Behaviour of asset pricing models in pre and post-recession period: an evidence from India

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BEHAVIOUR OF ASSET PRICING MODELS IN PRE AND POST RECESSION PERIOD: AN EVIDENCE FROM INDIA

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ABSTRACT

The study endeavours to assess empirically the performance of various models of asset pricing employing risk factors such as market premium, book to market equity, size, investment, momentum and profitability and attempts to unearth the effects of value, size, investment, momentum and profitability. It also compares the behaviour of five different asset pricing models: standard capital asset pricing model, three and five-factor model of Fama French, four-factor model of Carhart and six-factor model during the periods of pre-recession, recession and post-recession in the Indian equity market. The study uses constituents of S&P BSE 500 as a sample, traded over the period 1st July 2005 to 31st September 2017. The results exhibit that three-factor model is an effective model which brings a lot of improvements over CAPM and suggests that market premium and size factors are the most effective and strong factors explaining the variation in returns, throughout the study period. Four-factor model performs a little better for few portfolios created based on size-momentum during 2009-17 and 2005-17. Five and six-factor model do not make any further improvement if compare with the three-factor asset pricing model. Size effect is present in all the above models and across all the time periods, however, factors such as the premium for profitability, investment and momentum are found redundant during the study period in the Indian equity market.

Keywords: Asset pricing, momentum factor, profitability factor, investment factor, recession, Indian equity market.

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1. INTRODUCTION

How the assets are priced in capital markets is always a core issue in finance that makes Capital Asset Pricing Model (CAPM) one of the pillars of finance theory. CAPM was first in answering the central question of finance how the expected return of an investment can be affected by its risk. The model says that not all kinds of risk affect the asset price. It is only the systematic risk for which investors are compensated. In the early 1960s, CAPM was developed independently and simultaneously by four economists: Jack Treynor (1962), William Sharpe (1964), John Lintner (1965a, b) and Jan Mossin (1966). It was an extension of initial work of Harry Markowitz to establish market equilibrium. If we trace the origin of CAPM, two seminal papers seemed to have the primary inspirations (Sullivan 2006). Hary Markowitz in 1952 gave the first rigorous justification for diversifying and selecting a portfolio in his paper 'Portfolio Selection'. In 1959, he expanded his mean-variance model or Modern Portfolio Theory in a book-length study which states that investors prefer that portfolio which offers the highest expected return at given risk or lowest risk at given expected return. However, his original work faced difficulties in its implementation as one needs to compute the variance-covariance matrix for N (N-1)/2 times. Markowitz gave a possible solution for this problem by developing a 'single index model'. Indeed, this gave an idea to William Sharpe do research that culminates at his CAPM version. Another paper, which motivated to Jack Treynor is Franco Modigliani and Merton Miller's seminal paper of 1958, 'The cost of capital, corporation finance and the theory of investment'. They explored the relationship between the capital structure of a firm and its cost of capital. This gave impetus to Jack Treynor to develop a theoretical analysis of determining the correct discount rate.

A substantial body of empirical researches criticized this single-factor model and said that CAPM left a lot of variations in the average return that is unexplained. This gives motivation to researchers to do their research in finding out the additional risk factors that can explain variation better in returns across stocks. In addition to this, numerous studies explored many relevant additional risk factors these are book to market (b/m) ratio, leverage, size, price to earnings, etc. As these all are not explained by CAPM, hence called anomalies.

The present study proceeds as follows: section 2 reviews the existing published literature on pricing factors and asset pricing models. Section 3 provides the research methodology adopted in this study that encompasses data used in the analysis, explains the factors and the process of creating the portfolios. Section 4 deals with analysis and findings and section 5 concludes the study and gives the scope for future work.

2. REVIEW OF LITERATURE

Developing an asset pricing model that explains security returns correctly always be a toughest challenge in the area of Finance. There is a huge number of empirical evidence that documented that CAPM fails to explain the past return of securities as many anomalies exist in the security market. This section provides a review of empirical researches related to asset pricing models based on the company's fundamentals, conducted by international and domestic researchers, to identify research gaps and form the hypothesis.

Standard CAPM is a one-factor model that is based on market risk and not enough to explain cross-sectional variation in securities; therefore, researchers motivated to develop and test many multifactor models of asset pricing. Ross (1976) gave Arbitrage pricing theory, which states that asset return depends upon various macroeconomic, security-specific and market factors. Basu

(1977) unearthed that portfolio which has low price earning ratio yields higher return than a portfolio which has a high-price earning ratio. Stattman (1980) discerns that book to market equity has a positive relation with security returns. Banz (1981) discovered that small stocks offers higher returns than big stocks, which is called size effect. Keim (1983) argued about this negative relationship between the size of the firm and return instead he found that big size firm gives more return than what is given by a small firm. Rosenberg et al (1985) reported abnormal performance of two strategies which are statistically significant in the U.S market for the period 1973-1980. The first strategy is about 'book to price' which suggested that buy the high book to market equity stocks. The second strategy is 'specific return reversal' in which they computed security's return for the previous month and showed how it is related to factors of the stock market. They found that both strategies are profitable for investors. Bhandari (1988) explained the leverage effect that security return and leverage are positively related.

Chan et al (1991) came up with the fact that b/m ratio, cash flow yields are positively related with expected securities return in Japanese stock market for the period 1971-1988. Chui and Wei (1998) investigated the relationship between expected security return, size, market beta and book to market equity of five Pacific Basin security markets. They discovered a weak relation between market beta and security return while b/m and size are strongly related to returns. Fama French (1993) developed a three-factor asset pricing model that added SMB (small minus big) and HML (high minus low) factors in original capital asset pricing model and observed that their model can explain variation in stock return in the U.S. market better than CAPM. Lakonishoket et al (1994) discovered investment strategies, which were based on glamour stocks and value (out of favour) stocks. They showed that value stocks perform better than glamour stocks as glamour stock has low cash flow and earnings. Jagadeesh and Titman (1993) uncovered the momentum effect, under this trading strategy one can generate positive significant return if buy past winner stock and sell past loser stock. They create a portfolio based on the average return of 3-12 months and holding portfolio for the same period. Fama French (1996) showed that their multifactor model that included size, market premium, value and momentum factors explained long term but not short term momentum return.

In 1997, Carhart examined the momentum effect of one year in mutual funds. He uses the four-factor model, including size, market, value and momentum factor. The model well captures cross-sectional variation in returns. They also suggested that one could buy mutual funds performing good in the previous year and sell those who perform badly. Fama French (2008) explored that return of all size of securities are related to momentum, accruals and stock issues. They also show up that profitability and asset growth anomalies are less robust. Novy Marks (2013) uncovered the positive relation between expected return and profitable firm. Hou, Xue and Zhang (2014) proposed a model that also includes four factors, these are the market factor, size, investment and return on equity. In many cases, its performance is better than three and four-factor model of Fama French and Carhart respectively which captures remaining important anomaly. In 2015, Fama French gave a five-factor model including market, size, value, profitability and investment pattern. It better describes the average expected returns than Fama French three-factor model, although it is unable to explain the return of small stocks. Jiao and Lilti (2017) investigated the performance of Fama French five-factor model in Chinese stock market and observed that this model did not make any significant contribution to Fama French three-factor model except for the portfolio formed on size and profitability.

In the Indian context, Sehgal and Balakrishan (2013) examine value and size effects for the time period 1996-2010 and found that the Fama French three-factor model did a better job in explaining return than CAPM. Balakrishan (2014) observed the Fama French three-factor model is better than CAPM but it does not explain momentum returns. Even the four-factor model of Carhart did not make any improvement in explaining security return. Yadav (2015) compared the performance of different multifactor models in India and found that the five-factor model of Fama Franch outperforms the three-factor model.

In view of important findings discussed above, most persistent asset pricing factors are market premium, size and value. The present study extends this by including three additional pricing factors, which are profitability, investment and momentum and thus contribute to the existing research by developing different multifactor asset pricing models and assess their performance during different phases of time and attempt to unearth the value, size, investment, momentum and profitability effects in the Indian equity market. Hence, overall present study attempts to unearth and compare the behaviour of five different asset pricing models these are standard capital asset pricing models, three and five-factor model of Fama French, four-factor model of Carhart and six-factor model during the pre-recession (July 2005-June 2007), recession (July 2007-June 2009), post-recession (July 2009-September 2017) and overall time period (July 2005-September 2017) in the Indian equity market. The study formulates the following hypothesis:

1. Ho: market premium, size premium, book to market premium, profitability premium and investment premium factors do not affect portfolios' excess return.

2. Ho: Multifactor models do not have better explanatory power over standard CAPM.

This study contributes to the existing literature on performance of extended forms of asset pricing models under various risk factors. It is a comprehensive study in itself which provides insights into the behaviour of various asset pricing models during the different phases of time in the Indian equity market.

3. RESEARCH METHODOLOGY

Data source

The study uses constituents of S&P BSE 500 as a sample, traded over the period 1st July 2005 to 31st September 2017. The data was extracted from Bloomberg. We have used S&P BSE 500 index as a proxy for the market portfolio, and 91-day Treasury bill yields are used as the proxy for the risk-free rate. The monthly closing prices of stock are converted into log return, as well as the closing value of index into market log return.

Sorting process for creating portfolios

For creating portfolios and factors, we followed the same methodology as used by Fama French (2015) and Carhart (1997). Every year in June ends each company have been allocated to the different portfolios by using four variables. These are:

- Size: is the market capitalization at every 30th June.
- Operating Profitability: defined as the ratio of pre-tax profit to total book equity on the 31st March of each year.
- Book to market equity ratio (b/m ratio) at each 31st March.
- Investment: define as change in total asset, i.e. $(A_t - A_{t-1}) / A_{t-1.}$ Where A_t is the total asset at 31st March of year t and A_{t-1} is the total asset at 31st March of year t-1.
- 11 months momentum return: It has been calculated at the end of June each year.

