RELATIONSHIP IN STOCK MARKET RETURNS AND THE MACROECONOMIC FACTORS IN PAKISTAN

Muhammad Arshad Sial[1], Muhammad Imran Khan[2] & Rafaqet Ali[3]

[1]Lecturer Department of Commerce University of Sargodha, Mianwali
[2]Assistant Professor Department of Management Science COMSAT Vehari
[3]Assistant Professor Department of Management Science COMSAT Vehari

ABSTRACT

The aim of the research to discover the long-term and cause and effect relationship amid set of macroeconomic indicators and KSE-100 index return regarding Pakistan. Macroeconomic factors of study are exchange rate, inflation rate, interest rate, gold prices and oil prices. Tow co-integration vectors has found in multivariate co-integration test. Bivariate co-integration test outcome indicate that long-term co-integration exits between KSE-100 Index and inflation rate and KSE-100 and Oil prices. Result of pair wise granger causality test reports that causality relationship exists between KSE-100 Index and macroeconomic factors except gold prices. Variance decomposition analysis shows variance due to own shocks.

Keywords: *Equity Market, Macroeconomic Factors, Economy, KSE 100 Index*

INTRODUCTION

Equity market of any nation plays a fundamental part in the advancement and economic progress of any nation. The performance of equity market returns manipulates the decision of investors. Equity market helps in mobilizing and saving of the people. It channelizes these saving into industrial fertile and productive perseverance. Equity market is also supportive in inviting and dragging the foreign capital in different shares of well established companies (Sohail & Hussain 2009). Pakistan came into being on 14 August 1947 soon after independence its first stock market was established on 18 September 1947 in Karachi with the name of Karachi Stock Exchange (Guarantee) Limited. KSE-100 Index was established in November, 1991 and it's based on 1,000 points. The 100 companies that included KSE-100 index chosen form represented sectors and large market capitalization. The companies selected in KSE-100 index are capture almost ninety % of whole capitalize market among the entire listed corporation on the KSE.

Currently three equity markets are exist in Pakistan, The KSE, The LSE and ISE. Biggest and oldest equity market of Pakistan is Karachi Stock Exchange. Relationship subsists between the equity market return and macro-economic factors because with the escalation of interest rate the rational investors moves towards credits in banks to minimize the risk (Rushed & Abdul, 2010; Alam & Slahudin, 2009, Khan & Amanullah 2012). With the rise

in inflation rate, the purchasing power of people go down and their saving is also shrink as result; the investment in equity market is drop down and as result of stock market's return weaken (Sohail and Hussain 2009). Exchange rate explained as the worth of one currency in term of another (Shapiro, 2002; Khan et al. 2011). There is several ways in which exchange rate disturbs on stock prices. When there is a decline of the local currency then price of imported goods increase and as result earning of organization which deals in imported goods also decrease (Erdogam & Ozlale, 2005). Significance of gold becomes dear in current world as a result of financial disaster in economic world. The most countries of the world move toward use gold as reserves.

The rational financial investors move toward investing in real assets like gold to minimize their risk. Impact of irregular and unpredicted price variations in oil price hurriedly seeps into national market and also threatening the already existing macroeconomic imbalance in oil importing nations like Pakistan. There is link between prices of oil and return on stock (Narrayan &Narrayyan, 2009). The elementary perseverance of this study to guide and explained financial investors weather in the long-run macroeconomic factors affect the equity market return or not and this study will also help the equity investors for taking rational decisions regarding investment. Yet, there are no comprehensive studies in Pakistan which identifying long run multivariate cointegration, bi-variate cointegration and causality relationship between equity market returns and macroeconomic factors such as foreign exchange rate, rate of inflation, interest rate, prices of gold and oil among other which to a large extent are expected to influence equity market returns.

