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Research

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# RISK ADJUSTED PERFORMANCE EVALUATION OF MUTUAL FUNDS AND SELECTION ABILITIES OF FUND MANAGERS IN PAKISTAN

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## Abstract

*Mutual funds are decent tools to encourage savings and investments, especially in developing nations like Pakistan which rely heavily on foreign aids. This study explores the mutual fund performance in Pakistan by using seven different performance measures, i.e. Sharpe, Treynor, Sortino, Information, Jensen Alpha, M2/RAP, Fama decomposition measures. This study covers a period ranging from July 2005 to June 2013 and includes 27 mutual fund schemes out of which 20 funds are open ended while 07 funds are closed ended. Results prove underperformance on the part of all the mutual funds and the whole industry was found weak on the part of the selection abilities of the fund managers and the portfolios were found less diversified. However, it was noticed that closed ended funds are better performers as compared to the open ended funds. Results were also inconsistent for the performance of individual funds as none of the funds had the same rankings with respect to all the measures used.*

**Keywords:** Mutual fund performance, Selectivity, Diversification.

**JEL Classification:** G11, G20

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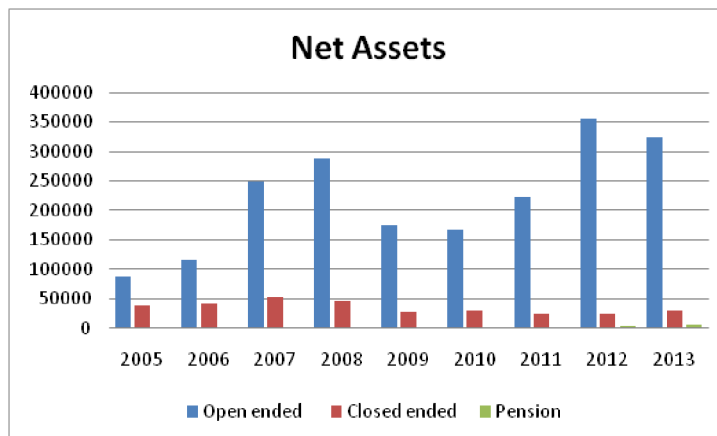
### **Introduction**

Can I own a portfolio? If yes, then which securities should it include? Is it possible to minimize my risk related to these securities? These and similar other questions have been answered by asset management companies with the introduction of mutual funds. One question is still being asked and challenged, i.e., Can I earn enough returns on these funds? The answer to this question lies in the performance evaluation of mutual funds. The mutual fund is a pool of resources filled with various small investors, and managed by professionals who try to use it in the most effective manner to get the highest possible results out of it by selecting the most suitable investments carefully. As investors, we are primarily concerned with the management of our assets and it proves to be a tough task because it requires a careful selection of such securities which should turn out to be an optimal combination. Better performance of a fund is linked with the personal ability of the fund manager. A successful manager is the one who is able to beat the market on a regular basis. Fear of loss generally dominates the joy of gain. This fear is even larger for those who do not possess enough expertise in the management of assets. An individual finds it difficult to have someone who may look into his affairs efficiently. This purpose is best served with the emergence of mutual funds in Pakistan as a pioneer of mutual fund industry in South Asia. The First mutual funds introduced in Pakistan was NIT units in 1962 and it was an open ended issue which was followed by ICP in 1966 which introduced different closed ended mutual fund schemes. Initially ICP units were nationally operated but they were privatized later on.

There are certain benefits which add to the popularity of funds around the globe. They include the ability to decide at the right time and pick the right security called market timing and selectivity respectively (Lee and Rehman, 1990). A perfect timer purchases the securities before the market rises and sells before market decline. Some of the other benefits associated with mutual funds are liquidity,

diversification, variety and convenience (Nafees, Shah and Khan, 2011). Liquidity refers to the quickness involved in the sale of the asset and diversification is a result of various securities included by a single fund to keep risk at lower levels. Whereas variety refers to a set of different funds which are available in the market for investors to select among them and convenience is the ease with which a person can buy or sell his units, i.e., through broker with instructions via phone, internet and even with the help of mobile applications. Gruber (1996) and Sipra (2006) also mentioned the benefits like customer service, reduction in transaction cost, diversification and professional management of assets.

**Figure-1**



Mutual funds have shown remarkable growth during the last decade in Pakistan as shown in Figure-1. Same is the case with other developed and developing nations. This industry values trillions of dollars on earth. Apart from the other developed countries, only the USA has a mutual fund industry which constitutes almost 49% of the whole world (source: ICI Fact book 2012). Pakistani funds market also showed a notable swelling of Rs.361,668 million in the last quarter of the year 2013. Open end and closed end funds contributed amounts

equal to Rs.325, 292 million and Rs.31,554 million, respectively, and pension funds contributed Rs.4,822 million. Such huge involvement of resources makes it a fascinating area of interest for researchers all around the world. Pakistani fund market, although is not that much mature as other nations have, it encompasses a big share among other sectors of the economy.

