Business Analyst, ISSN 0973-211X, 37(1) 31-46, © SRCC

REVISTING CAPM AND FAMA FRENCH THREE FACTOR MODEL IN INDIAN EQUITY MARKET

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ABSTRACT

The study aims to explore the applicability of the two most widely used asset pricing models - Capital Asset Pricing Model (CAPM) and Fama French Three Factor Model in the Indian equity market for the period 2005-2015. The study follows Fama Macbeth (1973) methodology of two pass regression to compare both models and draw new insights with regard to informational efficiency of the Indian equity markets. An attempt has been made to evaluate the ability of the alternative asset pricing model to explain variation in returns owing to firm specific characteristics like size and value for 498 companies listed on S&P CNX 500. The study found that Fama French Three Factor Model is a better model than one factor CAPM. A non-linear relationship was found between excess returns and beta (systematic risk) for CAPM contradicting the previous studies. Size effect stills prevails in India equity market whereas value effect is not discernable for the current period.

KEYWORDS - CAPM , Fama French Three Factor Model , Size Effect ,Value Effect.

INTRODUCTION

The birth of asset pricing models was marked by unveiling of a simple yet revolutionary concept of mean variance efficient portfolio by Harry Markowitz who proposed to the world the general solution to portfolio selection problem based on expected utility maxim. Built on the strong assumptions of risk aversive nature of investors who cares only about mean and variance of their one period investment return, the Modern Portfolio theory forms the basis for establishing relationship between expected return and risk. Investor aims for either maximising the return for a given level of risk (variance) or minimises the risk for a given level of return. Then a breakthrough discovery took place by three Nobel laureates (William F. Sharpe, 1964; Linter, 1965; Mossin, 1966) who simultaneously formulated Capital Asset Pricing Model (CAPM) that became the first general equilibrium model for asset pricing postulating a strong linear cross sectional relationship between expected return and market beta. It further stated that market beta is the sole factor explaining the variation in the excess returns.

CAPM is based on a lot of restrictive yet simplistic assumptions like investors are utility maximizers of terminal wealth for a single period who chooses portfolio solely on the basis of

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mean and variance, absence of taxes and transaction costs, homogenous behavior of all investors with regard to joint probability distribution of returns and lastly, the possibility of unrestricted risk free borrowing and lending. But it has wide ranging implication in the realm of corporate finance especially capital budgeting, portfolio selection and management, cost-benefit analysis and economic issues in the area of financial economics.

In emerging market economies like India and China, investors and portfolio managers are always on the look for any strategy to beat the market and cash in the returns but Efficient Market Hypothesis (EMH) extinguished all such notions by proclaiming that market prices fully reflect all the available information and will only be affected unexpected news. The standard CAPM postulated that the only way to earn higher return is to bear higher risk if markets are efficient but a plethora of studies proved the presence of anomalies if exploited at the right time could result in super normal returns. Size effect, value effect, leverage effect, liquidity effect, investment effect and price earning effect all proved to shook the prediction of CAPM and EMH.

Dissolution of CAPM saw emergence of two schools of thoughts, one, proclaiming that CAPM is mis-specified indicating the presence of some missing factor over and above market beta and second argument, hinted towards the role of irrational behavior of the investor attacking the CAPM assumption of investor rationality. The former argument led to the emergence of multifactor models like Fama-French Three Factor model and the latter argument opened up a new areas of research called Behavioral Finance that explored irrational exuberance and studies investor behavior.

These anomalies though not backed by a well developed body of theory prove to be important for investment decisions and development of a robust and liquid stock markets. Pressing on the above goal, this study tries to explore the applicability of CAPM and Fama Model in the India equity market in order to explore the role of company fundamentals in explaining average returns. A need was felt to revisit these models to examine the presence of size and value effect for the current period and draw insights about the informational efficiency of the Indian markets. An attempt has been made to compare these models and explore the possibility of new factors explaining the cross sectional variation in returns.

The paper is divided into three sections with second section exploring the rationale behind the study, third section presents a robust review of the literature with regard to developing and emerging economies with an emphasis on India, fourth section identifies the research hypotheses being tested in the study, fifth section exploring model specification for CAPM and Fama Model with sixth section being the heart of the paper presents data and methodology in detail and seventh section gives a comprehensive discussion on results and analysis followed by eighth and ninth sections presenting the concluding remarks and scope for further research. Tenth section gives a detailed descriptive analysis with tables and figures.

