

RELATIONSHIP BETWEEN NAV OF EQUITY FUNDS AND MACROECONOMIC VARIABLES IN PAKISTAN

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ABSTRACT

In this paper an attempt has been made to empirically analyze the impact of macroeconomic variable such as CPI, M2, KIBOR and KSE 100 (Karachi Stock Exchange) index on NAV (Net Assets Value) of equity based mutual funds. Co-integration and causality analyses have been applied to determine long and short run relationships. According to the findings, NAVs of majority of equity based mutual funds have long and short run relationship with macroeconomic variables and not with the KSE 100 index. NAVs of all mutual funds analyzed jointly with macroeconomic variables and KSE 100 index have long run relationship except one mutual fund. In case of bivariate causal relation relationship, the macroeconomic variables have causal relationship with NAVs of mutual funds and NAVs of few mutual funds have causal relationship with KSE 100 index. Jointly short run relationship do not exist for all mutual fund NAVs except three mutual funds.

Keywords: Mutual Funds, Macroeconomic Variables, Co-integration, Causality and Error Correction Model.

Introduction

Mutual funds industry has attracted a lot more attention of investors being financial intermediary between investors and financial markets in developing countries. As the economy of Pakistan is also considered under the umbrella of developing economy, therefore, the mutual funds industry of Pakistan has also grown up rapidly. According to the statistics given by MUFAP (Mutual Funds Association of Pakistan), net assets value was 22%, 27%, 20% and 31% of Individuals, banking and financial institutions, provident & pension mutual funds and other type of investors in financial year 2010. In the same year, total number of accounts held by Individual, banking and financial institutions, provident & pension funds and other investors were 1,09,244; 6,05; 2,347; 2,039 respectively. In financial year 2011, statistics regarding net assets value has documented an upward trend, whereas, number of account holders statistics has documented upward as well as downward trend. The net assets value and number of account holders statistics were as following 1,12,814; 1,199; 2,053; 6,707 in PKR million and 20%, 21%, 11%, 48% respectively of individuals, banking and financial institution, provident & pension funds and others respectively. It is expected that the industry will experience the same trend in forthcoming financial years. The return of

mutual funds industry in 2010 and 2011 remained respectively 10.04% and 24%. Macroeconomic factors are considered key drivers of any economy. The utmost effort of any type of investor is to maximize return on their investment. The important question arises that how current and potential investors can enhance their predictability power due change in macroeconomic condition of the country. So, this research would help the investors to alter investment decision because of change in macroeconomic conditions in Pakistan by forecasting their returns.

On the other hand, equity based mutual funds purpose is to invest in equity of different types. Numerous studies have reported that macroeconomic dynamics do affect the movement of equity market. Therefore, the mutual fund managers would also bring change in their portfolio due to change in macroeconomic variables. According to the best of author's knowledge, this study inherits pioneer characteristics to analyze the impact of macroeconomic variables on mutual funds industry of Pakistan. Depending upon these argument an attempt is made to find out the relationship between NAV (Net Asset Value) of equity based mutual funds and macroeconomic variables via Co-integration and causality analysis.

The rest of the paper contains the following sections. Section two is about previous literature support. Section three is about the research methodology. Section four is about the empirical results and discussion and section five is about the concluding remarks, limitations and future research directions.

Literature Review

In the extant literature, extensively evidences are available regarding influence of macroeconomic variables on stock prices. However, these evidences vary market to market because of different types of market structure. The relationship between macroeconomic variables is debatable but macroeconomic variables can be held responsible for excess returns in equity markets (Chancharoenchai, DIBOOG- LU et al. 2005). Change in macroeconomic variables have significant impact on stock prices (Maysami and Koh 2000). Stock prices and macroeconomic activities are significantly related (Nasseh and Strauss 2000). Long run relationship between macroeconomic variables and Jordanian stock exchange is significant (Al-Sharkas 2004). In Singapore both short and long run relationship between macroeconomic variables and different indexes is significant (Maysami, Lee et al. 2005). There exists bidirectional and causal relationship between stock market development and economic growth in Pakistan (Shahbaz, Ahmed et al. 2008). In Spain, the Co-integration between net asset value of mutual funds and stock market exist (Matallin and Nieto 2002). In Pakistan, macroeconomic factors granger cause the stock prices (Nishat and Shaheen 2004).

Studies have documented mixed relationship of inflation with capital market. Many studies have reported that actual and expected inflation is negatively related with the capital market. It is found that inflation has positive relationship with stock returns (Abdullah and Hayworth 1993). Jordanian stock exchange has negative long run relationship with inflation (Al-Sharkas 2004). It is difficult to give the idea that how much inflation would affect equity market but it is sure that the relationship between stock market and inflation is negative in Pakistan (Khan 2004). There exists negative relationship between stock market prices and inflation in Asian region (Chancharoenchai, DIBOOG- LU

et al. 2005). The likelihood of substantial shift in capital market movement increases because of high inflation (Summers 1981). Unexpected level of increase in inflation would result in fall of stock prices, the stock prices would respond within 10-20 minutes and the relationship between stock prices and inflation is state dependent (Adams, McQueen et al. 1999). Inflation and stock prices have long run relationship (Nishat and Shaheen 2004). Inflation is negatively related with stock prices in Pakistan (Sohail and Hussain 2009). Moderate inflation and nominal equity returns are uncorrelated but high level of inflation and nominal equity returns are correlated negatively (Barnes, Boyd et al. 1999). Inflation does not has long run relationship with stock prices but short run relationship between these two is significant in Pakistan (Nishat and Shaheen 2004). Bidirectional causality exists between Malaysian stock prices and inflation (Ibrahim 2003). Inflation does not granger cause the stock prices in Pakistan (Nishat and Shaheen 2004).

