Market, Size, Value and Stock Returns in India

Samreen Akhtar
Research Scholar,
Aligarh Muslim University

Abstract

This study empirically examines the single-factor market model and the Fama-French three-factor model for the Indian stock market using data for a longer time-period i.e. from 1993 to 2013. We also test the models for two shorter time periods of ten years each subdividing this entire period of twenty years. Then these two periods of ten years are further divided into two periods of five years each. In all, we carried out the tests for seven different time periods. The results report a negative relation between size and average return, and a positive relation between average return and value irrespective of size. R2 values establish that the stock-market returns, SMB and HML proxy for risk factors. Based on the joint test of the intercepts the three-factor model can't be rejected for the Indian stock market.

Keywords: Market, Size, Value, Returns, India

Introduction

The motive behind any investment is to maximize return generated by an asset/portfolio for a given level of risk or to minimize risk for a given level of return. This concern of investors (risk-return trade-off) has led to the development of asset pricing models. The classical and the most extensively used is the CAPM (Capital Asset Pricing Model) developed by William Sharpe (1964), John Lintner (1965) independently. But soon this model started losing its grounds because of the anomalies which emerged from many empirical works done in various stock markets across the world. Some of the most prominent CAPM anomalies are the size effect documented by Banz (1981), the value effect recorded by Chan et al. (1991), and the price to earnings ratio effect documented by Basu (1977). This led researchers to look for other factors to explain the cross-section of stock returns. Fama and French (1992, 1993, 1995, 1996) attributed the failure of this model to non-diversifiable risk, which is not captured by the standard CAPM. To capture this risk and the pricing anomalies, Fama and French (1992) proposed the three-factor model, by adding size and book-to-market mimicking portfolio returns to the standard CAPM.

Literature Review

Till date, a number of studies have been undertaken to explore the determinants that explain equity returns across the globe. Fama and French consider CAPM to be misspecified and believe that their influential paper (1993) incorporates additional risk factors that are absent from CAPM, indicating their results to be consistent with the efficient market hypothesis. However, other researchers consider Fama-French's (1993) results to be indicative of investor irrationality and inefficient markets, particularly with respect to the BE/ME component of the model. Researchers like Lakonishok et al. (1994) attribute BE/ME's explanatory ability on returns to investor overreaction to both good and bad news. Fama and French (1996) argue that the anomalies of the CAPM widely disappear by using a three-factor model. Jan Bartholdy and Paula Peare (2005) compare the performance of one-factor model (CAPM) and the Fama-French three-factor model for estimation of individual stock returns. Lawrence, Geppert, and Prakash (2007) empirically test and compare the performance of the traditional two-moment CAPM, the three-moment CAPM, and the FF three-factor model using the FF 25 portfolios data. Based on the time-series tests and the Fama-Macbeth cross-sectional tests, the FF three-factor model outperforms the CAPM and the three-moment CAPM. In the cross-sectional test, the three-moment CAPM has a higher R^2 than CAPM but in the time-series regression, the performance of CAPM and the three-moment CAPM is comparable. There is growing empirical evidence in favor of the three-factor model for other world markets besides the USA. Faff (2001) tests the model in Australian stock market by using shelf index and finds the results supportive of the model. Gaunt(2004) tests the validity of the Fama-French model and the CAPM on the Australian Stock Exchange. He finds that Fama and French three-factor model provides a better explanation of Australian stock returns than the CAPM. P. H. Chou et al. (2012) investigate the explanatory capabilities of three competing multi-factor models when examining various asset-pricing anomalies using Japanese data. The three models considered are Fama-French's (1993) three-factor model, Ferguson and Shockley's (2003) three-factor model, and Liu's (2006) liquidity-augmented two-factor model. The sample consists of monthly returns of common stocks listed on the Tokyo Stock Exchange (TSE) from January 1975 to December 2006. They mainly follow methodology proposed by Brennan, Chordia, and Subrahmanyam (1998). They identified several findings that are different from the U.S. market. Unlike the U.S. evidence where size, book-to-market (BM), and momentum are the major determinants of stock returns, the study finds significant BM and turnover premiums in the Japanese market for 1978-2006. The sub-period analysis reveals that turnover and low price effects are major determinants of stock returns for 1978-1990, whereas the BM premium is significant only for 1991-2006. The small-firm effect is surpassed by the low-price and turnover effects. Also, the low-price and turnover effects for 1978-1990 cannot be explained by any of three asset-pricing models, whereas the BM effect for 1991-2006 is well explained by a conditional version of the Fama-French three-factor model. The results suggest that the explanatory ability of different firm characteristics may have different roots and that among the three competing asset-pricing models, Fama-French model comes out to be the best model that describes stock returns. James Foye, Dušan Mramor, and Marko Pahor(2013) apply Fama-French three factor model to the Eastern European (EE) countries that joined the European Union (EU) in 2004. They replicate the portfolio ranking methodology of Fama and French (1993). However they use weekly returns which represent a departure from the methodology of Fama and French (1993) who use monthly returns. They find that the market value of equity component of Fama-French (1993) factor model performs poorly for stocks listed on the stock market of the EE EU nations. However, beta and Book equity-to-market equity ratio have significant explanatory power on returns. They propose to replace the market value of equity factor of the standard Fama-French model with Net Income/Cash Flow from Operations (NI/CFO) yields. They show that the results are more statistically significant when NI/CFO yields were incorporated into factor models than when ME was used.