OBJECTIVES

1. To test CAPM in Indian context.
2. To test Fama- French Three factor model in Indian context.
3. To examine which is the better model between CAPM and Fama French Three factor model.
4. To explore whether size effect persist in Indian Equity market .
5. To examine whether Value Effect persist in Indian Equity market.

REVIEW OF LITERATURE

A fertile body of literature explores the evolution of asset pricing models beginning from the Harry Markowitz's Modern Portfolio theory , standard CAPM testing across asset classes and countries and rise of multifactor models with the latest extending to five factor model by (Fama & French, 2014).

The cornerstone of asset pricing is based on Markowitz (1952) who spilt the portfolio selection process into task, firstly to choose the unique optimum combination of risky assets and secondly to decide the allocation of funds between such a combination selected and a riskless asset. Post-Modern Portfolio Theory, a huge body of literature arrived which tried to construct a market equilibrium theory of asset prices under conditions of risk. William (1964) tried to postulate the linear relationship between expected return and standard deviation of return (systematic risk) for an efficient combination of risky assets through an investment opportunity curve portraying benefits of diversification along with riskless borrowing and lending. Lintner (1965) tried to establish conditions under which stocks would be held long(short) by the investor in optimal portfolios even when risk premium would be positive(negative). Besides, he also simultaneously tried to explore the problem of optimal portfolio selection by a risk averse investor having both the options of risk free lending and borrowing. Mossin (1966) outlined the theory of market risk premium by determining the conditions of equilibrium of exchange of assets. By comparing relationship between the prices and yield of various assets, he found that equilibrium allocation of assets is Pareto optimum.

The main implication is that there exist a linear relationship between ex-ante expected returns and market beta (systematic risk) and market beta is the sole factor in explaining the variation in excess returns. There is a large body of literature trying to test and explore the various implications of CAPM using historical rates of return and market returns using cross sectional and time series regression analysis (Fischer, Jensen and Scholes, 1972; Fama and Macbeth, 1973; Miller and Scholes, 1972; and Rosenberg, 1998). CAPM is basically a one period investment model which tries to model the relation between expected risk premium and market beta (β) which is measured as the covariance between market return and return on individual security.

Post-1980, some empirical research on CAPM for different asset classes and in different countries invalidated the main prediction that market beta is the only factor that could explain variation in excess returns. Various other factors that had no mention in asset pricing literature came to the forefront as probable sources of variation over and above market beta. This marked the beginning of Arbitrage Pricing Theory (APT) that stated that there are 'n' number of factors that might explain the variation in securities return. Then, the rise of multifactor models which took up the task of deciphering the anomalies in asset pricing started to grow bigger till date. It all started with Fama and French (1992, 1993, 1995, 1996), who in the process of testing CAPM for NYSE, NASDAQ and AMEX stock for the period of 1963-1990 using cross sectional regression found that asset price risk are multidimensional and three variables size, value and leverage using proxies as market capitalisation, book to market equity and earnings to price ratio seems to explain the variation in individual securities. Using 100 size-value sorted portfolio, their studies found that no statistically significant relationship between average returns and beta when controlled for size , whereas , there is statistically significant relationship between size and returns.

Another major blow to CAPM came when Banz (1981) found a strong relationship between market equity and cross section of returns. Basu (1983) found that stocks with low earnings to price ratio shows higher return and stocks with high earnings to price ratio shows lower returns for the US stocks invalidating CAPM predictions. De Bont and Thaler (1985) explored momentum and contrarian effect by proving that stocks with a low average returns in past three years experienced high future long term returns and vice versa. Bhandari (1988) found a positive relationship between leverage and cross section of returns. Rossenberg et al. (1985) and Vishny et al. (1994) found a strong positive relation between average returns and BE/ME ratio.

Fama and French (1993) found that five factors namely beta , size, value , SMB(small minus big), HML(high minus low) are common risk factors jointly explaining maximum variation in cross section of returns using time series analysis as proposed by Fischer et. al. (1972). Fama (1998) furthered probed that in 12 out of 13 international markets value stocks outperformed growth stocks during the period of 1975-1995 and size effect is discernable in 11 out of 16 markets which was a further big blow to CAPM.