As far as money supply is concerned different results have been found. In Malaysia, money supply has positive affect on stock prices in short run but negatively affects in the long run (Ibrahim and Aziz 2003). One percent change in money supply would change stock prices almost 10 percent. The relationship becomes better with the passage of time and increase in money supply (Palmer 1970). There is positive relationship between money supply and stock returns (Abdullah and Hayworth 1993). Significant and positive relationship exists between real stock prices and M1 (Thornton 1998). In Malaysia, relationship between money supply and Kuala Lumpur Stock Exchange (KLSE) does not exist because the KLSE is efficient to absorb the information instantly (Habibullah and Baharumshah 1996). Money supply influences Malaysian stock market prices dominantly (Ibrahim 2003). Money supply have positive long run relationship with Jordanian stock exchange Jordanian stock exchange (Al-Sharkas 2004). Long and short run relationship exists between stock prices and money supply in Pakistan (Nishat and Shaheen 2004). Money supply have positive relationship in both short and long run with different indexes in Singapore (Maysami, Lee et al. 2005). Money Supply is positively related with stock prices in

Pakistan(Sohail and Hussain 2009). Money supply does not granger cause the stock prices in Pakistan in short run (Nishat and Shaheen 2004).

Now comes the interest rate,the long run relationship between Jordian stock exchange and stock prices is negative(Al-Sharkas 2004). Interest rate in Singapore can influence the movement of different indexes both in long and short run. In Singapore short run interest rate have positive relationship with different indexes and long run have negative relationship with different indexes (Maysami, Lee et al. 2005).Interest rate in short and long run causes the stock returns(Abdullah and Hayworth 1993). In long and short run, interest rate and stock prices both have significant relationship in Pakistan (Nishat and Shaheen 2004). In Pakistan, interest rate have significant relationship with the stock prices (Mehr-un-Nisa 2011). In short run, interest rate does not granger cause the stock prices in Pakistan (Nishat and Shaheen 2004).

Co-integration exists between the price level of equity funds and different indices benchmark by HKIFA (Hong Kong Investment Fund Association) in Hong Kong. Some of the mutual funds have short run co-movement but do not have long run relationship with different indices. On the other hand, some mutual funds have long run co-movement with the benchmarked indices but do not have short run co-movement. Opposite to this, some mutual funds have both long and short run co-movement with the bench marked indices. On the contrary to this, some mutual funds neither have long run nor short run relationship with the benchmarked indices(Chu 2010).

Research Methodology

Data

Data of macroeconomic variables has been obtained from IFS (International Financial Statistics) data base developed by IMF (International Monetary Funds) ranging from 2008-2012 on monthly basis giving maximum sixty number of observations. KSE(Karachi Stock Exchange) 100 index data has been obtained from Yahoo finance. Monthly closing net assets value data is obtained from MUFAP (Mutual Funds Association of Pakistan). All calculations are performed using E-views.

Unit Root Test

First of all, NG-Perron test is applied to check the stationarity of time series data to determine the integration level. A time series will be known as stationary time series if it has constant mean and variance over time. Further, the covariance between two time points purely depends on the lag or time or distance between them and not on the actual time at which this covariance is computed. Stationarity is checked to avoid spurious results. NG-Perron test was proposed by (Ng and Perron 1995). This test provides four different test statistics. This test is basically the modification of (Phillips and Perron 1988). In NG-Perron test, GLS (Generalized Least Square) procedure is used for creation of efficient procedure. Further, the criteria of selecting the lag length ensure minimum loss of power thus provides stable results. That is why, this test is considered best for small sample size as compare to other unit root test. NG-Perron test is been applied assuming two assumptions with constant and trend & constant.

Co-integration Test

If dependent and independent time series have same order of integration then co-integration test is applied. Two or more time series will be known as co-integrated time series if the series have long-run or equilibrium relationship irrespective of short run. First of all, bivariate co-integration test will be applied one by one to check long run relationship between two time series. So, the co-integrated results between NAVs and macro-economic variables would help to empirically analyze that both time series have same trend or not. Therefore, applying regression on co-integrated time series would not yield spurious results. Same is true for results between NAVs and KSE 100 index. So, this would help to determine that movement in NAVs are subject to the movement in macro-economic variables and market index or not. This is also checked through the application of joint test for co-integration that whether joint co-integration amongst all macroeconomic variables exist or not.

The approach used to determine co-integration is Johansen Juselius also known as JJ approach and was proposed by (Johansen and Juselius 1990). This is VAR based co-integration

approach. In this approach co-integration is tested using system of equations. There is no need to normalize the variables using JJ approach(Phillips 1991). Eigenvalue and trace statistics are two values obtained from results. The null hypothesis is rejected using 1%, 5% and 10% p-values. Therefore, trace statistics are obtained and reported at 1%, 5% and 10% up to four integrating vector proposed by (Osterwald-Lenum 1992). The lag length has been decided on the basis of AIC (Akaike Information Criterion) because AIC accuracy is more reliable amongst all lag length criterions.

Granger Causality Test

The granger causality test will be applied to determine causal relationship. If the time series are found not to be co-integrated then granger causality test would be applied. As, first of all bivariate co-integration would be applied then multivariateco-integration test is to be applied, therefore,first one way causality would be applied then multivariate causality is to be applied on such time series that would not be found co-integrated using equation given below.

$$\Delta NAV_t = a_0 + \sum_{i=1}^m \alpha_i \Delta X_{t-1} + \sum_{j=1}^m \beta_j \Delta NAV_{t-j} + \varepsilon_i \dots\dots\dots (1)$$

Application of one way causality test is logical because macroeconomic variables do not change due to change inportfolios of mutual funds by mutual fund manager, rather, mutual fund managers change their portfolios due to change in macroeconomic variables. Hence, one way causality from X to Y is applied. Y is NAV and X is macroeconomic variable. The lag

length has been decided on the basis of AIC (Akaike Information Criterion) because AIC accuracy is more trustworthy amongst all lag length criterions. The significance of equation 1 will be checked using following F-statistics.

$$F = \frac{(SSR_R - SSR_{UR})/m}{SSR_{UR}/n - k - 1}$$

F statistics follow the F-distribution with m and n. Where, SSR_R is known as sum of squares of residuals obtained from restricted regression with the assumption that all coefficients are equal to zero. SSR_{UR} is un-restricted sum of squares residuals obtained from un-restricted regression. $K-1$ represents the degree of freedom of model. So, the presence of uni-directional causality is checked by using granger causality test.