### **Literature Review**

The mutual fund industry is growing day by day. Researchers and academicians are keen to observe their performance for a period covering past few decades. Performance of a fund is viewed as the performance of a manager. Investors as well as other officials, including academic researchers are constantly engaged in measuring the fund performance of various classes. Various methods are used by different researchers to evaluate such performance. Treynor (1965), Sharpe (1966) and Jensen (1967) were among the pioneers to address this issue and devised different performance measures which are being used in different studies. Mutual fund performance is a widely discussed topic by several researchers. Most of the studies show similar results in inability to beat the market (Jensen 1968; Elton, Gruber, Das and Hlavka, 1993; Kothari and Warner 2001; Carhart 1997; Haslem et al 2008). Past studies that reported positive risk adjusted returns include Ippolito (1989), Lee and Rehman (1990), Grinblatt and Titman (1989,1992) and Hendricks, Patel and Zeckhauser(1993).

Howe and Pope (1993), compared the performance of specialty funds with traditional funds and found that there is not much difference between the returns of two categories, however specialty funds had high systematic and unsystematic risk as compared to their competitors and also said that specialty funds were less diversified due to having a particular type of assets in their portfolios. Hendricks, Patel and Zeckhauser (1993), observed short term persistence and it was significant over a period of one year. Mutual fund persistence can

predict future performance that can help in making future investment strategies.

Chan, Chen and Lakonishok (1999), said that mutual fund investments look to follow common benchmarks and the deviations found in managerial styles tend to pick stocks with better past performance and choose growth stocks. Poor performers do not stick to their investment styles. Investment styles can also be used as predictors of future performance. Chevalier and Ellison (1999), studied the impact of fund manager's characteristics on mutual fund performance. Relationship of fund manager characteristics like age, SAT scores during their undergraduate studies and whether they had an MBA with fund performance showed that managers with higher SAT scores earned higher risk adjusted returns. They proved that the personal characteristics of the fund managers were predictors of their performance.

Elton, Gruber and Blake (2003), said that the best performing funds pay large incentives and such managers show superior selection abilities as compare to those who are paid less or no incentives. Moreover, low performing managers who attract lesser benefits increase their fund's risk in the period following low performance. Wilcox (2003), said that in developed nations, there are a variety of funds to choose and the investors with financial knowledge focus on choosing the funds rather than considering the type of investments a fund manager is making with his pool of resources.

Wiberg(2006), compared the performance of long-term bond funds by taking OMRX-TBond index as a benchmark. He took monthly data from 35 Swedish bond funds for a period of three years ranging from May,2000 to April 2003. He proved that none of the funds were able to beat the benchmark by using Sharpe and Jensen measures. Modigliani and Modigliani measure also supported the results of underperformance, but it appeared pretty healthy as compared to Sharpe and Jensen measures used in that study. Eling (2008), in his

study claimed that the results of those studies based on different performance measures were similar to those which used Sharpe measure. He took data ranging from 1996 to 2005 and it included 38,954 funds. All funds showed similar rankings using different risk adjusted performance measures.

Kundu (2009), conducted a research on 31 equity mutual funds by employing Jensen and Fama measure to check the selection abilities of Indian mutual fund managers. He used three years data ranging from April 2005 to March 2008. He proved that the fund managers possess insignificant selection abilities and only a few funds could earn enough returns for low diversification to beat the market. Nazir and Nawaz (2010), conducted a research on mutual fund growth in Pakistan. They used panel data for a period of 2005 to 2009. They used fixed and random effect models to know the contributors of mutual fund growth in Pakistan on a data of 13 equity funds. Their results revealed that mutual fund growth has a direct relationship with turnover, family and expense ratio, whereas it is negatively influenced by fee and risk adjusted returns.

Zulfiqar et al (2011), analyzed the performance of closed ended mutual funds in Pakistan for a period of 1999-2009. They found underperformance under different states of the economy, i.e., boom, normal and recession. Mahmud and Mirza (2011), found growth in Islamic funds as compared to their Non-Islamic counterparts due to greater religious inclination. Moreover, income funds were underperformers due to immature bond market and no fund manager is regarded as consistent performer or looser while stocks of large caps are selected among stock funds. Gohar, Ahmed and Niazi (2011), compared the performance of equity and income funds. They further divided these funds on the basis of broker managed and institutional owned funds. It was found that overall performance of equity mutual funds is better as compared to income funds. Within equity funds, broker backed funds are better, but in case of income funds, institutional owned funds are better performers. It was further reported

that equity fund managers possess significant market timing abilities and institutional equity funds were timed better as compared to broker backed funds within this category.