Despite such contradictory evidence for CAPM, researchers started to test Fama-French factor models and some found survivorship biasness, data snooping biasness and selection biasness (Mackinley, 1995; Black, 1995, Kothari et. al., 1995). But several studies till date accept the superiority of Fama-French Factor model over CAPM. Chen and Yeh (2002) found strong relationship between BE/ME and returns. Connor and Sehgal (2001) found support for Fama model in India equity market and a strong pervasive presence of size, value and market beta factors for the period 1989-1999 for Crisil 500 stocks. Chui & Wei (1998) tested the model for stock markets in Hong Kong, Korea, Taiwan, Malaysia and Thailand and supported the Fama-French factor model strength.

Similar studies were conducted in India with most robust being (Connor and Sehgal, 2001; Mohanty, 2002; Sehgal and Tripathi, 2003; Tripathi 2008; Sehgal et al., 2012; Sehgal,

Subramaniam and Morandiere, 2013). These studies found the superiority of Fama model over CAPM and also found the presence of strong size premium by using different proxies for size - enterprise value, market capitalisation, net fixed asset, total assets, net annual sales and net working capital (Sehgal and Tripathi, 2003). Tripathi (2008) using a forward integration approach found that market capitalisation and price earnings ratio have statistically significant negative relationship with equity return while a positive relationship was observed BE/ME and debt equity ratios for 455 companies forming a part of S&P CNX 500 for the period of 1997-2007.

This paper empirically examines the Fama-French three-factor model for the Indian equity market for the period 2005-2015 and compares it with one-factor linear pricing relationship implied by the CAPM. It is analyzed whether the market, size and value factors are pervasive in the cross-section of random stock returns in Indian equity markets.

RESEARCH HYPOTHESIS

Following hypotheses have been tested for in the study –

(i) There is a statistically significant relationship between excess returns and market beta in Indian equity market.

(ii) Stocks of small companies yield higher returns than the stocks of large companies in Indian equity market.

(iii) High BE/ME stocks outperform low BE/ME stocks.

(iv) Fama French Three Factor model is a better model than CAPM

Statistical hypotheses are mentioned in Methodology section separately for each model.

MODEL SPECIFICATION

CAPM

A linear cross sectional relationship is established between excess returns and market beta, which is a measure of systematic risk.

$$\mathbf{E[R_{pt} - R_F] = \alpha_P + \beta_P(E[R_M] - R_F)} \quad \text{(for t = 1 to 120), (for p = 1 to 6)}$$

Where, $\mathbf{E[R_{p(t)} - R_F]}$ = Excess returns as calculated by subtracting risk free return from the return of portfolio.

$\mathbf{E[R_M] - R_F}$ = Market Risk Premium

$\boldsymbol{\alpha_p}$ = Intercept term- measure of abnormal returns

$\boldsymbol{\beta_P}$ = Slope coefficient (or beta coefficient) of the market factor- measures by

$$\boldsymbol{\beta_P} = \frac{\mathbf{Cov\,(R_M, R_P)}}{\mathbf{Var(R_M)}}$$

$\boldsymbol{\varepsilon_{(t)p}}$ = Error term

The main hypothesis is to test that $\alpha_p = 0$, for CAPM to hold, as postulated by Black, Jensen and Scholes (1972). The alternate hypothesis that $a_p \neq 0$, if found true, marks the presence of some other factors explaining the cross sectional variation in excess returns.

Fama-French Three Factor Model

This model tries to show that firm specific variables like size and value along with market beta better explain the variation in excess returns.

$$E[R_{Pt}–R_{ft}]= \alpha_P +\beta_1 E[R_{mt}-R_{ft}] +\beta_2 SMB_t + \beta_3 HML_t + \varepsilon_t$$

where,

SMB= [(S/L + S/M + S/H)/3] –[B/L + B/M + B/H)/3]

HML= [(S/H + B/H)/2] –[S/L + B/L)/2]

For Fama Model to hold , $\alpha_P = 0$ and $\beta_1, \beta_2, \beta_3$ should be statistically significant.

DATA & RESEARCH METHODOLOGY

Data

Indian equity market showcasing moderate growth with over 12,000 listed companies but is very thinly traded with only 10 percent of the firms making up majority of market capitalisation and trading activity. The sample data used for this study is composed of 500 companies listed on S&P CNX 500 till 31st March , 2015 covering 10 years monthly periods from October 2005 to September 2015. In order to factor into the earnings announcement in the form of financial statements and reports, portfolios were not made for financial year rather were made from October-September. The study also incorporates the effect of global financial crisis of 2008 whose impact can be shown on beta and return series.