In the Indian context, Connor and Sehgal (2003) provide empirical evidence in favor of the Fama-French three-factor model. Kumar and Sehgal (2004) find a strong size effect and a weak value effect for the Indian stock market. Their data comprised of adjusted month-end share prices for 364 companies from July 1989 to March 1999. Mohanty (2001), using data from 3270 companies over a period from September 1991 to March 2000, reports a negative relation between size and average stock returns. He also reports that size and market risk premiums capture most of the cross-sectional variation in stock returns when Fama-French three-factor model is used. Bhavna Bahl (2006) examines the Fama-French three-factor model of stock returns along with its variants, including the one-factor CAPM for 79 stocks listed on the BSE-100 stock market index for India and finds that factor portfolios that explain the returns are the market factor, size factor (SMB) and value factor (HML). The study concludes that the three-factor model fairs better in explaining the cross-section of returns in the portfolios than its variants and the CAPM. Yash Pal Taneja (2010) examines the CAPM and the Fama-French three-factor model by taking a sample of 187 companies for a study period of five years, ranging from June 2004 to June 2009. The study concludes that efficiency of Fama-French Model, for being a good predictor, cannot be ignored in India but either of the two factors (size and value) might improve the model.

In this article, we re-examine the relation between average returns and firm characteristics i.e. size and value. We also re-visit the single-factor market model and the Fama-French model for the Indian stock market using data for a longer time-period i.e. from 1993 to 2013.

Data and Methodology

Our study examines monthly data on common stocks listed on the BSE-500 index from September 1993 to September 2013. The number of firms covered significantly increases from 1993 to 2013. The minimum and a maximum number of firms covered during any one-year period are 187 (1993) and 483 (2013). We further examine the same data for different shorter sub-periods, i.e. two ten-year periods and four five-year periods. Share prices and accounting data are from the Prowess database published by the CMIE. The risk free rate is computed using the 91-days Treasury bill rate. The 91-days T-bill rate is sourced from the Reserve Bank of India's weekly auction data. The implicit yields have been converted to monthly rates. Return on BSE Sensex is taken as a proxy for market return. The risk free rate (Rf) is deducted from the return of the market portfolio to obtain the market risk premium. Following regression models are run for the six portfolios, that is, S/L, S/M, S/H, B/L, B/M, and B/H:

$$(R_{p,t}) - R_f = \alpha_{p,t} + \beta_p(R_{mt} - R_f) + \varepsilon_{pt}$$

The above market model says that the expected return on a portfolio in excess of the risk free rate is explained by the sensitivity of its return to the excess return on a broad market portfolio.

$$(R_{p,t}) - R_f = \alpha_{p,t} + \beta_p(R_{mt} - R_f) + s_p\,(SMB) + h_p\,(HML) + \varepsilon_{pt}$$

The above Fama-French three-factor model says that the expected return on a portfolio in excess of the risk free rate is explained by the sensitivity of its return to three factors: (i) the excess return on a broad market portfolio, (ii) the difference between the return on a portfolio of small stocks and the return on a portfolio of large stocks (SMB) and (iii) the difference between the return on a portfolio of high-book-to-market stocks and the return on a portfolio of low-book-to-market stocks (HML).

The size and value sorted portfolios

We sort stocks on size (market capitalization or market cap) and the ratio of book equity to market equity (B/M). The explanatory returns in our study are for portfolios constructed from 2 x 3 sorts on the size and B/M. At the end of September of each year *t* from 1993 to 2013, all sample stocks are ranked on the basis of size. The median sample size is then used to split the sample companies into two groups: small (S) and big (B). The sample stocks are broken into three B/M groups based on the breakpoints for the bottom 30% (low), middle 40% (medium), and top 30% (high) of the ranked values of B/M for the sample stocks.

