Applicability of Fama and French (2015) Five Factor Model in Sri Lanka

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***Abstract*—** Fama and French (2015) introduced a five-factor model to better explain the stock return variations. The model has been tested in many stock markets and contradicting findings have been reported. Nevertheless, the model has not been tested in Sri Lanka to predict the stock returns. Therefore, the present study attempts to test the validity of Fama and French (2015) five factor model in Sri Lanka. The study employs Newey and West (1987) weighted average least square regression model for thirty portfolios constructed on profitability and investment for three different sample period from June 2009 to December 2018. The results are robust to alternative profitability and investment measures and the findings suggest that return on assets and total asset growth best represent profitability and investment respectively in Sri Lanka. The presence of value is observed for different profitability and investment sorts while the existence of market risk premium is robust throughout the sample period. It could be concluded that Fama and French (2015) five factor model could be used to explain the cross-sectional variation of stock returns in Sri Lanka. Nevertheless, size, profitability and investment are not significant for any of the portfolios and it is similar to the findings of Fama and French (2017) for Japan and Asia Pacific portfolios. It is also evident from the R2 value that there could be many other factors that have not been captured by FF5 model that would explain the stock return variation in Sri Lankan context.

***Keywords*—** Fama and French five factor model, risk factors, stock returns, Colombo Stock Exchange.

INTRODUCTION

Asset pricing models have evolved from CAPM, a single factor model to several multifactor models. It is continuously argued that the market beta alone is not sufficient to explain the cross-sectional variation of expected returns. The search for a better asset pricing model was amplified during 1990s and resulted in multifactor models: Fama and French (1993) three factor model and Carhart (1997) four factor model.

Mehta and Chander (2010) empirically testing the three-factor model reveal that the three-factor model given by Fama and French (1993) is more powerful in explaining the variability in the returns. Nanayakkara (2012), Randeniya and Wijerathna (2012) and Riyath and Nimal (2016) studied the three-factor model and found supportive evidences in the CSE. Empirical studies pointing out a strong profitability and investment effects in assets returns (Hou, Xue & Zhang, 2015; Novy-Marx, 2013; Titman, Wei & Xie, 2004) suggest that variation in average returns triggered by profitability and investment is left unexplained by the three-factor model of Fama and French. Later studies found additional factors that exhibited a strong relationship with average returns. Novy-Marx (2013) finds that firms with high profitability generate significantly higher returns than unprofitable firms. In the wake of these findings, Fama and French (2015) published a study expanding the three-factor model with two additional factors: profitability and investment. Fama and French (2015) five factor model with profitability and investment empirically proved to be outperforming in explaining stock returns and resulting in less pricing errors in few other economies (El Abd, 2017; Fama & French, 2015; Nguyen, Ulku & Zhang, 2015).

Fama and French (2017) find evidence that the five-factor model performs better in North America and Europe. Their findings also suggest that Japanese stock returns have little relation to new factors. Comparing the three factors, four factor and five factor models on twenty-three developed stock markets, they find strong evidence for the five factor model in North America, Europe, and global market. However, the results show that profitability and investment factors merely do not exist in Japan and Asia Pacific portfolios. They further conclude that with inclusion of the two new factors, the value factor becomes redundant in North America, Europe, and Global portfolios, but not in the Asia Pacific region and this emphasises that the country level test for the model is important. In the context of Sri Lanka, validity of the CAPM and Fama and French three factor models have been empirically tested and contradictory results have been reported (Randeniya & Wijerathna, 2012; Riyath & Nimal, 2016; Thilakarathne & Jayasinghe, 2014; Samarakoon, 1997). The five-factor model yet to be tested in Sri Lanka to predict the stock returns. The applicability five factor model in explaining the cross-sectional variation of stock returns has not been tested in Sri Lanka. Given this gap, this study attempts to apply the Fama and French (2015) five factor

model in CSE to examine whether the risk factors incorporated in five factor model better explain the variation in stock returns in Sri Lanka. The study also uses alternative proxies for profitability and investment to construct portfolios to see which alternative measure(s) is more suitable in Sri Lanka to construct test assets.