Prasad and Srinivas (2012), analyzed the timing ability of equity fund managers. They included the data of 17 equity mutual funds for a period of 10 years, i.e., April 2000 to March 2010. They reported that equity fund managers possess better timing abilities. Rasheed and Qadeer (2012), studied survivorship biased 25 open ended Pakistani mutual funds for a period of March 2006 to February 2011. They found low selectivity and diversification and pointed towards higher returns due to positive diversification and the presence of unsystematic risk. Razzaq et al. (2012), conducted a research study with conventional mutual funds in Pakistan and took daily data from 2009 to 2010. They employed Sharpe, Treynor, Jensen and Information measures and reported that the well diversified conventional funds are better operators as compared to less diversified ones. Rahman, Qiang and Barua (2012), analyzed the performance of 15 growth funds registered in Dhaka stock exchange. Performance was analyzed for the entire life of these funds. Few of these funds had an age of only 12 months. They used Sharpe, Treynor and Sortino measures which showed underperformance on the whole, but few funds were able to earn superior risk adjusted returns. The Fama performance measure proved that these funds were under diversified and also reported that fund managers possess inferior selection and timing abilities which were diagnosed with the Treynor and Mazuay measure. Roy and Ghosh (2012), observed the performance of 52 saving mutual funds for period of January 2008 to February 2009 which was characterized by economic recession in India. These open ended equity funds showed clear underperformance which was measured with the help of Sharpe and Treynor ratios. They were also dissatisfied with the selection and timing abilities of these schemes captured through Jensen and Treynor and Mazuay measure.

Babar, Nawaz and Ashraf (2013), analyzed the mutual fund performance for a period of seven years that is 2004 to 2011. They used Sharpe, Treynor, Jensen, Sortino and information measures to check the performance of 20 mutual funds. All the funds proved underperformers as compared to KSE index. They also analyzed selection abilities of fund managers by using the Fama decomposition measure and reported that fund managers showed inferior selection abilities and were also unable to achieve the desired diversification in the relevant period. Kaushik, Brinckman and Rose (2013), studied the performance of 1374 actively managed funds in USA, categorized as small cap, mid cap and large cap funds. Their results revealed that small cap funds had high returns in excess of market returns and expenses, but they also had a high expense ratio. They also suggested that while making investments an investor should pick such a fund which have low expense ratios and investment asset turnover rate and also possess managers with long affiliation with the fund.

#### **Data and Methodology**

Data for open ended funds is taken from July 2005 to June 2013 from the respective websites of mutual fund companies and mutual fund association of Pakistan whereas data regarding closed ended funds is downloaded from brecorder. Only those funds are included in this study, which managed to survive in this period. Hence a total of 27 mutual funds is included out of which 20 funds are open ended while 07 are closed end funds. A common benchmark is used in this study for all types of funds, i.e., KSE 100 Index. Data for KSE Index is downloaded from yahoo.finance. The risk free rate will be considered as 12 months T-bill rate available on the official website of the financial market association of Pakistan. Seven different measures are used in this study: 1) Sharpe Ratio, 2) Treynor Ratio, 3) Sortino Ratio, 4) Jensen Differential measure, 5) Information/Appraisal Ratio, 6) RAP/M2 measure, 7) Fama Decomposition.



### *Sharpe Ratio*

This ratio was developed by William F. Sharpe (1966). Sharpe ratio gives a relationship between the returns excess of risk free rate and the overall risk of the portfolio denoted by statistical measure standard deviation. This ratio ranks the funds on the basis of returns earned per unit of overall risk, i.e., both systematic and unsystematic faced by each fund. This ratio is derived from the capital market line and it helps to assess the performance of less diversified portfolios.

$$\text{Sharpe Ratio} = (R_p - R_f) / \delta$$

$R_p$  = Average return on portfolio for the study period.

$R_f$  = Average risk free rate for the same period.

$\delta$  = Standard deviation of the actual returns on the fund.

### *Treynor Ratio:*

This ratio was developed by Jack L. Treynor (1965). Treynor suggested the use of beta instead of standard deviation. He ranked the funds by dividing the average excess returns of the portfolio over the risk free rate with systematic risk denoted by beta. This ratio is drawn from the capital asset pricing model (CAPM) and involves the use of any suitable index returns in the calculation of beta. He pointed that in a well diversified portfolio there is only the systematic risk that is assumed and that is why this ratio is more suitable for ranking diversified portfolios.

$$\text{Treynor Ratio} = (R_p - R_f) / \beta$$

$R_p$  = Average return on portfolio for the study period.

$R_f$  = Average risk free rate for the same period.

$\beta$  = Beta measure of systematic risk.

### **Sortino Ratio:**

This ratio was developed by Frank A. Sortino (1994). It is an extension of Sharpe ratio. In Sharpe ratio all the returns were

considered whether positive or negative, i.e., above or below the mean value or expected value targeted, but in this ratio only negative returns are considered to evaluate the variation which is known as downside risk. The rationale behind this ratio is more precise as it assumes only negative values in the calculation of standard deviation (semi-deviation) charged against returns excess of required returns.

$$\text{Sortino Ratio} = \frac{(R - T)}{DR}$$

R = Return realized on mutual fund.

T = Required rate of return on investment.

DR = Downside Risk.

#### *Jensen Differential Measure*

This measure was developed by Michael C. Jensen (1967). This measure is based on CAPM and it determines that how well a particular portfolio performed as compared to the market. Jensen alpha is the differential between excess returns on a portfolio and returns obtained through market model. It is calculated by using the following regression equation:

$$R_p - R_f = \alpha + \beta (R_m - R_f) + \varepsilon t$$

Where,

$R_p - R_f$  = Returns on portfolio excess of risk free rate.