Error Correction Model

The error correction model is applied to check the short run speed of adjustment towards long run equilibrium. If the series are co-integrated then ECM (Error Correction) model proposed by Engle Granger (1987) is applied.

$$\Delta NAV_t = a_0 + \gamma EC_{t-1} + \sum_{i=0}^m \alpha_i \Delta X_{t-1} + \sum_{j=0}^m \beta_j \Delta NAV_{t-j} + \varepsilon_i \dots\dots\dots (2)$$

ε_i is the error term of the error correction model. EC_{t-1} is the lagged error correction term obtained from residual of co-integrated time series after applying ordinary least square. γ represents the coefficient of error terms. The Engle Granger assumed that difference taken from lag of variables may capture the causal relationship.

Empirical Results

Unit root Test

Table.1 NG-Perron Test is applied at level to check the level of stationarity of all series

Variables	MZα		MZt		MSB		MPT	
	Deterministic terms		Deterministic terms		Deterministic terms		Deterministic terms	
	C	t,c	C	t,c	C	t,c	C	t,c
Ng-Perron at Levels								
Panel A								
MTPF	0.691	-3.511	0.356	-1.163	0.515	0.331	22.462	23.274
PIPF	1.168	-2.133	0.619	-0.791	0.530	0.371	25.175	30.939
PPF	0.892	-1.993	0.469	-0.760	0.526	0.381	23.824	32.485
APF	0.749	-2.871	0.385	-1.002	0.514	0.349	22.545	26.485
APIF	2.416	-2.204	2.030	-0.822	0.840	0.373	64.972	30.884
JSPSF	-0.375	-1.048	-0.204	-0.467	0.543	0.446	19.832	44.560
FCMF	-2.100	-3.398	-1.010	-1.236	0.481	0.364	11.534	25.559
JSGF	-1.998	-4.208	-0.975	-1.318	0.488	0.313	12.004	20.371
JSVFL	-0.967	-4.141	-0.563	-1.375	0.582	0.332	18.970	21.333
PICICEF	-3.772	-4.772	-1.372	-1.513	0.364	0.317	6.497	18.899
PICICGF	-1.221	-3.340	-0.694	-1.217	0.568	0.365	17.288	25.822
PICICIF	-1.278	-3.533	-0.711	-1.258	0.556	0.356	16.596	24.589
ASF	-2.121	-2.685	-1.017	-1.009	0.479	0.376	11.434	29.200
SMF	-2.110	-3.742	-1.018	-1.236	0.483	0.330	11.533	22.495
MCBDSF	-5.255	-15.572	-1.619	-2.727	0.308	0.175	4.666	6.228
PSMF	-2.110	-3.742	-1.018	-1.236	0.483	0.330	11.533	22.495
PSAF	-2.935	-4.249	-1.211	-1.372	0.413	0.323	8.347	20.628
ASMF	-2.853	-6.140	-1.147	-1.697	0.402	0.276	8.453	14.804
HBSLF	-4.138	-5.536	-1.359	-1.593	0.328	0.288	6.024	16.278
JSLCF(A)	-1.705	-5.641	-0.838	-1.585	0.492	0.281	13.055	15.947
CDF	-3.189	-6.570	-1.232	-1.737	0.386	0.264	7.644	13.902
NIUT	-0.674	-1.932	-0.494	-0.837	0.733	0.433	28.225	38.128
NSF	-1.072	-2.095	-0.699	-0.858	0.652	0.409	21.444	34.773
USAF	-1.000	-6.915	-0.536	-1.796	0.536	0.260	16.994	13.250
Panel B								
Inflation	-1.777	-17.833	-0.841	-2.975	0.473	0.167	12.383	5.177
M2	-2.177	-3.106	-1.040	-1.191	0.478	0.383	11.229	28.028
KIBOR	-2.641	-3.527	-1.149	-1.316	0.435	0.373	9.275	25.620
KSE 100	-1.235	-1.925	-0.620	-0.795	0.502	0.413	14.941	35.992
Test Critical Values								
At								
1%	-13.8	-23.8	-2.58	-3.42	0.17	0.14	1.78	4.03
5%	-8.1	-17.3	-1.98	-2.91	0.23	0.17	3.17	5.48
10%	-5.7	-14.2	-1.62	-2.62	0.27	0.18	4.45	6.67

