Economies of Scale and Efficiency of Mutual Funds in Pakistan

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Abstract *Mutual funds have a significant role as an institutional investor to allocate funds in an efficient way. Therefore, this study examines efficiency of mutual funds due to their substantial role in the growth of economy. Technical Efficiency (TE), Pure Technical Efficiency (PTE), and Scale Efficiency (SE) of mutual funds are examined over the period of 2011 to 2016 by following Data Envelopment Analysis (DEA). The results showed a TE of 70.6%, PTE of 73%, and SE of 96.3% in mutual funds of Pakistan. A significant boost has been noticed in the efficiency of the initial year but it decreased afterward. Decreasing return to scale is found 52.40% whereas, increasing return to scale are found 17.41%. There were only 30.19% mutual funds which are working on right scale. It suggests that regulators need to closely monitor mutual funds since unplanned growth in size of mutual funds will damage the overall efficiency since the decreasing return to scale are found highest in percentage.*

Key Words: Efficiency, Data Envelopment Analysis, Mutual Funds, Pakistan

Introduction

The mutual fund plays a vital role as an intermediary that purchases different types of securities and issue units to investors. These units are highly liquid and provide an investment alternative in the capital market. Return in mutual funds is expected to be above average since these funds are managed by professional managers who are specialized in the field of finance. They scrutinize securities and look for an investment opportunity to make a diversified risk-adjusted portfolio.

Mutual funds have a long history in Pakistan, National Investment Unit Trust (1962) was introduced as the first mutual fund in Pakistan. Recently, mutual funds have shown significant progress in their net assets since it increased from 116 billion rupees in 2006 to 453 billion rupees in 2016 while the net assets of closed-end funds have decreased from 43.5 billion rupees in 2006 to just 18.7 billion rupees in 2016. The reason behind decrease of closed-end mutual funds was the higher accessibility and operational easiness of open-end mutual funds which improve their popularity.

On one hand, mutual funds pool the expenses of research, commission, management and other relevant expenses over a large number of financial assets, which eventually reduce the cost of management for their investors. On the other hand, they also try to optimize their return and investments by managing it with the most professional personals. Moreover, they also allocate money from individual savers and firms to stocks, government securities, and other related financial assets in different potential industries of the economy. Consequently, they play an important role in the overall growth of the economy, particularly, in the industrial sector. Primarily, this study tries to analyze the overall efficiency of mutual fund from 2011-2016 in Pakistan. The current study helps managers of mutual funds to identify where they are lacking and where they are performing well. It also helps the investors to analyze mutual fund market and suggests which of the mutual funds are a better choice of investment based on their level of efficiency. The regulators can identify whether the mutual fund as an industry is performing sound as a whole. Is there any need for corrective measures to keep the industry on right track?

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This paper further discussed the efficiency of funds with the help of some previous empirical studies in section II. The methodology is presented in section III whereas, section IV provides the empirical result and the final section gives us an overall conclusion of the study with some empirical suggestions.

Literature Review

Many research studies have analyzed the efficiency of mutual funds e.g. Tavakoli and Houshyar (2014) investigated the efficiency and productivity of US mutual funds from 2000 to 2012. The key variables used in this research were management fee, fund size, age of fund, incentive fee. For analysis, Data Envelopment Analysis (DEA) was used, the results showed that efficiency and productivity were positively related to the age and fee and were negatively related to size and fee.

Garcia et al (2016) conducted worldwide efficiency research on 16,085 equity mutual funds of 35 different countries in the Asia Pacific, North America, Europe, and some other countries from 1990 to 2015. The key variables for this study were total net assets, turnover, management fee, loads, and fund age. DEA was applied and the results showed a negative relationship of return with other variables by applying parametric approach (regression model) and a positive relationship by applying non-parametric (DEA).

Ayadi et al. (2015) analyzed 85 Canadian Socially Responsible Investment (SRI) mutual funds from 2008 to 2011. They applied DEA on their selected input-output variables. This study revealed that Canadian SRI mutual funds were inefficient due to their fund size, and front-end loads. Alexakis and Tsolas (2011) investigated 55 Greek domestic equity funds to examine the efficiency of equity market using DEA from 2001 to 2004. They selected assets, loads, and risk as input variables whereas; return as the output variable. Their results depicted that the average efficiency in the equity funds was increased. In another study by Gardijan and Kristo (2017) applied DEA to assess the performance of 60 mutual funds in three different time periods; before the financial crisis, during financial crisis, and post-crisis from 2005 to 2015 in Croatia. The key variables for this study were semi-variance, and expected shortfall as inputs whereas; excess return, skewness and standard deviation as outputs. In results, it was found that stock and money market funds were efficient in pre-crisis period, but during financial crisis only money market funds performed efficiently, while post-crisis, there is no clear dominance by any fund.

Hendrawan and Sumantri (2013) investigated 105 mutual funds based on 39 fixed mutual funds, 38 balanced mutual funds, and 29 equity funds operating in Indonesia from 2007 to 2011. The result showed the highest index in CIMB principal Dollar (balanced fund), and Life Investra equity (equity fund) whereas; Trim Capital, First state multistrategy, and Obligasi Stabil had the lowest index scores.