At every 30th June, we independently split all companies in small (S) and big (B) size of groups by taking market capitalization as a base and for which breakpoint we have used median. Further, we have divided each group (small and big) into three subgroups: low (L), neutral (N) and high (H) by using 30th and 70th percentile value of the b/m ratio for breakpoints. By doing 2*3 bivariate sorting on variables the size and the b/m ratio, we get six portfolios these are SL, SN, SH, BL, BN and BH. After this every year from July-June, we calculate the monthly value weighted return for all these six portfolios. For weights, we have used market capitalization on 30th June of every year, i.e. portfolio creation date. The same process we have repeated each year. Hence, we get the series of value-weighted monthly returns for these six portfolios by employing bivariate sorting. In this way, we can see the impact of second sorting variables on stock returns while keeping the first sorting variable conditional. The same above process has been followed to construct the portfolios based on size-profitability, size-investment and size-momentum return except second variable sort has been done either on operating profitability or investment or momentum return. Portfolios based on size and profitability are SW, SN, SR, BW, BN and BR where W stands for the week, N for neutral and R for robust. Portfolios based on size and investment are SC, SN, SA, BC, BN and BA where C is conservative, N is neutral and A is aggressive. Similarly, portfolios based on size and momentum are SL, SN, SW, BL, BN and BW where L stands for the loser, N for neutral and W for the winner. Further, we compute the value-weighted monthly return for all categories of portfolios.

Explanatory variables

- Market premium (Rm-Rf): is the monthly excess return of the market portfolio.
- High minus Low (HML): is the monthly premium of book to market factor that is a difference of average return of SH and BH and average return of SL and BL.

- Robust minus Weak (RMW): is a monthly premium of the profitability factor which is the difference of average return of SR and BR and average return of SW and BW.
- Conservative minus Aggressive (CMA): is the monthly premium of the investment factor that is the difference of average return of SC and BC and average return of SA and BA.
- Winner minus loser (WML): is the monthly premium of the momentum factor which is the difference of average return of SW and BW and average return of SA and BA.
- Small minus Big (SMB): is the average of SMB_B, SMB_P and SMB_I . SMB_B is the difference between average return of SL, SN and SH and average return of BL, BN and BH. SMB_P is the difference of average return of SR, SN and SW and average return of BR, BN and BW. Similarly, SMB_I is the difference between average return of SC, SN and SA and average return of BC, BN and BA.

SMB, HML, WML, CMA and RMW factors are returns of zero investment or we can say mimicking portfolios of size, book to market, momentum returns, investment and operating profitability.

Dependent variables

Following Fama French (2015), we use 5*5 bivariate sorting to form our dependent variables. First, we divide whole sample companies into five size groups, and then these are further split into five subgroups based on the book to market equity, profitability, investment and momentum return. Then we have calculated weighted monthly returns of these portfolios and then computed their excess return. We construct four panels: A, B, C and D. Each panel consists of weighted monthly excess returns of 25 portfolios constructed on the basis of book to market equity, profitability, investment and momentum return. We have given name to these 25 series of all four sets of portfolios as Y1 to Y25.

Methodology

The study used descriptive statistics to know the average excess return of all dependent series and average premium for explanatory factors. Correlation analysis has been used to know the association among the explanatory variables and finally, we employ multiple regression for examining the influence of different risk premiums on excess portfolios' return. We have checked stationarity of all the hundred dependent series as well as six independent series by using three tests: ADF- Augmented Dickey-Fuller test, PP- Phillips Perron test and KPSS- Kwiatkowski- Phillips-Schmidt-Shin test. All statistical tools were employed on MS Excel and Eviews using 5% level of significance. We analyse the following five models of asset pricing in the current study during the different time frames as well as for all four sets of portfolios (size-b/m, size-profitability, size-investment and size-momentum):

CAPM : $R^e_t = \lambda 0 + \lambda 1 (RM_t - RF_t) + \varepsilon_t$

Where: $R^e_t = R_t - RF_t$

Three-factor model: $R^e_t = \lambda 0 + \lambda 1 (RM_t - RF_t) + \lambda 2\ SMB_t + \lambda 3\ HML_t + \varepsilon_t$

Four-factor model: $R^e_t = \lambda 0 + \lambda 1 (RM_t - RF_t) + \lambda 2\ SMB_t + \lambda 3\ HML_t + \lambda 4\ WML_t + \varepsilon_t$

Five-factor model: $R^e_t = \lambda 0 + \lambda 1(RM_t - RF_t) + \lambda 2\ SMB_t + \lambda 3\ HML_t + \lambda 4\ RMW_t + \lambda 5\ CMA_t + \varepsilon_t$

Six-factor model: $R^e_t = \lambda 0 + \lambda 1(RM_t - RF_t) + \lambda 2\ SMB_t + \lambda 3\ HML_t + \lambda 4\ RMW_t + \lambda 5\ CMA_t + \lambda 6\ WML_t + \varepsilon_t$

4. ANALYSIS AND FINDINGS

4.1 Stationarity checking

We have checked stationarity of all 100 dependent series and 6 independent variables with the help of three tests as mentioned above. We found that all series are stationary at 5% significance level.

4.2 Average excess return

Average excess return of sorted portfolios based on size-b/m, size-investment, size-momentum and size-profitability for the overall time period is depicted in part 1 of Table 1. Size-b/m sorted portfolios generate an extensive range of average return. A strong size effect can be discerned as in each BM column, small security is yielding more return than big security. Also, the average excess return is decreasing monotonically from small to big stocks. Further portfolios' returns tell a different story about value effect. No value effect is found as growth stocks always perform better than value stock, or we can say that reverse value effect is present in each size quintile. Size and return are negatively related for Size investment sorted portfolios. In all BM quintile showing the presence of size effect. We figure out weak investment effect in first, third and fourth size quintile as conservative stocks perform better than aggressive stocks while rest of size quintile shows reverse investment effect. Size effect is present in size-profitability sorted portfolios as returns are decreasing from small to big portfolio. Excess return of robust profitability portfolios always higher than weak profitability portfolios indicating profitability effect. In size-momentum portfolios size effect is present, and momentum effect is also observed here as winners are always performing better than losers. Momentum effect is strong in two small size rows.

Based on average excess returns, we can say that the size effect is present in all sets of portfolios during the different time frames but not the value effect. We find mix results for Investment effect, but profitability effect is depicted in 2005-17 and 2009-17 time period, which is not very strong. Momentum effect is also present here. In the recession, all portfolios have a negative excess return except only one or three (results unreported for 2005-07, 2007-09 and 2009-17).

4.3 Standard deviation

We measure the consistency with which returns are generated with help of standard deviation that quantifies the amount of variations in the returns. Results of standard deviation are shown in part 2 of Table 1. We found very high volatility in the stock returns in all four sets of portfolios during 2005-17. The standard deviation for size and BM sorted portfolios is very high that ranges from 6.7 to 16 percent. Here minimum value is 6.7 percent, which is in itself a very large value. Similarly, very high volatility can be observed in all kinds of portfolios, for size and investment sorted portfolios standard deviation ranges from 7.3 to 10.4 percent, for size momentum portfolios it is 7.1 to 10.71 percent and for size-profitability sorted portfolios it is from 6.6 to 12.4 percent. Thus we have found very high volatility in the stock returns in all four sets of portfolios and especially in the recession period in India.

4.4 Explanatory variables returns

The premium for risk factors in portfolios return is the mean value of explanatory variables. The mean value of Rm-Rf is 2.29 percent per month during 2005-07 or 27.48 percent per year, which is very high from an investment point of view (Table 2). This is nothing but equity premium for one unit of market beta. It turns to being negative in the recession period. It is 0.31 percent in

2009-17, which is a very low and 0.46 percent during 2005-2017. A strong average value (1.21 percent per month or 14.52 percent per year) of size premium (SMB) can be observed for the post-recession period in the Indian equity market. This is the average premium for the factor related to size. During 2005-07 size premium is 0.12 percent and in the recession, it is negative (-1.22 percent per month), but in the overall study period, it is 0.64 percent per month. A very strong momentum premium (WML) of 1.31 percent per month can be seen during 2005-07. It turns negative in 2007-09 and increased to 0.94 percent in post-recession that is also a large number. For the overall time period, it is 0.77 percent per month.

RMW produced average premium of 1.02 percent per month such a big value during 2009-17 but negative in 2005-07 and 2007-09 and for the overall period it is 0.63 percent. The average premium for book to market equity factor is 0.32 percent per month during the pre-recession period and became 0.86 percent in the recession period which is a large number. It is negative in post-recession but overall it producing a negative return of 0.10 percent. The average premium for investment factor is negative (-0.76 percent) in 2005-07 and become 1.06 percent, which is a large number in the recession period. For the post-recession, it is very weak, i.e. 0.07 percent and for the overall period, it is only 0.10 percent.

4.5 Correlation among independent variables

There is very weak positive but significant relation (r=0.18) between SMB and Rm-Rf i.e. market premium as small stocks have higher market betas in comparison of big stocks (Table 3). SMB factor is weakly correlated with HML and very weakly related to RMW factors with a correlation coefficient of 0.02 and -0.17 respectively. HML and CMA have a weak positive correlation while HML and RMW have a strong negative correlation with the coefficient of 0.31 and -0.69 as high BM value firms tend to be a low investment and weak profitable firms.

WML factor is weakly but significantly correlated with CMA, HML and RMW with the coefficient of -0.23, -0.36 and 0.34 respectively. RMW factor is moderately negatively correlated with market factor (r = -0.56) and very weakly related to CMA (r =-0.19). Market factor exhibits a moderate positive correlation with HML (r = 0.42) meaning that value firms demand more market premiums. A weak relation can be noticed between the market factor and CMA (r = -0.21). After analysing the correlation matrix we may figure out that no factor is very strongly related to another factor which stats that there is no problem of multicollinearity exist among the independent variables of the study.

4.6 Regression results

We investigate whether independent variables will improve the explanatory power of different models of asset pricing. We also check intercepts as well as the size of the coefficient of different variables and how these variables affect the excess returns of endogenous portfolios taken in the regression models. Regression results of CAPM, three-factor and six-factor models are given in Table 4, 5 and 6 respectively, where each table has four parts. Part 1, part 2, part 3 and part 4 show the results of time period 2005-17, 2005-2007, 2007-2009 and 2009-2017, respectively.

Time period 2005-2017

In CAPM market premium (Rm-Rf) is an only independent variable that alone captures much stock returns variation. All loadings of the market factors are significant, and their t statistics are more than 9 based on size b/m portfolios. Five out of 25 intercepts are significant and also express size effect, for small size portfolio intercept is more than those for big portfolios. Reverse value effect can also be read from the intercepts. Five intercept values out of 25 portfolios are significantly different from zero as their t statistic is more than 1.96. Adjusted R^2

ranges from 39 to 91 percent. It is very low for small size stocks but better for big stocks. But it also leaves the difference in returns, which may explain by other factors.