$\beta (R_m - R_f)$  = Returns forecasted by market model.

$\alpha$  = Additional returns showing superior selection abilities.

Value of alpha is determined by t-value obtained through regression. Normally distributed values of alpha having t-value of more than two indicates that the results obtained are due to superior selection and chances that probability of results due to luck are less

than 5%. This ratio is more suitable to compare the portfolios of similar risk or within peer groups. Positive value of alpha indicates superior selection abilities of the fund manager who have chosen the correct securities and benefited from inefficiencies in the market that enabled him to beat the market.

#### *Information/Appraisal Ratio*

This ratio is developed by Sharpe (1994). It defines a relationship between returns on a portfolio in excess of a selected benchmark with excess risk faced over the same benchmark. The difference in risk between the portfolio and that of the benchmark is the diversifiable risk assumed by the fund manager to get superior returns. So, this residual risk termed as tracking error is the standard deviation of the difference in returns between the portfolio and the benchmark.

$$\text{Information Ratio} = E(R_p) - E(R_b) / \delta(R_p - R_b)$$

Where,  $E(R_p)$  = Returns on the portfolio

$E(R_b)$  = Returns on stated benchmark

$\delta(R_p - R_b)$  = Standard deviation of the difference in returns of portfolio and stated benchmark.

#### *RAP/M2 Measure*

This measure was developed by Franco Modigliani and Leah Modigliani (1997). This ratio is also drawn from the capital market line like Sharpe ratio, but it reports the results in percentage terms. The risk adjusted performance (RAP) of a fund can be calculated by multiplying the Sharpe ratio with a market standard deviation taken as a benchmark. This measure indicates the return that a particular fund should earn if it had risk equal to the market risk.

$$RAP = \frac{\delta m}{\delta p} (Rp - Rf) + Rf$$

Where,  $\delta m$  = Standard deviation of market returns.

$\delta p$  = Standard deviation of portfolio returns.

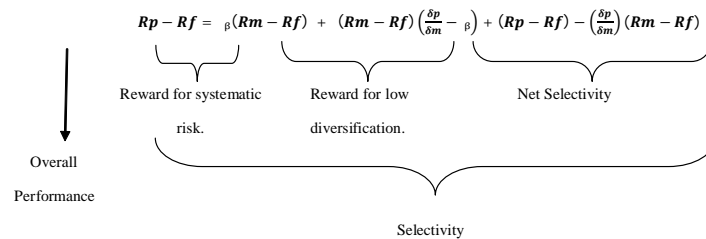
$Rp$  = Returns on the portfolio.

$Rf$  = Risk free rate.

Above equation indicates that if a fund faced a higher risk as compared to the market and earned lower returns, then it is a poor performer and vice versa. The two Modiglianis claimed that this ratio is easy to interpret as it results in percentages and it enables to know that by how many percentages a fund has performed well as compared to its other competitors.

*Fama's Performance Measure*

This measure was devised by Eugene Fama (1972). His measure enabled not only to capture the overall performance of a portfolio, but he also decomposed this performance into finer dimensions of net selectivity and diversification. Superior performance is due to the superior selection abilities of the manager and the extent of diversification achieved.



Where  $R_p$  = Returns of the portfolio.

$R_f$  = Risk free rate.

$R_m$  = Return of the market.

$\beta$  = Systematic risk of the portfolio.

$\sigma_m$  = Standard deviation of the market returns.

$\sigma_p$  = Standard deviation of the portfolio.

This breakdown of overall selectivity explains that the net selectivity can be obtained by deducting reward for low diversification from overall selectivity. Low diversification will reduce the net selectivity, but such a fund should get higher returns for the reason that more the diversification achieved lesser would be the reward for diversification and vice versa. If a fund is fully diversified then there will be no reward for low diversification and net selectivity will be equal to the overall selectivity. Therefore, net selectivity can always be equal to or less than the overall selectivity. A positive value of net selectivity states that a fund has performed well above the performance due to lower diversification whereas a negative value denotes that the fund is unable to recover returns even for low diversification.

### Results and Discussion

Monthly data are taken from July 2005 to June 2013 in this study. Analysis of this eight years of data revealed that none of the funds were able to beat the market. All the funds showed underperformance during this period. Descriptive statistics for the period are given in table 1. It includes measures like mean, maximum value, minimum value and standard deviation of the returns for all 27 funds used in this study. This table indicates that Al-Meezan Mutual Fund had the highest average returns of 0.004492 for the period and JS Aggressive Asset Allocation fund had the lowest average returns of -0.021221 for the period. PICIC Growth Fund earned the highest maximum returns of 0.24702 among all the funds, whereas Asian Stock Fund showed the minimum returns of -1.14488 in the whole mutual fund

industry and they also faced the highest overall risk (standard deviation) of 0.316527. The Atlas income fund was the least risky among all funds with a standard deviation of 0.020338.

