreign investor invest in Indian stock market. Investor strategies depend on expected return and expected risk of asset and securities. Emerging economy may exhibit different result of return and risk than developed economy.

Fama and French came with five factor asset pricing model directed at capturing the size, value, profitability and investment pattern in average stock return perform better than three factor model. They base their model on the fact that average excess portfolio return sensible five factor including three factor model and other two factor namely: (a) The difference between the return on robust profitability and weak profitability i.e. (RMW) (b) The difference between the conservative investment and aggressive investment i.e. (CMA) The model's main problem is its failure to capture the low average returns on small stocks whose returns behave like those of firms that invest a lot despite low profitability.

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