Pakistani Mutual Fund Performance: the demonstration of Multifactor Assets Pricing Models

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Abstract

Mutual Funds enable small investors to enjoy benefits of capital market instruments with small amount through professional managers. This study with special focus on Pakistani mutual fund industry tests the suitability of multifactor asset pricing models to the mutual fund performance and verifying the predictability of CAPM as a better estimator as compared to other two multifactor asset pricing models, with a view to capture whether these models justify the results of other emerging markets in Pakistan and whether CAPM outperforms the other two competing models. We collect data of 100 open-end mutual funds for the period 2005 to 2017 from Mutual Fund Association of Pakistan; the risk free rates data from State Bank of Pakistan and Stock data from Pakistan Stock Exchange. The study result has certain implications for the managers of assets management companies as well as useful for the investors in knowing which funds perform better and which kind of funds are ideal for investment.

Introduction

Mutual funds is the investment avenue, which is being preferred by all kind of small investors for the reason of being their investment is managed by the financial specialists, called asset management companies (Rehman and Balooch, 2016). This is the desire of every small investor in the capital market to maximize its return and minimize the risk, for which they prefer investment in mutual fund as a very suitable investment choice. This is a famous proverb in finance that do not put all eggs in a basket, which in the field of finance is termed as the diversification. So, while investment in mutual fund, an investor can achieve the goal of diversification. Mutual fund investment is also very encouraging in the sense that most of the investors do not have ample time to look at the business avenues for them investment in mutual fund is the easiest option in the capital market, where the investment is being looked after by the expert managers. Investing in mutual fund is very easy for those who do not have the sufficient resources and it is hard to invest these resources in any other portfolio, moreover it is also

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accessible for the small investors due to this reason (Rehman and Baloch, 2016). The mutual fund management companies invest the investment of the small investors in different instruments of the markets like bond, stock for the reason of having diversification (Shah and Hijazi, 2005).

The history of Mutual fund started from Netherlands in 1774, followed by North America in 1924 and soon the vehicle of investment got familiar in the whole world. The Pakistan funds started formally its operation in 1962 by introducing the first mutual fund as Investment Corporation of Pakistan and soon it got momentum as an attractive industry (Shah and hijazi, 2005). This growth in the industry is a sign of investors' trust that motivates the new investors to invest with frame of mind being the safer and lower risk instrument. The Pakistani fund industry is very huge now as it contains the 1.4 % assets of Mutual Fund of the world total Mutual fund assets (Bhatti et al, 2015). Pakistan Mutual fund industry is a rich industry in term of its range of funds. There are numerous funds categories like Equity, income, asset protected, balance, tracker and Islamic funds are traded in Pakistan (MUFAP). The CAPM describes the relationship between risk and expected return and the same is used in the pricing of risky securities. After the single factor model developed by Jensen (1967), it was extended to 2-factors and 3- factors models (Fama French, 1993).

This research study examines the performance of mutual Fund industry in Pakistan with a view to determine the working efficiency of different types of funds, rather just explaining the mutual fund performance, the investors also like to exploit best business avenues and hand over their investment with managers who are professionals and meet the investors' expectations, as the good signal for the investor means the better performance of the funds and they are enticed by it. The study also tries to study the expertise of the managers in capturing the market variation, as it is always a problem for the fund managers whether they can capture the market deviations explored these models. Outperforming the market is a challenge to the fund managers and they perform better to overcome the market & industry. Therefore, a comprehensive study needs to be conducted to know that how the fund's managers capture the market variations and whether the funds outperform the market return. This study has been conducted to ascertain the following objectives

1. To evaluate the mutual fund performance in Pakistan through competing models i.e. CAPM, Fama French-3 & Carhart-4 factor Model.

2. To check the suitability and validity of these models in quantifying Pakistani mutual funds' performance and decide which model better describe mutual fund performance.