Table.2 NG-Perron Test

Variables	MZ _a		MZ _t		MSB		MPT	
	Deterministic terms		Deterministic terms		Deterministic terms		Deterministic terms	
	C	t,c	C	t,c	C	t,c	C	t,c
Ng-Perron at First Difference								
Panel A								
MTPF	-27.560*	-28.007*	-3.712*	-3.741*	0.134*	0.133*	0.888*	3.258*
PIPF	-27.828*	-28.172*	-3.727*	-3.752*	0.133*	0.133*	0.887*	3.239*
PPF	-23.180*	-25.399*	-3.404*	-3.561*	0.146*	0.140*	1.056*	3.601*
APF	-8.049***	13.744***	2.005***	2.621***	0.249***	0.180***	3.047***	6.629***
APIF	-27.388*	-27.832*	-3.700*	-3.730*	0.135*	0.134*	0.894*	3.274*
JSPSF	-20.976*	-23.525*	-3.236*	-3.429*	0.154*	0.145*	1.173*	3.874*
FCMF	-16.665*	-22.087*	-2.879*	-3.518*	0.172*	0.150*	1.495*	4.012*
JSGF	-21.710*	-25.525*	-3.289*	-3.569*	0.151*	0.139*	1.145*	3.589*
JSVFL	-1.8552	-26.375	-0.945	-3.631	0.509	0.137	12.97	3.455
PICICEF	-27.447*	-27.969*	-3.704*	-3.739*	0.134*	0.133*	0.892*	3.260*
PICICGF	-17.426*	-22.491**	-2.944*	-3.350**	0.168*	0.148**	1.431*	4.070**
PICICIF	-17.523*	-22.556**	-2.953*	-3.355**	0.168*	0.148**	1.422*	4.058**
ASF	-19.452*	-23.088**	-3.116*	-3.394**	0.160*	0.147**	1.266*	3.964**
SMF	-21.118*	-24.952*	-3.249*	-3.522*	0.153*	0.141*	1.160*	3.709*
MCBDSF	-18.641*	-24.533*	-3.049*	-3.465*	0.163*	0.141*	1.327*	3.935*
PSMF	-21.118*	-24.952*	-3.249*	-3.522*	0.153*	0.141*	1.160*	3.709*
PSAF	-19.993*	-24.481*	-3.160*	-3.492*	0.158*	0.142*	1.230*	3.759*
ASMF	-23.415*	-26.537*	-3.419*	-3.640*	0.146*	0.137*	1.053*	3.447*
HBLSF	-22.534*	-26.018*	-3.356*	-3.599*	0.148*	0.138*	1.087*	3.548*
JSLCF(A)	-7.291***	-21.638**	1.896***	-3.285**	0.260***	0.151**	3.408***	4.233**
CDF	-8.683**	-24.820*	-2.071**	-3.519*	0.238**	0.141*	2.868**	3.692*
NIUT	-23.127*	-25.548*	-3.400*	-3.572*	0.147*	0.139*	1.059*	3.577*
NSF	-23.967*	-25.105*	-3.460*	-3.542*	0.144*	0.141*	1.026*	3.631*
USAF	-24.052*	-26.936*	-3.464*	-3.668*	0.144*	0.136*	1.030*	3.392*
Panel B								
Inflation	-26.973*	-23.858*	-3.643*	-3.426*	0.135*	0.144*	1.003*	3.958*
M2	-11.981**	-31.237*	-2.446**	-3.946*	0.204**	0.126*	2.047**	2.949*
KIBOR	-10.834**	-26.227*	-2.268**	-3.602*	0.209**	0.137*	2.493**	3.583*
KSE 100	-22.368*	-29.317*	-3.342*	-3.828*	0.149*	0.130*	1.102*	3.109*
Test Critical Values At								
1%	-13.8	-23.8	-2.58	-3.42	0.17	0.14	1.78	4.03
5%	-8.1	-17.3	-1.98	-2.91	0.23	0.17	3.17	5.48
10%	-5.7	-14.2	-1.62	-2.62	0.27	0.18	4.45	6.67

*,**,*** Indicates significance level at 1%, 5% and 10% respectively. C means that test is been applied only with intercept and c,t means that test is applied considering both trend & intercept both.

Unit Root

Table 1 exhibit results of unit root test determined through NG-Perron test along with critical values. All the macroeconomic variables and KSE 100 index are integrated of order I (1) with intercept, trend & intercept. The NAV series of all mutual funds are also integrated of order I(1). Detail of abbreviations used against all mutual fund names is given at the end of paper under annexure heading.

Co-integration Results

Table 3 and 5 contain results of bivariate and multivariate co-integration results.

Bivariate Co-integration

Table. 3 Bivariate Co-integration of Fund's NAV with KSE 100 and Macroeconomic variables

Sr. No	Fund Name	KSE 100	M2	Inflation	KIBOR
1	MTPF	0.143	1.607	0.355	0.062
2	PIPF	0.153	2.611***	0.366	0.139
3	PPF	0.016	2.509	0.232	0.082
4	APF	1.143	1.661	0.100	0.100
5	APIF	0.075	1.684	1.018	1.810
6	JSPSF	0.105	0.472	0.123	0.0546
7	FCMF	0.695	4.932**	6.198*	11.310*
8	JSGF	3.500**	10.46*	10.191*	10.612*
9	JSVFL	0.035	3.039***	7.145*	9.350*
10	PICICEF	0.262	3.997**	11.023*	5.556*
11	PICICGF	6.097*	3.905**	18.838*	22.274*
12	PICICIF	8.082*	3.459***	19.865*	11.239*
13	ASF	0.084	3.286***	7.9276*	10.605*
14	SMF	1.398	5.091*	7.9147*	7.881*
15	MCBDSF	1.316	3.503**	6.400*	6.852*
16	PSMF	1.398	5.091**	7.914*	7.881*
17	PSAF	0.608	4.127**	7.121*	14.947*
18	ASMF	0.576	2.626***	4.567*	7.346*
19	HBLSF	0.244	5.948*	4.370*	7.859*
20	JSLCF(A)	0.337	3.589***	7.948*	9.438*
21	CDF	0.084	2.859	12.040*	13.104*
22	NIUT	0.467	9.712*	11.477*	12.131*
23	NSF	0.152	7.520*	7.5435*	12.919*
24	USAF	0.003	0.682	4.0070*	4.995*

*, **, *** Indicates significance level at 1%, 5% and 10% respectively.