Eight of 25 intercepts of the three-factor model are significant and depict size effect in last two portfolios of the big size rows. The three-factor model that included SMB and HML factor push slopes of the market factors close to 1. Mimicking return to the size factor, i.e. SMB explained share variation in stock returns as all loadings of SMB except one is significantly different from 0. Slopes of SMB are related to size as small portfolios have strong positive loadings while big portfolios have negative loadings. Also, slopes of SMB are decreasing monotonically from small to big size portfolios in every BM quintiles. Most of the loadings of HML are also significant. Strong positive and significant loadings for two high BM quintiles can be seen, and two loadings in low BM quintile are significant and negative, which shows the value effect. A lot of improvements can be seen in adjusted R^2 values for all the portfolios if compare with CAPM. In short, we can say that three-factor of the stock market absorbs strong variation in returns across stocks better than CAPM. Only three intercepts are significant in the six-factor model. Again, SMB and HML show the same pattern as in three, four and five-factor model (results unreported for four and five-factor model). Eight, six and nine loadings of RMW, CMA and WML are significant respectively but not showing any pattern. No further improvement can be seen in adjusted R^2. Results of remaining sets of portfolios exhibit similar conclusion almost (not reported for the sake of brevity).

> *CAPM is not effective, especially for small stocks as it is unable to explain even 60 percent variation in returns. A lot of improvements can be seen in adjusted R^2 values of the three-factor model if compare with CAPM in all sets of portfolios. In the four-factor model adjusted, R^2 has been improved much for loser portfolios as compare to the three-*

factor model in size-momentum sorted portfolios. For size-investment based portfolios market premium, SMB, HML and CMA are important factors. We may say here that during 2005-2017 for Size-BM sorted portfolios and size-profitability sorted portfolios only three-factor model is good, which include market premium, SMB and HML. RMW, CMA and WML are useless factors and not improving the explanatory power.

2005-2007

Time period 2005-2007 tell a different story about all models. Many slopes of Rm-Rf are not close to one. Some of them are very large (3.02 in the four-factor model), and some are very small (0.45 again in the four-factor model). 15-19 loadings of SMB are significant in three, four, five and six-factor model, which is less than what is depicted during 2005-2017. CAPM is a very bad model to explain the variation of two small size quintiles portfolios as their adjusted R^2 is very low (29 to 56 percent). The three-factor model explains the return across stocks better than CAPM as adjusted R^2 improved a lot. Improvement can be seen especially in adjusted R^2 values of two small size portfolios quintiles. HML does not seem to be a good factor in explaining variation in returns as only three to four slope values are significant in all other factor models. In the six-factor model. Three, four one and five loadings of HML, RMW, CMA and WML respectively are significant. Some R^2 values are decreasing, and some had been increasing with nominal change.

It is not the right choice to include HML, RMW and CMA in the asset pricing model as their slopes have very low t statistics also they bring no enhancement in adjusted R^2. Therefore, we can say that they are redundant factors. However, CMA brings an improvement in adjusted R^2 only in four size-investment sorted portfolios. WML is also not a good factor except in case of size-momentum sorted portfolio, where it helps in *explaining stock return variation a little better than other portfolios. CAPM is not an effective model for many portfolios, especially for small stocks. Three-factor model is an effective model that brings a lot of improvements over CAPM. Four, five and six-factor models do not make any further improvement over the three-factor model. Overall, we find that only market premium and SMB factors are effective for all kinds of portfolios during the time period 2005-2007.*

2007-2009

Intercepts are indistinguishable from 0 in all models except only one in CAPM. CAPM gives a wonderful picture in this period as Rm-Rf alone explains 64 to 96 percent variation in stock returns. In the three-factor model again Rm-Rf and SMB both are good factors to explain stock return variation. However, HML is showing only two significant loadings. R^2 values have been increased in comparison to CAPM. Now 19 out of 25 values of adjusted R^2 are more than 90%. In the six-factor model, SMB has 16, HML and RMW both have five significant coefficients respectively while seven and four coefficients of CMA and WML respectively are significant. Adjusted R^2 ranges from 68 to 97 percent, out of which 21 values are more than 90 percent. However, not much improvement can be observed over the five-factor model.

All asset pricing models perform beautifully in this period as compared to what they have shown in 2005-2017 and 2005-2007. The three-factor model brings a lot of enhancement in R^2 if compare with CAPM. Six-factor model does a little better than other models. However, still market premium and SMB factors are the most effective and strong factors throughout all sets of portfolios during the time period 2007-2009.

2009-2017

CAPM has 10 significant intercepts especially for small stocks and showing abnormal returns. Adjusted R^2 ranges between 38 to 90 percent, not a good model for many portfolios. SMB always a strong factor that absorbs common time series variation in return across stocks as 23 loadings are significant in three and six-factor model. HML performs better as 16 coefficients in the three-factor model. The three-factor model explains much variation in comparison of CAPM as all adjusted R^2 values have been increased a lot. In the six-factor model, WML and RMW have five and CMA has three coefficients significant but does not show any improvement in adjusted R^2 values over the three-factor model.

> *CAPM is not a good model as in all four sets of portfolios as most of the intercepts are significantly different from zero. Rm-Rf and SMB capture much amount of variation in stock returns in all five models and also this time HML performs well in three and four-factor model but not in five and six-factor model. Three-factor model is an effective model that brings a lot of improvement over CAPM for all kinds of portfolios. The four-factor model does a little better than the three-factor model only for size, and momentum based portfolios. Five and six-factor model do not make any further improvement over the three-factor model.*

4.7 Behaviour of Portfolios' return during 2005-2017

Graph 1 shows the return of the portfolios having high and low BM ratio. Stocks which have high BM ratio are generally called value stock and portfolios with low BM ratio are called a growth stock. So many up and downs of returns we can see here. From 2005 to January 2007 sometime growth has outperformed and sometimes value stock outperforms. From April 2007 till April 2010, value stock outperformed but in the year 2008 when there was a recession period in the market both stocks fall substantially, and it is value stocks which suffered more loss than growth. When the market recovered in 2009, value stocks outperform growth stocks till April 2010. During the entire period, it is value stock whose returns go down more than a growth stock. Growth stocks outperform during the economic expansion from June 2010 to December 2011. January 2012 onwards, value stocks outperform except in the year 2015. Hence, history shows that most of the times value stocks give more return than growth stocks but there is a time when growth outperform value stocks. Therefore, either investing style cannot outperform others on the consistent basis. Hence neither growth nor value investing comes with a guarantee of good returns. Investors may be better off in a blended portfolio which includes both growth and value stocks to get consistent results as this mitigates the chance of loss during the bad time from any stock. Thus we conclude that value and growth investing are not static concepts.

Return of portfolios having weak and robust profitability shown in Graph 2. It is clearly depicted that during the entire study period weak profitability portfolios always outperform the robust profitability portfolio except for some point of times. The returns of portfolios having conservative and aggressive investment exhibits in Graph 3. From March 2010 to April 2017, aggressive portfolio outperformed and from April 2007 to February 2008 it is conservative portfolios that outperform. Again from April 2008 to April 2010, aggressive portfolios perform better than conservative. In October 2008 when the economy was in recession, aggressive investment portfolios suffer more loss. From June 2010 onwards conservative portfolios perform better than aggressive. So here most of the times conservative portfolios perform well. An investment strategy based on momentum says that buy those portfolios which performed well in past and sell those performed badly in the past, in the hope that momentum will also continue in the near future. But this not always true as shown in Graph 4. Till April 2008, sometime winners perform well while sometimes losers perform well. In October 2008 when the market in recession losers suffer more loss and at the time of recovery in 2009 winners outperformed. From December 2009 onwards most of the times, losers portfolios outperformed winners portfolios.

4.8 Return behaviour of S&P BSE SmallCap index and S&P BSE LargeCap index

Graph 5 shows return behaviour of S&P BSE SmallCap index and S&P BSE LargeCap index throughout the study period. We can see that most of the time SmallCap index outperformed the LargeCap index, and we find the same results in our study where most of the times small stock portfolios gave a higher return than big stock portfolios. Hence clearly 'size effect' was found present in the Indian equity market during the study period.

5. CONCLUSION

The study concludes that CAPM is not a good model, especially for small stocks for all time frames except during 2007-09. The three-factor model is an effective model that brings a lot of improvements over CAPM. Market premium and SMB factors are the most effective and strong factors explaining the variation in returns throughout all phases of the time period, but the performance of HML is satisfactory only during the period 2005-17 and 2009-17. For few size-momentum portfolios, the four-factor model does a little better than three-factor during 2009-17 and 2005-17. Five and six-factor model do not make any further improvement over the three-factor model asset pricing model. Many times, asset pricing models are unable to explain the return of small portfolios. During the recession period, the average return of all four sets of portfolios fell substantially to a negative level and also volatility was very high. This recession leads to an increase in market risk (hence beta) and thus increased the adjusted R^2 values. It is clear from average returns, regression results and history of returns, which are shown in the graph that portfolios based on the book to market ratio, investment, profitability and momentum may not perform effectively all the time in the Indian equity market as it does in the United States. Thus in the Indian equity market, only size effect is present. Value effect, profitability effect, investment effect and momentum effect did not exist throughout the study period. Hence, we can not make investment strategies on the basis of these factors except size, as no investing style outperformed others on a consistent basis.

Thus, the study finds that only the three-factor model may reject the second null hypothesis which states that this model does not have better explanatory power over standard CAPM. Further on the basis of overall results, we do not reject the first null hypothesis for RMW, CMA and WML that these factors do not affect the excess returns. Our results are in line with Fama French (1993) and Jiao and Lilti (2017) but contrary with Aharoni, Grundy and Zeng (2013), Novy Marx (2013), Fama French (2015) and Yadav (2015). Hence it is proved that out of all asset pricing models, the three-factor model has an enormous improvement over standard CAPM. But still left room for some better asset pricing models that include some other company's fundamentals or macroeconomic variables, which can be developed further in the future as the stock market does not tie only with the operations of a company. The results of study especially for the three-factor model can be used by investment analysts, investors and fund managers in different applications to estimate the return of stocks and portfolios. This includes portfolio selection, estimation of the cost of capital, evaluation of portfolios' performance. Investors are suggested to make investment strategy on the basis of size factor but keep in mind their risk preferences first as small stocks give more return but risky as well.

Intercepts of time series regression can be used to judge the ability of a fund manager meaning whether he beats the market or not.