LITERATURE REVIEW

Evidence from Developed Economies

Zoa (2014) conducted study with the objective to exploring whether the performance of equity market was affected from macroeconomic factors in Japan. They found rate of interest, inflation and exchange rate had a long-run relationship with Nikkei 225 in Japan. Chuam (2012) reported no long-term relationship existed between inflation rate and stock prices. POH (2012) conducted study on stock market and macroeconomic integration. They tried to explore the long- run connection between share prices and macroeconomic factors. Study used Descriptive analysis, Unit Root Test, pair wise Granger casualty test and Co integration test. The finding of study showed that share prices at Nikki 225 had long run relationship with Interest rate and Inflation. Alam and Slahudin (2009) investigated the shock of interest rate on share return in both developing and advance countries. Secondary monthly data of fifteen countries was taken from 1988 to 2003.

In this study it was concluded that for all countries CPI had a considerable negatively relationship with stocks returns. Evidence from six countries out of fifteen selected countries showed that relationship between change in interest rate and change in stock price was significantly negative. Park and Ratte (2008) investigated the oil price variation impact on U.S stock market and thirteen other European countries. They found that real stock proceeds were exaggerated by shock in oil price. Sadorsky (1999) conducted study to investigate oil prices shocks on stock market activity in United State of America. In this study monthly data during 1947:1 to 1996:4 was collected about rate of interest, industrial production index, and real prices of oil and market return. Result of study also showed that negative correlations exist between stock return and oil prices and interest rate also negative correlated with stock return.

Evidence from Developing Economies

Hussain et al., (2014) examined the fundamental and long-run association between share prices and set of selected macroeconomic factors. Secondary data on monthly basis about the variables during January, 2002 to December 2010 was collected. They reported that except export, no causality relationship among study variables however study found that co-integration relationship prevail between study variables. Inyiama and Ekwe (2014) explained that GDP, exchange rate and CPI insignificantly negatively while interest rate insignificantly positively correlated with All Share Index at Nigeria Stock Exchange. Siah et al., (2014) studied the asymmetric impact on stock prices in Malaysian equity market. Khan (2014) explained that 80% shock in stock prices due to independent variables. Study further explained that GDP, exchange rate, and inflation rate were positively correlated while interest rate was negatively correlated with Stock price at Karachi Stock Exchange 100 Index. Baig et al., (2013) studied the oil prices and gold price relationship with KSE-100 index.

Finding of study indicated that study variables were not co integrated and no causality relationship exist. Mohi-u-Din & Hussain (2013) found that macroeconomic variables affected stock prices in India. Yeng et al., (2013) concluded in their study that stock return of four ASEAN countries influenced by positive or negative shock in macroeconomic variables. Sohail and Hussain (2009) examined the behavior of stock price to macro-economic factors. Study used Johansen cointegration technique. Result of this study indicated that exchange rate had a positive relationship with KSE-100 Index and LSE-25 Index but not with ISE-10 Index. Inflation positively relationship with stock price of KSE-100 index while negatively relationship with stock price of rest of tow stock markets. Hussin et al., (2012) found that Karachi stock exchange returns were co intergraded with interest and exchange rate in the long term. Samadi et al., (2012) concluded that exchange

rate, gold prices and inflation had an effect on returns of Tehran stock exchange while liquidity and oil prices had no impact on equity return.

Akbar (2012) reported that macroeconomic factors and KSE-100 index was co-integrate and unidirectional causality was lie between two sets of study variables. It was also found that short term rate of interest and supply of money positively correlated while reserve of foreign exchange and rate of inflation were negatively correlated with stock price. Osamwonyi and Esther (2012) examine association amid macroeconomic factors and Nigerian capital index. In this study yearly data from 1975 to 2005 about macroeconomic factors i.e. interest rate, fiscal deficit, CPI, M1 and foreign exchange rate and share prices was used. Rashid and Abdul (2010) identified a link amid a set of macroeconomic factors and stock prices. They reported that macroeconomic factors except CPI escort to increase in stock worth. Further study concluded that exchange rate positively while interest rate negatively affected stock returns. Shahzadi and Chohan (2010) found that gold prices had no co integration relation with KSE-100 Index return. Singh (2010) found that interest rate and monetary exchange rate no effect on returns of stock at Sensex Indian stock exchange.