We construct six portfolios (S/L, S/M, S/H, B/L, B/M, B/H) from the intersection of the two size and three B/M groups. For example, S/L portfolio contains stocks that are in the small size group and also in the low B/M group while B/H consists of big size stocks that also have high B/M ratios. We compute monthly equally-weighted returns for each of the six portfolios from October of year *t* to September of *t* + 1, and the portfolios are reformed in October of each year.

The factor portfolios

The Fama-French model involves the use of three factors for explaining common stock returns: the market factor (market index return minus risk free rate) proposed by the CAPM, and factors related to size and value. We have discussed the market factor earlier in this section. The other two factors i.e. size and value factors are constructed following Fama and French (1993). SMB (small minus big) is meant to mimic the risk factor in returns related to size. SMB is the difference, each month, between the simple average of the returns on the three small-stock portfolios (S/L, S/M, S/H) and the simple average of the returns on the three big-stock portfolios (B/L, B/M, B/H). Thus, SMB is the difference between the average returns on small and big stock portfolios. HML (high minus low) is meant to mimic the risk factor in returns related to value. HML is the difference, each month, between the simple average of the returns on the two high-BE/ME portfolios (S/H and B/H) and the average of the returns on the two low-BE/ME portfolios (S/L and B/L).

Tests of the CAPM and the Fama-French three-factor model

Descriptive statistics

Table 1 shows the descriptive statistics on the portfolio returns of the six size and value sorted portfolios and the three-factor portfolio returns for the period 1993-2013. The pattern is similar to what is reported in other markets. The results report a negative relation between size and average return, and a positive relation between average return and value irrespective of size. As shown in Table 1, all sample monthly means are positive and range from 0.79% (B/L) to 4.28% (S/H). Small value portfolios display highest return of 4.28% per month and big growth portfolios exhibit the lowest return of 0.79% per month. The spread in the value portfolios is 1.91% and 0.64% in small and big stock portfolios respectively. The average monthly (a) market return is 1.11%, (b) SMB return is 1.97% and (c) HML return is 1.27%. A finding of positive average return is consistent with the view that investors are compensated with a positive premium for bearing factor risk. The portfolio returns have fairly high volatility, for example, S/H has 12.80%. Considering the SD of the six portfolios, it is observed that the small stocks are more volatile than the large stocks, while the returns on the small stocks are higher than those of the large stocks. All the portfolios have some positive skewness and positive kurtosis.

Table 1. Summary statistics on the portfolio returns (October 1993- September 2013, 240 observations)

Portfolio	Mean	SD	Skewness	Kurtosis
SL	0.0237	0.0919	2.3371	0.4344
SM	0.0228	0.0936	1.7337	0.4441
SH	0.0428	0.1280	7.5396	1.8161
BL	0.0079	0.0800	2.7630	-0.0640
BM	0.0080	0.0891	2.9394	0.2733
BH	0.0143	0.1058	1.5699	0.5087
SMB	0.0197	0.0460	11.6906	2.2318
HML	0.0127	0.0617	6.5833	1.5628
Rm	0.0111	0.0754	0.5110	0.0455
Rf	0.0062	0.0018	0.2042	0.4726
Rm-Rf	0.0049	0.0757	0.5122	0.0490

Table 2 presents the sample correlation across all variables. Overall, the six portfolio returns show a higher correlation with the MKT than with SMB or HML. The SMB (HML) shows a higher correlation with small (high-BM) stocks than with large (low-BM) stocks.

Table 2. Correlations between portfolios

	sl-Rf	sm-Rf	sh-Rf	bl-Rf	bm-Rf	bh-Rf	Rm-Rf	SMB	HML
Rm-Rf	0.7768	0.7683	0.5328	0.8809	0.9049	0.7989	1.0000	-0.1754	0.0879
SMB	0.2523	0.2423	0.5866	-0.0761	-0.0628	-0.0466	-0.1754	1.0000	0.4311
HML	0.1047	0.3274	0.7017	0.0641	0.1990	0.4523	0.0879	0.4311	1.0000

Four different combinations of the market, size, and value portfolios are considered, i.e., (a) Market model or the CAPM (b) Market model with SMB factor (c) Market model with HML factor (d) Fama-French three-factor model (1993). For a model to be a better descriptor of stock return patterns, its intercept terms for all the test portfolios should be indistinguishable from zero. GRS (1989) statistic which tests the joint significance of all intercepts should not be significant for an ideal model. GRS test rejects all the models except the FF.

Empirical Results

Regression results for the period 1993-2013

In Table 3, the market model results report that average R2 is 62%. All beta estimates are significant suggesting that the market risk premium is important in explaining returns.