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Table1: Part 1 - Average Returns different portfolios

Part 1	Size and BM sorted portfolios 2005-17					Size and investment sorted portfolios 2005-17					Size and momentum sorted portfolios 2005-17					Size and profitability sorted portfolios 2005-17				
	Low	2	3	4	High	Conser	2	3	4	Agg	Loser	2	3	4	Winner	Weak	2	3	4	Robust
Small	0.029	0.01	0.015	0.013	0.015	0.017	0.016	0.011	0.01	0.011	0.007	0.009	0.015	0.018	0.02	0.011	0.008	0.013	0.01	0.019
2	0.005	0.008	0.009	0.005	0.003	0.006	0.01	0.005	0.004	0.008	0.001	0.003	0.007	0.009	0.012	0.001	0.006	0.009	0.01	0.01
3	0.006	0.002	-0.003	0.004	0.001	0.005	-0.001	0.002	0.007	-0.001	-0.003	0.001	0.005	0.006	0.01	0	0.001	0.008	0.006	0.006
4	0.005	0.003	0.002	0.003	0.001	0.001	0.005	0.006	0.004	-0.001	0.001	0.002	0.003	0.004	0.009	-0.005	-0.002	0.001	0.004	0.01
Big	0.002	0.002	0	-0.002	-0.005	-0.004	0	0.003	0.001	0	0.001	0	0.001	0.003	0.004	-0.007	-0.004	0.005	0.002	0.001

Part 2: Standard Deviation

Small	0.160	0.099	0.100	0.097	0.101	0.095	0.104	0.103	0.100	0.100	0.104	0.098	0.096	0.093	0.107	0.113	0.102	0.099	0.098	0.110
2	0.103	0.090	0.092	0.091	0.100	0.092	0.086	0.091	0.088	0.102	0.097	0.096	0.085	0.085	0.098	0.109	0.095	0.084	0.087	0.095
3	0.083	0.095	0.090	0.096	0.091	0.089	0.090	0.086	0.088	0.103	0.101	0.088	0.081	0.081	0.094	0.111	0.100	0.082	0.082	0.085
4	0.073	0.088	0.096	0.092	0.091	0.080	0.079	0.084	0.082	0.096	0.104	0.081	0.084	0.078	0.092	0.113	0.092	0.078	0.080	0.068
Big	0.067	0.075	0.080	0.098	0.112	0.089	0.073	0.077	0.073	0.093	0.094	0.092	0.071	0.073	0.092	0.124	0.081	0.081	0.066	0.078

Table 2: Descriptive statistics of explanatory variables

		SMB	WML	RMW	HML	CMA	RM-RF
2005-07	Average	0.0012	0.013	-0.003	0.0032	-0.0076	0.0229
	SD	0.0477	0.0311	0.0276	0.0342	0.0259	0.067
2007-09	Average	-0.0122	-0.0045	-0.0002	0.0086	0.0106	-0.0076
	SD	0.042	0.0334	0.0529	0.043	0.0467	0.1392
2009-17	Average	0.0121	0.0094	0.0102	-0.0043	0.0007	0.0031
	SD	0.0285	0.0364	0.0375	0.035	0.0212	0.0467
2005-17	Average	0.0064	0.0077	0.0063	-0.001	0.001	0.0046
	SD	0.0356	0.0353	0.0392	0.0363	0.0279	0.0728

Table 3: Correlation between independent variables

Probability	CMA	HML	RM-RF	RMW	SMB	WML
CMA	1.000					
HML	**0.306**	1.000				
	0.000	-----				
RM_RF	**-0.206**	**0.417**	1.000			
	0.012	0.000	-----			
RMW	**-0.185**	**-0.685**	**-0.563**	1.000		
	0.025	0.000	0.000	**-----**		
SMB	0.022	**0.202**	**0.176**	**-0.167**	1.000	
	0.795	0.014	0.033	0.043	-----	
WML	**-0.230**	**-0.355**	-0.093	**0.339**	-0.074	1.000
	0.005	0.000	0.264	0.000	0.372	-----

Note: Bold coefficients are statistically significant at 5% significance level

Table 4: Regression results of CAPM

Part 1: Period 2005-2017

CAPM : Rt–RFt = λ0 + λ1 (RMt–RFt) + εt

BM	Low	2	3	4	High	Low	2	3	4	High
Size	Intercept					t (λ0)				
Small	**0.02**	0.01	**0.01**	0.01	0.01	2.14	1.05	2.16	1.73	1.95
2	0.00	0.00	0.00	0.00	0.00	-0.24	0.82	0.98	0.08	-0.73
3	0.00	0.00	**-0.01**	0.00	0.00	0.36	-1.05	-2.70	-0.57	-0.86
4	0.00	0.00	0.00	0.00	0.00	0.14	-0.79	-1.16	-0.43	-1.11
Big	0.00	0.00	0.00	**-0.01**	**-0.01**	-0.88	-1.27	-1.56	-2.35	-2.42
	Coefficients of Rm-Rf					t (λ1)				
Small	**1.38**	**1.04**	**1.12**	**1.12**	**1.15**	9.70	14.28	17.21	18.79	17.73
2	**1.22**	**1.07**	**1.11**	**1.08**	**1.19**	20.88	21.28	22.06	20.57	21.25
3	**1.01**	**1.20**	**1.14**	**1.19**	**1.02**	23.16	27.94	27.61	26.21	17.22
4	**0.92**	**1.11**	**1.21**	**1.09**	**1.10**	26.31	27.82	27.11	20.30	22.46
Big	**0.84**	**0.99**	**0.99**	**1.23**	**1.33**	26.91	37.57	24.83	27.36	20.57
	Adjusted R square					Standard error of regression				
Small	0.39	0.58	0.67	0.71	0.68	0.13	0.06	0.06	0.05	0.06
2	0.75	0.76	0.77	0.74	0.76	0.05	0.04	0.04	0.05	0.05
3	0.79	0.84	0.84	0.82	0.67	0.04	0.04	0.04	0.04	0.05
4	0.83	0.84	0.83	0.74	0.78	0.03	0.04	0.04	0.05	0.04
Big	0.83	0.91	0.81	0.84	0.74	0.03	0.02	0.03	0.04	0.06

Part 2: 2005-2007

BM	Low	2	3	4	High	Low	2	3	4	High
Size	Intercept					t (λ0)				
Small	-0	**-0.01**	-0.02	**-0.01**	0.01	-0.27	-0.81	-1.15	-0.48	0.34
2	-0	0.00	0.01	-0.01	-0.01	-0.24	-0.30	1.38	-0.39	-1.16
3	0	0.00	-0.02	**-0.02**	-0.01	0.42	-0.36	-3.43	-1.82	-0.34
4	-0	-0.01	0.00	0.00	-0.01	-1.43	-1.33	-0.23	-0.26	-0.82
Big	0	0.00	-0.01	-0.01	**0.01**	0.60	-0.32	-1.21	-1.08	1.17
	Coefficients of Rm-Rf					t (λ1)				
Small	2.48	**0.93**	**1.16**	**0.93**	**1.09**	3.25	4.25	5.53	5.05	4.62
2	1.15	**1.00**	**0.99**	**1.06**	**1.07**	5.33	5.68	8.36	4.65	5.87
3	1.23	**1.12**	**1.20**	**1.13**	**0.73**	9.81	9.59	11.57	7.05	3.25
4	0.78	**1.20**	**1.11**	**0.96**	**0.90**	6.63	16.37	9.42	4.06	8.28
Big	0.75	**1.01**	**0.96**	**0.99**	**0.98**	8.85	9.57	7.91	10.27	5.87
	Adjusted R square					Standard error of regression				
Small	0.29	0.43	0.56	0.52	0.47	0.24	0.07	0.07	0.06	0.08
2	0.54	0.58	0.75	0.47	0.59	0.07	0.06	0.04	0.07	0.06
3	0.81	0.80	0.85	0.68	0.29	0.04	0.04	0.03	0.05	0.07
4	0.65	0.92	0.79	0.40	0.75	0.04	0.02	0.04	0.08	0.03
Big	0.77	0.80	0.73	0.82	0.59	0.03	0.03	0.04	0.03	0.05

Part 3: 2007-2009

	Intercept					t (λ0)				
Small	0.02	0.00	-0.01	-0.01	0.00	0.81	-0.29	-0.78	-0.40	-0.20
2	-0.02	-0.02	-0.02	-0.01	0.00	-1.46	-1.48	-1.39	-0.95	0.01
3	-0.01	**-0.02**	-0.01	0.00	0.01	-0.71	-1.99	-1.21	-0.02	0.47
4	0.00	-0.01	-0.01	0.00	0.01	-0.37	-0.76	-0.44	-0.33	1.00
Big	0.00	-0.01	0.01	0.00	0.00	-0.16	-0.92	1.00	0.29	0.04
	Coefficients of Rm-Rf					t (λ1)				

Part 4: 2009-2017

	Intercept					t (λ0)				
Small	**0.03**	**0.01**	**0.02**	**0.01**	**0.01**	3.71	2.09	4.56	3.28	2.52
2	0.00	**0.01**	**0.01**	0.00	0.00	1.31	2.97	2.16	1.33	-0.21
3	0.00	0.00	0.00	0.00	-0.01	0.47	0.39	-1.06	0.63	-1.39
4	0.00	0.00	0.00	0.00	-0.01	1.69	-0.17	-0.97	0.04	-1.71
Big	0.00	0.00	**-0.01**	**-0.01**	**-0.02**	-0.99	-0.94	-2.39	-2.69	-3.48
	Coefficients of Rm-Rf					t (λ1)				