Afshan (2013) assesses the performance of balanced mutual funds, categorized as 15 growth funds and 15 dividend funds from the period of 2009 to 2012 in India. The standard deviation of return, Value-at-Risk (VaR), conditional VaR, and imputed cost were selected as input variables whereas; annual return and residual return were selected as output variables. Efficiency scores were measured by applying DEA. The findings of the study revealed an increasing trend of efficiency in both categories.

There is limited literature on efficiency analysis of mutual funds in Pakistan since there are limited studies that estimate the efficiency of mutual funds with a DEA approach. Asghar et al (2013) analyzed 100 mutual funds of Pakistan to measure the cost-efficiency. An increasing trend in efficiency was noticed in the efficiency of mutual funds from 2005 to 2008 but afterward, in 2008, the efficiency scores fall because of the financial crisis. Recently, Bangash et al (2018) also evaluated Cost Efficiency (CE) of 44 mutual funds with DEA. The study found there were 7 mutual funds which were working efficiently.

The current study has tried to examine the technical, pure technical and scale efficiency rather than cost efficiency which is already analyzed in previous studies. The PTE is the managerial efficiency that how much they are efficient in converting inputs into outputs whereas, SE is the size efficiency which tells us about the efficiency of mutual fund in a particular size. If it is working efficiently, it will be considered as Constant Return to Scale (CRS) and if it is inefficient then it can be due to Increasing Return to Scale (IRS) or Decreasing Return to Scale (DRS). The TE is actually the operating efficiency which is calculated by-product of both managerial efficiency (PTE) and size efficiency (SE). It describes how much a firm is operationally efficiently in converting inputs into outputs irrespective of their size (scale). Moreover, the focus of the current study is to examine the recent

efficiency of mutual funds since the Pakistan Stock Exchange (PSX) performed wonderfully well during selected study period from 2011 to 2016. Furthermore, this study has also included Return to Scale (RTS) analysis to find the real cause of scale inefficiency in mutual funds as discussed above.

Research Methodology

Parametric and non-parametric techniques can be used but many empirical studies with small sample size have preferred non-parametric DEA which was introduced by Charnes et al in 1978. DEA uses multiple input variables and output variables to calculate efficiency scores between 0 and 1. It will be efficient if it attains the level of efficiency at 1 and if it is less than 1, it will be an inefficient DMU (Afza & Jam-e-Kausar, 2010).

Input and Output Variables

Different studies have followed various approaches but this study has selected value-added approach as compared to intermediation approach and user cost approach since it selects input & output based on its value addition as DMU (Asghar et al, 2013). The present study selected two output variables; Returns and Investments, as these variables have been selected in previous empirical studies e.g., (Qamruzzaman, 2014; Barrientos & Boussofiane, 2005). Both return and investment are an essential part of every financial institution. Mutual funds try to increase their returns by investing in different national and international securities. Mutual funds invest in highly diversified portfolio to minimize the risk associated with securities and maximize their returns. In this study, return is measured as relative return to eliminate the problem of negative values in mutual funds as suggested in literature.

Input variables are; management fee, operating expenses, and total assets. Management companies require a remuneration from mutual funds against their management services. This cost incurred by mutual funds is called the management fee. Many empirical studies have used operating expenses as an input variable e.g., (Barrientos & Boussofiane, 2005). So, this study has also considered operating expenses as an input variable since it is a major expense paid by mutual funds. Total assets are also considered important input variable in the current study by following previous literature (Cullinan & Zheng, 2012). The details of these variables are provided in table 1.

Table 1. Input and Output Variables

Variables	Input/output Variable	Measure
Relative return	Output	(Total Income / Total Assets) + 1
Investment	Output	Total investments
Management fee	Input	Remuneration of management
Operating expense	Input	Total operating expenses
Total Assets	Input	Total Assets of Fund

Data

71 funds are analyzed from 2011 to 2016. Mutual funds were adversely affected after the financial crises in 2008-09 therefore, this study tried to include the time period after the crisis since the Pakistan Stock Exchange (PSX) showed continuous improvement during this study period of 2011 to 2016. The descriptive statistics are provided in Table 2. Relative Return of mutual funds in Pakistan is 1.108 in 2011 and 1.103 in 2016 that shows a slight decrease in relative return. Investment has also shown a decreasing trend from Rs. value-added billion in 2011 to Rs. 3090 billion in 2016. Management Fee has shown rapid growth from Rs. 32.34 million in 2011 to Rs. 51.59 million in 2016. Operating expenses also increased from Rs. 52.54 million in 2011 to Rs. 84.71 million in 2016. Assets of the funds show an increasing trend from Rs. 2,940 billion in 2011 to Rs. 4,260 billion.