The data with regard to adjusted closing prices of shares and market returns were taken from CMIE Prowess. The risk free rate data of 91 day T-Bill rate was taken from RBI Database. The adjusted share price series have been converted into return series using arithmetic returns.

The accounting information has been obtained for the sample companies for the financial years 2005 to 2015. The financial year in India is from April of year t to March of calendar year t+1. The book value per share and number of shares outstanding for the sample companies are recorded in March-end of each year. The above sample was taken to provide contemporary analysis towards the applicability of both models in the Indian context and compare them with previous studies undertaken on the same lines for Indian equity markets.

Variables Used

1. R_i= **Individual company returns =** $(P_1-P_0)/P_0$

   P_0- Adjusted closing price of the individual company's previous month

   P_1- Adjusted closing price of the individual company's current month

2. R_m**= Market return=** $(P_1\text{-}P_0)/P_0$

P_0- CNX 500 index's closing value of previous month

P_1- CNX 500 index's closing value of the current month

3. R_f**= Risk free return**= 91 day T-bill yield

4. Size- Market capitalization = Share price as on Oct 't' times No. of shares outstanding in March '*t'*

5. Value- P/B ratio= Market price of a share to Book value per share in March 't'

The rationale behind taking Oct-Sept as portfolio construction dates is that since all the companies as per Companies Act , 2013 have to disseminate their annual reports to their shareholders , so in order to fully reflect the investor behavior with regard to company's fundamentals and financials , the market price will be more reflective of their current behavior.

Portfolio Formation

Since the complete data was not available for all companies for all years leading to survivorship biasness, every year portfolios were rebalanced and only those companies with complete financial and accounting data were used leading to variation in number of companies from 295 to 449 from 2005-2015. Test for stationary of the prices series was undertaken using Augmented Dickey Fuller Test and found only 2 companies with non stationary series which were subsequently removed. Chow test showed presence of structural breakpoint at October, 2008 due to financial crisis.

a. Size Value Sorted Portfolio

Every September of each year 't' starting from 2005, all sample individual securities were sorted on the basis of market capitalisation calculated as closing price time no. of shares outstanding. The sample is then bifurcated into small denoted by S and big by B on the basis on median sample size. Price to book ratio is calculated separately due to variation in financial year and portfolio construction year. P/B ratio for year 't' is ascertained by dividing book value of equity at the end of financial year (March) 't' by market value at the end of the financial year 't'. The value sorted portfolios are formed by following 30-40-30 strategy of low-medium-high denoted by L, M, and H respectively for the ranked values of P/B ratio.

At the intersection of size and value, six stylised portfolios were formed namely - S/L, S/M, S/M, B/L, B/M, B/H with each signifying the above mentioned denotations like S/L signifying stocks with small market cap but low P/B ratio. Equally weighted returns are calculated on the six portfolios from October of year 't' to September of year 't+1'.

b. Factor Portfolio

In order to examine the impact of the three common factors to test Fama-French Three factor model, factor mimicking portfolios are construct red namely SML and HML.

SMB or small minus big is used as a proxy for size effect. For every month difference was calculated between the simple average of returns on three small cap stocks namely - S/L, S/M, S/H and the simple average of returns on three big stocks namely -B/L, B/M, B/H. This portfolio SMB is devoid of BE/ME effects as it is the difference between the returns on small and big stock portfolios with about the same weighted-average BE/ME.

HML or high minus low is used as a proxy for value effect as measured by price to book ratios. It is ascertained every month as a difference between the simple average of returns on two high P/B portfolios (S/H and B/H) with the simple average of returns on two low P/B ratios (S/L and B/L). Both these factor models are independent of each other in calculation terms.