Small	**1.24**	**0.96**	**1.04**	**1.13**	**1.04**	6.54	8.22	9.41	10.79	10.73	**1.17**	**1.28**	**1.31**	**1.24**	**1.41**	7.86	10.40	13.11	12.86	13.41
2	**1.20**	**1.10**	**1.09**	**1.00**	**1.14**	10.63	12.18	10.34	11.21	13.45	**1.29**	**1.04**	**1.18**	**1.23**	**1.40**	15.86	13.93	15.08	18.07	14.57
3	**0.96**	**1.25**	**1.12**	**1.19**	**0.92**	11.54	17.42	13.98	17.27	9.92	**1.00**	**1.13**	**1.17**	**1.28**	**1.41**	14.18	15.15	17.43	17.27	16.77
4	**0.97**	**1.07**	**1.24**	**1.10**	**1.03**	23.29	14.40	12.72	11.72	13.06	**0.89**	**1.15**	**1.18**	**1.15**	**1.36**	14.73	15.77	17.33	15.93	15.94
Big	**0.94**	**0.99**	**0.90**	**1.29**	**1.31**	16.59	18.04	13.95	13.92	14.10	**0.69**	**0.95**	**1.21**	**1.23**	**1.53**	13.68	29.75	19.10	16.98	13.01
	Adjusted R square					Standard error of regression					Adjusted R square					Standard error of regression				
Small	0.64	0.74	0.79	0.83	0.83	0.13	0.08	0.07	0.07	0.06	0.38	0.52	0.64	0.63	0.65	0.07	0.06	0.05	0.04	0.05
2	0.83	0.87	0.82	0.84	0.89	0.08	0.06	0.07	0.06	0.06	0.72	0.66	0.70	0.77	0.68	0.04	0.03	0.04	0.03	0.04
3	0.85	0.93	0.89	0.93	0.81	0.06	0.05	0.05	0.05	0.06	0.67	0.70	0.76	0.75	0.74	0.03	0.03	0.03	0.03	0.04
4	0.96	0.90	0.87	0.86	0.88	0.03	0.05	0.07	0.06	0.05	0.69	0.72	0.75	0.72	0.72	0.03	0.03	0.03	0.03	0.04
Big	0.92	0.93	0.89	0.89	0.90	0.04	0.04	0.04	0.06	0.06	0.66	0.90	0.79	0.75	0.63	0.02	0.01	0.03	0.03	0.05

Table 5: Regression results of Three-factor model

Part 1: Period 2005-2017 | **Part 2: 2005-2007**

Three-factor model : Rit - RFt = λ0 + λ1 (RMt - RFt) + λ2 SMBt + λ3 HMLt + εt

BM	Low	2	3	4	High	Low	2	3	4	High	Low	2	3	4	High	Low	2	3	4	High
Size	Intercept					t (λ0)					Intercept					t (λ0)				
Small	0.02	0.00	0.00	0.00	0.00	1.51	-0.37	1.05	0.45	0.82	-0.01	-0.01	-0.02	0.00	0.01	-0.25	-1.16	-1.51	-0.56	0.73
2	**-0.01**	0.00	0.00	**-0.01**	**-0.01**	-2.39	-1.18	-0.70	-2.42	-2.31	0.00	0.00	**0.01**	0.00	-0.01	-0.16	-0.24	2.14	-0.48	-1.36
3	0.00	**-0.01**	**-0.01**	-0.01	**-0.01**	-0.88	-2.97	-4.21	-1.84	-2.06	0.00	0.00	**-0.02**	**-0.02**	0.00	0.50	-0.30	-3.63	-2.17	-0.43
4	0.00	0.00	**-0.01**	0.00	0.00	-0.32	-1.45	-2.03	-0.70	-1.30	-0.01	-0.01	0.00	0.00	-0.01	-1.37	-1.42	-0.15	-0.28	-0.82
Big	0.00	0.00	0.00	**-0.01**	**-0.01**	-1.20	-0.83	-0.87	-2.34	-2.14	0.00	0.00	-0.01	-0.01	0.01	0.97	-0.41	-1.38	-1.03	1.41
	Coefficients of Rm-Rf					t (λ1)					Slope of Rm-Rf					t (λ1)				
Small	**1.26**	**0.93**	**0.98**	**0.99**	**0.98**	8.47	15.19	20.83	22.70	24.18	**2.11**	**0.76**	**1.01**	**0.80**	**0.93**	2.91	5.55	6.55	6.22	6.21
2	**1.16**	**1.02**	**1.02**	**0.95**	**1.00**	24.88	27.27	26.87	27.93	23.76	**1.05**	**0.91**	**0.91**	**0.91**	**0.97**	7.19	6.68	10.82	7.06	6.56
3	**1.00**	**1.18**	**1.07**	**1.11**	**0.83**	23.80	31.09	27.43	26.43	16.87	**1.24**	**1.08**	**1.16**	**1.03**	**0.54**	9.79	10.25	11.61	7.71	3.29
4	**0.88**	**1.03**	**1.16**	**0.96**	**0.94**	23.62	25.78	25.38	17.86	20.91	**0.76**	**1.17**	**1.08**	**0.88**	**0.85**	6.04	16.02	10.16	3.63	7.92
Big	**0.96**	**1.01**	**0.96**	**1.13**	**1.12**	36.99	35.64	22.97	24.56	19.97	**0.82**	**1.05**	**1.01**	**1.00**	**0.89**	14.50	10.13	8.90	10.20	6.96
	Coefficients of SMB					t (λ2)					Coefficients of SMB					t (λ2)				
Small	**1.22**	**1.18**	**1.21**	**1.09**	**1.27**	4.32	10.10	13.44	13.16	16.60	**2.29**	**1.16**	**0.98**	**0.92**	**1.27**	2.30	6.09	4.60	5.16	6.15

2	**1.03**	**0.95**	**0.92**	**1.03**	**0.79**	11.67	13.29	12.76	15.85	9.86	**1.11**	**0.81**	**0.59**	**1.30**	**0.80**	5.54	4.28	5.05	7.31	3.96
3	**0.55**	**0.66**	**0.52**	**0.60**	**0.71**	6.85	9.09	7.01	7.55	7.67	0.15	**0.43**	**0.31**	**0.64**	**0.88**	0.87	2.93	2.24	3.50	3.88
4	**0.22**	**0.34**	**0.43**	**0.30**	**0.21**	3.15	4.51	4.92	2.89	2.44	0.11	0.03	**0.43**	0.13	0.26	0.63	0.34	2.90	0.38	1.73
Big	**-0.15**	**-0.16**	**-0.27**	0.07	**-0.21**	-3.04	-2.91	-3.42	0.76	-1.98	**-0.21**	**-0.31**	**-0.38**	0.08	-0.14	-2.65	-2.15	-2.42	0.58	-0.77
	Coefficients of HML					t (λ3)					Coefficients of HML					t (λ3)				
Small	0.07	0.00	0.16	**0.18**	**0.32**	0.25	0.04	1.66	2.03	3.92	1.05	0.29	0.38	0.19	0.15	0.75	1.08	1.27	0.76	0.51
2	-0.13	**-0.16**	0.07	**0.16**	**0.62**	-1.42	-2.10	0.89	2.38	7.28	-0.29	-0.13	0.13	-0.01	0.11	-1.04	-0.50	0.82	-0.03	0.39
3	**-0.18**	**-0.18**	0.12	**0.17**	**0.63**	-2.09	-2.34	1.50	1.99	6.36	-0.35	-0.11	0.12	0.28	**0.86**	-1.42	-0.52	0.63	1.10	2.72
4	0.10	**0.24**	0.06	**0.49**	**0.66**	1.28	2.98	0.70	4.49	7.32	0.11	0.26	-0.17	0.59	0.17	0.46	1.82	-0.83	1.25	0.82
Big	**-0.51**	-0.04	**0.23**	**0.46**	**1.08**	-9.72	-0.72	2.78	4.96	9.55	**-0.53**	0.05	-0.13	-0.27	**1.08**	-4.86	0.26	-0.60	-1.42	4.38
	Adjusted R square					Standard error of regression					Adjusted R square					Standard error of regression				
Small	0.45	0.75	0.86	0.87	0.90	0.12	0.05	0.04	0.03	0.03	0.40	0.79	0.78	0.78	0.80	0.23	0.04	0.05	0.04	0.05
2	0.87	0.89	0.89	0.91	0.89	0.04	0.03	0.03	0.03	0.03	0.80	0.76	0.88	0.84	0.75	0.05	0.04	0.03	0.04	0.05
3	0.84	0.90	0.88	0.88	0.81	0.03	0.03	0.03	0.03	0.04	0.81	0.85	0.87	0.79	0.64	0.04	0.03	0.03	0.04	0.05
4	0.84	0.87	0.86	0.78	0.84	0.03	0.03	0.04	0.04	0.04	0.63	0.93	0.84	0.40	0.77	0.04	0.02	0.03	0.08	0.03
Big	0.91	0.91	0.83	0.86	0.84	0.02	0.02	0.03	0.04	0.04	0.90	0.82	0.77	0.82	0.77	0.02	0.03	0.04	0.03	0.04

	Part 3: 2007-2009										Part 4: 2009-2017									
	Intercept					t (λ0)					Intercept					t (λ0)				
Small	0.03	0.01	0.00	0.00	0.01	1.10	0.75	0.34	0.49	1.11	**0.02**	0.00	**0.01**	0.00	0.00	2.26	-0.85	2.22	0.35	-0.60
2	0.00	0.00	0.00	0.00	0.01	-0.32	-0.05	0.07	0.47	0.90	0.00	0.00	0.00	0.00	-0.01	-1.28	-0.47	-0.57	-1.56	-1.62
3	0.01	-0.01	0.00	0.01	0.02	0.59	-0.92	-0.31	0.82	1.47	**-0.01**	**-0.01**	**-0.01**	0.00	**-0.01**	-2.49	-2.83	-2.90	-1.55	-2.64
4	0.00	0.00	0.01	-0.01	0.01	-0.63	0.27	0.46	-0.40	0.84	0.00	0.00	**-0.01**	0.00	0.00	0.02	-1.31	-2.27	-0.53	-1.24
Big	0.01	-0.01	0.01	0.01	-0.01	1.04	-1.49	0.60	0.88	-0.46	0.00	0.00	0.00	0.00	-0.01	-1.57	-0.66	-0.96	-0.90	-1.77
	Slope of Rm-Rf					t (λ1)					Slope of Rm-Rf					t (λ1)				
Small	**1.19**	**1.03**	**1.00**	**1.05**	**0.98**	5.51	8.47	12.76	13.81	15.18	**1.00**	**0.98**	**1.00**	**0.95**	**0.98**	5.82	8.75	11.91	12.19	13.95
2	**1.22**	**1.15**	**1.13**	**1.02**	**1.07**	13.68	17.45	16.49	15.54	16.47	**1.12**	**0.84**	**0.90**	**0.92**	**0.91**	13.98	14.42	14.17	19.80	12.91
3	**1.00**	**1.28**	**1.13**	**1.22**	**0.89**	13.17	21.26	14.07	16.25	10.46	**0.88**	**1.01**	**0.97**	**1.02**	**1.06**	12.85	14.28	14.41	15.07	13.86
4	**0.95**	**1.14**	**1.32**	**1.01**	**0.95**	19.08	14.45	12.37	9.99	11.06	**0.75**	**0.84**	**0.93**	**0.89**	**1.03**	11.70	12.92	14.10	12.33	12.66
Big	**1.04**	**0.94**	**0.93**	**1.28**	**1.20**	21.20	15.06	13.64	12.68	11.81	**0.90**	**1.05**	**1.11**	**0.94**	**1.14**	19.16	30.37	15.62	16.17	10.56
	Coefficients of SMB					t (λ2)					Coefficients of SMB					t (λ2)				