Table 2. Descriptive Statistics of Input and Output Variables

		Outputs		Inputs		
Year		**Relative Returns**	**Investment** (PKR)	**Mgt Fee** (PKR)	**Operating Expences** (PKR)	**Total Assets** (PKR)
2011	Mean	1.108 bn	3.64 bn	0.032 bn	0.052 bn	2.94 bn
	S.D	0.082	11.69 bn	0.053 bn	0.137 bn	6.18 bn
	Mean	1.079	3.44 bn	0.040 bn	0.075 bn	4.14 bn
2012	S.D	0.081	7.33 bn	0.074 bn	0.207 bn	8.31 bn
2013	Mean	1.174	2.49 bn	0.041 bn	0.065 bn	3.59 bn
	S.D	0.248	6.19 bn	0.074 bn	0.121 bn	7.58 bn
2014	Mean	1.117	2.97 bn	0.044 bn	0.362 bn	4.05 bn
	S.D	0.072	8.30 bn	0.079 bn	0.131 bn	8.87 bn
2015	Mean	1.090	3.03 bn	0.051 bn	0.086 bn	4.08 bn
	S.D	0.066	9.28 bn	0.101 bn	0.161 bn	9.67 bn
2016	Mean	1.052	2.98 bn	0.051 bn	0.084 bn	4.26 bn
	S.D	0.045	9.14 bn	0.105 bn	0.169 bn	9.45 bn
Mean	Mean	1.103	3.09 bn	0.043 bn	0.176 bn	3.35 bn
	S.D	0.068	1.72 bn	0.018 bn	0.029 bn	1.19 bn

Empirical Results

The efficiency results are provided in Table 3. Technical efficiency or operating efficiency is found at 70.6% which suggests that mutual funds are consuming 29.4% more inputs to produce the same level of outputs. Technical efficiency improved in 2012 as it increased from 42.7% in 2011 to 83.3% in 2012. Afterward, they continuously decreased and reached 67.6% in 2016. This technical efficiency level is lower than found by Asghar et al. (2013) who found average efficiency of 92% during the period of 2005 to 2010. It suggests that mutual fund industry has lost its way and it is not producing same amount of outputs as compared to earlier study period.

Table 3. Efficiency of Funds (2011-2016)