RESEARCH OBJECTIVES

The study investigates the validity of the Fama and French five factor model five thereby examining the effects of five risk factors viz., market, size, value, profitability, investment, on stock return in CSE. Therefore, the study addresses the following research questions:

1. To identify suitable proxies for investment and profitability to form portfolios in Sri Lanka.
2. To investigate whether the portfolios constructed on profitability and investment generate significant abnormal returns to investors in Colombo Stock Exchange after controlling the risk factors.

LITERATURE REVIEW

Fama and French (2015) introduce a five-factor model incorporating profitability and investment factor to their three-factor model in responding to the later findings in the asset pricing literature. Several empirical studies point out the strong profitability and investment effects in assets returns (e.g. Chen & Novy-Marx, 2011; Hou, Xue & Zhang, 2015; Titman, Wei & Xie, 2004).

There were many evidences that average stock returns are related to the book to market equity ratio, and it was also apparent that profitability and investment add to the description of average returns provided by book to market value. Therefore, the combined effect of investment and ROE is a good start to understand the big picture of the cross section of expected stock returns (Chen, Novy-Marx & Zhang, 2011). Awaken by these findings, Fama and French decided to expand their model. Fama and French (2015) published a study expanding the three-factor model with two additional factors; profitability and investment. The study finds that the five-factor model performs better than their three-factor model in explaining average returns for the sample.

Testing the model on international markets, Fama and French (2017) find evidence that the five-factor model performs better in North America and Europe but not in Japan. They further conclude that with the inclusion of the two new factors, the value factor becomes redundant in North America, Europe, and Global portfolios, but not in the Asia Pacific region. The new model has been tested in different other markets and found to have validity in predicting the variation in stock returns.

A study by Martinsa and Eid Jr (2015) in Brazilian market show that the Fama and French (2015) five factor model performs better than the three-factor model while revealing that MKT, SMB and HML factors still perform similarly as previous works indicated. Findings of the study by Zheng (2015) in Australia also confirm the power of five factor model in predicting the stock returns. However, the book to market factor is not redundant in Australia as per the conjecture of Fama and French (2015).

Consistent with these findings Chiah, Chai, Zhong and Li (2016) using an extensive sample over the period from 1982 to 2013 investigate the performance of the five-factor model in pricing Australian equities. They find that the five-factor model is able to explain more asset pricing anomalies than a range of competing asset pricing models, which supports the superiority of the five-factor model. They also reveal that the value factor retains its explanatory power in the presence of the investment and profitability factors.

Desban and Jarjir (2016) using monthly data from January 1990 to July 2016 for sample of 1163 firms listed Euronext Stock Exchange market find evidence for the five-factor model. However, in contrast to the original findings of Fama and French (2017) they further state that their study on the French market suggests that SMB portfolio is a redundant factor in the original five factor model.

The applicability of the model has also been witnessed in the emerging markets as well. Shao (2017) confirms that Fama French five factors model performs well in the Chinese A-share market and the Chinese real estate industry from July 2002 to December 2015. He reveals that the excess return of the A-share size book to market (B/M) portfolio can be captured by the market excess return, size and operating profitability factors while the excess return of the real estate industry size B/M portfolio can be captured by the market excess return, size, operating profitability, and investment factors. He further states that the value factor is not helpful in explaining the excess return of A-share size B/M and real estate size B/M portfolio either.

Consistent with this, El Abd (2017) aiming at identifying the determinants of stock returns in the Egyptian stock market by applying four different asset pricing models to the Egyptian stock returns; the CAPM, Fama and French three factor model, Carhart four factor model, and Fama French five factor model, provides

evidence of the superiority of Fama French five factor model to the other asset pricing models tested. Furthermore, a study by Nguyen, Ulku and Zhang (2015) report evidences that the Fama and French five factor model can explain more asset pricing anomalies than traditional CAPM and the three-factor model and show that importance of the value factor is not lessened by inclusion of the profitability and investment factors in the Vietnamese stock market. However, the model has been rejected by several scholars. For example, Foye (2018) tests the model in 18 emerging markets divided into three regions: Asia, Eastern Europe and Latin America. Though he finds the five-factor model offering an improved explanation of stock returns in Eastern Europe and Latin America, the model yields disappointing results from the Asian sample and offers no improvement over the traditional three factor model. Accordingly, he concludes that a profitability or investment premium cannot be distinguished in the Asian factors and the five factor model fails to provide a better explanation of stock returns in the region. Racicot and Rentz (2016) rejected the model using monthly observations from January 1968 through December 2014 stating only market factor is significant at even the 5% level using a GMM approach. Kursenko (2017) proved that the five-factor model is invalid in US market in which the model was developed but using a small sized sample. Kubota and Takehara (2017) in Japan stated that five factor model is not the best benchmark pricing model and this is consistent with the international test of Fama and French (2017).

