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IS EQUITY FUND PERFORMANCE PREDICTABLE? A STUDY ON PAKISTANI EQUITY FUNDS USING DYNAMIC PANEL DATA MODEL

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ABSTRACT

The motive of present paper was to test the predictability of equity fund performance on the basis of fund variables. In this respect, five equity fund variables were selected namely past fund performance, flow, expense ratio, age and size. The data of seventeen equity funds for the time period June 2010 to June 2017 was collected. Moreover, Arellano and Bond (1991) dynamic panel data approach was employed to examine the predictability of fund performance. Results indicated significant negative influence of past fund performance and expense ratio on future performance of equity funds, however, no significant influence of past fund flow, age and size on future performance of equity funds was found. Overall results suggest that investors can predict future performance of equity funds on the basis of past performance and expense ratio. Moreover, predictability of performance can help investors in making optimal investment decisions. This study is novel in its nature as it examined the predictability of Pakistani equity fund performance by using dynamic panel data approach. Hence the research can be extended in other types of fund operating in Pakistan.

Key Words: *Equity funds, Mutual funds, Performance predictability, Pakistan.*

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Introduction

The main objective of investors is to earn optimal risk-adjusted returns from their investments. To achieve this objective, the first challenge for investors is to identify and select the right financial securities and the second is to manage these securities in a professional manner. Majority of investors lack professional competence that is required to manage investment. Professional management of securities is possible through competent, skilled and experience market agents having sufficient financial resources (Roy, 2014). Catering the need of investors, financial market provides variety of investment alternatives to prospective investors. Mutual fund is one of investment choices that allow safe returns to the investors with lower degree of expected risk as compared to that of equity market. Furthermore, mutual funds provide a low cost access to investors for management of their investment portfolios through full-time skillful experts. Therefore, investors prefer to make their investments in mutual funds (Bodie, Kane and Marcus, 2011).

The selection of right mutual fund for investment is a challenging task for prospective investors. Mutual fund performance is a distinctive way to determine and evaluate the ranking of mutual funds. The investors are always interested to estimate performance of mutual funds for selection of right investment choices. Considering the needs of investors, the academicians and practitioners are putting their attention to develop different tools to gauge performance of mutual funds (Kiymaz, 2015). The importance of mutual fund performance measurement in academic circles can be seen from the fact that several risk adjusted performance measures have been developed in past such as Treynor ratio (1965), Sharpe ratio (1966), Treynor and Mazuy model (1966), Jensen measure (1968) and others. Similarly, a lot of researchers measured mutual fund performance using different risk adjusted measures (e.g., Eling, 2008; Badrinath and Gubellini, 2012; Bhatti, Tanveer and Sial, 2015; Hussain, Hussain and Hassan, 2016; Kaur, 2018). In addition to performance measurement, several researchers studied the factors that affect the realized performance of mutual funds (e.g., Chen and Huang, 2011; Kiymaz, 2015; Basso and Funari, 2016).

Basically, risk adjusted measures are the indicators of mutual fund's past performance. It is evident that existing as well as potential investors are often interested in becoming well-informed about the future performance of mutual funds so as to diversify their investment for optimal portfolios. This facet motivated researchers to find out relevant factors that interact with mutual fund performance. Belgacem and Hellara (2011) examined explanatory power of fund size, fund age, management fees, past performance of fund, fund growth and net asset value on Tunisian mutual funds' future performance and found that past performance, fees and size significantly influence mutual fund performance. Moreover, Kaur (2018) also investigated the link among past and future performance of Indian equity funds and reported the positive influence of past performance on future performance. Considering above factors, present study is an attempt to find out pertinent factors that influence equity funds performance in Pakistani context, therefore, investors can derive directions while making their optimal future investment decisions. From extensive review of literature, the predictability of equity fund performance in Pakistan is yet ignored by financial researchers, therefore, present study attempted to fill this empirical gap by determining which factor directly impact equity mutual funds' performance through dynamic panel data approach.