The estimates on the intercept terms are now examined. If the single-factor model fully explained the returns on the portfolios, then the intercepts should not be significantly different from zero (Black et al., 1972). Results indicate that three out of six intercept terms are statistically different from zero. In particular, B/L and B/M portfolios exhibit a negative alpha, indicating that these portfolios do not earn a return consistent with their beta risk. To formally test whether all the intercepts are jointly equal to zero, the GRS-statistic is calculated. The results indicate that this statistics is statistically significant, indicating that we should reject the null that all intercepts are jointly equal to zero. When the market model is used along with the SMB and HML, R2 increases to 75 % and 73% respectively. Based on intercepts the model is rejected in two out of six instances in case of market and SMB, and in the case of market and HML, the model is rejected in four out of six cases. GRS test also rejects both the models. Finally, Fama-French regression results reject the model in three instances on the basis of the intercept. However, we are unable to reject the FF model on the basis of GRS statistic with p-value of 0.095. The three factors jointly explain 81% of the variations in average returns over time which is a substantial increase over the market model which had an average R2 of 62%.

We observe that the market factor, beta estimates are highly significant and are close to or greater than one for all portfolios for all the models studied indicating that exposure to the market risk premium is extremely important in explaining variation in returns.

We now turn to the estimate of s, which captures the amount each portfolio loads onto the SMB factor. In the case of market and SMB, the s coefficient is positive and significant for the three small stock portfolios. The s coefficient for the big portfolios is diminishing when compared with the three small stock portfolios. However, they are positive and significant.

In the case of market and HML, the h coefficient increases monotonically for the three small stock portfolios and is significant. It is interesting to note that the h coefficient is negative for the B/L portfolio, but becomes positive and significant for the B/M and B/H portfolios.

In the case of the FF model, the s coefficient is positive and significant for the three small stock portfolios. The s coefficient for the big portfolios is diminishing when compared with the three small stock portfolios. The s coefficient for the B/M and B/H portfolios is not statistically significant and is negative for the B/H portfolio. Since small firms have higher slopes and load positively on SMB, we deduct that small firms are riskier than big firms.

The influence of the HML factor on portfolio returns also demonstrates a regular pattern related to changes in book-to-market ratios. Firstly, portfolios belonging to low BE/ME ratio have negative loadings on the HML factor. Secondly, the loading increases as average book-to-market ratios increase, leading to a strong positive and significant factor loading for the value portfolios. The positive HML slopes of high book-to-market equity firms raise their variances and imply higher average returns. This result demonstrates that HML possesses explanatory power. These results are consistent with international studies on the three-factor model (Gaunt, 2012; Fama and French, 1993, 1996, 1998) that observe that small and high book-to-market equity firms have positive slope on SMB and HML respectively, while big and low book-to-market equity firms have diminishing positive or negative slopes on SMB and HML.

Table3. Regressions of size and book-to-market equity sorted portfolio excess returns on combinations of the market, size and value portfolios.HAC (Newey-West) adjusted t-values are also given. The Gibbons et al. (1989) (GRS) test statistic testing whether αp = 0, is also reported. (sample period 1993-2013).

Explanatory variable	Dependent variable	α	β	s	h	t(α)	t(β)	t(s)	t(h)	R^2
MKT	S/L	0.013	0.947	—	—	3.137	15.374	—	—	0.603
	S/M	0.012	0.954	—	—	2.639	13.994	—	—	0.590
	S/H	0.032	0.903	—	—	4.420	8.244	—	—	0.284
	B/L	-0.003	0.934	—	—	-1.056	17.471	—	—	0.776
	B/M	-0.003	1.070	—	—	-1.264	21.042	—	—	0.819
	B/H	0.003	1.121	—	—	0.562	18.274	—	—	0.638
	GRS statistic		*10.145*			*P value*		*Less than 0.01*		
MKT+SMB	S/L	-0.003	1.033	0.804	—	-1.018	22.389	6.102	—	0.759
	S/M	-0.004	1.039	0.795	—	-1.105	18.920	5.853	—	0.737
	S/H	-0.007	1.112	1.957	—	-1.553	12.609	9.229	—	0.761
	B/L	-0.006	0.949	0.141	—	-2.086	17.694	2.622	—	0.782
	B/M	-0.007	1.090	0.192	—	-2.715	22.011	3.420	—	0.828
	B/H	-0.002	1.144	0.223	—	-0.363	18.152	1.980	—	0.647
	GRS statistic		*2.152*			*P value*		*0.049*		
MKT+HML	S/L	0.012	0.943	—	0.055	2.902	14.890	—	0.641	0.605
	S/M	0.007	0.926	—	0.400	1.777	14.999	—	5.161	0.658
	S/H	0.015	0.805	—	1.374	3.327	10.139	—	8.099	0.716
	B/L	-0.003	0.935	—	-0.017	-0.996	17.339	—	-0.427	0.776
	B/M	-0.006	1.057	—	0.175	-2.306	22.277	—	4.630	0.833
	B/H	-0.006	1.073	—	0.664	-2.055	22.224	—	5.217	0.785
	GRS statistic		*7.885*			*P value*		*Less than 0.01*		
MKT+SMB+HML	S/L	-0.003	1.070	0.972	-0.271	-1.090	23.517	9.034	-3.376	0.785
	S/M	-0.004	1.016	0.692	0.167	-1.113	19.322	5.336	1.849	0.746
	S/H	-0.007	0.987	1.399	0.904	-2.566	17.157	15.416	18.174	0.909
	B/L	-0.006	0.960	0.191	-0.082	-2.146	17.185	2.633	-1.677	0.785
	B/M	-0.007	1.071	0.107	0.139	-2.769	23.107	1.515	2.980	0.835
	B/H	-0.002	1.042	-0.236	0.743	-0.475	21.310	-1.665	6.808	0.793
	GRS statistic		*1.825*			*P value*		*0.095*		