Methodology for CAPM

Following Fama-Macbeth Methodology of 1973 , the following procedure was adopted using Eviews 8 for running large no. of regression equations -

Step 1- To run First pass times series regression to estimate beta of market portfolio

$$\mathbf{E[R_{Pt}-R_f\ ] = \alpha_P + \beta_P(E[R_m]-R_f) + \varepsilon_t} \quad \text{(for t = 1 to 120) (for p = 1 to 6)} \qquad (1)$$

Where, Dependent Variable = $E(R_{pt}) - R_f$ and Independent Variable = $E(R_m - R_f)$

Step 2- Run Second pass cross sectional OLS regression

$$\mathbf{E[R_{p(t)} - R_f\ ] = \gamma_{0(t)} + \gamma_{1(t)}\,\beta_p + \varepsilon_{(t)p}} \qquad (2)$$

Where , Dependent Variable = $\mathbf{E[R_{p(t)} - R_f\ ]}$ and Independent Variable = $\boldsymbol{\beta_p}$ (Calculated from Step 1)

Step 3- In order to check whether $\boldsymbol{\beta_p}$ is linearly related to excess premium and whether there is a presence of non-systematic risk (S_p), we went one step further and did **First pass regression** on the model

$$\mathbf{E[R_{(t)p}-Rf] = \alpha_p+\beta_pE(R_m-R_f)+\beta_P^2E(R_m-R_f)+G_p(S_{p,t}) +\varepsilon_{pt}} \qquad (3)$$

Where , Dependent Variable = $E[R_{(t)p} - Rf]$ and Independent Variables = $E(R_m - R_f)$, S_P

Step 4- Run Second Pass Cross Sectional OLS Regression

$$\mathbf{E[R_{(t)p} - R_f] = \gamma_{(t)} + \gamma_{1(t)}\,\beta_p + \gamma_{2(t)}\,\beta_p^2 + \gamma_{3(t)}S_p + \varepsilon_{(t)p}} \qquad (4)$$

Where , Dependent Variable = $E[R_{(t)p} - R_f]$ and Independent Variable = β_p , S_p, β_p^2 where S_P represents the standard deviation of residual returns ε(p) for security p, for p =1,…..,n. From equation (4), study postulated major implications given by CAPM under the assumption of returns and parameters being IID (Independently and Identically Distributed) which allowed use of t-test for the following set of hypothesis:

Statistical Hypotheses for CAPM

H1 - $\gamma_{(t)} = 0$ - Presence of abnormal returns

H2- $\gamma_{1(t)} = E(R_m - R_f) > 0$ - Positive expected risk return trade off

H3 - $\gamma_{2(t)} = 0$ - Linearity

H4- $\gamma_{3(t)} = 0$ - Non systematic effect of non beta risk

Step 5- Use t test to test above hypotheses

Methodology for Fama-French Three Factor Model

In order to validate the Fama Model, we use same Fama-Macbeth approach of two pass regression of 1973.

$$E[R_{pt} - R_f] = \alpha_P + \beta_{1P} E[R_{mt} - R_f] + \beta_{2,P} SMB_t + \beta_3 HML_t + \varepsilon_t \quad (5)$$

$$E[R_{pt} - R_f] = \lambda_0 + \lambda_M \beta_1 + \beta_2 \lambda_{SMB} + \beta_3 \lambda_{HML} + \varepsilon_t \quad (6)$$

Perform all the 5 steps as above. Here, we hypothesize that all Beta coefficients should be significantly different from zero and Adj R^2 should improve over that of standard CAPM

Statistical Hypotheses for Fama Model

H1 - $\lambda_0 = 0$ - Absence of abnormal returns

H2- $\lambda_M = E(R_m - R_f) > 0$ - Positive expected risk return trade off

H3 - $\lambda_{SMB} = 0$ - Absence of Size effect

H4- $\lambda_{HML} = 0$ - Absence of Value effect

EMPIRICAL ANALYSIS & DISCUSSION

Table 1 presents the average number of companies present in each size value sorted portfolio out of 498 companies. SL and BH have less companies as compared to SM, BM and BL. Table 2 shows descriptive statistics for different portfolios with mean returns very low and high volatility. There is presence of positive skewness and kurtosis in some companies while some companies provide evidence for positive autocorrelation in returns that hinted towards stale price effects. Table 3 shows the correlation matrix showing correlation coefficients amongst market beta, SMB and HML factors. There is a negative correlation between SMB and HML and positive correlation between SMB and Market Beta. All return series of different portfolio were checked for stationary and were found stationary except 2 which were subsequently removed from the sample. Graph 1

shows the variation in excess returns over these portfolios with Small cap firms having high returns than Large cap firms. Graph 2 shows that Beta of market portfolio of SL portfolio is greater than BH portfolio. This proves the assertion that excess returns are proportional to market beta.

