Paradigms: A Research Journal of Commerce, Economics, and Social Sciences
Print ISSN 1996-2800, Online ISSN 2410-0854
2017, Vol. 11, No. 1 Page 103-110
DOI: 10.24312/paradigms110116

Impact of macroeconomic fundamentals on stock exchange market: Empirical evidence from Pakistan

Pervez Iqbal
Scholar at Quaid e Azam University, Islamabad
Sajjad Nawaz
PhD Scholar Othman Yeop Abdullah Graduate School of Business, Universiti Utara Malaysia
Zeeshan Umer
M.Phil. Scholar National University of Modern Languages, Islamabad

ABSTRACT

The study accomplishes a healthy endeavor to investigate the short run and the long run impact of macroeconomic variables on stock exchange prices in case of Pakistan. The relationship between macroeconomic variables and stock exchange prices has earned indispensable attention to study for the flourishment of the business activity and the economic prosperity. To analyze the relationship, the monthly time series data ranges from January 1999 to June 2016 is utilized. The time series properties of data show mixed order of integration that compelled us to employ ARDL technique that provides short run and long run effects of macroeconomic variables on stock prices. The evidence of existence of co-integration among the series is granted through bound testing procedure. The results of the study leave important implications for the policy makers.

Keywords: Karachi Stock Exchange; Macroeconomic factors; ARDL; Pakistan

INTRODUCTION

Capital markets play vital role in modernistic economy in sense of diversifying the domestic funds into cultivable investment. Specifically, stock markets are considered very important channels for savings and investment. More explicitly, financial sector revenues and investment objectives are impelled largely by macroeconomic indicators. That's why the stock markets' behavior has called extensive interest in empirical and policy circles; broadly speaking, the impact of macroeconomic indicators on stock market performance has brought forth lot of interest.

It is generally stated that if the stock price of equity as whole depends on the condition of economy, then dubiety in macroeconomic situations would affect the stock returns (Adjasi, 2009). Bekhet and Mattar (2013) argued that contribute macroeconomic environment boosts the profitability of business, which prompts them to a hike where these businesses can attain a sustainable growth.

Many international researchers tried to explore the relationship between fundamentals of economy and stock market indexes of one country or in specified group of countries. Some of them are Nasseh and Strauss (2000) and Dickinson (2000) looked into international effect of macroeconomic indicators on stock market prices. These longstanding empirical studies have come upon with evidence that there is correlation between stock prices and related macroeconomic indicators, (Maysami, Howe, & Hamzah, 2004; Kim, Mckenzie, & Faff, 2004; Ghosh, 2009; Gosnell & Nejadmalayeri, 2010; Diamandis & Drakos, 2011).

These studies also propose that the motility of stock market index is extremely responsive to the alteration in the fundamentals of the economy and to the changes in believes about future outlook. Mostly researches are well documented to postulate the relationship between economic fundamentals and capital markets in developed economies, such as (Apergis & Miller, 2009; Kim & In, 2002; Omran & Pointon, 2001; Rangel, 2011). Coleman and Tettey (2008) investigated the impact of macroeconomic variables on Ghana Stock Exchange – a developing stock exchange. Pal and Mittal (2011) examined the long run relationship between the Indian capital markets and major economic variables. Results of these studies intimates that investors of developing economies should consider economic fundamentals for their investing decisions, but it need more evidence from emerging markets. This need for the investors and policy makers actuated study to probe the degree to which this determination is applicable to another emerging stock market in Pakistan – the Karachi Stock Exchange.

Thus, the main purpose of the study is to examine that whether Pakistani stock market prices are driven by its economic fundamentals and either any relationship exist between Karachi Stock Exchange (KSE-100) index and selected macroeconomic indicators (money supply, interest rate, exchange rate and industrial production index). After the brief introduction in the first section, Section 2 consist of trends and patterns in KSE. Literature review is presented in section 3. Section 4 provides Data and Methodology. Results and interpretations are made in Section 5, while the Section 6 concludes.