Empirical Model and Variable Specification

The main objective of the study is to empirically test the validity of Fama and French (2015) Five factor model to identify the most appropriate model to explain the variation of stock returns in Sri Lankan stock market. In order to carry out the test, the following empirical models are used.

Fama and French five factor model:

$$R_{pt} - R_{ft} = \alpha_p + b_p\, MKT_t + s_p\,(SMB_t) + h_p\,(HML_t) + r_p(RMW_t) + c_p(\mathrm{CMA}_t) + \varepsilon_{pt}$$

Where;

- R_{pt} is the return on portfolio p for period t;
- R_{ft} risk free rate in period t;

SMB_t (small minus big), HML_t (high minus low), RMW_t (robust minus weak) and CMA_t (conservative minus aggressive) are the factor mimicking portfolios for size, value, profitability and investment of Sri Lankan equities;

MKT_t is the excess returns on Sri Lankan stock market portfolio? The following table 1 summarises the variable specification.

Table 1: *Variable Specification*

Variable	Measurement	Source
Dependent Variable		
Excess Portfolio Return	Return on Portfolio – Treasury bill rate	Fama and French (1993: 2015)
Independent Variables		
Excess Market Portfolio Return	ASPI – Treasury Bill rate	Shaker and Elgiziry (2014)
Size	Market capitalization	Fama and French (1993; 2015)
Book-to-Market Equity	Book-to-market equity ratio	Fama and French (1993; 2015)
Profitability	Return on equity ratio	Fama and French (1993; 2015) and Chiah et al. (2016)
Investment	Asset growth ratio	Cooper, Grulen and Chill (2008); Gray and Johnoson (2011); Fama and French (1993; 2015)

Sampling and Data

The sample of the study consists of 181 companies listed on CSE. These companies represent 19 sectors. The sample excludes Banking, Finance and insurance sector companies since high leverage firm do not have the same meaning as for non-financial firms (Fama & French, 1993). The sample is limited to 181 companies listed on CSE. The sample period is limited to 115 months due to the lack of availability of the data. The sample period is from 2009 June to December 2018.

Data Analysis

Newey and West (1987) heteroscedasticity and autocorrelation consistent weighted least square approach for the portfolios since the most of the regression model fails to meet the assumptions of the heteroscedasticity and autocorrelation. The Newy and West (1987) t test and the F test are used to determine significance of the coefficient estimates. They provide a measure of the accuracy of the significance of independent variable's impact on dependent variable. Individual impact of independent variables is

examined using t tests. On the other hand, collective significance of the impact of independent variables is tested using the F test. In addition, the study closely follows the Fama and French (2015) method in the construction of test assets and calculation of asset pricing factors. This enhances the comparability of results between the current study and existing studies in the field.

Construction of the Test Assets

In investigating the explanatory power of the Fama and French (2015) five factor model, size and book to market, size and profitability, size and investment portfolios are constructed independently, consistent with the Fama and French (1993; 2015). Considering the empirical nature of the current study and the absence of theory to guide the factor constructions, the study has closely followed the empirical design of previous studies in order to enhance the comparability. To construct the size, book to market, profitability, and investment factors, the methodology outlined in Fama and French (1993; 2015) has been closely followed.

FINDINGS AND DISCUSSION

Profitability sorted portfolio

The study tests fifteen profitability portfolios for a period of 115 months from June 2009 to December 2018. The stocks are grouped into five profitability sorts based on the level of profitability. Three different proxies for profitability are used for this purpose. Return on equity, return on assets and net profit margin are used to measure the profitability of the companies. Table 2 presents the factor loadings, t value, adjusted R squared value and F statistic of Fama and French (2015) five factor model. The results indicate that the market risk premium is positive and significant at 1 percent in 13 portfolios and the other two portfolios generate significant returns at 5 percent and 10 percent significance level.