Research Hypothesis

H_1: The long-run relationship exists between KSE-100 Index and Macroeconomic factors.
H_2: The cause and effect relationship exists between KSE-100 Index and Macroeconomic factors.

RESEARCH METHODLOGY

Data Collection

Monthly time series data about study variables for thirteen year starting from January, 2000 to December 2013 is collected. Data about the study variables is collected from various sources like; Yahoo Finance, State Bank of Pakistan, The Business Recorder, Karachi Stock Exchange,Tradingeconomics.com, Investment.com and Federal Bureau of Statistics. However, the brief definition of all the variables along with their proxy is presented in the table 3.1 mentioned below.

Table 1: Data Description

Name of Variables	Symbolic Used	Proxy Used
Inflation rate	IFR	Consumer Price Index (CPI)
Interest rate	IR	Bench Mark Interest Rate(BMIR)
Foreign exchange rate	FER	Monthly Average Rupees Per Unit of US $
Gold prices	GP	Monthly Average Gold Prices US $ per Troy Ounce
Oil prices	OP	Monthly Average Crude Oil US $ Per Barrel
Stock index KSE-100 Index returns	Index	Monthly Average Adjusted Closing Price.

The following model is use to identify the long-run relationship between the study variables and to illustrate logarithmic form of study variables puts L at the start.

LINDEX = f (LFER, LGP, LIFR, IR, LOP)………..………………………. **(1)**

The study used following equation to calculate the continuous compound rate of returns of study variables:

Dependent Variable, Equity market return:

R_t = LN (P_t/P_{t-1})……………………………………………………………... **(2)**

Where

R_t = Return for specified period P_t = Price at end time

P_{t-1} = Prince at beginning time   LN = Natural Log

Independent Variables, Macroeconomic Variables Continuous Compound Rate

Inflation Rate = IFR= LN (IFR/IFR_{t-1}), Foreign Exchange Rate = FER = LN (FER/FER_{t-1})

Interest rate= IR = LN (IR/IR_{t-1}) Gold Price = GP = LN (GP/GP_{t-1})

Oil Prices = OP = LN (OP/OP_{t-1})

Table 2: Descriptive Statistics

	INDEX	FER	GP	IFR	IR	OP
Mean	0.0158	0.0042	0.0087	1.9948	-0.0016	0.0085
Median	0.0198	0.0014	0.0059	2.1271	0.0000	0.0244
Maximum	0.2411	0.0532	0.1212	3.2320	0.6419	0.1738
Minimum	-0.4488	-0.0390	-0.1258	0.3436	-0.7472	-0.3118
S. D	0.0827	0.0117	0.0394	0.6276	0.0853	0.0830
Skewness	-1.1694	1.0511	-0.0366	-0.3879	-1.5595	-1.1498
Kurtosis	8.6394	7.1255	3.5415	2.6708	55.3570	5.1676
Jarque-Bera	260.9085	150.0699	2.0896	4.9722	19256.8800	69.9073
Observations	168.0000	168.0000	168.0000	168.0000	168.0000	168.0000

 Source: Author: 2016.

The KSE-100 Index returns mean is 0.0158. Which indicates that the index earn 1.585% while the standard deviation is 8.27% which indicates the risk of index.

Table 3: Correlation Matrix

	INDEX	FER	GP	IFR	IR	OP
LN ΔINDEX	**1.0000**					
LN ΔFER	-0.1347	**1.0000**				
LN ΔGOLD	-0.0741	-0.1469	**1.0000**			

LN ΔIFF	-0.1790	0.2860	0.0276	**1.0000**		
LN ΔIR	-0.0151	0.0523	-0.1282	0.1004	**1.0000**	
LN ΔOIL	0.1221	-0.0787	0.2331	-0.0369	-0.0691	**1.0000**

Source: Author: 2016.