Table 4 presents single factor regression of testing CAPM and shows that Jenson's Alpha is statistically different from zero and hence , the market beta is not the only factor explaining variation in Excess returns since there are abnormal returns . And by comparing means of actual and expected Market beta, the analysis shows that Market returns is a good measure of risk. But the extended Fama -Macbeth version of unsystematic risk and non-linearity proves bizarre results that Beta is not linearly related to excess returns and hence, CAPM is highly mis-specified. The model also predicts the presence of unsystematic risk in portfolios i.e. they are not diversified. Table 5 shows multiple regression of Size and value effect and shows that still there is abnormal returns in the market that is, there are other factors which may explain the variation in returns. But it shows that Size effect stills prevails in Indian stock market but value effect does not. Also, market beta is a significant factor in explaining the variation. It means small cap firms are earning higher excess returns as shown in graph 2 than large cap firms. But High P/B stocks (Growth Stocks) do not have higher returns than Low P/B stocks (Value stocks). The adjusted R^2 of Fama Model is higher than that of CAPM. It indicated that Fama Model is a better model than the CAPM in Indian stock market for the give study period.

SUMMARY OF RESULTS

- The Indian stock market has not changed in its information efficiency. The size effect prevails for a long duration as found by Tripathi (2008) and this persistence of the size anomaly indicated that Indian stock markets are not semi strong form efficient.

- The analysis of CAPM testing also shows that R_M is not a good proxy for market returns as pointed out by Roll (1977).

- It also indicates non-linear relationship between excess returns and beta and shows the presence of unsystematic risk pointing to non-optimal diversification.

- Market Beta does not come out to be a significant factor in explaining the variation in returns unless controlled for size effect.

- The CAPM tests also shows there might be other factors explaining the variation in excess returns than market beta.

- Fama-French Three Factor Model comes out to be winner and indicates the persistence of size anomaly contradictory to research by Dijk (2011).

- The value effect is not found and presence of abnormal returns still exits which indicated that there are further more factors that might explain the variation.

- The improvement in adjusted R^2 also proves that Fama model is a better model than CAPM and there is further scope of more independent factors.

The limitation of the study is the presence of non-normal distributions and problem of micro-numerosity in having 6 size-value sorted portfolios. Further, the limitation of Macbeth 1993 approach will also affect our analysis. Also, since there is no theory backing these anomalies , concrete conclusion cannot be made with regard to its credibility .

POLICY IMPLICATIONS

This study has important policy implications for regulators, investors, portfolio managers and firms at large.

- **Implications regarding Efficiency of Markets**- Since size proved to be a statistically significant factor in explaining average returns, Indian equity market still has not achieved semi strong form of efficiency as size effect was found way back in 1990 by Connor and Sehgal (2001) but markets could not exploit this opportunity till 2015.
- **Implications for Investment Decisions**- Since a strong size effect is found with a non-linear relationship between excess returns and market beta, there exist an arbitrage opportunity as investors should buy small cap stocks as they yield higher returns .
- **Implications for Asset Pricing -** No single factor seems to be significant alone to explain the variation in returns but jointly size and market beta explain the maximum variation. This lends support to Fama Model but in line with them market beta alone is not coming out to be statistically significant dissolving the predictions of CAPM. It also implies that firm specific variables are gaining importance in explaining the variation.
- **Implications for Market Microstructure**- Since this study includes firms listed on NSE whereas previous studies (Connor and Sehgal, 2001, Tripathi, 2008; Sehgal, Subramaniam and Morandiere, 2012) have tested these models on BSE and NSE, this points to the fact that market microstructure does impacts relationship between firm specific factors and equity returns.

CONCLUSION & SCOPE FOR FUTHER RESEARCH

This study was an attempt to see the relevance of the asset pricing models in India for the current period and decipher the informational efficiency of Indian markets. The presence of anomalous behavior hints towards the irrational behavior of the investors and inefficient markets in India. Both fundamental analyst and behavior economist will have different explanation to the presence of such anomalous behavior but there has been no crystal clear explanation with regard to the existence of anomalies.

But the future of asset prices rest on the discovery of a new theory and a new parsimonious models that could solve the existing challenges. The future perspectives on such research can be on exploring whether firm specific factors explain risk in brad asset classes like industry sorted portfolios, examining the role of business cycles on the asset pricing and company fundamentals, testing whether size effect is found only in emerging markets or developed markets or both . Being a growing capital market. India should deepen its equity market with greater equity participation and a robust ecosystem for investment management.