Multivariate Co-integration Results

Table.4 Johansen Juselius multivariate Co-integration NAV of funds as dependent and macroeconomic variable CPI, M2 and KIBOR as independent with KSE100

Sr. No.	Fund Name	Ho	Eigenvalue	Trace Statistics	Critical Values at 1%, 5% and 10%		
					1%	5%	10%
1	MTPF	r - 0	0.488	68.875***	77.818	69.819	65.819
		r ≤ 1	0.218	29.982	54.681	47.856	44.493
		r ≤ 2	0.155	15.666	35.458	29.799	27.066
		r ≤ 3	0.095	5.882	19.937	15.495	13.428
		r ≤ 4	0.001	0.075	6.634	3.8414	2.7055
2	PIPF	r - 0	0.617	111.370*	77.818	69.819	65.819
		r ≤ 1	0.362	58.458*	54.681	47.856	44.493
		r ≤ 2	0.286	33.681*	35.458	29.799	27.066
		r ≤ 3	0.161	15.097***	19.937	15.495	13.428
		r ≤ 4	0.094	5.431*	6.634	3.8414	2.7055
3	PPF	r - 0	0.602	109.308*	77.818	69.819	65.819
		r ≤ 1	0.370	58.588*	54.681	47.856	44.493
		r ≤ 2	0.289	33.106*	35.458	29.799	27.066
		r ≤ 3	0.143	14.309***	19.937	15.495	13.428
		r ≤ 4	0.100	5.8222	6.634	3.8414	2.7055
4	APF	r - 0	0.501	79.483*	77.818	69.819	65.819
		r ≤ 1	0.265	39.763	54.681	47.856	44.493
		r ≤ 2	0.190	22.151	35.458	29.799	27.066
		r ≤ 3	0.148	10.072	19.937	15.495	13.428
		r ≤ 4	0.0162	0.9332	6.634	3.8414	2.7055
5	APIF	r - 0	0.475	76.830**	77.818	69.819	65.819
		r ≤ 1	0.240	40.083	54.681	47.856	44.493
		r ≤ 2	0.208	24.428	35.458	29.799	27.066
		r ≤ 3	0.169	11.067	19.937	15.495	13.428
		r ≤ 4	0.008	0.5051	6.634	3.8414	2.7055
6	JSPSF	r - 0	0.585	123.90*	77.818	69.819	65.819
		r ≤ 1	0.511	75.523*	54.681	47.856	44.493
		r ≤ 2	0.359	36.086*	35.458	29.799	27.066
		r ≤ 3	0.185	11.584	19.937	15.495	13.428
		r ≤ 4	0.005	0.2891	6.634	3.8414	2.7055
7	FCMF	r - 0	0.495	70.326**	77.818	69.819	65.819
		r ≤ 1	0.234	30.661	54.681	47.856	44.493
		r ≤ 2	0.157	15.131	35.458	29.799	27.066
		r ≤ 3	0.080	5.196	19.937	15.495	13.428
		r ≤ 4	0.005	0.320	6.634	3.8414	2.7055

Table.4 (Continued)

Sr. No	Fund Name	Ho	Eigen value	Trace Statistics	Critical Values at 1%, 5% and 10%		
8	JSGF	r - 0	0.507	69.358***	77.818	69.819	65.819
		r ≤ 1	0.223	28.313	54.681	47.856	44.493
		r ≤ 2	0.154	13.639	35.458	29.799	27.066
		r ≤ 3	0.063	3.8762	19.937	15.495	13.428
		r ≤ 4	0.001	0.0848	6.634	3.8414	2.7055
9	JSVFL	r - 0	0.537	80.215*	77.818	69.819	65.819
		r ≤ 1	0.270	35.489	54.681	47.856	44.493
		r ≤ 2	0.150	17.173	35.458	29.799	27.066
		r ≤ 3	0.122	7.7362	19.937	15.495	13.428
		r ≤ 4	0.002	0.1648	6.634	3.8414	2.7055
10	PICICEF	r - 0	0.374	68.478***	77.818	69.819	65.819
		r ≤ 1	0.303	41.261	54.681	47.856	44.493
		r ≤ 2	0.208	20.317	35.458	29.799	27.066
		r ≤ 3	0.108	6.7831	19.937	15.495	13.428
		r ≤ 4	0.002	0.1386	6.634	3.8414	2.7055
11	PICICGF	r - 0	0.421	66.325***	77.818	69.819	65.819
		r ≤ 1	0.225	34.566	54.681	47.856	44.493
		r ≤ 2	0.168	19.768	35.458	29.799	27.066
		r ≤ 3	0.133	9.0976	19.937	15.495	13.428
		r ≤ 4	0.013	0.8103	6.634	3.8414	2.7055
12	PICICIF	r - 0	0.433	70.125*	77.818	69.819	65.819
		r ≤ 1	0.229	37.142	54.681	47.856	44.493
		r ≤ 2	0.185	22.003	35.458	29.799	27.066
		r ≤ 3	0.145	10.088	19.937	15.495	13.428
		r ≤ 4	0.016	0.9592	6.634	3.8414	2.7055
13	ASF	r - 0	0.411	68.445***	77.818	69.819	65.819
		r ≤ 1	0.308	37.714	54.681	47.856	44.493
		r ≤ 2	0.188	16.286	35.458	29.799	27.066
		r ≤ 3	0.061	4.1743	19.937	15.495	13.428
		r ≤ 4	0.008	0.476762	6.634	3.8414	2.7055
14	SMF	r - 0	0.434	67.165***	77.818	69.819	65.819
		r ≤ 1	0.259	34.145	54.681	47.856	44.493
		r ≤ 2	0.158	16.692	35.458	29.799	27.066
		r ≤ 3	0.079	6.684	19.937	15.495	13.428
		r ≤ 4	0.031	1.880	6.634	3.8414	2.7055
15	MCBDSF	r - 0	0.577	107.830*	77.818	69.819	65.819
		r ≤ 1	0.395	60.455*	54.681	47.856	44.493
		r ≤ 2	0.349	32.781**	35.458	29.799	27.066
		r ≤ 3	0.148	9.139	19.937	15.495	13.428
		r ≤ 4	0.005	0.305	6.634	3.8414	2.7055
16	PSMF	r - 0	0.434	67.165***	77.818	69.819	65.819
		r ≤ 1	0.259	34.145	54.681	47.856	44.493
		r ≤ 2	0.158	16.692	35.458	29.799	27.066
		r ≤ 3	0.079	6.684	19.937	15.495	13.428
		r ≤ 4	0.031	1.880	6.634	3.8414	2.7055

Table.4 (Continued)