Table 4. Comparative results of the variant models with factor portfolios

Portfolio	GRS	P value	Av. |α|	Av. R^2
MKT	10.145	<0.01	0.011	0.618
MKT+SMB	2.152	0.049	0.004	0.752
MKT+HML	7.885	<0.01	0.008	0.729
MKT+SMB+HML	1.825	0.095	0.004	0.809

Table 4 exhibits the comparative results of different combinations of market, size and value factors. Results based on GRS are similar to that of Connor and Sehgal (2003) for the CAPM and the FF. The model that performs best is the FF model as it has the lowest GRS statistic and the strongest rejection is found to be in the case of a market model with the highest GRS statistic. Baring FF model, all the models stand rejected with their GRS statistics coming out to be significant. FF model can't be rejected as the p-value of its GRS statistic is 0.095. Based on mean absolute alphas, the FF model outperforms the CAPM as the latter has greater mean absolute alpha. The average model fit is best in the case of FF model.

Now Table 5 presents the results of the CAPM and the FF model applied separately for the up and down market periods (entire sample period was divided in up and down market periods). CAPM alphas are larger than FF alphas in both the market scenarios. In both, the market scenarios CAPM is rejected in two out of six instances as reported by the t-ratio of their intercepts. FF model can't be rejected as all FF intercepts are found to be insignificant in both up and down markets. Beta coefficient is significant and is close to or greater than one for all six portfolios for both the models and in both the market cases. In the case of upmarket, the s coefficient is positive and significant for the three small stock portfolios. The s coefficient for the B/L portfolio is significant and is not significant for the B/M and B/H portfolios. In the case of down market, the s coefficient is positive and significant for the three small stock portfolios. The s coefficient for the three big portfolios is diminishing when compared with the three small stock and is positive for the B/L and B/M portfolios. The s coefficient for the B/H portfolio is negative but significant. Talking about h coefficient, in the case of upmarket, it is negative and significant for the S/L portfolio. The h coefficient becomes positive and significant for the S/M and S/H portfolios. The h coefficient is negative and not significant for the B/L portfolio but becomes positive and significant for the B/M and B/H portfolios. The positive HML slopes of high book-to-market equity firms raise their return variances and imply higher average returns. In the case of down market, the h coefficient is negative for the S/L portfolio but becomes positive for the S/M and S/H portfolios. Similarly, it is negative for the B/L portfolio but becomes positive for the B/M and B/H portfolios, suggesting that high book-to-market equity firms have positive loadings on the HML.

Hence, our multifactor model findings are consistent with those of FF (1996) who observe that low book-to-market equity firms have diminishing positive or negative slopes and high book-to-market equity firms have higher slopes on the HML.

Table 6 presents the summarized results of the CAPM and the FF model applied separately for the up and down market periods (entire sample period was divided in up and down market periods). As suggested by mean absolute alpha, three-factor model performs better than the CAPM in upmarket as well as down market. Lowest mean absolute alpha is found for the FF model in down market. GRS rejects the CAPM in upmarket while in rest of the instances the models can't be rejected based on GRS. In case of CAPM average R2 for the six portfolios is 0.356 and 0.462 in up and down markets respectively which implies that the beta variable explains only 35.6 % and 46.2 % of the variation in the cross-section of average stock returns for up and down markets respectively. In summary, our tests of the traditional CAPM show that other factors in addition to the beta variable may help explain the variation in average stock returns. When size and value factors are added to the model, average R2 increases to 0.684 and 0.701 for the six portfolios in up and down markets respectively. Hence, our findings clearly