Literature Review

Assets pricing has very abundant literature, managed over the period of time, from the studies conducted across the globe. The literature starts from the theory of Graham & Dodd's (1934) which, predicts that a stock has an intrinsic value and investor will prefer purchasing stocks below the intrinsic value and it is expected that the assets will move up over the period of time without risk. The theory states that if investor buy assets below their intrinsic value will maximize their overall profit. Later on another theory emerged on stock and portfolio management which mainly focuses on two pillars i.e. maximizing return and risk minimization being the ideal choice of investors. The theory predicts that investor's goal is maximizing profit at any level of risk and making ideal Portfolios (Markowitz, 1959). Sharp (1964) asserts that the asset pricing theory states that risk premium to be justified by holding portfolios of risker assets, where each security is held in proportion to its values in the market. The theory assumes that in an efficient market, the risk premium on each stock is proportional to the risk premium on the entire market, which is derived from the difference between the expected return on the market and the risk free rates; where the constraint of proportionality is reflected by the beta of stock which determines the co-variance of individual asset's return and the market return. The theory formally documents the relationship between expected return of portfolio and its risk, and a model developed, called CAPM. In View of the same portfolio management, Linter (1965) predicts that investors do want higher risk premium for their higher risky securities, properly justify for their investment, thereby documenting the suitability of CAPM**.** Messon (1966) predicts that an investor invest in risker assets for higher and optimal return and always maintain high risk premium. In 60s and 70s the same asset pricing theory so called CAPM was considered as best estimation technique for asset's pricing and still a valid model for estimating assets prices. But in the mid of 70s, Ross (1976) asserts that rather than market factor (Rm-Rf), other factors like asset's specific and macro-economic factors can also affect the asset's returns.

Jensen (1968) argues that selected portfolio return is very sensitive. Murthi et al (1997) analyzed the efficiency of the investment funds through DEA Technique and found that some of the portfolios of fund were quite efficient in performing. Fama French (1993) used 2-

factor and 3-factor model for the performance evaluation of funds and found different results for the market factor, size factor and value factor. The study suggests that value and size factors also affect the fund performance significantly rather than the only market factor. The same model was applied by Caietal (1997) in explaining the fund's portfolio and predicts that market factor better explain the funds return than value and size factor. The researcher finds results different from the previous researchers in term of size and value factor. Unlikely the previous researchers, Carhart (1997) applied 4-factors model for the performance evaluation of funds and stocks portfolio as an estimation technique and predicts similar results for the market, value and size factor, very much consistent with the results obtained through Fama French (1993). The study finds that the fund outperforms the market in term of all its four factors. The same 4-factor model was tested by Otten and Bams (2002) and predicts similar results for the first three factor, very much consistent with the findings of Carhart(1997) but the only momentum factor show poor performance in this regard. In a similar study most of the portfolios significantly associated all 4- factorsi.e market factor, value factor, size factor and the momentum factor, thereby documenting the results of the previous researchers, who found that all equity funds outperform the market in term of market factor, size, value and momentum factor EGB (2004).

Data and Methodology
Data Procedures and Management

We analyze the portfolio of various 100 open-end mutual funds traded on the mutual fund association of Pakistan for the period 2005 to 2017. Firstly, we collected the daily Net asset value of all these sample funds collected from MUFAP and converted in daily return using the formula as Ln (Today NAV/ Previous NAV. In second step we collected daily risk free rates (T-bills) from state bank of Pakistan and daily 100-index data form Pakistan Stock Exchange. We calculated daily index returns through Ln (Today index / Previous index), converted the daily index returns to monthly index returns. In third step we collected daily share price data from PSE and calculated the stock returns using formula as Ln (Today stock price / Previous stock price). In fourth step the monthly stock returns and index returns have been merged. In the next step we generated size and BM rankings of firms in each year; Size is based on Big and Small while B/M based on Low, Medium and High. We generated six portfolio returns in each month, Portfolios are BL, BM, BH, SL, SM, SH, where B represent big size and S for small size. L M, and H showing Low, Medium and High Book to Market ratios. Finally,

we generated SMB and HML factors, as SMB = (SL + SM + SH)/3 - (BL + BM + BH)/3 while calculated HML as (SH + BH)/2 - (SL + BL)/2. In the next stage we calculated MOM factor in each month on 11 month's cumulative returns for each stock and then ranked all stocks on their 11 months' cumulative returns. Obtained the value of momentum returns in each month as a difference between average returns of top 30% minus bottom 30% stock returns. Next, we constructed various ten portfolios of mutual funds on the basis of their cumulative last one year returns, based on their returns, where funds with lowest returns placed in P1 and highest returns funds in P10. Each portfolio contains on average 15 mutual funds. In the last stage we apply CAPM, Fama French 3-factor, and Carhart 4-factor model to construct portfolios, ordered these portfolios in docile pattern to examine and investigate the mutual fund performance (Risk adjusted performance) through these competing multifactor models and GRS test applied to test the suitability of the suitable and best model.

Mutual Fund Performance Measures

We predict the mutual funds' performance through the following models.