The results indicate that stock market returns are insignificant negatively correlated with exchange rate, gold rate, inflation rate and interest rate, which indicated that if there is an increase in the above discussed variables there is decrease in stock market return while the result indicated that oil prices and stock market return are positively correlated. It shows that if there is a raise in oil prices as a result an upward in stock market returns.

DATA ANALYSIS
For data analysis purpose study use unit root test: (ADF & PPT), Johnson and Julius co integration test, Pair-wise granger casualty test and Variance Decomposition test on time series data for the purpose of analysis. All tests used in this study are computed by using EViews7 Software.

Unite Root Test
To test the stationary of research data unit root analysis tool is use. In Unit Root test we employ ADF test and PPT. An ADF test can be stated simply as as:

> An AR (1) Model
>
> $Z_t = \beta Z_{t-1} + \mu_t$ .... (3)
>
> Z_t = Study variables for the specified time period's'
>
> β = Coefficient
>
> μ_t = Error term

Cointegration Analysis
Johansen &Juselius co integration test was intended to be used in order to capture the long run equilibrium relationship between macroeconomic variables and stock prices. This has been carried out by Humpe & Macmillan (2009), Puah & ayaraman (2007) and Gan et al. (2006). To detect the number of cointegrating vectors the Johansen and Juselius (1990) is used which is based on maximum likelihood estimates and gives maximum Trace Value test statistics and Maximum Eigen Value. This process gives framework for co integration test in the context of VAR approach. Johansen method is explained as follows:

$$y_t = A_0 + \sum_{j=1}^{k} A_j y_{t-j} + \varepsilon_t .$$ ………………………………………………...…………………

(5) y_t is a (n × 1) vector of time series variable with order of integration equal to one, I (1), A_0 is an (n × 1) vector of constants, k is the number of lags, A_j is a $(n \times n)$ matrix of

coefficients and εt is assumed to be a ($n \times 1$) vector of Gaussian error terms. The above vector autoregressive process was reformulated and turned into a vector error correction model (VECM) in order to use Johansen and Juselius test as under:

$$\Delta y_t = A_0 + \sum_{j=1}^{k-1} \Gamma_j \Delta y_{t-j} + \Pi y_{t-k} + \varepsilon_t \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots (6)$$

Where $\quad \Gamma_j = -\sum_{i=j+1}^{k} A_j \quad$ and $\quad \Pi = -I + \sum_{i=j+1}^{k} A_j$

Where Δ is use for 1st difference lag operator and 'I' is an ($n \times n$) identity matrix. The Trace statistics test and the Maximum Eigen Value test are used to find number of characteristic roots that were insignificantly different from unity.

RESULTS AND DISCUSSION

Table 4: Unit Root Test

	ADF (Level)	ADF (1st Difference)	Phillips-Peron (Level)	Phillips-Peron (1st Difference)
Index	-0.5484	-11.8241	-0.5772	-11.8241
FER	-0.1198	-7.0265	0.3431	-6.8968
GP	-0.8395	-11.2892	-0.8397	-11.3029
IFR	-1.7161	-11.4197	-1.8536	-11.3921
IR	-1.7448	-13.7497	-2.1456	-20.6652
OP	-1.2692	-9.9212	-1.2958	-9.9458
Critical Values				
1%	-3.4697	-3.4699	-3.4697	-3.4699
5%	-2.8787	-2.8788	-2.8787	-2.8788
10%	-2.5760	-2.5761	-2.5760	-2.5761

Source: Author: 2016.

In Unit Root Analysis table both augmented ducker fuller and Phillips- Peron test indicate that data is not stationery at level but both tests reveals that time series is stationery at 1st difference.

