



Performance Evaluation of Pakistan's Mutual Fund Industry: Validating Fama French 3 And 5 Factor Model

Ayesha Iraj *

Brekhna Gul †

Muhammad Sohail Alam Khan ‡

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Abstract

In order to evaluate the performance of the mutual fund industry in various financial markets, a wide variety of researches have been conducted, which lead to different results. As the Pakistani mutual fund industry is much younger as compared to the US and UK fund industries and thus limited work has been done to evaluate the Pakistani mutual fund industry. Over the past few years, the industry has shown a phenomenal growth and it makes it worthwhile to study the performance of mutual funds. The aim of this research study is to validate the Fama French 3-Factor Model and Fama French 5-Factor Model. Also, this research attempts to test that which one of the included model performs better than the other so as to check their preferred suitability in measuring and evaluating the mutual fund performance in Pakistan. The monthly data of 323 open ended mutual funds for the period of 2008 to 2018 is analyzed. The GRS model validation test was applied, the results of the test found that the Fama French 5-Factor Model performed much better than the Fama French 3-Factor Model. This research contributes to the body of knowledge by providing academicians and practitioners more knowledge regarding multifactor asset pricing model so as to make better investment decisions.

Key Words: Mutual Funds, Performance Evaluation, Fama French 3- Factor Model, Fama French 5- Factor Model

Introduction

There are a lot of investment avenues available in today's financial market, out of which the mutual funds are considered to be the key instrument by the investors, because this instrument has been acknowledged as the best profitable investment for the small investors across the globe, especially those who don't possess professional knowledge of portfolio management. In Pakistan the first mutual fund was introduced by Investment Corporation of Pakistan (ICP) in 1962. The industry showed the phenomenal growth, and today there are 323 open ended mutual funds listed on the Mutual Fund Association of Pakistan (MUFAP). This tremendous growth of the industry is in itself proof of investors' trust in this instrument, as it is considered safer and less risky investment instrument. It is witnessed that over the years, different tools and measures have been used to evaluate the performance of mutual funds. Previous studies showed that the traditional ratio analysis has been used for the said purpose. After the introduction of [the Sharpe ratio, Sharpe \(1964\)](#) along with [Lintner \(1965\)](#), and [Mossin \(1966\)](#), formally developed the Capital Asset Pricing Model (CAPM) for the performance evaluation of stocks. This model describes the relationship between the risk and the expected return of the securities. This single factor model was extended by Fama and French (1993) with two more factors of size and value. Furthermore, this three-factor model was extended by [Carhart \(1997\)](#) by adding another factor of momentum. [Yi and He \(2016\)](#) found that the value factor of Carhart four factors model can explain the variation of returns of the Chinese mutual funds. [Sundqvist \(2017\)](#) used CAPM and Fama French five-factor model and found that the size, value, and investment factor explain average returns of the Nordic stock market. [Rehman and Baloch \(2016\)](#) size factor and value factor are insignificant in explaining the returns of Pakistani

* PhD Scholar, Institute of Business and Leadership, Abdul Wali Khan University, Mardan, KP, Pakistan.

† Lecturer, Department of Economics, Faculty of Business and Economics, Adul Wali Khan University, Mardan, KP, Pakistan.

‡ Lecturer, Department of Economics, Faculty of Business and Economics, Adul Wali Khan University, Mardan, KP, Pakistan. Email: Sohailalam@awkum.edu.pk

mutual funds. [Faroq \(2018\)](#) used CAPM to evaluate the performance of Pakistan mutual funds and concluded that these funds have higher risk. [Urooj \(2017\)](#) found that the value factor and market factor are significant in explaining the returns of the Pakistan stock market. [Roy and Shinjin \(2018\)](#) found that the Fama French five factors model, along with the sixth human factor can explain returns of US stock. Though these single-factor and multi-factor models have been widely used for the performance evaluation of stocks and funds across the globe very rarely used to evaluate the performance of Pakistan's mutual fund industry enabling the researcher to cover this gap. As the literature is scarce on the studies that use multifactor model especially four factor model to evaluate the mutual funds of Pakistan, on this ground and references, there is a clear research gap which impelled the researcher to conduct the research on Pakistan mutual fund market. Therefore this study attempts to evaluate the performance of Pakistan mutual funds using the multifactor asset pricing model.