Pakistan's Equity Market: Trends and Patterns

Although Pakistan continues to scramble with socio-political challenges, recently it has made enormous pace in

the economic front by doing reforms that were stacked in the early part of 1991. The most epoch-making of the reforms was perchance the opening of the economy to foreign investment on very liberal terms, which allows foreign direct and indirect investment in equity market, in turn, these reforms produce positive results.

Pakistan's foreign investment and industrial exports are growing at the country's fastest rate ever, that's why many Pakistani stocks are now being traded in international markets, not only this but foreign brokerages houses are now being allowed through joint ventures with Pakistani investment bankers to participate in primary as well as secondary markets in Pakistan.

Given the new-sprung interest in the Pakistani stock markets, a challenging question arises, that how these markets have performed over the years. To resolve this dilemma, we analyzed the return generating process of the Karachi Stock Exchange. There are three stock exchanges in Pakistan, namely Karachi Stock Exchange (KSE), Lahore Stock Exchange (LSE) and Islamabad Stock Exchange (ISE). KSE is the largest and most operational stock exchange in Pakistan, accounting for approximately 75% of the value of the country's total stock transactions.

KSE was declared as the "Best Performing Stock Market of the World for the year 2002". KSE comprises of four indices KSE-all share index, KSE-100, KSE-30 and KMI-30. Karachi Stock Exchange comprises of 36 sectors with 569 local and foreign companies. KSE' approximately listed capital as on (June, 30, 2013) was US $ 1.11 billion and market capitalization: US $ 52.07 billion. KSE-100 index achieved maximum value 29,669.95 on April, 17, 2016.

LITERATURE REVIEW

Capital markets play vital role in economy of any country. It has been stated by different researchers that value of equity is driven by the whole economy of the country where that company is running its operations (Adjasi, 2009). That's why, to ascertain how stock market indices respond to macroeconomic fundamentals has received great concentration from researchers whose empirical studies have used different macroeconomic indicators for different time periods from both developed and emerging economies.

Studies of several academics have used different statistical models to set up relationship between macroeconomic variables and stock market indices. Numerous studies have been reviewed of the developed and emerging stock markets. Evidently, the empirical literature on macroeconomic fundamentals and stock market is nourished with many studies. Various studies like Kim, Mckenzie and Faff (2004), Ghosh (2009), Diamandis and Drakos (2011), and Hussain (2011) have conducted research to determine the factors affecting stock market, strengthening the argument of relationship between economic fundamentals and stock market. Most of these studies have found an association between stock market and macroeconomic indicators by using co-integration and Engle Granger causality techniques (Abugri, 2008; Coleman & Tettey, 2008; Gosnell & Nejadmalayeri, 2010).

Many factors like GDP growth rate, inflation rate, exchange rate, fiscal and debt position, national savings, money supply and industrial production index are identified as instruments for quantifying the performance of the economy. Some variables such as exchange rate, money supply and inflation, among others, have been found to be explanatory indicators of stock market (Flannery & Protopapadakis, 2002).

Fama (1981) started to ascertain association between stock market and macroeconomic indicators and established results that macroeconomic fundamentals impacts stock market volatility. Following Fama (1981) study, many other researchers have tried to ascertain relationship between macroeconomic variables and stock market performance so that, they can conclude how stock market responds to changes in macroeconomic indicators? Such as, (Fama, 1990; Kearney, 2000; Hussain, 2011; Maghyereh, 2002) have concluded that uncertainty in macroeconomic indicators drives the stock market volatility.

Bekhet and Matar (2013) examined the short-term and long-term state of connectedness between the macroeconomic fundamentals and stock market indexes, used Amman Stock Exchange as case study. The researchers used yearly time series data from 1978 to 2010. Following macroeconomic indicators (money supply, exchange rate, industrial production and discount rate) were used in their study.

Hussainey and Ngoc (2009) investigated that how macroeconomic variables affects the Vietnamese stock prices. Researchers conducted study using monthly time series data spanning from 2001 to 2008. Coleman and Tettey (2008) looked into the relationship between macroeconomic variables and stock index of Ghana Stock Exchange. Academics used quarterly time series data spanning from 1991-2005 for share-index.