Table5. Regression results for the Up and Down markets

Panel A: Upmarket										
Explanatory variable	**Dependent variable**	**α**	**β**	**s**	**h**	**t(α)**	**t(β)**	**t(s)**	**t(h)**	**R^2**
MKT	S/L	0.024	0.810	—	—	2.224	4.736	—	—	0.268
	S/M	0.022	0.814	—	—	1.850	4.052	—	—	0.257
	S/H	0.044	0.725	—	—	2.734	3.218	—	—	0.118
	B/L	-0.001	0.877	—	—	-0.102	9.311	—	—	0.524
	B/M	-0.004	1.055	—	—	-0.437	7.721	—	—	0.584
	B/H	0.005	1.086	—	—	0.466	7.160	—	—	0.383
	GRS statistic		*5.124*			*P value*		*Less than 0.01*		
MKT+SMB+HML	S/L	-0.009	1.095	1.211	-0.243	-1.017	9.096	8.641	-2.815	0.666
	S/M	-0.012	1.021	1.014	0.309	-1.278	7.883	8.675	4.360	0.675
	S/H	-0.007	0.960	1.307	0.913	-0.919	10.359	12.511	13.098	0.841
	B/L	-0.007	0.929	0.221	-0.052	-0.887	10.048	2.241	-0.763	0.547
	B/M	-0.012	1.081	0.185	0.240	-1.395	8.686	1.641	3.616	0.657
	B/H	-0.009	1.064	0.125	0.791	-0.989	8.817	0.875	9.257	0.717
	GRS statistic		*0.766*			*P value*		*0.598*		
Panel B: Downmarket										
Explanatory variable	**Dependent variable**	**α**	**β**	**s**	**h**	**t(α)**	**t(β)**	**t(s)**	**t(h)**	**R^2**
MKT	S/L	0.011	0.959	—	—	1.605	9.233	—	—	0.417
	S/M	0.013	1.012	—	—	2.006	12.370	—	—	0.425
	S/H	0.040	1.061	—	—	2.349	4.782	—	—	0.130
	B/L	0.009	1.101	—	—	1.400	11.224	—	—	0.663
	B/M	0.003	1.160	—	—	0.571	15.191	—	—	0.719
	B/H	0.006	1.171	—	—	0.583	11.621	—	—	0.415
	GRS statistic		*1.105*			*P value*		*0.344*		
MKT+SMB+HML	S/L	0.002	1.081	0.761	-0.245	0.319	12.490	5.351	-1.964	0.636
	S/M	0.005	1.069	0.473	0.076	0.781	12.504	3.076	0.565	0.573
	S/H	0.005	1.188	1.508	0.861	0.774	10.476	13.958	12.047	0.927
	B/L	0.007	1.136	0.191	-0.116	1.078	10.531	2.115	-1.642	0.680
	B/M	0.001	1.172	0.107	0.029	0.201	14.071	1.494	0.560	0.730
	B/H	0.004	1.030	-0.556	0.778	0.543	11.819	-2.854	4.383	0.660
	GRS statistic		*0.178*			*P value*		*0.982*		

suggest that the multifactor model explains the variation in average stock returns better than the traditional CAPM. Based on all these criteria, both the models perform better in down markets and FF is definitely better than the CAPM.

Table 6. Summarized results of the Market model and the FF model in Up and Down markets

Portfolios	Up Market		Down Market	
	CAPM α (t-ratio)	FF α (t-ratio)	CAPM α (t-ratio)	FF α (t-ratio)
S/L	0.024 (2.224)	-0.009 (-1.017)	0.011 (1.605)	0.002 (0.319)
S/M	0.022 (1.850)	-0.012 (-1.278)	0.013 (2.006)	0.005 (0.781)
S/H	0.044 (2.734)	-0.007 (-0.919)	0.040 (2.349)	0.005 (0.774)
B/L	-0.001 (-0.102)	-0.007 (-0.887)	0.009 (1.400)	0.007 (1.078)
B/M	-0.004 (-0.437)	-0.012 (-1.395)	0.003 (0.571)	0.001 (0.201)
B/H	0.005 (0.466)	-0.009 (-0.989)	0.006 (0.583)	0.004 (0.543)
Av. |α|	0.016	0.009	0.014	0.004
GRS (p value)	5.124 (<0.01)	0.766 (0.598)	1.105 (0.344)	0.178 (0.982)
Av. R^2	0.356	0.684	0.462	0.701

Table 7 presents intercepts and other performance criteria of the CAPM and the FF model for the two sub-periods (1993-2003 and 2003-2013). CAPM intercepts are larger than the FF intercepts in both the sub-periods. Based on alphas it is only in case of FF model in the first sub-period that all the intercepts are insignificant. Average absolute alpha is also lowest for the FF model in the first sub-period. Average absolute alphas for the CAPM in both the sub-periods are equal. GRS statistic also fails to reject the FF model in the first sub-period. The best average model fit is 84.4% for the FF model in second sun-period. So, the three-factor model is definitely better than the CAPM although its performance is better in the first sub-period.