This study contributes to the body of knowledge as it takes the multifactor models that are Fama French three factors model and Carhart four factors model as the parameters and dimensions to measure the performance of mutual funds. This study provides more knowledge to the academicians by enriching the literature in the context of developing country mutual fund market, as the previous researches are mostly conducted on the developed countries or on the equity markets of the developing markets. This study will not only enrich the literature but will also help fund managers in better evaluation of mutual funds of Pakistan. This study has significance for both the scholars and the practitioners, particularly those who are engaged in the mutual funds of Pakistan. This study would be important to those who conduct research studies on practicing investment strategies and techniques with the objective of obtaining an optimal return, which is the emerging domain of the research in the business management. The results of this study are beneficial for the decision making. This study aims to examine and evaluate the mutual fund performance of Pakistan by using this modern method of competing models. This research intends to determine which of the included factor of the Fama French three factors model and Carhart four factors model are significant for the performance evaluation of mutual funds. This research has the following research objectives;

- i. To measure and evaluate the competing model i.e., Fama French three-factor model and Fama French five-factor model.
- ii. To determine which of the used model better explains variation in the return of the mutual funds.

The rest of the paper is structured as follows; literature review of the study, followed by the methodology which discusses competing models and data formation, then the data analysis is discussed, and lastly, the conclusion is drawn from the analysis.

Literature Review

Capital Asset pricing theory, known as CAPM, was established by [Sharpe \(1964\)](#), [Lintner \(1965\)](#) and [Mossin \(1966\)](#). [Miller and Nicholas \(1980\)](#) applied regression analysis to test the CAPM and found an inconsistent relationship between the risk and return. Carleson (1970) found that the funds outperform the market return. [Murthi, Choi and Desia \(1997\)](#) investigated the efficiency of the investment funds through Data Envelopment Analysis (DEA) and found that all the mutual funds were approximately mean-variance efficient and performing quite efficiently. [Fama and French \(1993\)](#) developed a three-factor model for evaluating the mutual fund performance and found that the size and value factor of the model explains more variation in the return than the market factor. [Cai, Chan, and Yamada \(1997\)](#) used the same model and found contradicting results than that of [Fama and French \(1993\)](#) results and concluded that the market factor of the model better explains the mutual fund returns than the value and size factor. Carhart (1997) extended the Fama French three factors model with the momentum factor and applied the four factors model for the evaluation of funds and stock portfolios. The researcher found similar results as that of the three-factor model. The fourth factor of momentum also affected the fund returns. He concluded that the funds outperform the market in terms of all four factors. [Otten and Dennis \(1999\)](#) used Carhart's four factors model and found that the small-cap funds were able to add value, and there is a positive relationship between the fund size and the returns of the fund. [Otten and Bams \(2002\)](#) used the same model and found that three-factor factors of market, size, and value results were consistent with the Carhart four factors model but found contrasting results for the momentum factor and concluded the poor performance by the funds. [Kothari and Warner \(2001\)](#) applied Fama French three-factor model as well as the Carhart four