Small	1.00	**0.92**	**1.37**	**1.18**	**1.19**	1.58	2.59	5.96	5.32	6.28	**0.77**	**1.41**	**1.19**	**1.22**	**1.39**	3.01	8.42	9.52	10.55	13.17
2	**1.36**	**1.14**	**1.42**	**1.14**	**0.91**	5.23	5.94	7.10	5.93	4.76	**0.82**	**0.99**	**0.92**	**0.81**	**0.75**	6.79	11.45	9.76	11.65	7.12
3	**0.87**	**0.83**	**0.72**	**0.45**	**0.92**	3.90	4.71	3.06	2.04	3.69	**0.73**	**0.81**	**0.56**	**0.72**	**0.58**	7.15	7.65	5.58	7.12	5.03
4	-0.05	**0.46**	0.54	0.37	0.26	-0.34	1.97	1.74	1.27	1.05	**0.46**	**0.52**	**0.48**	**0.38**	0.16	4.80	5.34	4.90	3.50	1.31
Big	0.08	-0.15	**-0.44**	**0.64**	0.03	0.54	-0.82	-2.17	2.15	0.11	**-0.14**	**-0.12**	-0.19	**-0.18**	**-0.36**	-2.03	-2.33	-1.74	-2.11	-2.21
	Coefficients of HML					t (λ3)					Coefficients of HML					t (λ3)				
Small	0.26	-0.53	0.13	0.38	0.25	0.37	-1.31	0.51	1.53	1.18	0.02	0.00	0.13	0.09	**0.32**	0.07	0.01	1.12	0.84	3.41
2	-0.24	-0.41	-0.35	-0.19	0.36	-0.83	-1.88	-1.57	-0.86	1.68	-0.02	-0.02	**0.21**	**0.35**	**0.83**	-0.18	-0.31	2.49	5.60	8.73
3	-0.33	-0.24	-0.13	-0.28	0.09	-1.32	-1.21	-0.50	-1.11	0.34	-0.11	-0.15	**0.22**	**0.27**	**0.58**	-1.18	-1.56	2.50	2.97	5.68
4	0.14	-0.50	-0.57	0.56	0.47	0.83	-1.90	-1.61	1.69	1.65	0.10	**0.51**	**0.37**	**0.46**	**0.77**	1.20	5.91	4.21	4.77	7.08
Big	**-0.70**	0.33	-0.17	0.00	**0.70**	-4.32	1.61	-0.77	-0.01	2.09	**-0.46**	**-0.18**	**0.35**	**0.85**	**1.19**	-7.31	-3.84	3.73	10.99	8.27
	Adjusted R square					Standard error of regression					Adjusted R square					Standard error of regression				
Small	0.66	0.79	0.92	0.93	0.94	0.12	0.07	0.05	0.04	0.04	0.43	0.73	0.82	0.83	0.89	0.07	0.04	0.03	0.03	0.03
2	0.92	0.95	0.94	0.94	0.95	0.05	0.04	0.04	0.04	0.04	0.81	0.86	0.86	0.92	0.88	0.03	0.02	0.02	0.02	0.03
3	0.91	0.96	0.92	0.94	0.88	0.04	0.03	0.05	0.04	0.05	0.78	0.81	0.83	0.86	0.85	0.03	0.03	0.03	0.03	0.03
4	0.96	0.92	0.89	0.88	0.89	0.03	0.05	0.06	0.06	0.05	0.75	0.84	0.84	0.80	0.82	0.02	0.03	0.03	0.03	0.03
Big	0.96	0.94	0.91	0.91	0.91	0.03	0.04	0.04	0.06	0.06	0.79	0.92	0.81	0.89	0.78	0.02	0.01	0.03	0.02	0.04

Table 6: Regression results of Six-factor model

Part 1: Period 2005-2017 — **Part 2: 2005-2007**

Six-factor model : Rt - RFt = λ0 + λ1 (RMt - RFt) + λ2 SMBt + λ3 HMLt + λ4 RMWt + λ5 CMAt + λ6 WMLt+ εt

BM	Low	2	3	4	High	Low	2	3	4	High	Low	2	3	4	High	Low	2	3	4	High
Size	Intercept					t (λ0)					Intercept					t (λ0)				
Small	0.02	0.00	0.00	0.00	**0.01**	1.53	0.69	1.39	0.71	2.17	0.01	-0.02	-0.01	0.00	0.01	0.25	-1.90	-1.06	-0.05	0.57
2	0.00	0.00	0.00	0.00	-0.01	-1.43	-0.61	-0.05	-0.95	-1.73	-0.01	0.00	0.01	0.00	-0.01	-0.77	-0.15	1.83	0.23	-0.46
3	0.00	**-0.01**	**-0.01**	0.00	0.00	-0.71	-3.15	-3.26	-1.19	-1.24	0.01	0.00	**-0.03**	**-0.02**	-0.01	1.01	-0.06	-3.50	-2.76	-1.14
4	0.00	0.00	0.00	0.00	0.00	-0.60	-0.88	-0.48	0.18	-0.23	-0.01	-0.01	0.00	0.01	0.00	-0.54	-1.48	-0.56	0.28	-0.03
Big	0.00	0.00	0.00	0.00	-0.01	-0.12	-1.13	-0.62	-1.29	-1.45	0.00	0.00	-0.01	0.00	0.01	0.47	-0.37	-1.01	-0.44	0.76
	Coefficients of Rm-Rf					t (λ1)					Coefficients of Rm-Rf					t (λ1)				

Small	**1.20**	**0.88**	**0.96**	**1.00**	**0.90**	6.64	12.27	16.78	19.22	19.36	**3.40**	**0.71**	**1.01**	**0.97**	**1.07**	4.35	4.14	4.75	6.32	6.24
2	**1.07**	**0.99**	**0.99**	**0.89**	**0.99**	19.42	21.70	22.22	22.99	19.71	**1.01**	**0.94**	**0.99**	**1.00**	**0.91**	6.07	4.97	9.17	6.16	4.89
3	**0.99**	**1.18**	**0.99**	**1.05**	**0.80**	19.21	25.78	21.52	20.86	13.63	**1.19**	**1.16**	**1.10**	**0.80**	**0.47**	9.18	8.21	8.45	5.76	2.25
4	**0.91**	**1.00**	**0.98**	**0.87**	**0.89**	20.32	20.66	20.13	13.58	16.94	**0.71**	**1.10**	**1.01**	**0.87**	**0.96**	4.47	11.65	7.77	2.77	7.48
Big	**0.92**	**1.03**	**1.01**	**1.08**	**1.08**	31.98	30.10	21.05	20.02	16.10	**0.84**	**0.99**	**1.17**	**0.89**	**0.94**	11.48	7.39	8.62	7.37	5.69
	Coefficients of SMB					t (λ2)					Coefficients of SMB					t (λ2)				
Small	**1.22**	**1.17**	**1.21**	**1.09**	**1.27**	4.30	10.47	13.37	13.34	17.44	**2.79**	**1.05**	**1.00**	**1.10**	**1.22**	2.95	5.07	3.89	5.90	5.85
2	**1.03**	**0.95**	**0.92**	**1.03**	**0.79**	11.99	13.28	13.10	16.90	10.00	**1.11**	**0.81**	**0.64**	**1.39**	**0.90**	5.54	3.56	4.90	7.03	4.01
3	**0.55**	**0.66**	**0.52**	**0.60**	**0.71**	6.81	9.16	7.18	7.59	7.74	**0.28**	**0.48**	**0.28**	**0.59**	**0.74**	1.80	2.80	1.76	3.46	2.87
4	**0.22**	**0.34**	**0.43**	**0.30**	**0.21**	3.15	4.50	5.58	2.94	2.50	0.20	0.01	0.30	0.18	**0.33**	1.01	0.08	1.90	0.47	2.13
Big	**-0.15**	**-0.16**	**-0.27**	0.07	**-0.21**	-3.38	-2.92	-3.60	0.77	-2.03	**-0.24**	-0.29	-0.24	0.07	-0.14	-2.64	-1.79	-1.46	0.50	-0.71
	Coefficients of HML					t (λ3)					Coefficients of HML					t (λ3)				
Small	-0.14	-0.12	0.09	**0.25**	0.15	-0.36	-0.80	0.71	2.18	1.45	0.79	0.40	0.35	0.26	0.10	0.64	1.49	1.04	1.08	0.35
2	**-0.29**	**-0.22**	0.11	-0.02	**0.43**	-2.38	-2.25	1.18	-0.29	3.90	-0.12	-0.15	0.19	-0.09	0.02	-0.48	-0.50	1.14	-0.36	0.06
3	**-0.23**	-0.04	0.07	0.08	**0.50**	-2.03	-0.40	0.67	0.74	3.89	-0.28	-0.10	0.17	0.35	**0.96**	-1.34	-0.44	0.84	1.57	2.88
4	0.09	**0.23**	-0.09	**0.33**	**0.46**	0.86	2.14	-0.87	2.34	3.94	0.05	0.28	-0.22	0.39	0.09	0.21	1.86	-1.10	0.78	0.43
Big	**-0.46**	0.02	0.01	0.22	**1.10**	-7.35	0.31	0.07	1.88	7.51	**-0.53**	0.08	-0.05	-0.35	**1.19**	-4.56	0.40	-0.25	-1.86	4.55
	Coefficients of RMW					t (λ4)					Coefficients of RMW					t (λ4)				
Small	-0.39	-0.14	-0.09	0.14	**-0.29**	-1.01	-0.93	-0.73	1.28	-2.94	0.65	-0.07	-0.01	**0.95**	-0.49	0.32	-0.16	-0.02	2.39	-1.10
2	**-0.36**	-0.14	0.03	-0.28	-0.19	-3.06	-1.46	0.34	-3.39	-1.75	0.57	-0.05	0.40	0.06	0.16	1.33	-0.11	1.43	0.14	0.34
3	-0.10	0.11	**-0.22**	-0.21	-0.13	-0.92	1.12	-2.24	-1.95	-1.05	**0.87**	0.22	0.07	0.08	-0.32	2.60	0.62	0.20	0.21	-0.59
4	0.08	-0.06	**-0.56**	**-0.36**	**-0.26**	0.80	-0.61	-5.31	-2.60	-2.26	0.24	-0.01	**-0.71**	-0.42	-0.01	0.58	-0.05	-2.12	-0.52	-0.02
Big	-0.01	0.12	-0.07	**-0.30**	-0.02	-0.13	1.65	-0.63	-2.60	-0.14	-0.13	0.22	**0.80**	-0.23	0.27	-0.70	0.64	2.28	-0.75	0.64
	Coefficients of CMA					t (λ5)					Coefficients of CMA					t (λ5)				
Small	0.13	-0.28	-0.05	-0.16	-0.19	0.31	-1.75	-0.37	-1.37	-1.84	-1.66	-0.46	0.14	0.33	-0.75	-0.87	-1.10	0.27	0.88	-1.79
2	-0.18	-0.09	**-0.26**	-0.12	0.14	-1.49	-0.84	-2.61	-1.38	1.25	0.01	-0.05	-0.02	0.19	0.80	0.03	-0.11	-0.09	0.49	1.77
3	0.02	-0.15	**-0.26**	-0.11	-0.07	0.17	-1.42	-2.47	-0.98	-0.53	**0.82**	0.00	0.00	0.42	-0.62	2.61	-0.01	-0.01	1.23	-1.21
4	0.15	-0.16	**-0.49**	-0.20	-0.05	1.47	-1.45	-4.48	-1.38	-0.40	0.67	0.09	-0.40	0.45	0.08	1.73	0.38	-1.25	0.59	0.26
Big	**-0.31**	0.00	**0.38**	0.00	**-0.32**	-4.77	0.04	3.46	0.00	-2.09	-0.25	0.28	0.14	0.42	-0.31	-1.37	0.86	0.43	1.41	-0.76
	Coefficients of WML					t (λ6)					Coefficients of WML					t (λ6)				