This is similar to the finding of Thilakerathne and Jayasinghe (2014); Sooriyakumar, Sivanathan and Kandeepan (2015) and Nanayakkara (2012). However, the result contradicts with the finding of Samarakoon (1997) who revealed a negative insignificant beta in CSE and many other researchers in other economies for example, Adedokun and Olakojo (2012); Alqisie and Alqurran (2016); Bhatnagar and Ramlogan (2012); Paul and Asarebea (2013); and Shamim, Abid and Shaikh (2014).

The size factor found to have a positive relationship with the excess portfolio returns of highly profitable stock. However, the effect becomes negative with lower profitable stocks. This trend could be noticed on profitable portfolios sorted using all three proxies. Nevertheless, the factor is not significant in any of the portfolios.

Factor loadings for HML are negative for ROE sorted portfolios and positive for ROA and NPM sorted profitability portfolios. The effect is insignificant in all the portfolios except for one. HML found to be negative and significant for a high and a low profitable portfolio sorted on ROE at 10 percent significance level. The negative effect is consistent with the previous finding in Sri Lanka by Shafana, Rimziya and Jariya (2013) and against the findings of Rosenberg, Reid and Lanstein (1985) who find a positive relationship between the average return and the ratio of a firm's book value to market equity. The profitability factor RMW reports negative factor loadings for ROE sorted portfolios and positive for ROA and NPM sorted portfolios. The effect is significant only for a High NPM portfolio at 10 percent significance level. CMA has negative factor loadings and insignificant for all the portfolios at 5 percent significance level. The study uses return on equity, return on assets and net profit margin as measure of profitability to construct test assets. As per the adjusted R squared values reported, it is the return on assets better represents the profitability since four out of five sorts recorded highest adjusted R squared values when sorted.

Investment sorted portfolios during whole sample period

Table 3 presents the result for five factor model for investment sorted portfolios respectively for the period from June 2009 to December 2018. The adjusted R squared value for total asset growth sorted investment portfolios are high for all five investment sorts compared to the other proxies. This indicates that the total asset growth is the most suitable proxy to measure investment in sorting the portfolios. The F statistics presented in the table reveal that models consist of Fama and French (2015) five factors is able to explain the cross-sectional variation of stock returns in CSE. This is further validated by the adjusted R squared values. However, the five factors cannot completely explain cross sectional variation of average returns as per the reported R squared values. The market risk premium is positive and significant for the all the portfolios at 1 percent significance level. SMB and HML factors are positive while factor loadings on CMA is negative.

This factor loading on CMA is significant at 5 percent significance level. RMW is negative for TAG sorts and positive for NCG and WCG sorts. SMB is the weakest factors that influence the cross-sectional variation in stock returns of the investment sorted portfolios.

This reveals that the size effect disappears when the profitability and investment added to the explanation and this is consistent with the findings of Fama and French (2015). The profitability factor is positive and significant for high investment portfolios at 5 percent significance level in the case working capital sorts.

The findings are consistent with Duo et al. (2012); Novy-Marx (2013) in the international context and Wijesundera et al. (2015) and Menike, Dunusinghe and Ranasinghe (2015) in the Sri Lanka.

Table 2: *Five Factor Model for Profitability Sorted Portfolios - June 2009 to December 2018*