Sr. No	Fund Name	Ho	Eigenvalue	Trace Statistics	Critical values at 1%, 5% and 10%		
17	PSAF	r - 0	0.465048	66.315***	77.818	69.819	65.819
		r ≤ 1	0.201564	30.031	54.681	47.856	44.493
		r ≤ 2	0.158193	16.975	35.458	29.799	27.066
		r ≤ 3	0.113508	6.9879	19.937	15.495	13.428
		r ≤ 4	0.000004	0.0005	6.634	3.8414	2.7055
18	ASMF	r - 0	0.367449	57.604	77.818	69.819	65.819
		r ≤ 1	0.245636	31.498	54.681	47.856	44.493
		r ≤ 2	0.138025	15.431	35.458	29.799	27.066
		r ≤ 3	0.113413	6.9654	19.937	15.495	13.428
		r ≤ 4	0.001824	0.1040	6.634	3.8414	2.7055
19	HBLSF	r - 0	0.526393	96.129*	77.818	69.819	65.819
		r ≤ 1	0.417833	55.023*	54.681	47.856	44.493
		r ≤ 2	0.266049	25.268	35.458	29.799	27.066
		r ≤ 3	0.119608	8.2566	19.937	15.495	13.428
		r ≤ 4	0.022476	1.250	6.634	3.8414	2.7055
20	JSLCF(A)	r - 0	0.716908	128.083*	77.818	69.819	65.819
		r ≤ 1	0.461608	59.936*	54.681	47.856	44.493
		r ≤ 2	0.282904	26.501	35.458	29.799	27.066
		r ≤ 3	0.136019	8.5438	19.937	15.495	13.428
		r ≤ 4	0.011943	0.648	6.634	3.8414	2.7055
21	CDF	r - 0	0.604154	106.828*	77.818	69.819	65.819
		r ≤ 1	0.387761	55.858*	54.681	47.856	44.493
		r ≤ 2	0.283327	28.873***	35.458	29.799	27.066
		r ≤ 3	0.174557	10.551	19.937	15.495	13.428
		r ≤ 4	0.000007	0.004	6.634	3.8414	2.7055
22	NIUT	r - 0	0.463473	66.445***	77.818	69.819	65.819
		r ≤ 1	0.241929	30.332	54.681	47.856	44.493
		r ≤ 2	0.149040	14.267	35.458	29.799	27.066
		r ≤ 3	0.072559	4.9066	19.937	15.495	13.428
		r ≤ 4	0.009228	0.537	6.634	3.8414	2.7055
23	NSF	r - 0	0.516166	97.467*	77.818	69.819	65.819
		r ≤ 1	0.402302	57.536*	54.681	47.856	44.493
		r ≤ 2	0.313981	29.229***	35.458	29.799	27.066
		r ≤ 3	0.115047	8.5027	19.937	15.495	13.428
		r ≤ 4	0.031855	1.7805	6.634	3.8414	2.7055
24	USAF	r - 0	0.446003	61.162	77.818	69.819	65.819
		r ≤ 1	0.194729	26.907	54.681	47.856	44.493
		r ≤ 2	0.162106	14.346	35.458	29.799	27.066
		r ≤ 3	0.064419	4.088	19.937	15.495	13.428
		r ≤ 4	0.003893	0.226	6.634	3.8414	2.7055

*, **, *** Indicates significance level at 1%, 5% and 10% respectively.

Table.5: Unidirectional Granger Causality test between KSE100 with macroeconomic variables

and NAV of Funds

Sr. No	Fund Name	KSE100 to NAV	M2 to NAV	Inflation to NAV	KIBOR to NAV
		F-statistics	F-statistics	F-statistics	F-statistics
1	MTPF	5.554*	5.101*	3.804*	2.692**
2	PIPF	6.317*	NA	6.662*	4.909**
3	PPF	8.889*	3.669*	6.336*	4.681*
4	APF	8.748*	4.470*	5.403*	3.842*
5	APIF	7.686*	4.046*	3.366**	3.363**
6	JSPSF	2.273	2.722**	4.799*	4.698*
7	FCMF	1.354	NA	NA	NA
8	JSGF	NA	NA	NA	NA
9	JSVFL	0.071	NA	NA	NA
10	PICICEF	0.165	NA	NA	NA
11	PICICGF	NA	NA	NA	NA
12	PICICIF	NA	NA	NA	NA
13	ASF	1.447	NA	NA	NA
14	SMF	2.509**	NA	NA	NA
15	MCBDSF	1.043	NA	NA	NA
16	PSMF	2.509**	NA	NA	NA
17	PSAF	1.128	NA	NA	NA
18	ASMF	1.934	NA	NA	NA
19	HBLSF	0.543	NA	NA	NA
20	JSLCF(A)	0.992	NA	NA	NA
21	CDF	5.398*	0.791	NA	NA
22	NIUT	1.334	NA	NA	NA
23	NSF	1.673	NA	NA	NA
24	USAF	6.329*	3.353**	NA	NA

*,**,*** Indicates significance level at 1%, 5% and 10% respectively.

Co-integration Results

KSE 100 index does not has bivariate co-integration with NAVs of all fundsexcept NAVs of three funds, which means that only 12.5% mutual funds of selected sample have co-integration with KSE 100 index. Seventeen mutual funds have long run relationship of NAV with money supply and represents 71% of sample. The impact of Inflation, KIBOR, was same on NAVs of mutual funds. NAVs of 66.67% percent funds of sample are affected by Inflation and KIBOR.

Afterwards, joint Johansen Juselius VAR base test of co-integration has been applied. The purpose is to determine long run relationship of mutual fund's NAVs with macroeconomic variables and KSE100 index jointly. Results of joint Co-integration are reported in table 4. All mutual NAVs are jointly co-integrated with macroeconomic variables and KSE 100 index except ASMF (Asian Stock Market Funds). So, NAVs of 96% mutual funds of sample have long run relationship with macroeconomic variables and KSE 100. The trace statistics of joint co-integration have been rejected on the basis of 1%, 5% and 10% level.