Small	0.16	**-0.40**	-0.09	**-0.20**	**-0.18**	0.53	-3.30	-0.93	-2.28	-2.33
2	-0.02	-0.03	**-0.18**	**-0.18**	-0.07	-0.20	-0.43	-2.42	-2.71	-0.79
3	0.04	0.06	-0.03	-0.01	**-0.21**	0.47	0.74	-0.44	-0.09	-2.08
4	0.00	-0.09	-0.02	-0.06	**-0.20**	-0.06	-1.12	-0.28	-0.56	-2.24
Big	**-0.17**	-0.02	-0.14	-0.16	**-0.23**	-3.43	-0.29	-1.72	-1.75	-1.99
	Adjusted R square					Standard error of regression				
Small	0.45	0.77	0.86	0.88	0.91	0.12	0.05	0.04	0.03	0.03
2	0.88	0.89	0.90	0.92	0.89	0.04	0.03	0.03	0.03	0.03
3	0.84	0.90	0.89	0.88	0.82	0.03	0.03	0.03	0.03	0.04
4	0.84	0.87	0.89	0.79	0.85	0.03	0.03	0.03	0.04	0.03
Big	0.92	0.91	0.84	0.87	0.85	0.02	0.02	0.03	0.04	0.04

Small	**-4.91**	0.47	-0.07	-0.26	**-0.68**	-3.21	1.41	-0.18	-0.85	-2.02
2	**0.63**	-0.13	-0.06	-0.52	-0.02	1.96	-0.34	-0.29	-1.64	-0.07
3	0.46	-0.23	0.33	**0.92**	0.42	1.81	-0.83	1.30	3.37	1.01
4	0.04	0.28	0.00	-0.53	**-0.57**	0.12	1.50	0.01	-0.86	-2.27
Big	-0.09	0.32	-0.23	0.13	0.12	-0.61	1.22	-0.85	0.53	0.38
	Adjusted R square					Standard error of regression				
Small	0.57	0.80	0.74	0.80	0.84	0.19	0.04	0.05	0.04	0.04
2	0.84	0.72	0.88	0.84	0.76	0.04	0.05	0.03	0.04	0.05
3	0.88	0.83	0.87	0.86	0.64	0.03	0.03	0.03	0.03	0.05
4	0.63	0.92	0.85	0.38	0.79	0.04	0.02	0.03	0.08	0.03
Big	0.90	0.81	0.80	0.83	0.77	0.02	0.03	0.03	0.03	0.04

Part 3: 2007-2009

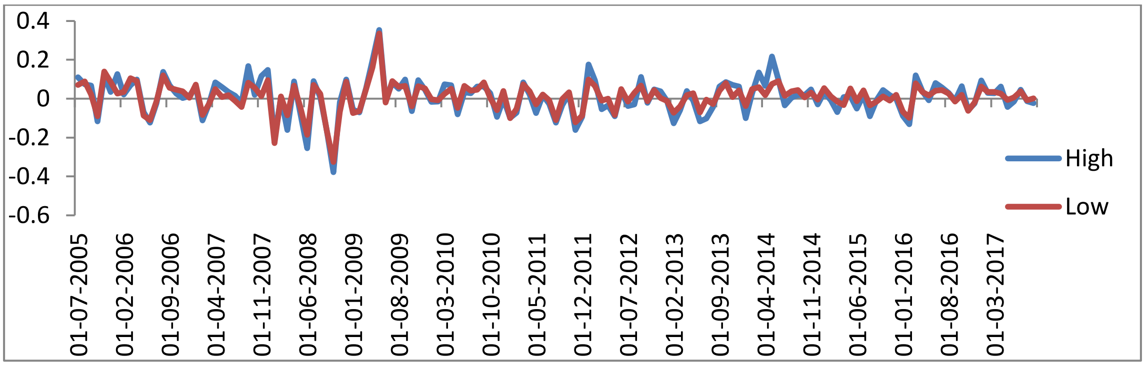
	Intercept					t (λ0)				
Small	0.04	0.01	0.00	0.00	0.01	1.35	0.57	0.24	0.25	0.90
2	0.00	0.00	0.00	0.00	0.01	-0.43	-0.21	-0.05	0.37	0.86
3	0.00	-0.01	0.00	0.01	0.02	0.43	-0.65	-0.36	0.64	1.42
4	0.00	0.00	0.01	0.00	0.01	-0.54	0.06	0.86	-0.21	1.04
Big	0.00	-0.02	0.01	0.00	-0.01	0.92	-1.95	0.77	0.50	-0.67
	Coefficients of Rm-Rf					t (λ1)				
Small	**1.04**	**0.70**	**0.78**	**0.95**	**0.87**	3.08	3.94	6.73	7.64	9.02
2	**1.12**	**1.04**	**1.02**	**0.94**	**1.03**	10.78	10.02	9.11	10.06	9.18
3	**0.86**	**1.21**	**0.88**	**1.01**	**0.88**	7.06	12.87	7.64	9.43	6.07
4	**0.95**	**0.92**	**0.99**	**0.85**	**0.95**	11.17	8.16	6.89	5.60	7.13
Big	**0.88**	**0.85**	**1.17**	**1.18**	**1.05**	14.34	9.15	13.08	9.93	6.49
	Coefficients of SMB					t (λ2)				
Small	**1.28**	**0.72**	**1.26**	**1.08**	**1.14**	1.96	2.10	5.66	4.50	6.13
2	**1.45**	**1.10**	**1.37**	**1.15**	**0.90**	7.19	5.49	6.31	6.34	4.17
3	**0.80**	**0.82**	**0.64**	0.33	**0.97**	3.41	4.54	2.86	1.58	3.46
4	-0.06	0.30	**0.58**	0.46	0.39	-0.35	1.39	2.07	1.57	1.51
Big	-0.02	-0.29	-0.32	**0.54**	-0.13	-0.19	-1.62	-1.84	2.33	-0.43

Part 4: 2009-2017

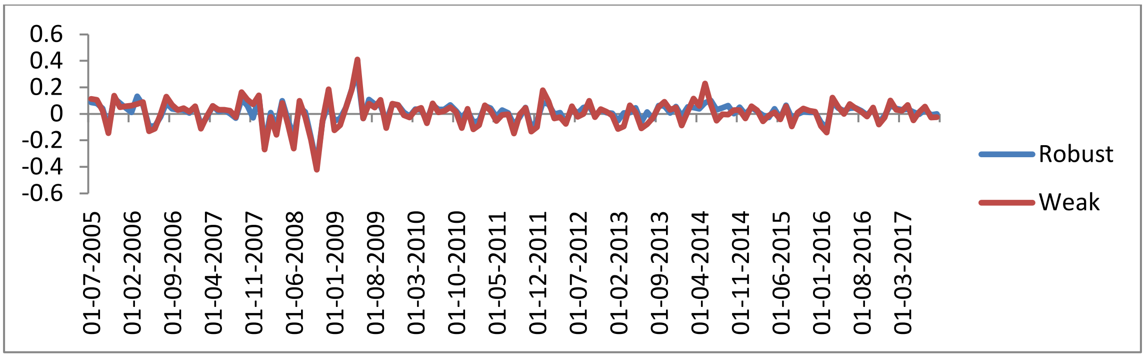
	Intercept					t (λ0)				
Small	0.01	0.00	**0.01**	0.00	0.00	1.86	-0.15	2.41	0.86	0.34
2	0.00	0.00	0.00	0.00	0.00	-0.20	-0.50	-0.24	-0.36	-1.40
3	-0.01	**-0.01**	-0.01	0.00	**-0.01**	-1.83	-3.25	-1.74	-1.00	-2.19
4	0.00	0.00	0.00	0.00	0.00	-0.50	-1.31	-1.38	0.48	-0.71
Big	0.00	0.00	0.00	0.00	-0.01	-1.40	-0.03	-0.49	-1.03	-1.24
	Coefficients of Rm-Rf					t (λ1)				
Small	**1.03**	**0.89**	**0.96**	**0.90**	**0.91**	5.57	7.82	10.56	10.88	12.20
2	**1.03**	**0.83**	**0.88**	**0.87**	**0.89**	12.21	13.57	12.94	17.81	11.87
3	**0.84**	**1.06**	**0.89**	**0.98**	**1.02**	11.41	13.81	12.68	13.55	12.68
4	**0.78**	**0.84**	**0.88**	**0.83**	**1.00**	11.49	11.90	12.37	10.89	11.31
Big	**0.90**	**1.02**	**1.07**	**0.95**	**1.09**	18.24	27.55	14.36	15.21	9.31
	Coefficients of SMB					t (λ2)				
Small	**0.76**	**1.42**	**1.20**	**1.23**	**1.39**	2.99	9.06	9.51	10.74	13.45
2	**0.82**	**0.99**	**0.93**	**0.82**	**0.75**	7.03	11.72	9.90	12.14	7.24
3	**0.73**	**0.81**	**0.57**	**0.72**	**0.58**	7.20	7.61	5.80	7.23	5.20
4	**0.46**	**0.52**	**0.49**	**0.39**	0.17	4.89	5.31	4.98	3.70	1.36
Big	**-0.14**	**-0.12**	-0.18	**-0.19**	**-0.35**	-2.04	-2.27	-1.78	-2.17	-2.16