Montes and Tiberto (2012) employed ordinary least square (OLS), generalized method of moments (GMM) to examine the impact of country risk and macroeconomic variables (real interest rate, exchange rate, economic growth and value of listed companies) on Bovespa index – Brazilian stock market index. Academics used monthly time series data spanning from 2001 to 2010. Results of both statistical models revealed that value of listed companies in IBOVESPA and economic growth of the country has statistically significant positive impact on Bovespa index.

Pal and Mittal (2011) employed Engel and Granger and Error Correction Mechanism to ascertain both the long-run and short-run interaction between

macroeconomic fundamentals. The selected variables like, Interest rate, rate of inflation, exchange rate IND. Rs/US $ and domestic savings were used to investigate their impact of Indian capital markets. Researchers used time series quarterly data runs from first month of 1995 to ending month of 2008 and reached at conclusion that macroeconomic fundamentals drive stock price index in India.

Kearney (2000) looked into the interdependence of macroeconomic variables with the stock markets in different countries. Their empirical study found that stock market index is positively influenced by gross domestic product and exchange rate in Zimbabwe and South Africa and these variables have short-term relationship with stock market prices in Botswana. Maghrereh (2002) also empirically suggested the presence of long-term causal association between macroeconomic fundamentals and stock price index in Ghana. There are yet more empirical evidences on the stock exchange of Ghana.

Wickremasinghe (2011) ascertained the link between stock market prices and selected macroeconomic variables in five ASEAN countries (Malaysia, Thailand, Philippines, Indonesia and Singapore). Their empirical results confirmed the positive long-run relationship between output growth and stock price index. Tessitore and Usmen (2005) come with evidence that stock prices volatility does not significantly affected by volatility of economic fundamentals in well-developed stock market in UK. The findings farther provoke the curiosity of investigating the association between economic fundamentals and stock prices indices.

Kollias, Mylonidis, and Paleologou (2012) examined the complementarity between the Euro/Dollar exchange rate and European stock market indexes by employing co-integration and Engle Granger causality tests. The study rolling co-integration analysis suggested no long-term connectedness between stock indices and exchange rate. Whereas, rolling causality test determined that stock indices are driven by exchange rate in normal conditions but under tense situation turnabout causality could be hold.

Pan, Chi-Wing and Liu (2007) investigated the seven East Asian countries and observed mixed results from different countries. Agrawal (2010) examined the dynamical association between stock returns variations and Ruppe/Dollar exchange rates through causality test. Through his empirical observation, he suggested the negative linkage between stock indices and Rupee-Dollar exchange rates. Many other empirical evidences are available which finds significant negative exposure of exchange rate to stock price indices of international trade oriented countries (Ibrahim & Aziz, 2003; Maysami & Koh, 2000; Lee *et al*, 2013).

Abugri (2008) examined that the stock markets in Latin America responds to real economic activity using VAR model. The statistical results demonstrate that rising industrial productivity is causal factor of sufficient gain in stock returns. Adel (2004) also analyzed the exposure of stock price indices towards macroeconomic fundamental in Jordan Stock Market and suggested that industrial productivity is positively related with stock market.

Lee et al. (2013) ascertained the impact of industrial production on stock market indices and proposed positive impact of real economic activity on stock prices. Filis (2010) employed Johansen co integration to know the responses of stock prices with changing macroeconomic variables and suggested positive relation between concerned variables. Dritsaki (2005) also found positive relationship between industrial productivity and stock prices in Greece using Granger causality test. Liu and Shrestha (2008) also investigated the response of stock prices to industrial productivity in China using heteroscedastic analysis. The study also proposed positive association between variables. Hussainey and Ngoc (2009) also suggested positive association between stock returns and industrial activity. The long-run association between stock market indices and industrial production index is found to be positive (Maghayereh, 2003; Ibrahim & Aziz, 2003; Chaudhuri & Smile, 2004; Maysami & Koh, 2000; Fama, 1990).

Fama (1981) argued that money supply can have impact on stock prices in two different manners. Rate of inflation is directly associated with the growth rate of money, thus, rising money supply can lead inflation in upward trend (Fama, 1990). With the rising inflation, nominal rate in discount valuation model also increases which ultimately decreases the stock prices and stock price indices as well. Hence, it proves negative association between money supply and stock prices.