factors model and found that the three-factor model performs better than the CAPM and four factors model does not affect the returns of the funds. [Sap and Tiwari \(2004\)](#) applied Fama and French three factors model and Carhart four factors model and concluded that the momentum factor has significant results and the investors only respond to the large recent returns. Luckoff (2011) evaluated the mutual fund performance using Fama French three factors model and Carhart four factors model and concluded that the past performance is merely an indicator of how the fund will perform in the future. As in Pakistan mutual fund industry is still in its growing phase most of the research have been done using the traditional ratio analysis for performance evaluation, and very few researches have been done where the researcher have applied CAPM or multi-factor model. [Sipra \(2006\)](#) found that mutual funds outperform the market. The same results were found by [Nazir and Nawaz \(2010\)](#). Whereas Saeed (2004) had found that mutual funds underperform than the market. Bhatti, Tanveer and Sial (2015) applied CAPM and found that low return portfolios capture more market variation than high performing portfolios. [Yi and He \(2016\)](#) found insignificant results for the factors of size and momentum factors, whereas the results were significant for the value factor. [Rehman and Baloch \(2016\)](#) applied CAPM and Fama French three-factor model and concluded that the CAPM model is more preferred model for the evaluation of mutual funds of Pakistan, whereas [Kampman \(2011\)](#) in his research study supported the notion that Fama French three-factor model better explains the return variations than that of CAPM. [Sundqvist \(2017\)](#) used CAPM and Fama and French five-factor model to evaluate the Nordic Funds and that the size, value and investment factors explain the average returns of the Nordic funds whereas the profitability factor does not explain the average returns of the mutual funds. [Urooj \(2017\)](#) used the three factor model and found that the market factor and value factor showed significant results, whereas the results for the size factor are insignificant. The literature reveals that the anomalies of size, value and momentum factor are widely used across the globe (Luckoff 2011, Ye & He 2016, [Roy & Shijin 2018](#)). These price anomalies are being used by researchers to evaluate the performance of the stock/equity market of Pakistan ([Rehman & Baloch, 2015](#), [Urooj, 2017](#), [Farooq, 2018](#), [Rasheed, Saood, Allam & Ullah, 2019](#)). The literature also reveals that there is a need to use more competing methods for the performance evaluation of the mutual funds of Pakistan. However there is no evidence that these multi factors model especially the Carhart four factors model is being used to evaluate the performance of mutual funds of Pakistan and it is needed to check whether these price anomalies have significant effect on the return of mutual funds of Pakistan or not. Therefore this research aims to investigate the four factors model along with the three factors model to evaluate the mutual fund performance. This study includes the market, size, value and momentum factor to check which of these included factors have the explanatory power for the variation in the returns of Pakistan mutual funds. This research has the following set of research hypotheses;

- H₀₁:** Fama French three factors model does not evaluate mutual fund performance better than the Fama French five-factor model
- H₁:** Fama French three factors model does evaluate mutual fund performance better than the Fama French five-factor model
- H₀₂:** Fama French five factors model does not evaluate mutual fund performance better than the Fama French three factors
- H₂:** Fama French five factors model does evaluate mutual fund performance better than the Fama French three factors

Research Methodology

This study falls under the quantitative paradigm. The time-series data for all 323 open-ended mutual funds has been collected from the MUFAP for the time period of 2008 to 2018. The monthly data of 323 open-ended mutual funds have been collected from the MUFAP database for the said time period. The T-bills 12-month rate was collected for the said time period and merged with the mutual fund's data. The data of PSE100 Index is calculated for the said time period for calculating the size, value, and momentum. Six portfolio returns were generated in each month, i.e., BL, BM, BH, SL, SM, SH where B stands for big, S stands for small, and L, M, H are for low, medium and high, respectively. After that, ten portfolios of mutual funds are created on the basis of

their cumulative last one year return, where the lowest return mutual funds are placed in portfolio one (P1) and highest return mutual funds are placed in portfolio 10 (P10). Time series regression has been applied.

Research Models

The models used for the analysis are Fama French three factors and Fama French five factors model. These models are discussed as follows;

Fama French Three-Factor Model: It can be stated as;

$$R_i - R_f = \alpha + \beta_1(R_m - R_f) + \beta_2(\text{SMB}) + \beta_3(\text{HML}) + \varepsilon \dots \dots \dots (1)$$

$R_i - R_f$ represents the actual risk premium on the given stock or fund,

$\beta (R_m - R_f)$ represents the expected risk premium,

$\beta_2 (\text{SMB})$ represents the size factor; it is the difference between the return on a portfolio that consist of small-cap funds and those that contain large-cap funds.