**Table 1**  
*Descriptive Statistics*

	Mean	Maximum	Minimum	S.D
<b>Open Ended Funds</b>				
1. Al Meezan Mutual Fund(Islamic equity)	0.004492	0.245616	-0.67054	0.118335
2. Meezan Balanced Fund(Islamic Balanced Fund)	0.002659	0.14197	-0.18042	0.049272
3. Meezan Islamic Fund(Islamic equity)	0.000547	0.209049	-0.49891	0.094335
4. Atlas Income Fund(Income)	-0.0000089	0.033883	-0.08979	0.020338
5. Atlas Stock Market Fund(Equity)	0.00036	0.226412	-0.52525	0.097938
6. Faysal Balanced Growth Fund(Balanced)	-0.00345	0.124462	-0.29248	0.065017
7. JS Aggressive Asset Allocation Fund(Asset Allocation)	-0.021221	0.190916	-0.77990	0.149621
8. JS Income Fund(Income)	-0.0014	0.027934	-0.10829	0.0238
9. JS Islamic Fund(Islamic equity)	-0.00508	0.173131	-0.69743	0.107273
10. JS Large Cap Fund(Equity)	-0.00109	0.221886	-0.52221	0.099979
11. JS Value Fund(Equity)	-0.000681	0.119482	-0.27950	0.069979
12. Unit Trust of Pakistan(Balanced)	-0.000233	0.130878	-0.31682	0.071951
13. Crosby Dragon Fund(Equity)	0.001278	0.212546	-0.42216	0.100691
14. Metrobank Pakistan Sovereign Fund(Perpetual)	0.001428	0.035359	-0.15471	0.023128
15. Pakistan Capital Market Fund(Balanced)	-0.003299	0.098910	-0.29540	0.063471
16. Pakistan Income Fund(Income)	0.0005866	0.034899	-0.09174	0.019142
17. Pakistan Premier Fund(Equity)	-0.002769	0.159728	-0.38026	0.085761
18. Pakistan Stock Market Fund(Equity)	-0.001599	0.171109	-0.35027	0.084524
19. Pakistan Strategic Asset Allocation Fund(Equity)	-0.000813	0.179258	-0.41708	0.085208
20. National Investment Unit Trust(Equity)	0.0011585	0.125445	-0.40279	0.077665
<b>Closed Ended Funds</b>				
21. Golden Arrow Selected Stock Fund(Equity)	0.0015711	0.176279	-0.30538	0.082996
22. Atlas Fund of Funds(Fund of funds)	0.0021168	0.157628	-0.44541	0.075081
23. First Capital Mutual Fund(Equity)	0.0015799	0.205006	-0.44296	0.076864
24. PICI Growth Fund(Equity)	-0.004235	0.247024	-0.46400	0.090470
25. PICIC Investment Fund(Equity)	-0.001962	0.236520	-0.44613	0.086715
26. Asian Stock Fund(Equity)	0.0001986	1.377636	-1.14488	0.316527
27. Safeway Mutual Fund(Equity)	0.0005449	0.572519	-0.55503	0.178732
Karachi Stock Exchange(KSE)	0.0113015	0.180467	-0.4488	0.001533

KSE Index is used as a benchmark in this research for all types of funds having an average return of 0.0113015 as compared to an average industry return of -0.00109. The KSE index also had the lowest risk as compared to any of the mutual funds with a standard deviation of 0.00153 whereas the mutual fund industry had an average standard deviation of 0.089438 of all mutual funds. These statistics proved that none of the funds could earn better returns as compared to KSE Index and they were also more risky as compared to the stated benchmark.

