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Factor Premiums : Evidence from the Indian Equity Market[1]

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Abstract

This paper empirically evaluates a six-factor asset pricing model in the Indian equity market. The study intends to highlight the existing factor premiums along with the relative performance of the prominent multi-factor asset pricing models. Employing portfolio methodology (Fama & French, 1993; 2015), the study examines a balanced cross-sectional data belonging to the 646 Indian listed firms for a duration from July 2002 to March 2018. Further, the study documents the presence of strong size, market, and profitability premiums in the average returns. While the value, momentum, and investment factors are found redundant in the Indian equity market. Albeit, the GRS test rejects all the different compositions of tested models connoting that no model is competent to explain the returns absolutely. However, the study recommends a nested composition of profitability factor (RMW), market factor (Rm-Rf), size factor (SMB), and the value factor (HML), for a better cross-sectional explanation in the Indian equity market.

I. Introduction

THE MULTI-FACTOR EXPLANATION of asset prices has always been the most debated issue in asset pricing research (Fama and French, 2017). Though many models have already been proposed, others are in the process of offering a better explanation of cross-sectional dispersion in the return forecast. Since the criticism of the capital asset pricing model (Blacket al., 1972; Black, 1972; Merton, 1973; and Ross,1976) and the existence of different highlighted anomalies (Basu's Earnings-price ratios, 1977; Stattman, 1980; Banz's Size effect, 1981; Rosenbergand Lanstein's B/M Ratio, 1984; and the reversal effect by De Bondt and Thaler, 1985) pave the way for the multi-factor explanation of the asset prices, the researchers have tried to establish a relationship between the different characteristics of stocks and their

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The results of our study highlight different cross-sectional effects in the Indian equity market, on the one hand, where it guides investors to understand the prevailing risk premiums in the market. That can help them to formulate effective investment and trading strategies in accordance to the market environment that can fetch better returns. On the other hand, these existing cross-sectional effects demonstrate market inefficiency, which needs to take care of by the concerned authorities. So an economy can concoct more efficient market environment for sustainable investment, which is essential for the development of a better financial system.

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Annexure

Table A1 presents regression results for the six Size-B/M portfolios, where panel A of the table reports intercept terms and their t-statistics for the three-factor model (Fama& French, 1993). Panel B of the Table shows intercept terms for the four-factor model of Carhart (1997). While the panel C documents intercept of the five-factor model (Fama& French, 2015). Furthermore, panel D reports intercept terms and slopes for all the factors of the six-factor model along with their t-statistics.

Table A1
Regressions results for the six value-weighted Size-B/M portfolios.

Panel A:Three-factor intercepts: RM-RF, SMB, and HML						
		α			**t(α)**	
SIZE/BM	**H**	**N**	**L**	**H**	**N**	**L**
B	0.59	0.28	0.47	1.77	1.16	4.88
S	0.43	0.56	0.82	2.82	2.30	3.83
Panel B: Four-factor intercepts: RM-RF, SMB, HMLO, and WIMLO						
B	0.81	0.37	0.47	2.37	1.45	4.79
S	0.36	0.44	0.62	1.67	1.77	3.15
Panel C: Five-factor intercepts: RM-RF, SMB, HMLO, RMW, and CMAO						
B	0.91	0.47	0.49	2.54	1.89	5.16
S	0.49	0.53	0.57	2.40	2.29	2.90
Panel D: Six-factor intercepts and coefficients: RM-RF, SMB, HMLO, WIMLOO, RMW, & CMAO						
B	0.93	0.47	0.49	2.77	1.92	5.14
S	0.49	0.53	0.56	2.39	2.28	2.89
		β			**t(β)**	
SIZE/BM	**H**	**N**	**L**	**H**	**N**	**L**
B	0.90	1.09	0.98	17.71	29.43	68.63
S	1.08	0.96	0.97	34.95	27.43	32.71
		s			**t(s)**	
B	0.34	0.16	0.05	2.90	1.92	1.48
S	1.25	1.06	0.98	17.63	13.16	14.40
		h			**t(h)**	
B	1.42	0.50	0.01	13.12	6.30	0.38
S	0.66	0.33	0.04	10.03	4.45	0.60
		w			**t(w)**	
B	-0.43	-0.11	0.02	-4.92	-1.70	0.80
S	0.03	0.01	0.02	0.55	0.22	0.39
		r			**t(r)**	
B	-0.27	-0.23	-0.03	-2.67	-3.12	-1.08
S	-0.27	-0.20	0.12	-4.42	-2.89	1.98
		c			**t(c)**	
B	0.21	0.20	0.14	1.94	2.55	4.56
S	0.22	0.35	0.10	3.38	4.77	1.68