$\beta_3 (\text{HML})$ represents the value factor, it is calculated as the difference in the return of a portfolio of high book to market fund and a portfolio of a low book to market fund.

Whereas α is the intercept.

Fama French Five-Factor Model: It can be stated as;

$$R_i - R_f = \alpha + \beta_1(R_m - R_f) + \beta_2(\text{SMB}) + \beta_3(\text{HML}) + \beta_4(\text{RMW}) + \beta_5(\text{CMA}) + \varepsilon \dots \dots \dots (2)$$

$R_i - R_f$ represents the actual risk premium on the given stock or fund,

$\beta(R_m - R_f)$ represents the expected risk premium,

$\beta_2(\text{SMB})$ represents the size factor, it is the difference between the return on a portfolio that consists of small-cap funds and those that contain large-cap funds.

$\beta_3(\text{HML})$ represents the value factor, it is calculated as the difference in the return of a portfolio of high book to market fund and a portfolio of a low book to market fund.

$\beta_4(\text{RMW})$ represents the difference between the returns on diversified portfolios of stocks with robust and weak profitability.

$\beta_5(\text{CMA})$ represents the difference between the returns on diversified portfolios of the stocks of low and high investment firms, which Fama and French called the conservative and aggressive and it is a zero-mean residual.

Whereas, α is the intercept.

Data Analysis and Results

This study attempts to evaluate the performance of mutual funds using single factor and multifactor asset pricing models. Table 1 shows the result of 10 decile portfolios defined and explained by the Fama- French three-factor model. The table indicates the significant results for the portfolio P1, which is the lowest return and for the portfolio P6 to P10, which is portfolios having higher returns as the coefficient of the market factor shows significant value. However the coefficient of SMB i.e., the size factor can explain the returns of portfolios having lower and higher returns but fails to explains the returns of the portfolios which have moderate returns i.e., P2 to P5. Whereas the HML factor i.e., the value factor, has an insignificant coefficient value for almost all portfolios except P2 and P10, thus indicating that the HML factor fails to explain the returns of portfolios but from the results of portfolios P2 and P10 we can say that this factor may have some explanatory power. The intercept has significant value for all the portfolios except P2. The results also indicate significant values for the market factor and size factor for the portfolios having higher returns thus suggesting that the Fama and French three factor model does have some explaining power for the variation in the returns of the mutual fund industry of Pakistan, especially for those which have higher returns than those having lower returns.

Table 1. Portfolio Regressions using Fama & French Three – Factor Model

Vars	rm_rf	SMB	HML	_cons	R ²
rpi1	0.028*** (2.164)	-0.055*** (-2.447)	0.001 (0.038)	0.010*** (8.940)	0.089
rpi2	0.041 (1.222)	-0.164*** (-2.842)	-0.232*** (-3.046)	0.005* (1.770)	0.124
rpi3	0.011 (0.948)	-0.038* (-1.965)	-0.009 (-0.352)	0.008*** (9.077)	0.040
rpi4	-0.002 (-0.208)	-0.015 (-0.814)	-0.020 (-0.818)	0.009*** (10.489)	0.011
rpi5	0.035 (1.631)	-0.063* (-1.686)	-0.041 (-0.836)	0.016*** (8.861)	0.047
rpi6	0.178*** (2.955)	-0.153 (-1.464)	-0.180 (-1.307)	0.033*** (6.653)	0.090
rpi7	0.183*** (4.702)	-0.155*** (-2.293)	-0.038 (-0.428)	0.037*** (11.328)	0.196
rpi8	0.177*** (3.322)	-0.211*** (-2.293)	-0.203* (-1.666)	0.047*** (10.599)	0.130
rpi9	0.173*** (3.225)	-0.198*** (-2.132)	-0.019 (-0.155)	0.055*** (12.285)	0.119
rpi10	0.194*** (3.429)	-0.209*** (-2.131)	-0.290*** (-2.239)	0.059*** (12.432)	0.138