1. $Ri = \alpha + \beta\ (Rm\text{-}Rf) + \varepsilon\ldots\ldots\ldots CAPM$
2. $Ri = \alpha + \beta 1\ (rm\text{-}rf) + \beta 2\ (SMB) + \beta 3\ (HML) + \varepsilon\ldots Fama\ French\ 3\text{-}factor$
3. $Ri = a + \beta_1\ (rm\text{-}rf) + \beta_{2(SMB)} + \beta_{3(HML)} + \beta_{4(MOM)} + \varepsilon\ldots Carhart\ 4\text{-}factor$

Where Ri is showing actual risk premium on a given stock, β(Rm-Rf): It represents the expected risk premium as suggested by CAPM and α is the intercept. SMB showing the size factor, which shows the difference in return on a portfolio that consists of small caps funds and large caps funds. HML predicting and showing the difference in high book to markets and portfolio of low book to market stocks, while α is the intercept. These models have been tested in developed economies by few researchers (EGB, 2004 ; Huiji and Verbreek , 2006; Otten and Bams, 2007) while CAPM and Fama French 3-factor model has been tested in the context of Pakistan (Rehman and Balooch ,2016). MOM is the prediction of finding difference in winners and lessors based on their past performance. This MOM factor has been measured with pattern of previous researchers (Carhart, 1997; Otton and Bams, 2007).

Demonstration of Carhart-4 Factor Model to the Mutual Fund Performance Carhart-4 Factor

Table demonstrates the performance of Pakistani mutual funds using Carhart-4 factor model. The results showing that market factor (Rm-Rf) has significant effect on the funds return as many of the total portfolios showing significant betas. While the size factors (SMB), value factor (HML) and momentum factor (MOM) do not offer proper explanation of the funds return. The majority of intercepts demonstrate significant behavior documenting that fana-3 factor do not offer suitability in predicting mutual fund performance in Pakistan. The results predict that it is a weak model in comparison to the other two models as majority of intercepts are significant and not closer to zero.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Variables	P1	P2	P3	P4	P5	P6	P7	P8	P9	P10
rm_rf	0.922***	1.543**	1.422***	0.534***	0.456***	2.433***	2.137***	3.897***	5.098***	10.900***
	(0.222)	(0.478)	(0.567)	(0.145)	(0.312)	(0.544)	(0.518)	(0.765)	(0.772)	(2.310)
SMB	0.047	0.039	0.054	0.315	-0.051	0.377	1.003**	1.908*	0.411	1.612
	(0.254)	(0.650)	(0.498)	(0.149)	(0.253)	(0.688)	(0.472)	(0.876)	(0.821)	(1.897)
HML	-0.980***	-1.865**	-1.456***	-0.234	-0.411	-1.860**	-0.175	0.112	0.423	-0.877
	(0.276)	(0.866)	(0.522)	(0.130)	(0.335)	(0.744)	(0.550)	(0.887)	(0.816)	(1.984)
MOM	0.511**	0.887	0.897**	0.311*	0.082	1.331**	0.511	0.312	-0.899	-0.213
	(0.242)	(0.662)	(0.531)	(0.213)	(0.290)	(0.678)	(0.412)	(0.700)	(0.713)	(2.111)
Const	0.015	0.021	0.053*	0.068***	0.065***	0.030	0.055**	0.113**	0.150***	0.425***
	(0.014)	(0.029)	(0.024)	(0.007)	(0.016)	(0.029)	(0.032)	(0.052)	(0.050)	(0.130)
Standard Errors in Parentheses										

Conclusion

This paper focused on knowing testability of multifactor assets pricing models to the mutual fund performance in Pakistan. The Mutual fund analysis across the world is debatable concerns for the researchers. Mutual funds channelize the saving of small investor who find hard to invest at their cost and manage these investments in profitable avenues. The study analyzed the various categories of open-end funds in Pakistan through the application of CAPM, Fama French 3-factor and Carhart-4 factor model. The study used the daily NAV of funds and stocks were obtained and then applied the validated mechanism of conversion in the light of past validated researches. The results demonstrate that CAPM along with Fama French-3 factor and Carhart-4 can explain the mutual fund performance but CAPM showing better suitability among the three competing models.

This study has certain implications for the mangers of asset management companies and the investors, who can be benefited from this study. This research can be extended to use more sophisticated and advance performance measuresi.e. Fama French-5 factor model. Similar studies can also apply muilti-level techniques for better comprehending the mutual fund performance in Pakistan. The same models can be tested for comparing conventional and Islamic mutual fund in Pakistan as well as emerging economies.

Reference

Afza, T., & Rauf, A. (2009). Performance Evaluation of Pakistani Mutual Funds. *Pakistan economic and social review*, 199-214.