Note: Table A1 presents regression intercepts and slopes of the coefficients for 6 value-weighted Size B/M portfolios from August 2002 to March 2018 for 188 months. The initial alphabets of respective quantiles highlight the intersections of resultant portfolios.

Source: Self Computed

Intercept values reported in the different panels of Table A1 are positive and significant, which shows that no model offers a complete explanation of cross-sectional variation. However, panel A report intercepts values for the three-factor model that is a little smaller than other tested models. This shows the three-factor model can provide a better explanation of cross-sectional variation in the size B/M sorted portfolios. Moreover, except panel A intercepts demonstrated in the other panels of Table A1 present almost similar performance of respective models, which indicates the inclusion of additional factors into the composition of the multi-factor model does not show any enhanced performance.

The first sub-panel of Panel D presents intercept values for the six-factor model, other than that all other six sub-panels of the panel are showing coefficient values for the other six factors mentioned in the six-factor model. The second sub-panel of panel D presents beta values for the market factor (R_m-R_f), significant slopes are found positive and almost equal to one for all the six portfolios. Thus, this reveals the persistence of a positive market effect in the cross-sectional average returns. The presented positive significant size coefficients in the third sub-panel reveal the existence of size effect in the cross-sectional average returns. However, the documented higher slope values for small size stocks show a strong persistence of size effect in these stocks. However, it is found comparative lower in the big size stocks.

The fourth sub-table of Panel D shows coefficient values for the orthogonally formed value factor (HMLO). Portfolios, except the lower B/M quantile, show higher positive significant coefficients. At the same time, coefficients documented for the low B/M portfolios are almost zero and insignificant. Thereby, presented results manifest the existence of a positive value effect in the average returns.

The fifth sub-table of Panel D is showing coefficients values for the profitability factor (RMW), where most of the coefficient values are showing a negative effect. In the same manner, the sixth sub-table of Panel D is showing coefficient values for the orthogonally formed investment factor (CMAO). The coefficient values show the positive values for the respective coefficients with the corresponding significant t-statistics. The result manifests a positive effect of investment factor in explaining cross-sectional variation in the size B/M sorted portfolios. That seems specific to this set of portfolios only.

Table A2 presents the regression results for the six size-investment portfolios. The different panels offer coefficient values relative to the different models, as presented in the other regression Tables.

Table A2
Regressions results for the six value-weighted Size-Investment portfolios.