Note. *t*-statistics are in parenthesis; *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Table 2 shows the result of 10 decile portfolios defined and explained by Fama- French five factor model. The result of the market factor is significant for the portfolio having lowest return, i.e., P1 and for those having moderate to highest returns that is portfolios P6 to P10, thus concluding that the market factor of the Fama and French five factor model have the explanatory power in terms of the variation in the mutual fund returns. The table shows that the size factor of the Fama and French five factors model explain the returns of mutual funds of those having lower returns, i.e., P1 to P3, and also for those portfolios which have higher returns, i.e., P7 to P10, as the results are significant. Whereas the size factor fails to explain the returns of those portfolios which have moderate returns. According to the results given in this table, the value factor, i.e., HML has insignificant values for all ten decile portfolios, thus indicating that the value factor of the Fama and French five factor model completely fails to explain the returns of the mutual funds of Pakistan. For the profitability factor i.e., RMW of the Fama and French five-factor model, the results show that this has significant result only for the portfolio of P2 and P6. Thus it is concluded that the profitability factor poorly explains the returns of the mutual funds of Pakistan. The investment factor, i.e., CMA of the Fama and French five-factor model have significant result only for the returns of the portfolio P2, thus indicating that the investment factor of this model can have the explanatory power for those portfolios which have lower returns and cannot explain the returns of the portfolios that have moderate to higher returns. The majority of the results of the Fama and French five factor model have insignificant values, and all the values of the intercept are significant, it can be concluded that this model poorly explains the returns of the mutual funds of Pakistan.

Table 2. Portfolio Regressions using Fama and French Five- Factor Model

Vars	rm_rf	SMB	HTML	RMW	CMA	_cons	R ²
rpi1	0.029*** (2.156)	-0.060*** (-2.597)	0.016 (0.499)	0.035 (1.133)	0.026 (0.752)	0.010*** (8.380)	0.101
rpi2	0.030 (0.936)	-0.203*** (-3.706)	-0.098 (-1.257)	0.192*** (2.607)	0.330*** (3.991)	0.006*** (2.355)	0.245
rpi3	0.012	-0.042***	0.006	0.041	0.020	0.008***	0.061

<i>Vars</i>	<i>rm_rf</i>	<i>SMB</i>	<i>HTML</i>	<i>RMW</i>	<i>CMA</i>	<i>_cons</i>	<i>R</i> ²
	(1.071)	(-2.161)	(0.215)	(1.565)	(0.670)	(8.416)	
rpi4	-0.001	-0.013	-0.026	-0.001	-0.021	0.009***	0.017
	(-0.058)	(-0.704)	(-0.958)	(-0.033)	(-0.741)	(9.638)	
rpi5	0.043*	-0.067*	-0.028	0.082	-0.022	0.015***	0.076
	(1.969)	(-1.769)	(-0.519)	(1.617)	(-0.393)	(7.913)	
rpi6	0.183***	-0.196*	-0.031	0.332***	0.264*	0.033***	0.141
	(3.026)	(-1.889)	(-0.208)	(2.385)	(1.689)	(6.340)	
rpi7	0.194***	-0.157***	-0.031	0.089	-0.051	0.035***	0.207
	(4.850)	(-2.283)	(-0.314)	(0.969)	(-0.495)	(10.302)	
rpi8	0.191***	-0.217***	-0.184	0.134	-0.048	0.045***	0.142
	(3.492)	(-2.311)	(-1.374)	(1.070)	(-0.337)	(9.637)	
rpi9	0.189***	-0.199***	-0.016	0.110	-0.086	0.053***	0.131
	(3.415)	(-2.100)	(-0.121)	(0.864)	(-0.605)	(11.195)	
rpi10	0.203***	-0.211***	-0.280*	0.081	-0.034	0.058***	0.143
	(3.474)	(-2.113)	(-1.958)	(0.603)	(-0.225)	(11.461)	