Table 6
Error correction model estimation of Fund NAVS

Sr.No	Fund Name	AKSEI100 _{t-1}		AM12 _{t-1}		AM1800 _{t-1}		AKIBOR _{t-1}	
		Statistics	E _{q1}	Statistics	E _{q1}	Statistics	E _{q1}	Statistics	E _{q1}
1	MEPF	NA	NA	NA	NA	NA	NA	NA	NA
2	PIPF	NA	0.002	0.061	NA	NA	NA	NA	NA
3	PPF	NA	NA	NA	NA	NA	NA	NA	NA
4	APF	NA	NA	NA	NA	NA	NA	NA	NA
5	APPF	NA	NA	NA	NA	NA	NA	NA	NA
6	JSPSF	NA	NA	NA	NA	NA	NA	NA	NA
7	FCMF	NA	-0.259*	-3.870	-0.166	-2.603	-0.005	-0.999	
8	JSGF	0.031	0.925	-1.998	-0.052**	-0.950	-0.042	-0.734	
9	JSVFL	NA	-0.265*	-4.365	-0.219*	-3.675	-0.223*	-3.829	
10	PIGCEF	NA	-0.323*	-2.971	-0.243*	-3.421	-0.237*	-3.388	
11	PIGCGF	0.002012	0.084427	-3.142	-0.120**	-2.081	-0.118**	-2.122	
12	PIGCIFF	0.007183	0.323149	-3.119	-0.125**	-2.116	-0.123**	-2.158	
13	ASF	NA	-0.172*	-2.532	-0.147*	-2.486	-0.152*	-2.508	
14	SMF	NA	-0.184*	-2.844	-0.122***	-1.854	-0.124***	-1.896	
15	MICBDSF	NA	-0.142**	-2.204	-0.114	-1.574	-0.136**	-1.944	
16	PSMF	NA	-0.184*	-2.844	-0.122***	-1.854	-0.124***	-1.896	
17	PSAF	NA	-0.294*	-3.779	-0.238*	-3.272	-0.215*	-3.046	
18	ASMF	NA	-0.170*	-2.528	-0.136***	-1.892	-0.164**	-2.365	
19	HBLSF	NA	-0.366*	-3.308	-0.278*	-3.560	-0.246**	-3.231	
20	JSLCF(A)	NA	-0.134*	-2.479	-0.120***	-1.848	-0.118***	-1.858	
21	CDF	NA	NA	NA	-0.109	-1.539	-0.120***	-1.743	
22	NIUT	NA	-0.141*	-3.411	-0.079***	-1.673	-0.096**	-2.063	
23	NSF	NA	-0.1602*	-3.333	-0.124*	-2.409	-0.125*	-2.426	
24	USAF	NA	NA	NA	-0.490	-0.993	-0.054	-1.140	

***, **, * indicates significance level at 1%, 5% and 10% respectively.

Table 7
Error correction model estimation of Fund NAV's

Sr. No	Fund Name	α_1	α_2	ANSE ₁	ANSE ₂	Adjustment		ANBOR ₁	ANBOR ₂	F- statistics				
						t- statistics	p- statistics							
1	MITF	1.081	1.655	-0.107	-1.809	0.0002	10.397	0.555	0.980	0.008	0.0084	-0.288	-0.322	23.708
2	PIFF	0.804	2.332	-0.052	-1.076	0.0064	15.363	0.461	1.524	-0.072	-0.134	0.086	0.094	51.920
3	PPF	0.726	1.982	-0.068	-1.143	0.0065	14.538	0.404	1.249	0.001	-0.486	-0.381	0.003	47.336
4	APF	0.847	2.367	-0.053	-1.204	0.0002	18.980	-0.183	-0.595	-0.107	-0.193	-0.482	-0.984	76.159
5	APF	2.244	4.139	0.003	0.140	0.0078	12.022	0.108	0.230	-0.086	-0.101	-0.201	-0.272	31.454
6	JSESE	0.231	0.871	-0.23	-2.248	0.0062	19.517	0.330	1.405	-0.251	-0.574	-0.016	-0.012	84.408
7	FCMF	-0.072	-2.354	0.014	0.348	0.0007	18.951	-0.018	-0.658	0.0470	0.924	-0.124*	-2.789	79.618
8	JSGF	-0.139	-1.200	0.011	0.257	0.0011	8.868	-0.022	-0.238	0.245	1.501	-0.126	-0.830	16.244
9	JSVTL	-0.296	-1.434	-0.234	-3.667	0.0006	2.454	0.041	0.234	-0.050	-0.160	-0.244	-0.865	5.636
10	PNICEF	-0.033	-0.704	-0.075	-1.070	0.0006	11.054	0.082	1.825	0.087	1.196	-0.106	-1.656	31.922
11	PNICGF	-0.415	-3.419	0.028	1.002	0.0027	18.727	0.019	0.185	0.185	0.983	-0.412*	-2.484	76.784
12	PNICIF	-0.181	-3.778	0.035	1.344	0.0012	21.093	0.015	0.369	0.087	1.170	-0.186*	-2.843	97.754
13	AS ₁	-0.054	-0.457	-0.133	-1.723	0.0004	6.452	0.091	1.937	0.020	0.249	-0.020	-0.273	11.040
14	SNF	-0.402	-0.676	-0.088	-1.196	0.0019	2.663	0.398	0.767	-0.290	-0.318	-0.563	-0.661	3.7472
15	MGBDSE	-0.368	-0.450	-0.228	-2.891	0.0018	1.783	-0.481	-0.68	-1.039	-0.833	1.661	1.453	3.7181
16	PSMF	-0.402	-0.676	-0.088	-1.196	0.0019	2.663	0.398	0.767	-0.290	-0.318	-0.563	-0.661	3.7472
17	PSAF	-0.048	-1.192	-0.023	-0.414	0.0006	13.690	0.038	1.088	0.083	1.303	-0.104	-1.883	43.509
18	ASNF	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
19	HBLSE	0.114	0.185	-0.573	-4.301	0.0026	3.394	1.034	1.883	0.832	0.847	-0.864	-1.002	5.778
20	JSLCH(A)	-1.148	-1.454	-0.034	-0.639	0.0076	7.901	0.592	0.852	1.270	1.048	-0.916	-0.848	13.979
21	CDP	-1.040	-0.665	-0.066	-0.910	0.0049	2.617	0.477	0.349	-0.796	-0.329	-0.227	-0.106	2.359
22	NIIT	-0.533	-1.493	-0.053	-0.995	0.0012	2.829	0.115	0.371	-0.566	-1.021	0.128	0.262	3.327
23	NSE	-0.104	-3.134	-0.025	-0.966	0.0007	19.281	0.047	1.649	0.071	1.403	-0.071	-1.562	81.388
24	USAF	-1.316	-1.415	-0.020	-0.490	0.0054	4.798	1.093	1.363	0.829	0.587	-0.880	-0.691	6.104