Literature Review

Since 1960, some seminal studies have investigated mutual fund performance such as Jenson (1968) and Sharpe (1966). Review of literature indicates that research on mutual funds in developed economies has two strands: first, comparison of mutual funds' performance with other investment opportunities and second, determining significant factors influencing mutual funds' performance. Present study has correspondingly focused second strands of literature in accordance with objectives to examine the effects of various mutual fund variables on realized mutual fund performance. Previous studies have suggested contradictory results regarding impact of fund size on equity fund performance (such as, Chen et al., 2004; Pollet and Wilson, 2008; Kiymaz, 2015; Basso and Funari, 2016). During last decade, Chen et al., (2004) examined influence of fund size on fund performance and found that fund size negatively affects fund's

performance. They concluded that increase in fund size results in deterioration of fund's performance and small size funds outperform as compared to large size funds. Conversely, Pollet and Wilson (2008) reported a positive effect of fund size on performance along with the reason of this effect. They suggested that fund size affects investment behavior of mutual funds, which in turn affects mutual fund performance. Funds that experience growth in assets diversify more and this diversification improves their performance in turn. Kiymaz (2015) found a negative relationship between fund size and performance and reported the better performance of smaller funds as compared to large funds. Basso and Funari (2016) used data envelopment analysis (DAE) in order to accurately determine the size effect on mutual fund performance. They observed the absence of linear association among fund size and fund performance. Though, they noted tendency of better performance in large funds as compared to smaller ones. Succinctly, mixed results were reported by previous studies about association among size of fund and performance of fund. Keeping in view the above literature, the study developed the following hypothesis to test the influence of size of fund on future fund performance.

H1: Fund size has a significant effect on future fund performance.

A number of researchers investigated mutual fund performance persistence in order to identify information signals contained in the past performance about fund's future performance. Persistence of performance justifies the prediction of performance of future period on the basis of past. Elton, Gruber and Blake (1995) reported that past performance of mutual fund possess power to predict future mutual fund performance and concluded that fund's risk adjusted performance can be predicted for both short and long run, whereas, Kader and Qing (2007) reported only short run performance persistence of mutual funds. They reported the repetition of good and bad mutual fund performances, but only in short run. Hou (2012) also confirmed the presence of performance persistence. Researcher observed that funds performing well in one period also performed well in the next period, though, funds that performed worst in one period also performed worst in future periods. In the light of above literature review, the study developed the following hypothesis to identify the link among past and future performance of fund.

H2: Past fund performance has a significant effect on future fund performance.

In addition to above variables, a few researchers examined the effect of governance on performance of mutual funds. Wellman and Zhou (2007) found positive affect of governance on performance of mutual funds and noted that funds having good grades of governance outperformed the funds with bad grades. Similarly, Chen and Huang (2011) found positive effect of stewardship grade on fund performance. Researchers reported that the funds possessing good governance mechanism performed well and vice versa. A few researchers focused on entirely different variables in respect while investigating mutual funds' performance. Fang, Peress and Zheng (2014) found that tendency to buy media covered stocks negatively affects the fund performance. Funds having high tendency underperform and vice versa. Additionally, Gallagher et al., (2014) tested the effect of portfolio quality on performance of fund and observed positive effect of portfolio quality on mutual fund performance. Moreover, they found that mutual funds with high portfolio quality perform better.

Furthermore, Belgacem and Hellara (2011) attempted to predict the future performance of mutual funds using funds' past information about performance, age, size, flow, fees and net asset value (NAV) and established significant positive effect of past fund performance and size on future performance of mutual fund, and significant negative influence of fees on future performance of mutual fund. Results revealed that good performance, large size and less fees of mutual fund at present is an indication of good performance in future and vice versa. Subsequently, Kiymaz (2015) pointed out positive relation of mutual fund age, fees and price to book ratio (PBR) with mutual fund performance. These relationships indicate that old funds perform better than young funds; funds having high PBR portfolio perform better than the funds having low PBR portfolio whereas, funds charging higher fees perform better than the funds charging lower fees. Champagne, Karoui and Patel (2017) found negative association among portfolio turnover and fund performance. It was noticed in this study that mutual funds with high portfolio turnover report poor performance and reported it as an evidence of poor performance of actively managed funds. Kaur (2018) observed the positive effect of past performance on future fund performance and recognized that future fund

performance can be predicted by considering past performance. The previous studies failed to report unanimous results about the association of above variables with funds' performance; therefore, the present study has developed non-directional hypotheses. The suggested hypotheses are as under:

H3: Flow of fund has a significant effect on future fund performance.

H4: Expense ratio has a significant effect on future fund performance.

H5: Age of fund has a significant effect on future fund performance.

Data and Methodology

a. Collection of data

Financial data of seventeen equity funds of Pakistan for the time period June 2010 to June 2017 was utilized to test the predictability of performance. Data was collected from the website of Mutual fund association of Pakistan (MUFAP) as well as from the annual reports of equity funds. KSE 100 index data is collected from the website of yahoo finance. T-bill rate is used as a proxy of risk free rate of return. Historical data of t-bill rate is obtained from the website of State Bank of Pakistan.

b. Methodology

The study estimates the explanatory power of five equity fund variables in respect of explaining fund's future performance. Estimation model used in this study is given below:

$$Perf_{i,t} = \beta_0 + \beta_1 Size_{i,t-1} + \beta_2 Perf_{i,t-1} + \beta_3 Flow_{i,t-1} + \beta_4 ER_{i,t-1} + \beta_5 Age_{i,t-1}$$

The dependent variable of this study is equity fund performance, which is specified as $Perf_{i,t}$ and indicates performance of fund "*i*" in time "*t*". Jensen (1968) model is used in order to measure equity fund performance. This model provides co-efficient "α" that indicates fund performance as an outcome of security selection and market timing ability of fund manager. Mathematical form of Jensen's model is given below:

$$R_{p,t} - R_{f,t} = \alpha_p + \beta_p(R_{m,t} - R_{f,t}) + e$$

Here, $R_{p,t}$ represents return of a fund "*p*" in time "*t*"; $R_{f,t}$ represents risk free rate of return in time "*t*"; $R_{m,t}$ represents return of market in time "*t*"

and β_p represents the slope. Performance of each equity fund is measured on annual basis by using monthly return data of equity fund, market and risk free asset. Monthly return of equity fund is measured using equation given below:

$$R_p = \frac{(NAV_{p,t} - NAV_{p,t-1}) + DIV_{p,t}}{NAV_{p,t-1}}$$

In this equation, $NAV_{p,t}$ indicates net asset value of fund "*p*" in month "*t*"; $NAV_{p,t-1}$ indicates net asset value of fund "*p*" in month "*t-1*" and $DIV_{p,t}$ indicates dividend of fund "*p*" in month "*t*". KSE 100 index of Pakistan stock exchange is used to measure monthly return of market using following equation:

$$R_m = \frac{(KSEIND_t - KSEIND_{t-1})}{KSEIND_{t-1}}$$

In above equation, $KSEIND_t$ represents KSE 100 index in month "*t*" and $KSEIND_{t-1}$ represents KSE 100 index in month "*t-1*".

The right hand side of estimation model includes five explanatory variables. The first is written as $Size_{i,t-1}$ and indicates past size of fund. Size is determined by means of natural log of equity fund's total net assets at each interval. The second is written as $Perf_{i,t-1}$ and indicates past fund performance. The third is written as $Flow_{i,t-1}$ and indicates past net relative flow of fund. Net relative flow is basically the net percentage growth in equity fund's asset. This growth shall be the result of new external money and must exclude return earned on assets under management. The flow is measured using following equation:

$$FLOW_{i,t} = \frac{TNA_{i,t} - TNA_{i,t-1}}{TNA_{i,t-1}} - r_{i,t}$$

In this equation, $TNA_{i,t}$ indicates total net assets of fund "*i*" in year "*t*"; $TNA_{i,t-1}$ indicates total net assets of fund "*i*" in year "*t-1*" and $r_{i,t}$ represents return of equity fund "*i*" in year "*t*". Fourth fund variable is written as $ER_{i,t-1}$ and indicates past expense ratio of fund. The expense ratio means yearly operating expenses of fund as a fraction of average amount of net assets. The fifth fund variable is written as $Age_{i,t-1}$ and

indicates past age of fund. Age is ascertained by taking the natural log of equity fund's age in years at each point of time.