Ahmad, A., Khan, Y., Jamil, S., & Ilya's, M. Do Pakistani Open End Mutual Funds Provide Fair Return against Risks Taken? A Risk Adjusted Performance Evaluation of the Industry.

Ahmed, P., & Nanda, S. (2005). *Performance* of enhanced index and quantitative equity funds. *Financial Review,* 40(4), 459-479.

Barberis, N., &Shleifer, A. (2003). Style investing. *Journal of financial Economics*, 68(2), 161-199.

Berkowitz, M. K., &Kotowitz, Y. (2002). Managerial quality and the structure of management expenses in the US mutual fund industry. *International Review of Economics & Finance,* 11(3), 315-330.

Bogle, J. C. (1998) The implications of style analysis for mutual fund performance evaluation. *Journal of Portfolio Management*, 24 (4): 34-43

Boudreaux and Suzanne, Empirical Analysis of International Mutual
    Fund performance, International *Business & Economics
    Research Journal*, 6, (2007): 19-22

Brown, K. C., & Harlow, W. V. (2006). Staying the course: *The impact
    of investment style*

Chan, L. K. C., Chen, H.-L. and Lakonishok, J. (2002) On mutual fund
    investment styles. *The Review of Financial Studies*, 15 (5):
    1407-1437

Chance, D. M., & Ferris, S. P. (1991). Mutual Fund distribution fees: An
    empirical analysis of the impact of deregulation. *Journal of
    Financial Services Research*, 5(1), 25-42.

Fama, E. F., & French, K. R. (1992). The cross section of expected stock
    returns. *The Journal of Finance,* 47(2), 427-465.

Gibbons, M. R., Ross, S. A., & Shanken, J. (1989). A test of the
    efficiency of a given portfolio. Econometrica: *Journal of the
    Econometric Society,* 1121-1152.

Goriaev, A. P., Nijman, T. E., &Werker, B. J. (2002). The dynamics of
    the impact of past performance on Mutual Fund flows. *Tilburg
    University*.

Green, R. K., &Wachter, S. M. (2007). The housing finance
    revolution. University of Penn, *Inst for Law & Econ Research
    Paper,* (09-37).

Jagric, T., Podobnik, B., Strasek, S., &Jagric, V. (2007). Risk-adjusted
    performance of mutual funds: some tests. *South-Eastern
    Europe Journal of Economics*, 5(2), 233-244.

Jiang, G. J., &Yuksel, H. Z. (2017). What drives the "Smart-Money"
    effect? Evidence from investors' money flow to mutual fund
    classes. *Journal of Empirical Finance*, 40, 39-58.

KHAN, Y., KHAN, A. W., SHAH, M., & REHMAN, D. S. U. (2018).
    Heuristic and Biases Related to Financial Investment and the
    Role of Behavioral Finance in Investment Decisions: A Case
    Study of Pakistan Stock Exchange.

Khan, Z. S. (2010). Mutual fund growth: Analysis and risk minimization.
    Interdisciplinary Journal of Contemporary Research in
    Business, 1(11), 142.

LaPlante, M. (2001). Influences and trends in mutual fund expense
    ratios. *Journal of financial research, 24(1), 45-63.*

Latzko, D. A. (1999). Economies of scale in mutual fund
    administration. *Journal of Financial Research,* 22(3), 331-339.

Malhotra, D. K., & McLeod, R. W. (1997). An empirical analysis of
    mutual fund

McDonald, J. G. (1974). Objectives and performance of mutual funds, 1960–1969. *Journal of Financial and Quantitative Analysis*, 9(3), 311-333.

Rehman, A., & Baloch, Q. B. (2016). Evaluating Pakistan's Mutual Fund Performance: Validating through CAPM and Fama French 3-Factor Model. *Journal of Managerial Sciences*, *10*(1).

Saeed, A. (2004) Islamic Banking and Finance. In Hooker, V.M. and Saikal, A. eds., Islamic

Sipra, N. (2006). Mutual fund performance in Pakistan, 1995-2004. *Centre for Management and   Economic Research (*CMER), 1-14.

Treynor, J. L. (1965). How to rate management of investment funds? Harvard business review, 43(1), 63-75. costs, and expenses. *The Journal of Finance,* 55(4), 1655-1703.

Wolfers, J., &Zitzewitz, E. (2006). Prediction markets in theory and practice (No. w12083). National bureau of economic research.

Zafar, D. C., Chaubey, D. S., & Ali, S. (2009). An Empirical Study on Indian Mutual Funds Equity Diversified Growth Schemes and their Performance Evaluation. *International Journal of Research in IT, Management and Engineering,* 2(2), 1-18.