*** indicates significance level at 1%, 5% and 10% respectively.

Causality Test

Unidirectional causality test has been applied on NAVs. Unidirectional Co-integration is logical because purpose is to determine the impact of macroeconomic variables and KSE100 index on NAVs. So that, mutual fund managers would alter their decision due to change in macroeconomic conditions. Results of unidirectional relationship are reported in table 5. Amongst non-co-integrated mutual funds, NAVs of nine mutual funds out of twenty one mutual funds have been found to have causal relationship with KSE100 index. In case of Money Supply except CDF (Crosby Dargon Fund) NAVs of all funds have been found to have causal relationship. Inflation and KIBOR has been found to have causal relationship with the NAVs of all mutual funds. It represents 100% causal relationship of non-co-integrated mutual funds NAVs with these macroeconomic variables.

Error Correction Model

The error correction test is applied to determine the short run relationship and speed of adjustment towards equilibrium. As bivariate and joint two different types of long run relationships are determined, therefore, short run relationship has also been found of bivariate and jointly co-integrated time series. Results of both cases are reported in Table 6 and Table 7 respectively. It is found that short run relationship does not exist between co-integrated fund NAVs and KSE 100 index. Further, short run relationship between NAVs of all funds and money supply and inflation exists except PIPF (Pakistan Islamic Pension Fund) and FCMF (First Capital Mutual Fund) respectively. NAVs of only FCMF (First Capital Mutual Fund) and JS GF (JS Growth Fund) do not have short run relationship with KIBOR. According to the results of error correction model applied on jointly co-integrated macroeconomic variables and KSE 100 index with NAVs of equity base mutual funds the NAVs of only three mutual funds have short run relationship with KSE 100 index, money supply and inflation and KIBOR.

Conclusion

To the best of author's knowledge, this paper is pioneer to determine the long and short run relationship between NAVs of equity based mutual funds with macroeconomic variables and KSE 100 index. Macroeconomic variables are inflation proxy by CPI (Consumer Price Index), Money Supply Proxy by M2 and Interest rate proxy by KIBOR (Karachi Interbank Offering Rate). The data is taken from 2008-2013 on monthly basis. First of all, NG-Perron unit root test is applied to find out the order of integration of all series. All the series are integrated of order I(1). Jointly and bivariate long run relationship is explored through VAR based co-integration approach also known as Johansen Juselius. According to the results, macroeconomic variables are dominant to have long run relationship with NAVs of equity based mutual funds. 96% and 66.67% mutual funds of the taken sample have long run relationship with the inflation, money supply and KIBOR respectively. NAV of only three funds have been found to have long run relationship with the KSE 100 index. In case joint test of long run relationship it is found that except ASMF fund, NAVs of all mutual funds have long run relationship with the macroeconomic variables and KSE 100. Then causality test is applied to find out the causal relationship of non-co-integrated NAV of mutual funds with macroeconomic variables and KSE 100 index. Total nine non co-integrated mutual funds have causal relationship with KSE 100 index. All funds NAVs except CDF (Crosby Dargon Fund) have causal relationship with money supply. In case of inflation and KIBOR all non-co-integrated mutual funds have causal relationship with NAVs of mutual funds.

Results of bivariate short run relationship between NAVs of equity base mutual funds and macroeconomic variables are almost consistent with long run relationship. The collective short run relationship results are not consistent with long run relationship. Therefore, only three mutual funds FCMF (First Capital Mutual Fund), PICIGF (PICIC Growth Fund), PICICIF (PICIC Investment Fund) have short run

relationship with KSE100 index and macroeconomic variables.

The focus of this study is only on mutual funds industry of Pakistan. The data in this research have limitation 2008-2013 on

monthly basis. Further, In future cross country comparison can be made of Asian economies. So that international investors can be attracted. Impact of macroeconomic variables on other type of mutual can also be determined.

Abbreviations	Fund Name
MTPF	Meezan Tahaffuz Pension Fund
PIPF	Pakistan Islamic Pension Fund
PPF	Pakistan Pension Fund
APF	Atlas Pension Fund
APIF	Atlas Pension Islamic Fund
JSPSF	JS Pension Savings Fund
FCMF	First Capital Mutual Fund
JSGF	JS Growth Fund
JSVFL	JS Value Fund Limited
PICICEF	PICIC Energy Fund
PICICGF	PICIC Growth Fund
PICICIF	PICIC Investment Fund
ASF	Asian Stocks Fund
SMF	Safeway Mutual Fund
MCBDSF	MCB Dynamic Stock Fund
PPF	Pakistan Premier Fund
PSMF	Pakistan Stock Market Fund
PSAF	Pakistan Strategic Allocation Fund
ASMF	Atlas Stock Market Fund
HBLSF	HBL Stock Fund
JSLCF(A)	JS Large Cap Fund (A)
CDF	Crosby Dragon Fund
NIUT	National Investment Unit Trust
NSF	NAFA Stock Fund
USAF	United Stock Advantage Fund

$$F = \frac{\text{Number of outcomes}}{\text{Total Number of Possible Outcomes}}$$

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