	ROE					**ROA**					**NPM**				
	High	2	3	4	Low	High	2	3	4	Low	High	2	3	4	Low
C	0.01 (0.20)	-0.04 (-0.84)	-0.01 (-0.28)	-0.02 (-0.50)	-0.03 (-0.70)	0.02 (0.54)	0.01 (0.60)	0.00 (0.12)	-0.00 (-0.11)	0.00 (0.12)	0.00 (0.32)	0.01 (-0.41)	0.00 (-0.06)	0.00 (0.02)	0.00 (-0.14)
DMKT	0.88*** (6.74)	0.70** (2.16)	0.81*** (5.90)	0.74*** (5.18)	0.72*** (5.66)	0.85*** (9.02)	0.66*** (5.30)	0.87*** (13.17)	0.77*** (8.10)	0.76*** (7.38)	0.67*** (4.56)	0.35* (1.80)	0.59*** (4.41)	0.57*** (3.63)	0.57*** (4.43)
SMB	2.23 (0.98)	3.81 (0.47)	-1.25 (-0.64)	-2.09 (-0.75)	-0.37 (-0.09)	2.80 (0.95)	3.78 (1.51)	2.93 (1.32)	-1.12 (-0.30)	-0.81 (-0.21)	3.43 (1.04)	-0.013 (0.00)	-0.93 (-0.17)	-3.42 (-0.50)	-0.55 (-0.11)
HML	4.44 (0.91)	-16.36* (-1.68)	-0.87 (-0.16)	-0.57 (-0.09)	-7.46* (-1.76)	4.03 (1.00)	1.21 (0.39)	3.36 (0.94)	5.23 (0.94)	5.84 (1.12)	0.17 (0.04)	-6.54 (-1.29)	0.56 (0.10)	3.92 (0.43)	-0.32 (-0.06)
RMW	-0.45 (-0.04)	-9.64 (-1.00)	-6.10 (-1.00)	-1.00 (-0.15)	-0.12 (-0.02)	-3.38 (-0.18)	6.20 (0.59)	10.24 (1.03)	6.53 (0.66)	10.79 (1.10)	12.13* (2.00)	2.60 (0.36)	6.39 (0.98)	4.63 (0.65)	4.36 (0.65)
CMA	-10.72 (-1.27)	2.46 (0.24)	-3.53 (-0.47)	-1.39 (-0.31)	4.43 (0.77)	-14.12 (-1.26)	-4.73 (-0.61)	3.87 (0.71)	1.00 (0.14)	-0.85 (-0.12)	-3.77 (-0.76)	-8.71 (-1.23)	-7.00 (-1.05)	-9.46 (-1.50)	-6.84 (-0.98)
Adj. R2	0.311	0.107	0.205	0.144	0.292	0.209	0.311	0.643	0.396	0.491	0.351	0.063	0.298	0.109	0.231
F-Statistic	11.19***	3.71**	6.81**	4.78***	10.32***	7.00***	11.24***	41.79***	15.86***	22.80***	13.26***	2.52**	10.632***	3.78***	7.817***

Note: Total number observation is 114. At the end of June each year t, stocks are distributed into five profitability groups using sample 20th, 40th , 60th and 80th percentile breakpoints based on return on equity, return on assets and net profit margin. C is the intercept. DMK is the first difference of average monthly return on ASPI in excess of the risk free rate. SMB is the difference between the average monthly returns on the two small and the two big size portfolios. HML is the difference between the average monthly returns on the two high B/M and the low B/M portfolios. RMW factor is the return difference between the average returns on the high (robust) profitability portfolios and the average returns on the low (weak) profitability portfolios. CMA factor is the return difference between the average returns on the conservative investment portfolios and the average returns on the aggressive investment portfolios. Newey-West t-statistic is given in parentheses. *, **, and **** denote statistical significance of the coefficients at the 10%, 5% and 1% significance level, respectively.

Table 3: *Five Factor Model for Investment Sorted Portfolios - June 2009 to December 2018*

	TAG					**NCG**					**WCG**				
	High	2	3	4	Low	High	2	3	4	Low	High	2	3	4	Low
C	0.02 (0.51)	0.02 (0.53)	0.01 (0.42)	0.02 (0.60)	0.02 (0.54)	-0.00 (-0.07)	0.01 (0.40)	-0.01 (-0.25)	0.01 (0.25)	0.01 (0.40)	0.01 (0.43)	0.01 (0.43)	0.01 (0.47)	0.01 (0.31)	0.00 (0.05)
DMKT	0.98*** (18.17)	0.98*** (18.84)	0.95*** (16.03)	0.90*** (17.20)	0.96*** (16.53)	0.71*** (5.15)	0.82*** (9.75)	0.73*** (6.68)	0.75*** (8.91)	0.85*** (10.12)	0.71*** (5.48)	0.71*** (5.47)	0.71*** (5.97)	0.66*** (4.93)	0.69*** (5.25)
SMB	0.42 (0.40)	0.70 (0.64)	0.17 (0.16)	1.21 (0.90)	0.87 (0.87)	-0.84 (-0.21)	0.50 (0.13)	1.12 (0.41)	3.50 (1.52)	3.20 (1.39)	4.05 (1.24)	4.20 (1.26)	4.29 (1.35)	2.94 (0.75)	0.15 (0.02)
HML	4.10 (1.09)	4.05 (1.07)	3.19 (0.81)	3.59 (0.99)	4.06 (1.08)	4.31 (0.73)	6.40 (1.27)	1.20 (0.29)	2.29 (0.69)	3.65 (1.12)	0.08 (0.02)	0.09 (0.02)	-0.16 (-0.04)	0.44 (0.11)	-0.32 (-0.05)
RMW	-3.89 (-0.70)	-3.67 (-0.63)	-5.20 (-0.88)	-5.41 (-0.95)	-4.36 (-0.72)	10.15 (1.022)	11.50 (1.17)	10.55 (1.06)	10.92 (1.12)	12.78 (1.30)	13.83* (2.54)	13.87** (2.61)	9.59 (1.56)	9.90* (1.72)	6.85 (0.93)
CMA	-8.37 (-1.56)	-8.02 (-1.46)	-8.97 (-1.60)	-12.82 (-1.61)	-8.66 (-1.51)	-0.03 (-0.00)	-0.93 (-0.143)	1.24 (0.19)	-1.94 (-0.26)	1.34 (0.23)	-3.92 (-0.90)	-3.58 (-0.83)	-6.81 (-1.24)	-4.24 (-0.87)	-17.01 (-1.23)
Adj. R2	0.652	0.641	0.597	0.611	0.672	0.241	0.497	0.347	0.449	0.636)	0.490	0.484	0.433	0.396	0.095
F-Statistic	43.52***	41.47***	34.53***	36.60***	47.43***	8.20***	23.41***	13.03***	19.46***	40.55***	22.78***	22.26***	18.30***	15.85***	3.38***