Table-2

## Name of Fund

	Sharpe	Treynor	Sortino	Information	M2	Jensen Alpha
<b>Open Ended Funds</b>						
1. Al Meezan Mutual Fund(Islamic equity)	-0.07298	-0.00597	-0.00147	-0.071645	0.00599	-0.00656
2. Mezzan Balanced Fund(Islamic Balanced Fund)	-0.13211	-0.01554	-0.14284	-0.147811	-0.00145	-0.00743
3. Mezzan Islamic Fund(Islamic equity)	-0.09139	-0.00951	-0.08813	-0.180961	0.001822	-0.01057
4. Atlas Income Fund(Income)	-0.45036	-0.47431	-0.40775	-0.138775	-0.02702	-0.00922
5. Atlas Stock Market Fund(Equity)	-0.08994	-0.01366	-0.08591	-0.125239	0.001939	-0.01021
6. Faysal Balanced Growth Fund(Balanced)	-0.19401	-0.02354	-0.14012	-0.242716	-0.00642	-0.01378
7. JS Aggressive Asset Allocation Fund(Asset Allocation)	-0.20811	-0.06387	-0.07267	-0.216173	-0.00715	-0.03143
8. JS Income Fund(Income)	-0.44423	-1.19432	-0.33807	-0.152839	-0.02653	-0.01062
9. JS Islamic Fund(Islamic equity)	-0.13285	-0.01727	-0.07996	-0.193221	-0.00150	-0.01604
10. JS Large Cap Fund(Equity)	-0.10263	-0.01131	-0.08929	-0.182610	0.000919	-0.01222
11. JS Value Fund(Equity)	-0.12128	-0.01228	-0.12066	-0.219708	-0.00057	-0.00998
12. Unit Trust of Pakistan(Balanced)	-0.12119	-0.01863	-0.12101	-0.150962	-0.00081	-0.00998
13. Crosby Dragon Fund(Equity)	-0.07836	-0.01108	-0.09007	-0.117300	0.002870	-0.00943
14. Metrobank Pakistan Sovereign Fund(Perpetual)	-0.33166	-0.32871	-0.36904	-0.120734	-0.01772	-0.00781
15. Pakistan Capital Market Fund(Balanced)	-0.19643	-0.03604	-0.14454	-0.188940	-0.00661	-0.01323
16. Pakistan Income Fund(Income)	-0.44831	2.735495	-0.43353	-0.129297	0.004101	-0.0086
17. Pakistan Premier Fund(Equity)	-0.13919	-0.01468	-0.10337	-0.248840	-0.00201	-0.01369
18. Pakistan Stock Market Fund(Equity)	-0.12739	-0.01844	-0.10693	-0.166800	-0.00107	-0.01203
19. Pakistan Strategic Asset Allocation Fund(Equity)	-0.14216	-0.01366	-0.09917	-0.261356	-0.00024	-0.01189
20. National Investment Unit Trust(Equity)	-0.10813	-0.01340	-0.11608	-0.148150	0.000879	-0.00931
Average	-0.18644	0.02196	-0.15751	-0.17020	-0.00402	-0.01170
<b>Closed Ended Funds</b>						
21. Golden Arrow Selected Stock Fund (Equity)	-0.10889	-0.01080	-0.12367	-0.160571	0.001811	-0.0092
22. Atlas Fund of Funds(Fund of funds)	-0.12026	-0.00986	-0.10378	-0.201260	0.001617	-0.0087
23. First Capital Mutual Fund(Equity)	-0.11770	-0.00896	-0.11926	-0.305156	0.008052	-0.00946
24. PCI Growth Fund(Equity)	-0.10857	-0.01381	-0.11177	-0.335180	-0.00273	-0.01546
25. PICIC Investment Fund(Equity)	-0.10769	-0.01356	-0.11119	-0.373329	-0.00114	-0.01322
26. Asian Stock Fund(Equity)	-0.02876	-0.04403	-0.03388	-0.034438	0.006890	0.07225
27. Safeway Mutual Fund(Equity)	-0.03075	-0.21943	-0.06754	-0.055281	0.005290	-0.00874
Average	-0.09137	-0.04577	-0.09667	-0.20931	0.00282	0.00106

Sharpe ratio showed negative performance for the entire industry. Asian stock fund proved to be the best among all mutual funds having a Sharpe ratio of -0.02876. The Atlas income fund was the worst having a Sharpe ratio -0.45036. Comparison of open ended and closed ended funds revealed that closed ended funds perform better as compared to open ended funds. The Pakistan Income Fund had the highest Treynor ratio of 2.73549 in the whole industry. None of the other funds were able to realize a positive Treynor ratio. It can also be observed that it possesses negative beta value. The Pakistan income fund invests in fixed income securities whereas for the calculation of beta the benchmark used in this study is KSE Index which includes stocks only. This fact resulted in the negative covariance between the Pakistan Income Fund and KSE 100 Index and the final result was a negative beta. It is also an indicator of market inefficiencies as stock market faced many up and down fluctuations during the period and there was also a stock market crash during the period. The JS Islamic Fund as shown in the bottom had the lowest Treynor results of -1.19432.

Results of Sortino ratio were also consistent with the results of Sharpe ratio as not a single fund was able to generate positive values. Al-meezan mutual fund was the best performer among all the funds included in this sample with a Sortino ratio of -0.03776 and the Pakistan Income Fund was at the bottom with the lowest performance of -0.43353. Although all the mutual funds showed poor performance, but closed ended funds are relatively better performers as compared to open ended funds which is once again confirmation of the results of Sharpe ratio. The Asian Stock Fund was ranked best with an information ratio of -0.034438 and lowest performance was shown by the PICIC Investment Fund with an information ratio of -0.373329. It is observed in this table that both the best and poorest performers regarding information ratio are the part of closed ended funds. This ratio suggests that on average open ended funds are better as compared to closed ended ones which is in contrary to the results generated by Sharpe and Sortino ratios but in line with the Treynor ratio. If a fund has RAP greater than the market returns, then it is a better performer and vice versa. As discussed earlier, it is computed by adjusting portfolio risk for the market risk. Underperformance is due to having lesser returns as compared to KSE returns or it is due to facing a high risk as compared to the benchmark. It is evident from table-3 that none of the funds could have M2 (RAP) greater than the benchmark which clearly indicates underperformance on part of the mutual fund industry. If we observe the results generated in table-3 it is found that the First Capital Mutual Fund had the highest RAP value of 0.008052 and Atlas Income has the lowest RAP value of -0.02702. Only one mutual fund out of 27 mutual funds was able to generate a positive alpha all other funds had negative alpha value during the study period. The Asian Stock Fund is the best performer in this regard with an alpha value of 0.07225 and JS Aggressive Asset Allocation Fund had the lowest alpha value of -0.03143.