Table 7. Comparative results of the Market model and the FF model in 2 sub-periods of 10 years each

Portfolios	1993-2003		2003-2013	
	CAPM α (t-ratio)	FF α (t-ratio)	CAPM α (t-ratio)	FF α (t-ratio)
S/L	0.013 (1.883)	-0.002 (-0.529)	0.012 (2.594)	-0.005 (-0.989)
S/M	0.010 (1.387)	-0.005 (-1.040)	0.012 (2.329)	-0.003 (-0.541)
S/H	0.033 (2.855)	-0.004 (-1.025)	0.029 (3.541)	-0.011 (-3.092)
B/L	-0.002 (-0.510)	-0.004 (-1.065)	-0.005 (-1.532)	-0.008 (-2.284)
B/M	-0.002 (-0.506)	-0.006 (-1.476)	-0.005 (-1.956)	-0.009 (-2.579)
B/H	0.004 (0.481)	-0.002 (-0.422)	0.000 (0.070)	-0.001 (-0.220)
Av. |α|	0.011	0.004	0.011	0.006
GRS (p value)	3.662 (0.002)	0.747 (0.613)	7.427 (< 0.01)	2.171 (0.051)
Av. R^2	0.547	0.778	0.697	0.844

Table 8 reports alphas and other necessary performance indicators of the CAPM and the FF model for the four sub-periods (1993-1998, 1998-2003, 2003-2008 and 2008-2013). In first sub-period based on alphas, CAPM is rejected in two out of six cases while FF model is rejected in four out of six cases. Mean absolute alpha is also lower in the case of CAPM. But GRS and average model fit results are in favor of FF model than that of CAPM. In the second sub-period FF model clearly, has better results than CAPM. All alphas of the FF model are insignificant while three out of six CAPM alphas are significant that means the model is rejected in three out of six instances. Mean absolute alpha of FF model is also lower at 0.003 as opposed to the CAPM mean absolute alpha of 0.020. GRS statistic also can't reject the FF model as its p-value is not significant. Average R2 is also greater in the case of the FF model. In the third sub-period both the models are rejected. Fourth sub-period results are similar to that of the second sub-period. So, to conclude we can say that the FF model clearly is a better model than the CAPM.

Table 8. Comparative results of the Market model and the FF model in 4 sub-periods of 5 years each

Portfolios	1993-1998		1998-2003		2003-2008		2008-2013	
	CAPM α (t-ratio)	FF α (t-ratio)	CAPM α (t-ratio)	FF α (t-ratio)	CAPM α (t-ratio)	FF α (t-ratio)	CAPM α (t-ratio)	FF α (t-ratio)
S/L	0.005 (0.476)	-0.012(-2.683)	0.020 (2.465)	0.005 (0.776)	0.012 (1.528)	-0.014(-2.467)	0.013 (2.384)	0.000 (-0.066)
S/M	-0.002(-0.244)	-0.016(-3.274)	0.023 (2.587)	0.001 (0.084)	0.014 (1.589)	-0.018(-3.731)	0.012 (2.262)	0.007 (1.620)
S/H	0.018 (1.080)	-0.002(-0.445)	0.046 (3.785)	-0.003(-0.528)	0.030 (2.889)	-0.015(-2.714)	0.030 (2.288)	-0.004(-0.838)
B/L	-0.001(-0.132)	-0.004(-0.754)	-0.004(-0.649)	-0.003(-0.493)	-0.010(-2.714)	-0.017(-3.209)	0.001 (0.176)	0.000 (-0.003)
B/M	-0.010(-2.431)	-0.013(-3.729)	0.005 (0.681)	0.000 (-0.008)	-0.005(-1.579)	-0.015(-3.638)	-0.005(-1.043)	-0.001(-0.278)
B/H	-0.014(-2.311)	-0.014(-2.571)	0.021 (1.838)	0.006 (0.825)	0.008 (0.795)	-0.015(-2.669)	-0.005(-0.809)	0.004 (0.924)
Av. |α|	0.008	0.010	0.020	0.003	0.013	0.016	0.011	0.003
GRS (p value)	3.316 (< 0.01)	2.218 (0.056)	4.525 (< 0.01)	0.477 (0.822)	6.779 (< 0.01)	3.081 (.012)	4.134 (< 0.01)	0.725 (0.631)
Av. R^2	0.570	0.836	0.559	0.742	0.648	0.881	0.757	0.868