	2011				2012				2013				2014			
Names	TE	PTE	SE	RTS	TE	PTE	SE	RTS	TE	PTE	SE	RTS	TE	PTE	SE	RTS
ABL Cash Fund	0.200	0.212	0.945	drs	0.891	0.932	0.956	drs	0.938	1.000	0.938	drs	0.710	0.732	0.971	drs
ABL Income Fund	0.129	0.129	0.995	irs	0.777	0.777	1.000	-	0.497	0.497	0.999	-	0.506	0.506	1.000	-
ABL Islamic Income Fund	0.608	0.664	0.916	drs	0.745	0.745	1.000	-	0.638	0.641	0.995	irs	0.220	0.225	0.980	irs
ABL Stock Fund	0.301	0.424	0.710	drs	0.923	1.000	0.923	drs	0.906	0.920	0.984	drs	0.700	0.703	0.996	drs
ABL Government Securities Fund	N/A	N/A	N/A	N/A	1.000	1.000	1.000	-	0.582	1.000	0.582	drs	0.694	0.745	0.932	drs
AKD Aggressive Income Fund	0.417	0.442	0.944	drs	0.493	0.494	0.998	drs	0.562	0.569	0.988	irs	0.624	0.626	0.996	irs
AKD Cash Fund	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	1.000	1.000	1.000	-
AKD Index Tracker Fund	1.000	1.000	1.000	-	1.000	1.000	1.000	-	1.000	1.000	1.000	-	0.992	1.000	0.992	irs
AKD Opportunity Fund	0.328	0.353	0.929	irs	0.998	1.000	0.998	drs	0.966	1.000	0.966	drs	0.990	1.000	0.990	drs
AKD Golden Arrow Selected Stock Fund	0.240	0.243	0.989	drs	0.989	1.000	0.989	drs	0.991	1.000	0.991	drs	0.970	1.000	0.970	drs
Al Meezan Islamic Fund	0.153	0.238	0.641	drs	0.966	0.966	1.000	-	0.925	0.973	0.950	drs	0.900	0.933	0.965	drs
Al Meezan Sovereign Fund	0.233	0.244	0.958	drs	0.727	0.727	1.000	-	0.730	0.792	0.922	drs	0.666	0.688	0.969	drs
Al Meezan Mutual Fund	0.219	0.433	0.506	drs	0.898	0.898	1.000	-	0.919	0.922	0.996	drs	0.945	0.964	0.980	drs
Al Meezan Balanced Fund	0.248	0.359	0.692	drs	0.950	0.950	1.000	-	0.840	0.841	0.999	drs	0.759	0.761	0.998	drs
Al Meezan Cash Fund	0.094	0.103	0.917	drs	0.350	0.350	1.000	-	0.589	0.589	1.000	-	N/A	N/A	N/A	N/A
Al Meezan Islamic Income Fund	0.186	0.206	0.903	drs	0.732	0.732	1.000	-	0.563	0.563	0.999	irs	0.326	0.329	0.990	drs
KSE Meezan Index Fund	N/A	N/A	N/A	N/A	1.000	1.000	1.000	-	1.000	1.000	1.000	-	0.828	0.913	0.906	drs
Alfalah GHP Cash Fund	0.291	0.328	0.886	drs	0.843	0.843	1.000	-	0.687	0.687	0.999	-	1.000	1.000	1.000	-
Alfalah GHP Value Fund	0.331	0.338	0.979	irs	0.565	0.565	1.000	-	0.818	0.818	1.000	-	0.984	0.998	0.987	drs
Alfalah GHP Income Multiplier Fund	0.614	0.629	0.976	drs	0.839	0.840	0.998	irs	0.652	0.666	0.979	irs	0.886	0.949	0.934	drs
Alfalah GHP Islamic Stock Fund	0.409	0.410	0.997	irs	0.593	0.609	0.974	drs	0.737	0.746	0.988	drs	0.732	0.742	0.987	drs
Alfalah GHP Alpha Fund	0.904	0.938	0.964	irs	1.000	1.000	1.000	-	1.000	1.000	1.000	-	0.770	1.000	0.770	drs
Askari Asset Allocation Fund	0.576	0.699	0.824	irs	0.950	0.989	0.960	drs	0.750	0.757	0.991	irs	0.946	0.961	0.984	drs
Askari High Yield Scheme	0.174	0.180	0.964	drs	0.732	0.732	1.000	-	1.000	1.000	1.000	-	0.758	0.773	0.982	drs
Askari Islamic Asset Allocation Fund	0.940	0.974	0.965	irs	1.000	1.000	1.000	-	0.857	0.857	1.000	-	1.000	1.000	1.000	-
Askari Islamic Income Fund	0.656	0.729	0.901	drs	0.687	0.689	0.997	drs	0.511	0.515	0.993	irs	0.836	0.837	0.999	irs
Askari Sovereign Cash Fund	0.213	0.240	0.888	drs	0.836	0.836	1.000	-	0.666	0.666	1.000	-	0.713	0.721	0.988	drs
Askari Equity Fund	N/A	N/A	N/A	N/A	1.000	1.000	1.000	-	1.000	1.000	1.000	-	1.000	1.000	1.000	-
Askari Sovereign Yield Enhancer Fund	N/A	N/A	N/A	N/A	1.000	1.000	1.000	-	0.928	0.929	0.999	irs	0.976	0.976	1.000	-
Atlas Money Market Fund	0.231	0.269	0.860	drs	0.770	0.770	1.000	-	0.983	0.983	1.000	-	0.675	0.693	0.974	drs
Atlas Income Fund	0.298	0.307	0.973	drs	0.840	0.840	1.000	-	0.773	0.774	0.999	irs	0.670	0.684	0.980	drs
Atlas Stock Market Fund	0.319	0.655	0.487	drs	0.984	0.984	0.999	drs	0.929	0.932	0.997	drs	0.870	0.876	0.993	drs
Atlas Islamic Income Fund	0.627	0.712	0.880	drs	0.708	0.745	0.950	drs	0.727	0.733	0.993	irs	0.541	0.544	0.995	irs
Atlas Islamic Stock Fund	0.486	1.000	0.486	drs	0.916	0.917	0.999	drs	0.897	0.901	0.996	drs	0.845	0.849	0.995	drs