TABLES AND GRAPHS

Table 1: Mean of securities present in each size - value sorted portfolio

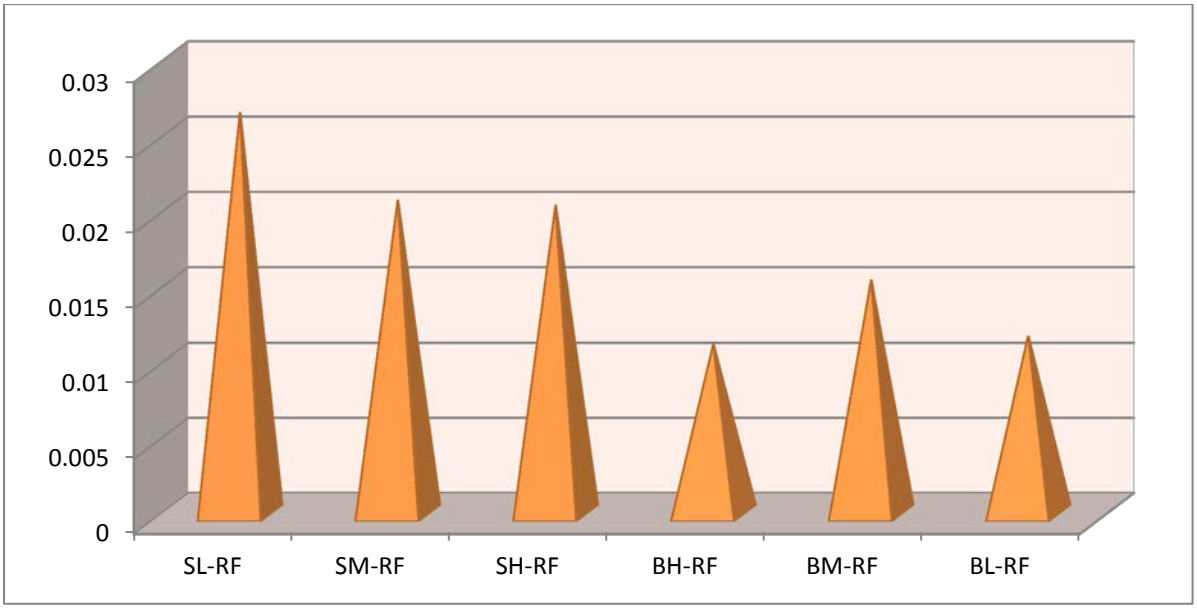
		VALUE SORTED		
		LOW	MEDIUM	HIGH
SIZE SORTED	SMALL	40	88	88
	BIG	86	88	42

TABLE 2: Summary Statistics of monthly excess returns of Portfolios sorted on the basis of Size and Value

	SL_RF	SM_RF	SH_RF	BL_RF	BM_RF	BH_RF	RM_RF	SMB	HML
Mean	0.026683	0.020846	0.020508	0.011844	0.015538	0.011287	0.006473	0.009789	-0.003366
Median	0.040490	0.028517	0.028632	0.014022	0.018200	0.018040	0.007561	0.010047	-0.000951
Maximum	0.499131	0.482222	0.491372	0.494774	0.454361	0.471971	0.293137	0.116826	0.097628
Minimum	-0.286726	-0.285912	-0.331741	-0.298974	-0.318548	-0.307454	-0.324082	-0.107695	-0.194867
Std. Dev.	0.109596	0.096882	0.091577	0.111658	0.087957	0.082240	0.078130	0.028206	0.045792
Skewness	0.414655	0.464869	0.453149	0.555878	0.654212	0.712604	-0.664582	-0.660015	-0.716000

Kurtosis	5.421685	6.958774	9.119181	5.323018	8.314543	11.66029	6.388968	7.437697	4.635685
Jarque-Bera	32.76156	82.68153	191.3288	33.16208	149.7817	385.1591	66.25891	107.1782	23.63044
Probability	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000007
Sum	3.201917	2.501482	2.460935	1.421227	1.864599	1.354414	0.776787	1.174698	-0.403898
Sum Sq. Dev.	1.429352	1.116958	0.997967	1.483632	0.920626	0.804845	0.726412	0.094672	0.249532
Observations	120	120	120	120	120	120	120	120	120