Note: Total number observation is 114. At the end of June each year t, stocks are distributed into five investment groups using sample 20th, 40th, 60th and 80th percentile breakpoints based on based on the growth rate in total assets, noncurrent assets and working capital. C is the intercept. DMK is the first difference of average monthly return on ASPI in excess of the risk free rate. SMB is the difference between the average monthly returns on the two small and the two big size portfolios. HML is the difference between the average monthly returns on the two high B/M and the low B/M portfolios. RMW factor is the return difference between the average returns on the high (robust) profitability portfolios and the average returns on the low (weak) profitability portfolios. CMA factor is the return difference between the average returns on the conservative investment portfolios and the average returns on the aggressive investment portfolios. Newey-West t-statistic is given in parentheses. *, **, and **** denote statistical significance of the coefficients at the 10%, 5% and 1% significance level, respectively.

CONCLUSION

The empirical results reveal that the Fama and French (2015) five factor model is applicable in Sri Lanka yet none of the risk factors are robust except for marker factor. The study employed Newey and West (1987) weighted least square regression models on sixty investment and profitability sorted portfolios to investigate the applicability of Fama and French (2015) five factor model. It is revealed that the Fama and French (2015) five factor model is valid in Sri Lanka during the study period as the F values is highly significant at 1 percent significance level except for a few occasions. The findings are consistent with Chiah et al. (2016); Desban and Jarjir (2016); El Abd (2017); Nguyen, Ulku and Zhang (2015); Martinsa and Eid Jr (2015); Shao (2017) and Zheng (2015). This adds to the supportive literature on the Fama and French (2015) five factor model in an emerging economy. However, size, profitability and investment do not find to be significant for any of the portfolios and it is similar to the finding of Fama and French (2017) for the Japan and Asia Pacific portfolios. It is also evident from the R2 value that there could be many other factors that have not been captured by FF5 model that would explain the stock return variation in Sri Lankan context.

The current study attempts to identify suitable proxies for asset classification based on profitability and investment. The assets are sorted on return on equity, return on assets and net profit margin for profitability while total assets growth, noncurrent assets growth and working capital growth are used for investment sorts. Adjusted R squared values of the profitability asset sorts reveal that return on assets perform better than return on equity in representing the profitability in Sri Lanka. The adjusted R squared values for return on assets are high and robust compared to the other two proxies in most of profitability portfolios during all three study periods.

A better investment proxy is also a focus of the study. Total asset growth is revealed to be most suitable proxy for investment sorts based on the adjusted R squared values. All the TAG sorted portfolios performed well and robust in explaining the cross-sectional variation of stock returns. The value of F statistics and its significance at 1 percent significance level further validated the regression portfolios based on TAG. The adjusted R squared values are high and more than 50 percent in all the investment sorts based on TAG. This indicates that the cross-sectional variation of investment portfolios is better explained by the five-factor model in Sri Lanka during the study period.

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