**Table 3.**  
*Results for Fama Measure Open ended funds*

	Overall Performance	Systematic risk	Diversification	Net Selectivity
1. Al Meezan Mutual Fund(Islamic equity)	-0.00467	0.00186	0.00127	-0.00781
2. Meezan Balanced Fund(Islamic Balanced Fund)	-0.00651	0.00089	0.00041	-0.00782
3. Meezan Islamic Fund(Islamic equity)	-0.00862	0.00193	0.00057	-0.01112
4. Atlas Income Fund(Income)	-0.00915	0.00004	0.00049	-0.00969
5. Atlas Stock Market Fund(Equity)	-0.0088	0.00137	0.00122	-0.0114
6. Faysal Balanced Growth Fund(Balanced)	-0.01261	0.00114	0.00058	-0.01433
7. JS Aggressive Asset Allocation Fund(Asset Allocation)	-0.03038	0.00101	0.00295	-0.03436
8. JS Income Fund(Income)	-0.01057	0.00001	0.00061	-0.0112
9. JS Islamic Fund(Islamic equity)	-0.01425	0.00176	0.00108	-0.01709
10. JS Large Cap Fund(Equity)	-0.01026	0.00193	0.00071	-0.01291
11. JS Value Fund(Equity)	-0.00848	0.00147	0.00038	-0.01034
12. Unit Trust of Pakistan(Balanced)	-0.00893	0.00102	0.00088	-0.01084
13. Crosby Dragon Fund(Equity)	-0.00789	0.00151	0.00115	-0.01056
14. Metrobank Pakistan Sovereign Fund(Perpetual)	-0.00774	0.00005	0.00056	-0.00835
15. Pakistan Capital Market Fund(Balanced)	-0.01246	0.00073	0.00094	-0.01415
16. Pakistan Income Fund(Income)	-0.00858	-0.000006	0.00361	-0.01219
17. Pakistan Premier Fund(Equity)	-0.01193	0.00173	0.00054	-0.01421
18. Pakistan Stock Market Fund(Equity)	-0.01076	0.00124	0.00099	-0.01301
19. Pakistan Strategic Asset Allocation Fund(Equity)	-0.00998	0.00189	0.00037	-0.01224
20. National Investment Unit Trust(Equity)	-0.00801	0.00127	0.00078	-0.01007
Average	-0.01052	0.00114	0.00100	-0.01268
Closed ended funds				
21. Golden Arrow Selected Stock Fund(Equity)	-0.00759	0.00158	0.00062	-0.00979
22. Atlas Fund of Funds(Fund of funds)	-0.00707	0.00162	0.00035	-0.00904
23. First Capital Mutual Fund(Equity)	-0.00758	0.00185	0.01265	-0.02209
24. PICIC Growth Fund(Equity)	-0.0134	0.00204	0.00035	-0.0158
25. PICIC Investment Fund(Equity)	-0.01113	0.00207	0.00022	-0.01343
26. Asian Stock Fund(Equity)	-0.00896	0.00044	0.00095	-0.01736
27. Safeway Mutual Fund(Equity)	-0.00862	0.00008	0.00465	-0.01336
Average	-0.00919	0.00138	0.00382	-0.01441

The Fama decomposition measure is used to capture the selection abilities and the extent of diversification achieved by each fund.. Decomposition of this overall performance reveals that all the funds were not fully diversified as all the funds had positive reward for diversification. PICIC Investment Fund showed the lowest reward of 0.00022 which means it is more diversified fund available during the study period. The First Capital Mutual Fund was the most undiversified portfolio with the highest value of 0.01265. Al-meezan mutual fund proved better as compared to the other funds in the industry, but it was also characterized by the negative returns due to selectivity and it had net selection of -0.00781. The JS Aggressive Asset Allocation Fund showed the lowest results regarding selection abilities and had the worst reward for selectivity of -0.03436.

**Table-4**  
*Comparative Analysis*

	Sharpe	Treynor	Sortino	Information	M2	Jensen	Over all	Systemat	Diversificati	Net
		Ratio	Ratio	Ratio		Alpha	Performance	ic Risk	on	selectivi
										ty
<b>Islamic Funds</b>	-0.1073	-0.0120	-	-0.1484	0.0012	-	-0.00851	0.00161	0.00083	-0.01096
			0.0874		1	0.010				
<b>Income Funds</b>	-0.4193	0.1845	-	-0.13541	-	-	-0.00901	0.00002	0.00131	-0.01035
		3	0.3870		0.0167	0.009				
<b>Equity Funds</b>	-0.1016	-0.0299	-	-0.19528	0.0014	-	-0.00953	0.00146	0.00232	-0.01332
			0.1288			0.005				
<b>Balanced Funds</b>	-0.1715	-0.0260	-	-0.1942	-	-	-0.01133	0.00096	0.0008	-0.0131
			0.1352		0.0046	0.012				
<b>Asset Allocation funds</b>	-0.2031	-0.0638	-	-0.21617	-	-	-0.03038	0.00101	0.00295	-0.03436
			0.0726		0.0071	0.031				
<b>Fund of Funds</b>	-0.1202	-0.0098	-	-0.20126	0.0016	-	-0.00707	0.00162	0.00035	-0.00904
			0.1037		1	0.008				
						7				