Table 5: Vector Auto Regression (VAR Technique)

Lag	LogL	LR	FPE	AIC	SC	HQ
0	18.79302	NA	3.42E-08	-0.164013	-0.046711	-0.11637
1	1431.179	2698.019	7.42E-16	-17.80999	-16.98887*	-17.47648*
2	1478.629	86.99274	6.42e-16*	-17.95679*	-16.43186	-17.3374
3	1511.202	57.21141	6.74E-16	-17.91285	-15.68411	-17.0076
4	1547.704	61.30413	6.76E-16	-17.91928	-14.98673	-16.7282
5	1576.107	45.51809	7.57E-16	-17.82189	-14.18552	-16.345

* Shows lag order selection by Criterion

Source: Author: 2016.

Lag choice is a precondition to use cointegration test. Akaike criterion is found minimum at two lag, so two month lag is suitable lag length.

Table 6: Multivariate Cointegration Analysis

Hypothesized		Trace Statistics	Critical Value 5%	Prob.**	Remarks
No. of CE(s)	Eigen value				
None *	0.201814	107.7961	95.75366	0.0057	Trace statistics indicated 2 cointegration equation at 0.05 level
At most 1*	0.163401	70.60275	69.81889	0.0432	
At most 2	0.119206	41.1651	47.85613	0.1835	
At most 3	0.071951	20.22139	29.79707	0.408	
At most 4	0.046056	7.900656	15.49471	0.4761	
At most 5	0.000732	0.120804	3.841466	0.7282	

Trace test indicates 2co integrating eqn(s) at the 0.05 level
Source: Author: 2016.

Results indicate that the value of trace statistic successfully reject the null of no cointegration under two equations. This means, two equations are defined by this study that are use for the identification of long-run association amid the variables.

Table 7: Bivariate Cointegration Analysis (KSE-100)

Variables	Hypothesized		Trace Statistics	Critical Value 5%	Prob.*
	No. of CE(s)	Eigen value			
Index-FER	None	0.015723	3.247192	15.49471	0.9545
	At most 1	0.003824	0.63222	3.841466	0.4265
Index-Gold	None	0.016407	2.994162	15.49471	0.9672
	At most 1	0.001602	0.264486	3.841466	0.6071
Index-IFR	None *	0.106129	18.87753	15.49471	0.0149
	At most 1	0.002213	0.365575	3.841466	0.5454
Index-IR	None	0.067416	12.85015	15.49471	0.1204
	At most 1	0.008051	1.333764	3.841466	0.2481
Index-Oil	None *	0.098102	17.39012	15.49471	0.0256
	At most 1	0.002139	0.353328	3.841466	0.5522

Note: * represent existence co integration between variables.
Source: Author: 2016.

The trace statistics test indicates that equity market return has no integration with foreign exchange rate, gold prices and interest rate while the result of test shows that equity market index is co integrated with Inflation Rate and crude oil rate.

Table 8: Granger Causality Test

Null Hypothesis:	F-Statistics	Probability
LN FER does not Granger Cause LN INDEX	3.56936	0.0304*
LN INDEX does not Granger Cause LN FER	2.36737	0.097
LN GOLD does not Granger Cause LN INDEX	0.53204	0.5884
LN INDEX does not Granger Cause LN GOLD	0.82366	0.4407
LN IFR RATE does not Granger Cause LN INDEX	3.08704	0.0483*
LN INDEX does not Granger Cause LN IFR RATE	4.7086	0.0103*
LN IR does not Granger Cause LN INDEX	1.82208	0.165
LN INDEX does not Granger Cause LN IR	8.40492	0.0003*
LN OIL does not Granger Cause LN INDEX	1.77669	0.1725
LN INDEX does not Granger Cause LN OIL	9.06542	0.0002*

Source: Author: 2016.