T-statistics are in parenthesis; *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Table 3. Portfolio Regressions using Carhart - Four Factor Model

<i>Vars</i>	<i>rm_rf</i>	<i>SMB</i>	<i>HML</i>	<i>MOM</i>	<i>_cons</i>	<i>R</i> ²
rpi1	0.016	-0.052***	0.020	0.069***	0.006***	0.179
	(1.198)	(-2.310)	(0.658)	(3.207)	(3.843)	
rpi2	0.028	-0.161***	-0.233***	0.078	0.001	0.144
	(0.782)	(-2.629)	(-2.873)	(1.335)	(0.129)	
rpi3	0.006	-0.040*	-0.002	0.019	0.007***	0.055
	(0.498)	(-1.971)	(-0.084)	(1.002)	(5.165)	
rpi4	-0.021***	0.002	-0.004	0.105***	0.004***	0.310
	(-2.168)	(0.119)	(-0.187)	(6.735)	(3.391)	
rpi5	-0.011	-0.029	-0.005	0.268***	0.002	0.499
	(-0.641)	(-1.012)	(-0.119)	(9.778)	(0.966)	
rpi6	0.046	-0.047	-0.069	0.842***	-0.011***	0.628
	(1.107)	(-0.656)	(-0.730)	(12.362)	(-2.282)	
rpi7	0.106***	-0.110***	0.028	0.472***	0.011***	0.576
	(3.535)	(-2.160)	(0.414)	(9.691)	(3.065)	
rpi8	0.067*	-0.123*	-0.081	0.723***	0.009*	0.615
	(1.735)	(-1.883)	(-0.931)	(11.559)	(1.947)	
rpi9	0.073*	-0.122*	0.105	0.674***	0.019***	0.543
	(1.733)	(-1.698)	(1.106)	(9.837)	(3.837)	
rpi10	0.075***	-0.128***	-0.133	0.796***	0.016***	0.678
	(2.015)	(-2.035)	(-1.603)	(13.220)	(3.564)	

Note. *t*-statistics are in parenthesis; *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Table 3 shows the results of the GRS test. This test has been applied to find out which of the competing models better explain the variation of returns of the Pakistan mutual fund industry. If the intercepts are close to zero, then the model is considered a good model (Rehman & Baloch, 2016). The GRS test results reveal the Fama and French three factor model performs a little better than the CAPM in explaining the variation of returns of the Pakistan mutual fund industry thus rejecting null hypothesis one and accepting alternate hypothesis one. Whereas the GRS result of the Fama French five-factor model reveal that this model slightly better explain the variation of return of the Pakistan mutual fund industry than the Fama French three-factor model as the average adjusted R² value is higher than the R² value of three-factor model the 0.099, also the mean absolute value of five-factor

model is a bit closer to zero than the three-factor model's mean absolute value thus rejecting the null Hypothesis two and accepting alternating hypothesis two.

Table 4. GRS Tests Mean Absolute Intercepts and Returns Dispersions

Factors	GRS_F-test	P-value	Mean Abs. Alpha	Avg. Adj R ²
rm_rf SMB HML	21.377	0.000	0.028	0.064
rm_rf SMB HML RMW CMA	18.206	0.000	0.017	0.099