As discussed earlier that the funds included in this study are placed in six categories, i.e, Islamic, Income, Equity, Balanced, Asset Allocation and Fund of Funds with respect to the type of securities in which they invest. Comparative performance of these categories is given in table-9. Results for each measure used in the study are varying for each category, but on the whole results portray the negative picture as reported for the individual funds in previous discussion. In case of Sharpe ratio equity funds are better with an average result of -0.10167. Income funds perform better with respect to the Treynor ratio and they are characterized by low systematic risk which enabled them to realize an average Treynor ratio of 0.18453. Asset allocation funds possess highest Sortino ratio of -0.07267 which means they have less variation in their negative returns or we can say downside risk. All the six types of funds have a negative Sortino ratio, which is once again an indicator of poor performance. Income funds have a higher information ratio of -0.13541 and all other types exhibit even worse scenario as they are characterized by larger negative values for this ratio. As discussed earlier M2 is directly comparable to stock index returns. So if any fund had greater M2 than the average returns of the stock market, then it is a better performer. None of the funds were able to do so individually and the same should be the case when we compare this performance categorically. Best M2 was achieved by Fund of

Funds having an average M2 ratio of 0.00161 while average returns for the KSE are 0.01130 which is much higher as compared to all types of funds. Jensen Alpha for all funds is negative as previously discussed same are the results in case of fund types. Equity funds have a higher Jensen Alpha value of -0.00518. Table-9 presents the highest overall performance of -0.00707 for fund of funds and highest reward for systematic risk of 0.00162 is also associated to same category. Table-9 also proves that fund of funds category included in this study is also more diversified one with a reward for diversification equal to 0.00035 and it also have better selection abilities as compared to other categories having a value of -0.00904 but it is also noticeable that this category includes only one fund in this study period so it is not truly reflective of the fact that fund of funds are the best performers regarding Fama's measure because a single fund cannot be the representative of whole category but this will be clarified in future studies where more number of funds could have been included as number of funds is increasing day by day in Pakistan.

**Table 5.**  
*Correlation*

	<i>Sharpe</i>	<i>Treynor</i>	<i>Sortino</i>	<i>Information</i>	<i>M2</i>	<i>Jensen Alpha</i>	<i>Diversification</i>	<i>Net Selectivity</i>
Sharpe	1							
Treynor	-0.1579	1						
Sortino	0.7464	-0.2106	1					
Information	-0.0579	0.03452	-0.3096	1				
M2	0.7721	0.45019	0.5112	0.0220	1			
Jensen Alpha	0.2129	0.00474	-0.4468	0.4559	0.2346	1		
Diversification	0.1377	0.15509	-0.1499	0.0763	0.3866	0.4331	1	
Net Selectivity	-0.0676	-0.0177	-0.1585	0.3113	-0.0789	0.0888	-0.4837	1

In table-5 we can see the correlation of the results obtained through all the seven measures used in this study for each fund. The Results clearly indicate that there are many negative or less correlated values in this table. These negatively correlated answers support our varying results for each measure. It was also concluded in the previous analysis that there is not a single fund, which is constantly winner or loser as compared to its competitors for all the measures used. This suggests that the results of this study are not consistent with the

results of Eling (2008) who said that most of the risk adjusted measures portray almost similar rankings for the funds. Although one thing is common for all the measures used in this study that there is significant underperformance on the part of the whole mutual fund industry when compared to a common benchmark that is Karachi Stock Exchange.

### **Conclusion**

Pakistan is a developing country and its mutual fund industry is also in a growing stage. Although it is a multibillion industry, it still has a long journey to go. Risk adjusted performance of mutual funds is studied in this research and results depict underperformance using all the seven measures during this period. All the results revealed poor performance in comparison to the Karachi Stock Exchange. Comparison between open and close ended funds were reflective of better performance of closed end funds. It is also very clear that all the measures used gave different results on the part of individual funds as no single fund was consistent to win or lose. The Asian Stock Fund was ranked first in Sharpe, Information and Jensen measures. Atlas Income Fund had the lowest values for Sharpe and M2 measures. Pakistan Income Fund stood first for Treynor ratio, but came last in case of Sortino ratio and JS Islamic fund was worst according to Treynor ratio. Al-meezan Mutual Fund stood first for Sortino ratio and it was also the most diversified portfolio for having lowest returns for low diversification. PICIC Investment Fund had the highest net selectivity, but ranked last for Sortino ratio. First Capital Mutual Fund won the race for M2 measure, but on the other hand it was faced by worse selection abilities. The JS Aggressive Asset Allocation Fund stood last twice as it had lowest Jensen Alpha value and was also the most undiversified portfolio.

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