Panel A:Three-factor intercepts : RM-RF, SMB, and HML						
		α			**t(α)**	
SIZE/INV	**A**	**N**	**C**	**A**	**N**	**C**
B	0.19	0.34	0.50	0.76	2.16	3.35
S	0.65	0.66	0.56	1.98	2.01	3.67
Panel B: Four-factor intercepts: RM-RF, SMB, HMLO, and WIMLO						
B	0.13	0.35	0.54	0.49	2.20	3.57
S	0.39	0.52	0.46	1.41	1.59	2.52
Panel C: Five-factor intercepts: RM-RF, SMB, HMLO, RMW, and CMAO						
B	0.16	0.40	0.56	0.67	2.67	3.89
S	0.33	0.63	0.52	1.64	2.05	3.24
Panel D: Six-factor intercepts and coefficients: RM-RF, SMB, HMLO, WIMLOO, RMW, and CMAO						
B	0.15	0.40	0.56	0.65	2.66	3.90
S	0.33	0.63	0.52	1.65	2.06	3.23
		β			**t(β)**	
SIZE/INV	**A**	**N**	**C**	**A**	**N**	**C**
B	0.97	0.94	1.01	27.45	41.95	46.82
S	1.04	0.88	1.03	34.12	18.99	42.62
		s			**t(s)**	
B	0.42	0.09	0.02	5.19	1.83	0.33
S	1.40	1.11	1.02	19.91	10.42	18.31
		h			**t(h)**	
B	0.01	0.12	0.19	0.08	2.51	4.21
S	0.32	0.20	0.32	4.89	2.06	6.15
		w			**t(w)**	
B	0.11	0.01	-0.04	1.86	0.33	-0.99
S	-0.05	-0.05	0.02	-0.93	-0.62	0.50
		r			**t(r)**	
B	-0.05	-0.10	-0.04	-0.70	-2.32	-0.98
S	0.12	-0.25	-0.14	1.93	-2.66	-2.81
		c			**t(c)**	
B	-0.56	0.24	0.23	-7.43	5.09	5.02
S	-0.81	0.47	0.35	-12.60	4.81	6.91

Note: Table A2 presents regression intercepts and slopes of the coefficients for six value-weighted Size Investment portfolios from August 2002 to March 2018 for 188 months. The initial alphabets of respective quantiles highlight the intersections of resultant portfolios.

Source: Self Computed

Regression intercepts presented in the different panels of Table A2 show the lowest values among all other regression tables relative to different bivariate sorted portfolios. Panel A presents the results for the three-factor model and reports that all the intercept values are positive and significant. The significant intercept values indicate that cross-sectional variation available in the average excess return is not explained entirely for any portfolio mentioned in panel A. While panel B of the Table presents intercept values and their respective t-statistics for the four-factor model. Similar to panel A, intercepts presented in panel B are also positive and significant though their values are lower than all other

model intercepts shown in the Table. That shows the four-factor model can explain maximum cross-sectional variation in the average excess return for the bivariate sorted size investment portfolios.

The five-factor model, which is believed to have a better explanation of cross-sectional average returns, is not outperforming here. The results shown in panel C presents intercepts relative to the five-factor model, which are higher than the four-factor model and present positive significance.

Panel D presents results for the six-factor model; this model includes an additional (Momentum) factor into the five-factor model. However, the presented intercept values are not able to match the variation explained by the four-factor model. The model produced higher intercept values and left scope for a more nested composition of prominent factors that can explain better cross-sectional variation. The second sub-panel of the six-factor model presents coefficient values of market factor, given beta values are positive and significant, which claims to have a premium to bear the additional market risk. The fourth sub-panel relative to the B/M factor also presents positive and significant coefficients and hence documents a value effect in the average returns of size investment bivariate sorted portfolios. Similar to the other regression tables, the fifth sub-panel related to the momentum factor also present very small and insignificant coefficients. These coefficients are non-distinguishable from zero and hence convey no momentum effect in the cross-sectional average returns.

The sixth sub-panel related to the profitability shows both the negative and positive kinds of coefficients. Thus it does not show any clear sign of the relationship between the investment effect and the average returns. Moreover, most of the coefficients are close to zero, and some of them are insignificant, which makes the relation ambiguous.

The last sub-panel of the Table belongs to the regression results of the investment factor, where the aggressive investment and size sorted portfolios exhibit negative coefficients, in contrast to the rest of the portfolios, which are presenting positive coefficients. Thus, we can conclude that there is a negative investment effect in the aggressive investment stocks and a positive effect in the neutral and conservative investment stocks. This bi-directional investment effect is unique to the size and investment portfolios only. At the same time, the other tables have observed a positive effect in the same panel for the considered set of portfolios.

Regression results documented in Table A3 belong to the six size and momentum portfolios. Although the regression intercept values presented by all the panels are not very different from each other, however, the intercepts shown by the four-factor model in panel B are lowest among all. The presented results show a relative outperformance of the four-factor model. However, all the intercepts are found positive significant and highlight the scope of the better composition of the nested factor.