Discussion and Implications

Multifactor asset pricing models are widely used across the globe for the performance evaluation of stock markets as well as the mutual fund industry. In western countries, the three factors model and four factors model are used by most of the researchers to check whether the factors included in these models have significant results or not. However, in Pakistan, the CAPM has been repeatedly used for the performance evaluation of mutual funds. This study uses the Fama French three factors model and Fama French five factors model to check whether or not the market factor, size factor, value factor, Profitability factor and investment factor have the ability to predict the mutual funds returns. So for this purpose, this research used the last decade's time series data for July 2008 to July 2018 with the help of stata coding. This study used the [Carhart \(1997\)](#) methodology and created ten portfolios of mutual funds on the basis of their cumulative last one year return, where the lowest return mutual funds are placed in portfolio one (P1) and the highest return mutual funds are placed in portfolio 10 (P10). The results of Fama French three factor model revealed that the size factor have some explaining power in terms of variation of the returns of mutual funds, whereas the value factor i.e., HML, fails to capture mutual fund returns. Thus concluding that Fama French three factor model does not significantly explains the returns of the mutual funds of Pakistan especially those that have higher returns. But performs somewhat better than the CAPM as the adjusted R² value is .074 (7.4%) which is slightly more than .047 (4.7%). The finding of this study negates the previous studies, which evidenced that the return variation is concerned with the market factor ([Huiji & Verbeek, 2006](#), [Afza & Rauf, 2009](#), [Nazir & Nawaz, 2010](#), Alam & Qadar, 2015, Sundquist, 2017). Also, this study shows contradicting results that of [Huiji and Verbeek \(2006\)](#), [Kothari and Warmer \(2001\)](#) who found that the variation of return is well captured by size and value factor. The results of four factors model of this study showed that the momentum factor could predict returns of the mutual fund industry. The results are consistent with the previous studies of Jagdeesh and Titman (1993), Anjun, Ijaz and Ahmed (2016), [Khan \(2016\)](#) and [Rasheed, Saood, Alam \(2019\)](#). This study also shows consistent results with that of [Detzel and Weigand \(1998\)](#), [Otten and Dennis \(1999\)](#), [Kothari and Warmer \(2001\)](#), Wermers (2003), which suggested momentum factor explains the variation of the returns of the mutual funds whereas the results of this study negates the results of [Yi and He \(2016\)](#) that suggest that momentum factor does not capture the fund returns. The results of the GRS test reveal that the five-factor model better explains the mutual fund performance than the Fama French three factors model as the adjusted R² value is 0.099 (9.9%), which is more than the adjusted R² value of the three factors model.

Conclusion and Further Research Directions

A mutual fund is an important investment instrument that is trusted across the globe. This research study attempted to evaluate the Pakistan's mutual fund performance by applying the modern method of three competing models, i.e., the Fama French three-factor model and the Fama French five-factor model. Also this study aims to determine which of the applied models better explain the variation in return of mutual funds industry of Pakistan. The monthly data of 323 open-ended mutual funds for the time period of 2008 to 2018 was collected. The CAPM results showed that all the intercepts have significant results, thus indicating that CAPM performs poorly in explaining the variations of the returns of the mutual funds of Pakistan. The results of the Fama French three factor model shows that the size factor have some explain power in terms of variation of the returns of mutual funds, whereas the value factor i.e., HML fails to capture mutual fund returns. Thus concluding that Fama French three-factor model does not significantly explains the returns of the mutual funds of Pakistan

especially those that have higher returns. The results of Carhart four factors model suggest that the market and size factor may sometime explain the return variation of the portfolio, whereas the value factor fails to explain the return variation. The momentum for of this model verily explains the returns of the mutual funds of Pakistan. The GRS test was applied to find out which of the competing model is the best for explaining the returns of the mutual funds of Pakistan. The GRS test results reveal that the Fama French five factor model better captures the return variation of the Pakistan mutual fund industry, as its mean absolute value is closer to zero. In the future along with these factors, the investment and profitability factor may also be included to evaluate the performance of mutual funds. Also, the factors of trading volume and transaction cost along with the human factor may also be included in this model for future research to get the broader picture of the mutual fund industry of Pakistan.

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