Graph 1: Comparison of portfolio excess returns



Graph 2: Comparison of Portfolio's Beta

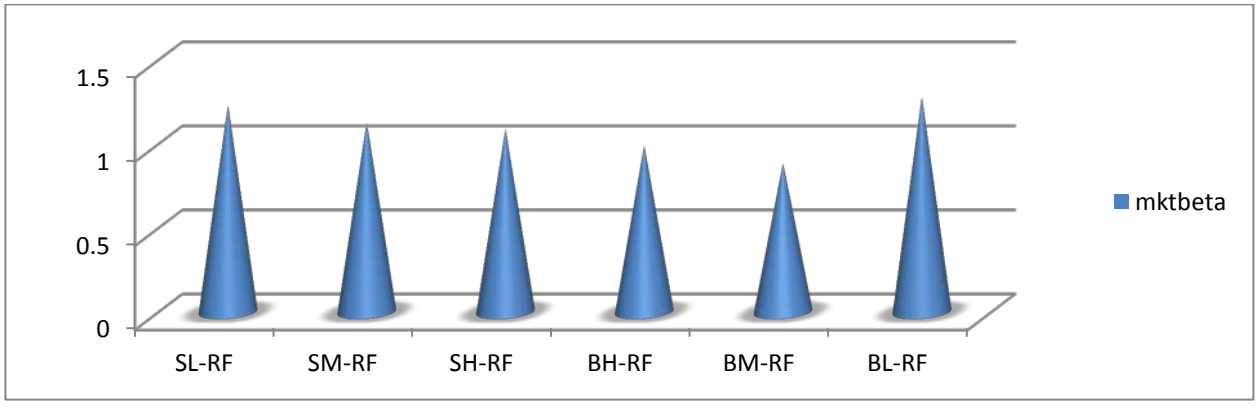


Table 3- Cross Correlation-Matrix of Fundamental Variables and average Portfolio Returns - (Pearson's coefficient of correlation)

Portfolio	**SMB**	**HML**	**R_m-R_f**
SMB	1.0000	-0.1907	0.2718
HML	-0.1907	1.0000	-0.3684
R_m-R_f	0.2718	-0.3684	1.0000

Table 4: **Regression Results of standard CAPM-based on $E[R_{pt}-R_f] = \alpha_P + \beta_P(E[R_m]-R_f)$**

	Low	Medium	High	Low	Medium	High
	A			p- val α		
Small	0.0187	0.0135	0.0135	0.0002	0.0004	0.0000
Big	0.0049	0.0098	0.0036	0.0583	0.0520	0.4372
	Mkt. β			p- val Mkt. β		
Small	1.2324	1.1294	1.0902	0.0000	0.0000	0.0000
Big	0.9912	0.8856	1.2808	0.0000	0.0000	0.0000
	Adj R^2					
Small	0.7699	0.8281	0.8639			
Big	0.8857	0.6156	0.8015			

Table 5: **Regressions of size and book-to-market sorted portfolio excess returns (Rt) on combinations of the market (MKT), size (SMB) and value (HML) based on $E[R_{pt} - Rf] = \alpha + \beta_{1i}\ E[R_{mt}-R_f] + \beta_{2,i}SMB_t + \beta_{3,i}HML_t + \varepsilon_t$ (Fama-French Three Factor Model)**

	Low	Medium	High	Low	Medium	High
	α			p- val α		
Small	0.0097	0.0066	0.0092	0.0016	0.0376	0.0033
Big	0.0047	0.0166	0.0041	0.0689	0.0005	0.1186
	Mkt. β			p- val Mkt. β		
Small	0.9797	0.9943	1.0434	0.0000	0.0000	0.0000
Big	1.0326	0.9943	1.0962	0.0000	0.0000	0.0000
	HML β			p- val HML β		

Small	0.8108	0.6932	0.4672	0.0000	0.0000	0.0000
Big	0.0692	-0.8235	-0.2745	0.4409	0.0000	0.0036
	SMB β			p- val SMB β		
Small	-0.8016	-0.3107	-0.0042	0.0000	0.0000	0.9506
Big	0.2232	-0.3602	-0.9795	0.0002	0.0008	0.0000
	Adj R^2					
Small	0.9197	0.8885	0.8813			
Big	0.8974	0.6972	0.9406			

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