Liu and Shrestha (2008) argued that through monetary policy, excess money can be provided to industry as stimulus which reduces discount rate in valuation model, resulting in growth in expected cash flows and equity prices. Adel (2004) also confirmed positive association between money supply and stock prices in Jordan using EGARCH model.

Adjasi (2009) also confirmed that due to positive association between money supply and inflation, the stock prices are negatively connected with money supply. Aburgi (2008) argues that with the advent of money supply in the industry in an economy, money supply should have negative impact on stock prices because of its relationship with inflation uncertainty.

It is clear from the detailed literature on relationship between macroeconomic indicators and stock market performance that most of the studies have been conducted in more developed economies but evidence from developing countries is not enough for final decision of investors and policy makers. Pakistan's economy is not strong as USA economy or other European economies so it is necessary to analysis impact of local economic variables

on Pakistani stock market.

METHODOLOGY

Present segment comprises of data and methodology used to judge estimated effects of macroeconomic variables on Karachi Stock Exchange Index (KSE-100) in Pakistan. Macroeconomic variables are; money supply (M2), interest rate (IR), exchange rate (ER) PKR/US$ and industrial production index (IP). Government of Pakistan Treasury Bills Rate is considered to represent interest rate.

Data and Material Sources

Monthly time series data from 1999: M1-2016: M6 are used for regression analysis. Data for the independent variables (interest rate, exchange rate, industrial production index and money supply) has been obtained from statistical bulletin of State Bank of Pakistan, whereas, data for the dependent variable (KSE-100 Index. Variables definition and description is being explained in the next section.

In order to empirically investigate the impact of macroeconomic variables on stock market index, the study employed Auto Regressive Distributed Lag (ARDL) model approach to co-integration test. Augmented Dicky Fuller (ADF) test proposed by Dicky and Fuller (1981) has been employed to check stationary nature of the data series.

Definition of Variables

The macroeconomic variables included in this study are being discussed as under;

Karachi Stock Exchange – KSE-100 Index. Karachi Stock Exchange was established in 1947, it is the oldest and largest stock exchange in Pakistan. KSE-100 Index includes top hundred companies with respect to highest market capitalization. The organization having highest market capitalization from each sector is also included to ensure full market representation. Monthly index is obtained by doing average of daily closing index of KSE-100.

Money supply. This is the broad amount of money an economy contains and used to quantify liquidity in an economy. Money supply comprises of the money speeded in market, cash with central bank and time deposit with commercial banks (Glossary State Bank of Pakistan).

Interest rate. T-bill rates corresponds the interest rate fluctuations in Pakistan's economy. These rates are the short-term borrowing instruments of the Government of Pakistan. Primary Dealers also sold these instruments through auctions held on fortnightly basis. 3 month treasury bills rates have been taken as proxy for interest in this study. Monetary authorities use this factor for easy or tighten monetary policy.

Exchange rate. It is the price of domestic currency in terms of another country's currency. PKR/US$ has been considered as foreign exchange rate in this study.

Industrial production index. It is an economic indicator released on monthly basis by the Pakistan's Bureau of Statistics to estimate changes in output for the manufacturing sector of the economy. Quantum Index Manufacturing is used a proxy for industrial production index.

Data Description

The variables has been described as follows; M2 is Money Supply, IR is Government of Pakistan 3-Month T-Bills Rates, ER is PKR/US$, Exchange Rate (End Month SBP Rate to Authorized Dealers – Mid Point of Spot Buying and Selling), IP is Industrial Production Index, and KSE-100is Karachi Stock Exchange Index – average of daily closing index to obtained monthly index.

Econometric issues. This section gives overview regarding the issues in approximation of time series data. Augmented Dicky Fuller (ADF) tests can be applied to ascertain the order of integration of dependent and independent variables. In this light Autoregressive Distributed Lag Model is most appropriate to ascertain short-term and long-term relationship.

ARDL bound testing Co-integration relationship. The long-run association among variables first determined by bound testing procedure through Wald Test and then long-run and short-run coefficients are calculated.