	Coefficients of HML					t (λ3)					Coefficients of HML					t (λ3)				
Small	-0.63	0.13	0.50	0.70	0.28	-0.63	0.24	1.47	1.91	0.97	-0.11	-0.32	-0.04	0.00	0.13	-0.33	-1.61	-0.28	-0.02	0.97
2	**-0.83**	-0.37	-0.23	-0.41	0.44	-2.66	-1.19	-0.69	-1.47	1.31	-0.27	-0.16	0.17	**0.22**	**0.65**	-1.85	-1.46	1.48	2.56	4.96
3	-0.16	0.00	0.21	0.09	-0.09	-0.43	0.01	0.63	0.28	-0.21	**-0.26**	-0.05	0.03	0.08	**0.40**	-2.02	-0.39	0.27	0.60	2.84
4	0.22	0.06	-0.45	0.27	-0.02	0.86	0.18	-1.05	0.60	-0.06	0.10	**0.46**	0.22	**0.37**	**0.74**	0.82	3.71	1.82	2.79	4.84
Big	**-0.41**	**0.78**	**-0.72**	-0.22	**1.27**	-2.24	2.82	-2.71	-0.62	2.64	**-0.39**	**-0.23**	0.10	**0.78**	**1.01**	-4.57	-3.53	0.79	7.18	4.96
	Coefficients of RMW					t (λ4)					Coefficients of RMW					t (λ4)				
Small	-1.36	-0.20	-0.20	0.05	-0.37	-1.83	-0.50	-0.78	0.19	-1.73	-0.19	-0.01	-0.16	0.00	**-0.31**	-0.57	-0.05	-0.94	-0.02	-2.28
2	**-1.02**	-0.30	-0.17	**-0.54**	-0.02	-4.40	-1.30	-0.70	-2.61	-0.07	**-0.37**	-0.09	0.08	**-0.19**	-0.12	-2.38	-0.78	0.61	-2.14	-0.88
3	-0.23	0.18	-0.28	-0.22	-0.24	-0.84	0.85	-1.11	-0.93	-0.74	-0.26	0.19	**-0.34**	-0.25	-0.02	-1.95	1.35	-2.66	-1.88	-0.10
4	0.12	0.01	**-0.69**	**-0.75**	-0.57	0.61	0.05	-2.16	-2.24	-1.92	0.18	0.01	-0.24	-0.23	-0.04	1.46	0.07	-1.86	-1.69	-0.24
Big	-0.17	0.21	0.00	**-0.76**	0.21	-1.24	1.01	0.02	-2.90	0.57	0.15	-0.05	**-0.27**	-0.09	-0.10	1.62	-0.72	-2.01	-0.75	-0.47
	Coefficients of CMA					t (λ5)					Coefficients of CMA					t (λ5)				
Small	0.35	**-1.01**	**-0.64**	-0.39	-0.19	0.40	-2.16	-2.14	-1.20	-0.74	0.45	0.29	0.11	-0.06	-0.17	1.21	1.24	0.58	-0.37	-1.09
2	0.30	-0.19	-0.25	0.06	-0.14	1.11	-0.71	-0.86	0.26	-0.48	-0.17	**0.29**	0.01	-0.16	0.28	-1.00	2.30	0.07	-1.63	1.83
3	-0.35	-0.34	**-0.68**	**-0.61**	0.12	-1.11	-1.37	-2.28	-2.19	0.31	-0.04	0.19	-0.22	0.10	0.26	-0.25	1.24	-1.55	0.65	1.58
4	-0.06	**-0.78**	-0.71	-0.07	0.35	-0.28	-2.63	-1.88	-0.18	1.01	**0.36**	0.18	-0.14	**-0.41**	-0.22	2.61	1.29	-0.96	-2.66	-1.21
Big	**-0.49**	-0.46	**0.82**	0.10	-0.65	-3.04	-1.89	3.51	0.31	-1.54	-0.09	-0.05	0.23	0.20	0.08	-0.93	-0.59	1.54	1.57	0.33
	Coefficients of WML					t (λ6)					Coefficients of WML					t (λ6)				
Small	0.28	-0.74	-0.40	-0.34	**-0.49**	0.33	-1.65	-1.39	-1.09	-2.02	0.33	**-0.50**	-0.06	**-0.23**	-0.04	1.39	-3.48	-0.50	-2.17	-0.39
2	-0.46	-0.37	-0.29	-0.39	0.01	-1.76	-1.43	-1.03	-1.68	0.05	-0.08	0.03	**-0.19**	-0.09	-0.01	-0.77	0.41	-2.18	-1.43	-0.08
3	-0.37	0.26	-0.35	**-0.54**	0.03	-1.22	1.09	-1.20	-2.03	0.07	0.06	0.03	-0.02	0.03	**-0.20**	0.64	0.36	-0.18	0.32	-1.96
4	0.07	-0.45	-0.04	-0.09	0.07	0.34	-1.58	-0.12	-0.23	0.22	-0.07	-0.02	-0.03	-0.09	-0.13	-0.80	-0.20	-0.30	-0.98	-1.17
Big	**-0.44**	-0.38	0.26	**-1.16**	-0.43	-2.90	-1.64	1.15	-3.90	-1.05	**-0.15**	-0.07	0.03	0.10	-0.18	-2.36	-1.39	0.30	1.24	-1.23
	Adjusted R square					Standard error of regression					Adjusted R square					Standard error of regression				
Small	0.68	0.82	0.93	0.93	0.95	0.12	0.06	0.04	0.04	0.03	0.43	0.76	0.82	0.84	0.89	0.07	0.04	0.03	0.03	0.03
2	0.96	0.95	0.94	0.95	0.94	0.04	0.04	0.04	0.03	0.04	0.82	0.87	0.86	0.93	0.88	0.03	0.02	0.02	0.02	0.03
3	0.91	0.96	0.94	0.95	0.86	0.04	0.03	0.04	0.04	0.05	0.78	0.81	0.84	0.86	0.86	0.03	0.03	0.03	0.03	0.03
4	0.95	0.93	0.92	0.89	0.90	0.03	0.04	0.05	0.05	0.05	0.77	0.84	0.84	0.82	0.82	0.02	0.03	0.03	0.03	0.03
Big	0.97	0.95	0.94	0.95	0.91	0.02	0.03	0.03	0.04	0.06	0.80	0.92	0.82	0.89	0.78	0.02	0.01	0.03	0.02	0.04

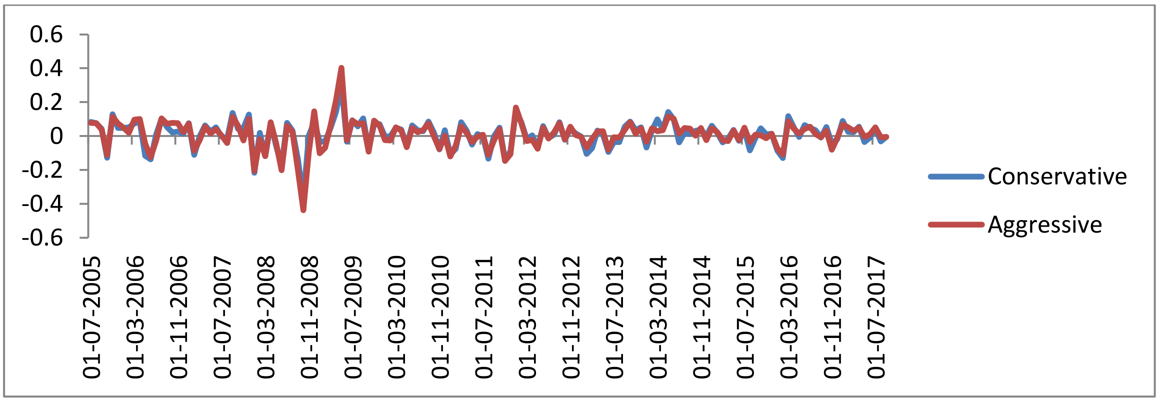
Graph 1: Average returns of portfolios having high and low BM ratio during 2005-2017



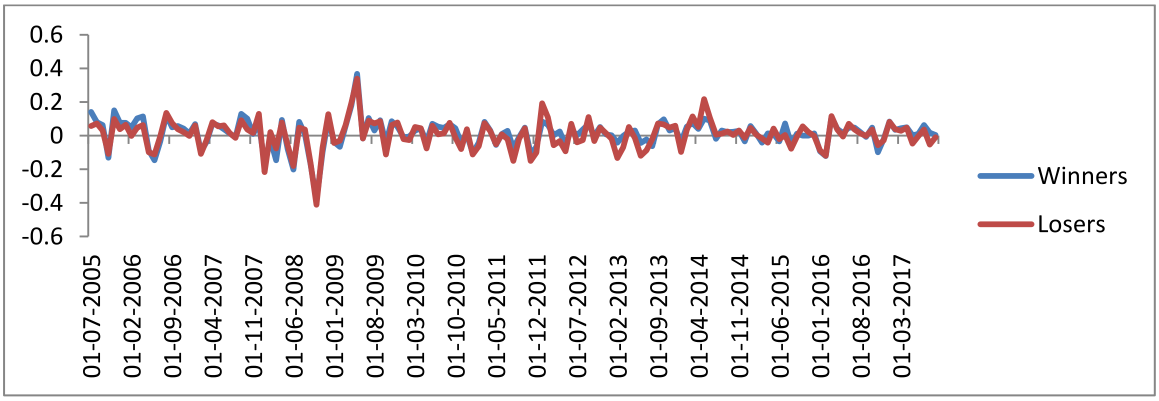
Graph 2: Average returns of portfolios having Robust and Weak profitability during 2005-2017



Graph 3: Average returns of portfolios having Conservative and Aggressive investment during 2005-2017



Graph 4: Average returns of Winners and Losers portfolios on the basis of 11 months momentum return during 2005-2017



Graph 5: Return behaviour of S&P BSE SmallCap index and S&P BSE LargeCap index