BMA Chandigarh Road Saving Fund	1.000	1.000	1.000	-	0.926	0.929	0.997	irs	0.811	0.816	0.994	irs	0.772	0.785	0.983	irs
BMA Epress Cash Fund	0.287	0.303	0.949	drs	0.946	0.946	1.000	-	0.872	0.881	0.990	irs	0.865	0.868	0.996	drs
Faysal Balanced Fund	0.388	0.389	0.996	irs	0.807	0.823	0.980	irs	1.000	1.000	1.000	-	1.000	1.000	1.000	-
Faysal Islamic Saving & Growth Fund	0.670	0.730	0.917	drs	0.392	0.500	0.784	drs	0.494	0.499	0.991	irs	0.266	0.273	0.975	irs
Faysal Money Market Fund	0.590	0.632	0.934	drs	0.795	0.795	1.000	-	1.000	1.000	1.000	-	0.237	0.240	0.984	drs
Faysal Income & Growth Fund	0.299	0.306	0.980	drs	0.729	0.730	0.999	-	0.847	0.850	0.996	irs	0.729	0.729	1.000	-
Faysal Saving and Growth Fund	0.082	0.083	0.992	irs	0.780	0.780	1.000	-	0.686	0.686	0.999	irs	0.453	0.453	1.000	-
Habib Cash Fund	1.000	1.000	1.000	-	0.812	0.812	1.000	-	0.834	0.835	1.000	-	0.812	0.821	0.989	drs
Habib Income Fund	0.217	0.220	0.989	irs	0.798	0.798	1.000	-	0.871	0.872	0.999	irs	0.938	0.938	1.000	-
Habib Stock Fund	1.000	1.000	1.000	-	0.996	1.000	0.996	drs	1.000	1.000	1.000	-	0.958	0.990	0.968	drs
Habib Islamic Balanced Fund	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.829	0.851	0.974	irs	0.595	0.595	1.000	-
Lakson Money Market Fund	0.153	0.160	0.959	drs	0.598	0.598	1.000	-	0.268	0.268	1.000	-	0.157	0.158	0.997	-
Lakson Equity Fund	0.934	0.934	1.000	-	0.890	0.938	0.949	drs	1.000	1.000	1.000	-	0.868	1.000	0.868	drs
Asset Allocation Global Commodities	N/A	N/A	N/A	N/A	0.838	0.838	1.000	-	0.843	0.849	0.993	irs	N/A	N/A	N/A	N/A
Asset Allocation Emerging Markets	N/A	N/A	N/A	N/A	0.831	0.832	1.000	-	0.867	0.872	0.994	irs	0.700	0.741	0.944	irs
NIT Govt. Bond Fund	0.187	0.198	0.944	drs	0.983	0.983	1.000	-	1.000	1.000	1.000	-	0.945	0.962	0.983	drs
NIT Income Fund	0.210	0.228	0.919	drs	0.963	0.963	1.000	-	0.983	0.983	1.000	-	0.883	0.893	0.989	drs
National Investment Unit Trust	0.163	0.166	0.981	drs	0.923	1.000	0.923	drs	0.941	1.000	0.941	drs	0.966	1.000	0.966	drs
NAFA Govt. Sec. Liquid Fund	1.000	1.000	1.000	-	0.896	0.896	1.000	-	0.386	0.387	0.999	-	0.515	0.532	0.969	drs
NAFA Aggressive Income Fund	N/A	N/A	N/A	N/A	0.780	0.803	0.972	irs	0.813	0.868	0.937	irs	N/A	N/A	N/A	N/A
NAFA Islamic Asset Allocation Fund	N/A	N/A	N/A	N/A	0.715	0.716	0.999	irs	0.436	0.436	0.999	drs	N/A	N/A	N/A	N/A
NAFA Money Market Fund	N/A	N/A	N/A	N/A	1.000	1.000	1.000	-	0.163	0.163	1.000	-	0.161	0.164	0.977	drs
Pak Oman Advanced Fund	0.254	0.278	0.914	drs	0.661	0.661	1.000	-	0.828	0.830	0.998	irs	0.351	0.352	0.999	-
Pak Oman Islamic Asset Allocation	0.953	1.000	0.953	drs	0.966	1.000	0.966	drs	0.776	0.795	0.976	irs	0.924	0.934	0.990	irs
Pak Oman Advanced Islamic Income	0.503	0.552	0.911	drs	0.912	0.912	0.999	drs	0.726	0.749	0.969	irs	N/A	N/A	N/A	N/A
Pak Oman Adv. Asset Allocation	0.569	0.574	0.992	drs	0.913	0.933	0.979	irs	0.812	0.813	0.999	drs	0.957	1.000	0.957	irs
UBL Liquidity Plus Fund	0.130	0.133	0.976	drs	0.655	0.672	0.974	drs	0.742	0.777	0.955	drs	0.348	0.394	0.882	drs
UBL Govt. Security Fund	N/A	N/A	N/A	N/A	0.746	0.746	1.000	-	0.625	0.626	1.000	-	1.000	1.000	1.000	-
UBL United Growth & Income Fund	0.103	0.111	0.922	irs	0.801	0.801	1.000	-	0.846	0.846	1.000	-	0.793	0.805	0.985	drs
UBL United Stock Advantage Fund	0.208	0.274	0.757	drs	0.978	0.978	1.000	-	0.916	0.919	0.996	drs	0.913	0.938	0.974	drs
Al-Amin Islamic Soveriegn Fund	0.364	0.438	0.830	drs	0.782	0.782	1.000	-	0.734	0.734	1.000	-	0.777	0.790	0.984	drs
Al-Amin Shariah Stock Fund	0.348	0.563	0.618	drs	0.785	0.785	0.999	-	0.938	0.941	0.997	drs	0.841	0.865	0.972	drs
UBL Gold Fund	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	1.000	1.000	1.000	-
UBL Al-Amin Islamic Cash Fund	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	1.000	1.000	1.000	-	N/A	N/A	N/A	N/A
MEAN	0.427	0.476	0.898		0.833	0.842	0.988		0.795	0.809	0.984		0.754	0.773	0.976	