Table A3
Regressions results for the six value-weighted Size-Momentum portfolios.

Panel A:Three-factor intercepts: RM-RF, SMB, and HML						
		α			**t(α)**	
SIZE/MOM	**W**	**N**	**L**	**W**	**N**	**L**
B	0.61	0.33	0.50	2.98	1.96	1.65
S	0.77	0.66	0.24	3.09	3.10	0.82
Panel B: Four-factor intercepts: RM-RF, SMB, HMLO, and WIMLO						
B	0.54	0.41	0.62	3.18	2.55	2.53
S	0.52	0.54	0.21	2.59	2.58	0.84
Panel C: Five-factor intercepts: RM-RF, SMB, HMLO, RMW, and CMAO						
B	0.60	0.41	0.65	2.89	2.36	2.14
S	0.54	0.57	0.28	2.23	2.66	1.00
Panel D: Six-factor intercepts and coefficients: RM-RF, SMB, HMLO, WIMLOO, RMW, & CMAO						
B	0.58	0.43	0.69	3.48	2.68	2.87
S	0.51	0.57	0.31	2.67	2.73	1.29
		β			**t(β)**	
SIZE/MOM	**W**	**N**	**L**	**W**	**N**	**L**
B	1.07	0.97	0.95	42.67	40.28	26.23
S	1.03	0.94	1.02	35.86	29.42	28.19
		s			**t(s)**	
B	0.13	0.08	0.40	2.33	1.46	4.84
S	1.15	0.96	1.27	17.40	13.10	15.20
		h			**t(h)**	
B	0.11	0.29	0.20	2.07	5.69	2.59
S	0.42	0.08	0.48	6.78	1.19	6.17

(*Contd....*)

Table A3 (*Continued*)

		w			**t(w)**	
B	0.44	-0.26	-0.67	10.23	-6.19	-10.68
S	0.52	-0.13	-0.53	10.44	-2.44	-8.55
		r			**t(r)**	
B	-0.09	-0.04	-0.14	-1.74	-0.83	-1.97
S	0.01	-0.08	-0.22	0.26	-1.27	-3.07
		c			**t(c)**	
B	0.17	0.14	0.26	3.29	2.74	3.37
S	0.28	0.04	0.25	4.66	0.65	3.33

Note: Table A3 presents regression intercepts and slopes of the coefficients for six value-weighted Size Momentum portfolios from August 2002 to March 2018 for 188 months. The initial alphabets of respective quantiles highlight the intersections of resultant portfolios.

Source: Self Computed

The next noteworthy explanation belongs to Panel D. It shows the regression results related to the six-factor model along with their significance level. All the reported intercept values are positive and significant, like others presented in the Table. The positive significant beta values given in the second sub-panel of panel D establish a positive relationship between the average returns and the market factor. The third sub-panel presents a positive significant size effect in the average returns, which is found stronger in the intersections of small size and momentum portfolios. Based on the positive significant coefficients produced for B/M factor, the fourth sub-panel presents a significant positive value effect in the average returns. The fifth sub-panel presents a bi-directional relationship between the momentum effect and the average returns. The resultant portfolios made by the intersections of winner momentum quantile and the size sorted stocks present positive significant coefficients. In contrast, the rest of the portfolios shows negative but significant coefficients. Hence, it confirms the presence of a positive momentum effect, but it is limited to only winner quantile portfolios, while others show a negative tilt.

The sixth sub-panel of panel D presents coefficients for the profitability factor. The coefficients reported in the sub-panel manifest a negative profitability tilt. Although, most of the coefficient values are insignificant, however, their values show a negative inclination towards the profitability sorted stocks. In the same manner, the last sub-panel of the Table presents investment coefficient values. All the presented values are positive and significant though these values are smaller; however, their positive inclination establishes a positive relationship between the investment sorted stocks, size, and momentum sorted portfolios.