Unidirectional casualty exists between foreign exchange rate KSE-100 Index returns. The result of the study validates the existing work of Kalyoncu et al. (2008) and Khalid (2010). Study shows an absence of causal relationship between gold price and index return consists with the finding of Shahzadi & Chohan (2010). While bi-directional causality relationship exists between Inflation and KSE-100 index returns means both inflation and KSE-100 index granger cause each other validates the finding of Singh (2010) and contradicts the results of Hussain et al., (2014) and Patel (2012). The results of pair wise granger casualty further shows the unidirectional causality running from KSE-100 index returns towards interest rate and oil prices. These results show that if rise in the stock price directly raise the oil prices and interest rates within an economy.

Table 9: Variance Decomposition Analysis of KSE-100 Index

Period	S.E.	INDEX	FER	GP	IFR	IR	OP
1	0.0817	100	0	0	0	0	0
2	0.0830	97.1489	2.1565	0.0590	0.0216	0.0357	0.5783
3	0.0833	96.4856	2.6889	0.0805	0.1178	0.0530	0.5741
4	0.0834	96.1737	2.8719	0.0827	0.2352	0.0589	0.5776
5	0.0835	95.9987	2.9276	0.0825	0.3523	0.0588	0.5799
6	0.0836	95.8641	2.9472	0.0827	0.4655	0.0591	0.5814
7	0.0837	95.7488	2.9551	0.083	0.5720	0.0590	0.5819
8	0.0837	95.6442	2.9589	0.0836	0.6721	0.0590	0.5821
9	0.0837	95.5477	2.9611	0.0841	0.7659	0.0590	0.5821
10	0.0838	95.4579	2.9625	0.0847	0.8538	0.0590	0.5820

Source: Author: 2014.

The result of variance decomposition analysis of KSE-100 Index indicated that shock or fluctuation to index is account for 95.46% fluctuation in index (own shock), in simple word main cause of fluctuation in index is itself.

Cholesky Ordering: Index Exchange Rate, Gold, Inflation Rate, Interest, Oil

CONCLUSION

Study explored the long-run and causality relationship between the five macroeconomic factors including foreign exchange rate, inflation rate, gold prices, interest rate and oil price and KSE-100 Index returns. Result of unit root analysis shows that series of macroeconomics factors and KSE-100 Index are non-stationary at level but all the time series became stationary at 1st difference. The existence of two co integration vectors in multivariate co integration analysis reveals the presence of long run relationship between KSE-100 Index returns and macroeconomic factors. Bi-variate co integration results show that inflation rate and oil prices are integrated in long run with KSE-100 Index return while other macroeconomic factors such as interest rate, foreign exchange rate and gold price are not co integrated with equity returns in the long run at Karachi stock exchange. Results of granger causality show that except gold prices, granger causality relationship exists between macroeconomic factors and KSE-100 Index returns.

Findings of this study provide the valuable information regarding the behavior of stock price movement in relation to a set of macroeconomic variables. Such behavior helps the financial analysts; portfolio manager and policy maker to design their strategies according to the desired results. The study results have a number of essential policy implications. Firstly, foreign exchange rate contains some important information to predict equity market performance. As a result, State Bank of Pakistan (SBP) should try to keep a glowing exchange rate. Second inflation rate is a most important factor by having knowledge about its behavior the policy makers establish appropriate polices. Third interest rate is key factors affecting from stock markets, therefore the regulatory body must try to manage it through well-established strategies. Fourth, commodity prices like gold prices provide hedge against stock prices so investors can diversifying their investment to minimize risk. Oil prices are also major macroeconomic factor that have long run relationship with stock markets returns.

Generally prices of these commodities are charged at the worldwide level, however still by suitable import duty and local taxes, policy makers should try to maintain competitive price levels. Finally, the government and autonomous regulatory bodies can positively participate in professional working and progress of the Pakistan equity market. This study provides guideline to new researcher while exploring relationship between macroeconomic

variables and stock return by adding more economic variables and by using more techniques. The further investigations will provide benefit for investors, various organizations and for the government regulatory bodies.

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