Names	2015				2016				Average		
	TE	PTE	SE	RTS	TE	PTE	SE	RTS	TE	PTE	SE
ABL Cash Fund	0.757	0.787	0.963	-	0.195	0.195	0.999	-	0.615	0.643	0.962
ABL Income Fund	0.478	0.490	0.976	drs	0.521	0.521	0.999	drs	0.485	0.487	0.995
ABL Islamic Income Fund	0.454	0.470	0.966	drs	0.491	0.546	0.898	drs	0.526	0.549	0.959
ABL Stock Fund	0.890	0.923	0.965	drs	0.947	0.949	0.998	drs	0.778	0.820	0.949
ABL Government Securities Fund	0.595	0.618	0.962	drs	0.242	0.242	0.998	-	0.623	0.721	0.895
AKD Aggressive Income Fund	0.885	0.913	0.969	drs	0.570	0.574	0.993	drs	0.592	0.603	0.981
AKD Cash Fund	1.000	1.000	1.000	-	1.000	1.000	1.000	-	1.000	1.000	1.000
AKD Index Tracker Fund	1.000	1.000	1.000	-	0.997	1.000	0.997	drs	0.998	1.000	0.998
AKD Opportunity Fund	0.968	1.000	0.968	drs	0.959	0.960	0.999	drs	0.868	0.886	0.975
AKD Golden Arrow Selected Stock Fund	0.916	0.916	0.961	drs	0.986	0.987	0.999	drs	0.849	0.872	0.976
Al Meezan Islamic Fund	0.940	0.979	0.960	drs	0.928	1.000	0.928	drs	0.802	0.848	0.907
Al Meezan Sovereign Fund	0.716	0.744	0.961	drs	0.602	0.655	0.918	drs	0.612	0.642	0.955
Al Meezan Mutual Fund	0.729	0.757	0.963	drs	0.972	0.986	0.986	drs	0.780	0.827	0.905
Al Meezan Balanced Fund	0.827	0.858	0.964	drs	0.862	0.864	0.998	drs	0.748	0.772	0.942
Al Meezan Cash Fund	0.282	0.295	0.954	drs	0.205	0.205	1.000	-	0.304	0.308	0.974
Al Meezan Islamic Income Fund	0.557	0.578	0.964	drs	0.658	0.658	0.999	drs	0.504	0.511	0.976
KSE Meezan Index Fund	0.804	0.891	0.902	drs	0.999	1.000	0.999	drs	0.961	0.962	0.999
Alfalah GHP Cash Fund	0.947	0.973	0.973	drs	0.421	0.582	0.724	drs	0.698	0.736	0.946
Alfalah GHP Value Fund	0.893	0.938	0.952	drs	0.871	1.000	0.871	drs	0.744	0.776	0.965
Alfalah GHP Income Multiplier Fund	0.895	0.926	0.967	drs	0.772	0.773	0.999	-	0.776	0.797	0.976
Alfalah GHP Islamic Stock Fund	0.826	0.929	0.889	drs	0.813	1.000	0.813	drs	0.685	0.739	0.941
Alfalah GHP Alpha Fund	0.869	1.000	0.869	drs	0.818	0.818	1.000	-	0.894	0.959	0.934
Askari Asset Allocation Fund	0.820	0.827	0.992	drs	0.729	0.759	0.960	irs	0.795	0.832	0.952
Askari High Yield Scheme	0.704	0.730	0.965	drs	0.508	0.509	0.998	drs	0.646	0.654	0.985
Askari Islamic Asset Allocation Fund	0.848	0.852	0.995	irs	0.901	0.934	0.965	irs	0.924	0.936	0.988
Askari Islamic Income Fund	0.371	0.376	0.986	irs	0.734	0.739	0.992	drs	0.633	0.648	0.978
Askari Sovereign Cash Fund	0.692	0.716	0.967	drs	0.449	0.494	0.909	drs	0.595	0.612	0.959
Askari Equity Fund	0.774	0.788	0.983	irs	0.943	0.970	0.972	irs	0.943	0.952	0.991
Askari Sovereign Yield Enhancer Fund	0.742	0.756	0.980	drs	0.516	0.516	1.000	-	0.832	0.835	0.996
Atlas Money Market Fund	0.092	0.092	0.995	-	0.230	0.264	0.870	drs	0.512	0.520	0.950
Atlas Income Fund	0.143	0.146	0.979	drs	0.476	0.715	0.665	drs	0.533	0.578	0.933
Atlas Stock Market Fund	0.895	0.949	0.943	drs	0.990	0.992	0.998	drs	0.831	0.898	0.903
Atlas Islamic Income Fund	0.569	0.575	0.988	irs	0.855	1.000	0.855	drs	0.671	0.718	0.944
Atlas Islamic Stock Fund	0.925	0.955	0.969	irs	0.969	0.970	0.999	drs	0.840	0.932	0.907