Least square regression method assumes strict exogeneity of regressors. As estimation model of study includes the lagged value of dependent variable as regressor, therefore, this assumption about exogeneity is violated. If the least square regression is used, the lagged dependent variable is expected to correlate with the error term, which will result in generation of biased estimate of coefficients. Therefore, the estimation of dynamic panel data through the least square regression would be inappropriate because it will provide invalid results (Heij et al. 2004). Arellano and Bond (1991) dynamic panel data model is used for the analysis that uses two generalized method of moments (GMM). This method enables the use of lags of predetermined variable as instrument in order to generate unbiased estimates. Additionally, the lags of strictly exogenous regressors can also be used as additional instruments in this model in accordance with Belgacem and Hellara (2011) estimated method that was used to predict performance of Tunisian mutual funds. Moreover, Kaur (2018) also employed dynamic panel data approach

Before applying dynamic panel data model, correlation between explanatory variables is examined on the basis of correlation values and variance inflation factors (VIFS). After applying dynamic panel data model, the two tests will be performed namely Sargan test and Wald test to examine the model specification because dynamic panel data model does not report F-statistic. The purpose of Sargan test is to ensure validity of instrument variables. The lack of correlation between instrument variables and residuals is an indication of instrument validity. So, null hypothesis of Sargan test is that instruments are valid. Sargan statistics is distributed as χ^2 (p-k) where p is the instrument rank and k is the number of estimated coefficients. Secondly, Wald test measures joint significance of all variables and its statistic is distributed as χ^2. Null hypothesis for this test is that there is no relationship between the variables.

Results and Discussion

a. Descriptive Statistics

The results of descriptive statistics are presented in table 1.

Table 1

Descriptive statistics

	$PERF_t$	$PERF_{t-1}$	$FLOW_{t-1}$	ER_{t-1}	AGE_{t-1}	$SIZE_{t-1}$
Mean	0.001455	0.000445	0.093996	0.040484	2.111392	7.121098
Median	0.001156	0.000240	-0.092521	0.037448	2.062623	7.061405
Maximum	0.018053	0.018053	6.700864	0.087607	3.982170	11.16835
Minimum	-0.01461	-0.01461	-0.862194	0.015362	0.480325	4.653389
Std. Dev.	0.006796	0.006765	0.884348	0.013159	0.704518	1.455708
Skewness	0.168374	0.402992	4.712222	1.120262	0.605238	0.578920

b. Correlation Analysis

Values of VIF's and correlation coefficients are presented in the table as follows:

Table 2

Correlation Analysis

	$PERF_{t-1}$	$FLOW_{t-1}$	ER_{t-1}	AGE_{t-1}	$SIZE_{t-1}$	VIF
$PERF_{t-1}$	1					1.06146
$FLOW_{t-1}$	-0.014752	1				1.09331
ER_{t-1}	-0.222413	0.059248	1			1.92459
AGE_{t-1}	0.045935	-0.085116	-0.427917	1		1.78349
$SIZE_{t-1}$	0.171874	0.108938	-0.671864	0.640014	1	2.74971

Table 2 shows correlation values between explanatory the variables of model as well as their VIFs. All correlation values are below +/- 0.7 and VIFs are less than 5. Consequently, it is evident that issue of problematic multicollinearity does not exist.

c. Results of Econometric Model

Result obtained from estimation model is shown in the table as follows:

Table 3

Influence of explanatory variables on equity fund performance

Dependent Variable: $PERF_t$				
Variable	**Coefficient**	**Std. Error**	**t-Statistic**	**Prob.**
$SIZE_{t-1}$	-0.006866	0.003703	-1.85434	0.0674
$PERF_{t-1}$	-0.465774	0.125307	-3.717075	0.0004
$FLOW_{t-1}$	-4.93E-05	0.001961	-0.025154	0.9800
ER_{t-1}	-0.813071	0.296635	-2.740982	0.0076
AGE_{t-1}	0.011485	0.011937	0.962128	0.3389

Results reported in table 3 shows insignificant effect of past fund size on future fund performance, which is not consistent with the result of Belgacem and Hellara (2011). On the basis of this result, H1 is rejected. It is clear from this result that past fund size has no effect on future fund performance. Further results reveal significant negative effect of past performance on future fund performance. H2 is accepted according to this result. Moreover, it is evident from this result that performance of equity funds is not persistent. Funds having good performance in one period exhibit poor performance in next period and vice versa. Coefficient value is -0.46, which indicates that next performance changes by fourty six percent. The observed result is different from the past findings of Belgacem and Hellara (2011), and Kaur (2018) because these studies reported significant positive influence of past performance.

Results presented insignificant effect of past fund flow on future fund performance. This finding serves as a ground for rejecting H3. This result is in line with the result of Belgacem and Hellara (2011). It is clear from this finding that past fund flow has no significant effect on future fund performance. Additionally, a significant negative effect of past expense ratio on future fund performance is seen. H4 is accepted in accordance

with this result. It is clear from this result that equity funds having high expense ratio in one period report poor performance in next period and vice versa. Coefficient value is -0.813071, which indicates a huge impact on performance. This result is in line with the result of Belgacem and Hellara (2011) as they also observed significant negative association among these variables. Moreover, an insignificant influence of the fund age on future fund performance is found, which is also consistent with the result of Belgacem and Hellara (2011). This leads to rejection of H5, which means that past fund age has no effect on future fund performance.

d. Results of other tests

The results of Sargan test, Wald test residual test are presented in table 4 as follows:

Table 4

Results of Sargan test, Wald test and Residual test

Sargan test		**Wald test**		**Residual Test**	
Sargan Statistic	7.1081	**Wald Statistic**	22.1371	**Mean**	-0.0001
p-value	0.2127	**p-value**	0.0005	**Jarque Bera**	1.2420
				p-value	0.5374

The result of Sargan test show p-value of 0.2127. On the basis of this p-value, the null hypothesis that instrument variables are valid is not rejected. This indicates that model of this study is correctly specified. Moreover, Wald test show p-value of 0.0005, so the null hypothesis that there is no relationship between variables is rejected. This result indicates correct specification of model. Results of residual test show that mean value of residuals is close to zero and p-value of Jarque-Bera indicates that residuals are normally distributed.

Conclusion

The purpose of this study was to test the predictability of equity fund performance on the basis of five equity fund variables i.e. the past fund

performance, flow, expense ratio, age and size. Dynamic panel data approach has been employed due to the likely correlation among lagged dependent variable and residuals. Results indicated that past performance negatively effects future fund performance. This negative connection means that there is no persistence in performance of equity funds. It is derived from the results that the equity fund having good performance in current period will have poor performance in future period and vice versa. Moreover, results showed significant negative effect of past expense ratio on future performance of equity fund. It is depicted that the equity funds having higher expense ratio in current period would have poor performance in future period and vice versa. However, the remaining three variables i.e., flow; age and size have no significant influence on future performance.

Overall results indicate that performance of Pakistani equity funds is predictable and past performance and expense ratio of the equity fund can be used to predict its future performance. Nevertheless, the other three factors i.e., equity fund's flow, age and size have no role in prediction of future mutual funds' performance. At present, the study focused only on the equity funds of Pakistan but the future studies should examine the predictability of the other Pakistani funds types as well.

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