Conclusion

Our findings suggest that small and high book-to-market equity firms generate higher returns than big and low book-to-market equity firms respectively for the Indian market investigated in this paper. Since small and high book-to-market equity firms outperform big and low book-to-market equity firms we propose that such firms carry a risk premium. Therefore, mean-variance efficient investors should be able to achieve higher returns by simply shifting their portfolios in favor of these characteristics. The results clearly indicate the presence of size effect and value effect and suggest that the premium is a compensation for the risk that is not captured by the market model. The findings indicate that the CAPM is misspecified, as the null hypothesis of joint significance of intercepts is rejected for the CAPM. However, GRS statistic can't reject the FF model. Also, the FF model performs better than the CAPM based on average absolute alpha and average R2. When the entire sample period is divided into up and down markets and CAPM and FF model are applied separately on the two market scenarios, the performance of both the models is better in the case of down market as compared to that of upmarket and FF model clearly comes out to be a better performer than the CAPM. Sub-period results also find that the FF model is better than the CAPM.

References

Bahl B (2006), “Testing the Fama and French three-factor model and its variants for the Indian stock returns”. Available at www.ssrn.com, Dated October 20, 2007, pp.1-34.

Banz R (1981), “The relationship between return and market value of common stocks”, Journal of Financial Economics, Vol. 9, pp. 3–18.

Basu S (1977), “The investment performance of common stocks in relation to their prices to earnings ratios: A test of the efficient market hypothesis”, Journal of Finance, Vol. 32, pp. 663–683.

Brailsford T, Gaunt C and O'Brien M A (2012), “Size and book-to-market factors in Australia”, Australian Journal of Management, Vol. 37, pp. 261-281.

Chan L K C, Hamao Y and Lakonishok J (1991), “ Fundamentals and stock returns in Japan”, Journal of Finance, Vol. 46, pp. 1739–1764.

Chou P H, Ko K C, Kuo S T and Lin S J (2012), “Firm characteristics, alternative factors, and asset-pricing anomalies: evidence from Japan”, Quantitative Finance, Vol. 12, pp. 369-382.

Connor G and Sehgal S (2003), "Test of the Fama and French Model in India," Decision, 30.2, pp. 1-19.

Faff R (2001) “An examination of the Fama and French three-factor model using commercially available factors”, Australian Journal of Management, Vol. 26, pp. 1-17.

Fama E and French K (1992), “The cross-section of expected stock returns”, The Journal of Finance, Vol. XLVII, pp. 427-465.

Fama E and French K (1993), “Common risk factors in the returns on stocks and bonds”, Journal of Financial Economics, Vol. 33, pp. 3-56.

Fama E and French K (1995), “Size and book-to-market factors in earnings and returns”, The Journal of Finance, Vol. L, pp. 131-155.

Fama E and French K (1996), “Multifactor explanations of asset pricing anomalies”, Journal of Finance, Vol. 5, pp. 55-84.

Fama E and French K (1998), “Value versus growth: the international evidence”, Journal of Finance, Vol. 53, pp. 1975–1999.

Foye J, Mramor D and Pahor M (2013), "A respecified Fama-French three-factor model for the new European Union member states", Journal of International Financial Management and Accounting, pp. 1-24.

Gaunt C (2004), "Size and book to market effects and the Fama-French three-factor asset pricing model: Evidence from Australian Stock Market", Accounting and Finance, Vol. 44, pp. 27-44.

Gharghori P, Chan H and Faff R (2007a), "Are the Fama-French factors proxying default risk", Australian Journal of Management, Vol. 32, pp. 223–250.

Kumar M and Sehgal S (2004), "Company Characteristics and Common Stock Returns: The Indian Experience", Vision-The Journal of Business Perspective, July-December, pp. 33-45.

Lakonishok J, Shleifer A and Vishny R W (1994), "Contrarian Investment, Extrapolation, and Risk", Journal of Finance, Vol. 49, pp. 1541–1578.

Lintner J (1965), "The valuation of risk assets and the selection of risky investments in stock portfolios and capital budgets", Review of Economics and Statistics, Vol. 47, pp. 12-37.

Mohanty P (2001), "Efficiency of the Market for Small Stocks", available at www.nseindia.com, Dated March 7, 2006.

Sharpe W (1964), "Capital asset prices: A theory of market equilibrium under conditions of risk", Journal of Finance, Vol. 19, pp. 425-442.

Taneja Y P (2010), "Revisiting Fama-French Three-Factor Model in Indian Stock Market", The Journal of Business Perspective, Vol. 14, pp. 268-274.