BMA Chandigarh Road Saving Fund	0.425	0.447	0.951	irs	0.483	0.489	0.989	drs	0.736	0.744	0.986
BMA Epress Cash Fund	N/A	N/A	N/A	N/A	1.000	1.000	1.000	-	0.794	0.800	0.987
Faysal Balanced Fund	1.000	1.000	1.000	-	1.000	1.000	1.000	-	0.866	0.866	0.996
Faysal Islamic Saving & Growth Fund	0.275	0.278	0.990	irs	0.422	0.431	0.979	irs	0.420	0.452	0.939
Faysal Money Market Fund	0.764	0.764	0.966	drs	0.155	0.156	0.994	irs	0.586	0.598	0.980
Faysal Income & Growth Fund	0.634	0.636	0.997	drs	0.159	0.182	0.876	drs	0.566	0.572	0.975
Faysal Saving and Growth Fund	0.338	0.344	0.983	drs	0.171	0.171	0.999	-	0.418	0.420	0.996
Habib Cash Fund	0.465	0.472	0.985	drs	0.164	0.167	0.988	drs	0.681	0.685	0.994
Habib Income Fund	0.546	0.556	0.983	drs	0.537	0.537	0.999	irs	0.651	0.651	0.995
Habib Stock Fund	1.000	1.000	1.000	-	0.976	0.990	0.986	irs	0.988	0.997	0.992
Habib Islamic Balanced Fund	0.945	0.953	0.991	irs	1.000	1.000	1.000	-	0.842	0.850	0.991
Lakson Money Market Fund	0.656	0.680	0.965	drs	0.260	0.347	0.750	drs	0.349	0.369	0.945
Lakson Equity Fund	0.960	0.997	0.963	drs	0.939	0.940	0.998	drs	0.932	0.968	0.963
Asset Allocation Global Commodities	0.992	0.999	0.993	irs	0.505	0.686	0.736	drs	0.795	0.843	0.931
Asset Allocation Emerging Markets	1.000	1.000	1.000	-	0.990	0.990	0.990	irs	0.878	0.889	0.986
NIT Govt. Bond Fund	0.702	0.729	0.964	drs	0.692	0.693	0.998	drs	0.752	0.761	0.982
NIT Income Fund	0.646	0.669	0.966	drs	0.453	1.000	0.453	drs	0.690	0.698	0.979
National Investment Unit Trust	0.960	1.000	0.960	drs	1.000	1.000	1.000	-	0.826	0.861	0.962
NAFA Govt. Sec. Liquid Fund	0.410	0.425	0.965	drs	N/A	N/A	N/A	N/A	0.641	0.648	0.987
NAFA Aggressive Income Fund	0.404	0.411	0.981	irs	0.184	0.184	1.000	-	0.545	0.547	0.973
NAFA Islamic Asset Allocation Fund	0.641	0.784	0.818	drs	0.627	0.627	0.999	-	0.605	0.641	0.954
NAFA Money Market Fund	0.157	0.161	0.976	drs	N/A	N/A	N/A	N/A	0.370	0.372	0.988
Pak Oman Advanced Fund	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.524	0.530	0.978
Pak Oman Islamic Asset Allocation	0.990	1.000	0.990	drs	0.857	0.889	0.964	drs	0.911	0.936	0.973
Pak Oman Advanced Islamic Income	N/A	N/A	N/A	N/A	0.730	0.745	0.980	drs	0.718	0.740	0.965
Pak Oman Adv. Asset Allocation	1.000	1.000	1.000	-	1.000	1.000	1.000	-	0.875	0.887	0.988
UBL Liquidity Plus Fund	0.171	0.175	0.980	drs	0.236	0.236	0.999	-	0.380	0.398	0.961
UBL Govt. Security Fund	0.771	0.801	0.962	drs	0.725	0.725	1.000	-	0.773	0.780	0.992
UBL United Growth & Income Fund	0.805	0.835	0.965	drs	0.497	0.497	1.000	-	0.641	0.649	0.979
UBL United Stock Advantage Fund	0.925	0.961	0.963	drs	0.917	0.918	0.998	drs	0.810	0.831	0.948
Al-Amin Islamic Sovertign Fund	N/A	N/A	N/A	N/A	0.662	1.000	0.662	drs	0.664	0.749	0.895
Al-Amin Shariah Stock Fund	0.944	0.982	0.961	drs	0.891	0.893	0.998	drs	0.791	0.838	0.924
UBL Gold Fund	N/A	N/A	N/A	N/A	0.930	1.000	0.930	drs	0.965	1.000	0.965
UBL Al-Amin Islamic Cash Fund	0.211	0.211	1.000	-	N/A	N/A	N/A	N/A	0.606	0.606	1.000
MEAN	0.707	0.732	0.968		0.676	0.708	0.955				

Firm wise results of technical efficiency indicate that AKD Cash fund outperformed since it is the only fund that remained on the efficient frontier. AKD Index Tracker Fund performed the best with an efficiency level of 99%,

it is the second-best performing mutual fund. Habib Stock Fund also remained close to the frontier with an efficiency level of 98%. The reason behind outperforming of these funds is that they have the best managerial efficiency scores and also scale efficiently as compared to other funds and have the ability to efficiently utilize their inputs to generate outputs. Al Meezan Cash Fund, Lakson Money Market Fund, and NAFA Money Market Fund are found too far from the efficient frontier and were least efficiency with efficiency scores of 30%, 35%, and 37%, respectively. The reasons behind their lowest technical efficiency is managerial inefficiency.

PTE and SE combine together to form the TE. Mutual funds in Pakistan have lower PTE as compared to their SE. This suggests that funds need to improve their managerial efficiency either through producing more outputs or by reducing their total inputs to further raise their operating efficiency. PTE which (managerial efficiency) is found 73% over the period of 2011 to 2016. AKD Cash Fund and AKD Index Tracker Fund performed at optimum level whereas, AL-Meezan Cash Fund, Lakson Money Market Fund, NAFA Money Market Fund are amongst lowest managerial efficient mutual funds.

SE is found 96.3% in mutual funds of Pakistan. AKD Cash Fund, AKD Index Tracker Fund, and UBL Al-Amin Islamic Cash Fund while Atlas Stock Market Fund, ABL Govt. Securities Fund, Al-Amin Islamic Sovereign Fund are found inefficient with the efficiency scores of 0.903, 0.895, and 0.895, respectively. It indicates that mutual funds can raise their TE (operational efficiency) then they need to improve their PTE (managerial efficiency) since the level of PTE is lower than their SE.

Figure 2 provides the trend analysis of mutual funds from 2011 to 2016. The average TE in mutual funds increased from 42.7% in 2011 to 83.3% in 2012 and then continuously declined until 2016. PTE was at the point of 42.7% in 2011, then improved to 84.2% in 2012 and continued to fall to 70.8% in 2016. SE also increased from 89.8% in 2011 to 98.8% in 2012 and in 2016, it is found at 95.5%. These results indicate that the mutual funds failed to maintain their higher efficiency and need to improve their efficiency level particularly,in terms of their PTE. The significant improvement in terms of all efficiencies can be related to stock market revival after the worst performance in 2008-09.

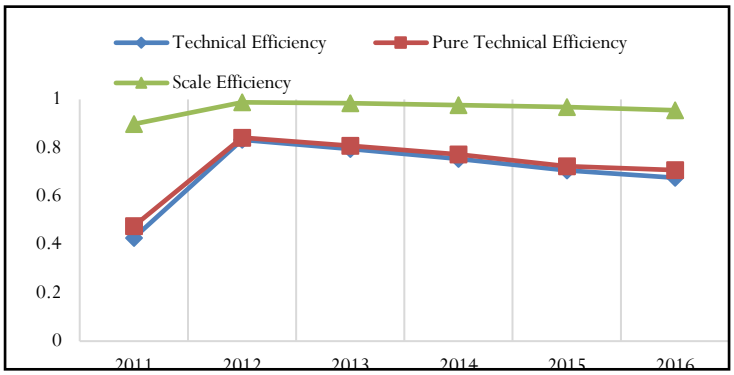

Fig 2: Mutual Funds of Pakistan

Economies of Scale

This study has also examined economies of scale in mutual funds. Proportional change in outputs resulting from the proportional change in inputs is called Return To Scale (RTS). There are three possibilities; Constant Return to Scale (CRS), Increasing Return to Scale (IRS), and Decreasing Return to Scale. If there is more proportional change in outputs resulting from less proportional change in inputs is considered as IRS or otherwise (DRS) whereas, if there is same proportional change then it is considered as CRS.

Table 4 describes the proportional changes of mutual funds over the period of 2011-2016. 52.40% mutual funds have DRS, whereas; 17.41% mutual funds are experiencing IRS, and the remaining 30.19% mutual funds are found CRS. These results suggest that most of the funds are working on an incorrect scale. The highest DRS are found in 2015 (73.02%) while the lowest in 2013 (27.27%). It suggests that in recent years the DRS problem is somewhat more alarming than the initial period of study. IRS has the highest percentage of 33.33% in 2013 and over the study period, there is a decreasing trend. It indicates that the regulators need to strategically monitor

mutual fund as an industry since any unplanned growth may lead to increase in inefficient funds because mutual funds with DRS are increasing whereas, mutual funds with IRS are decreasing. So, to improve level of efficiency in mutual funds, regulators have to focus on size of the mutual funds and made policy accordingly since mutual funds are facing problem of DRS.

Table 4. Scale Economies of Mutual Funds

	Return to Scale		
Year	**DRS**	**CRS**	**IRS**
2011	68.52%	11.11%	20.37%
2012	28.13%	62.50%	9.38%
2013	27.27%	39.39%	33.33%
2014	59.68%	24.19%	16.13%
2015	73.02%	12.70%	14.29%
2016	57.81%	31.25%	10.94%
Total	**52.40%**	**30.19%**	**17.41%**

Conclusion

The efficiency measurement of the mutual fund industry is much important as it is a way for individual as well as institutional investors to invest their money in capital markets. It also facilitates financially non-skilled persons to invest money in highly diversified portfolios managed by professionals. Therefore, their efficiency is important for the management as well as the investors. In addition, the contribution of mutual funds in the economy is also key since they facilitate in allocation of funds in various industries of economy.

It is noticed that the technical efficiency of mutual fund industry is low due to the lower pure technical efficiency rather than scale efficiency. It is suggested that mutual funds have to raise their managerial operations to improve their operational efficiency since they have lower managerial efficiency. They can do that by decrease in their inputs or by enhancing their overall output. This can be achieved by encouraging healthy competition amongst them. After financial crisis, the level of efficiency improved however, it deteriorated afterward.

This study also reveals that most of the mutual funds are inefficient due to higher number of DRS as compared to IRS. It indicates that overall industry is growing well however, any unplanned growth may lead to more efficiency detrition and raise the number of inefficient mutual funds. Therefore, the policymakers like Securities and Exchange Commission (SECP) need to monitor the industry and have to avoid such unproductive growth.

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