This model would ascertain how the macroeconomic variables could affect stock market index. Δ is the first-difference operator and u_t an error term.

$$\left[\Delta(KSE)_t = \beta_0 + \sum_{i=1}^{a0}\beta_{ai}\Delta(KSE)_{t-i} + \sum_{i=0}^{a1}\beta_{bi}\Delta(M2)_{t-i} + \sum_{i=0}^{a2}\beta_{ci}\Delta(IR)_{t-i} + \sum_{i=0}^{a3}\beta_{di}\Delta(ER)_{t-i} + \sum_{i=0}^{a4}\beta_{ei}\Delta(IP)_{t-i} + \right.$$
$$\left. + \beta_{a1}(KSE)_{t-1} + \beta_{b1}(M2)_{t-1} + \beta_{c1}(IR)_{t-1} + \beta_{d1}(ER)_{t-1} + \beta_{e1}(IP)_{t-1} + \mu_{t1} \ldots..(4.1)\right]$$

An equation is the unrestricted error correction model of the order (a_0, a_1, a_2, a_3 and a_4) mentioning that stock price index tends to be influenced by its past values. The structural lags are developed by engaging minimum Schwarz Information Criteria.

The model comprises of short-term and long-term coefficients. Where, β_a, β_b, β_c, β_d, β_e and β_{a1}, β_{b1}, β_{c1}, β_{d1}, β_{e1} are the short-term and long-term coefficients respectively, whereas, β0 is the intercept term. To ascertain the long-run association between concerned variables, the Wald Test has been executed.

The null hypothesis is as follows:

$$H_0 : \beta_{a1} = \beta_{b1} = \beta_{c1} = \beta_{d1} = \beta_{e1} = 0$$

(No long-term relationship)

Against the alternative hypothesis,

$$H_1 : \beta_{a1} \neq \beta_{b1} \neq \beta_{c1} \neq \beta_{d1} \neq \beta_{e1} \neq 0$$

(Long-term relationship)

The calculated *F-statistics* values would be explained using the critical values tabulated in Table CI (iii) of Pesaran et al. (2001). If F-Statistics value is below the lower bound value, the long-run association does not exist. Other the other hand, if its value is higher than upper bound limit the long run relationship exists. On the other hand, if

the computed *F*-statistic falls between the lower and upper bound values, then the results are inconclusive.

Long Run Relationship between KSE and Macroeconomic Variables

If the F-statistics value of is away from the critical value, it elicit the need to investigate the long-term coefficients and interconnected ECM. ECM is created in sense of first difference, which eliminates trends from concerned variables. So chances for spurious regression got rid of.

$$KSE_t = \theta_0 + \sum_{i=1}^{a_0} \theta_{1i}(KSE)_{t-i} + \sum_{i=0}^{a_1} \theta_{2i}(M2)_{t-i} + \sum_{i=0}^{a_2} \theta_{3i}(IR)_{t-i} + \sum_{i=0}^{a_3} \theta_{4i}(ER)_{t-i} + \sum_{i=0}^{a_4} \theta_{5i}(IP)_{t-i} + \varepsilon_t \quad \text{.....4.2)}$$

θ_0 in Equation (4.2) is the intercept term, whereas, θ_1, θ_2, θ_3, θ_4, θ_5 are the long run coefficients of explanatory variables that would capture the long run effects on stock price index (dependent variable).

Short Run Relationship and Error Correction Mechanism (ECM)

To estimate the short run relationship among macroeconomic variables and stock price index error correction mechanism of ARDL approach has been adopted. The coefficients of error correction mechanism must be negative and significant (Pesaran *et al.* 2001).

$$\Delta KSE_t = \partial_0 + \sum_{i=1}^{a_0} \partial_{1i}\,\Delta(KSE)_{t-i} + \sum_{i=0}^{a_1} \partial_{2i}\,\Delta(M2)_{t-i} + \sum_{i=0}^{a_2} \partial_{3i}\Delta(IR)_{t-i} + \sum_{i=0}^{a_3} \partial_{4i}\,\Delta(ER)_{t-i} + \sum_{i=0}^{a_4} \partial_{5i}\,\Delta(IP)_{t-i} + \lambda(ECM)_{t-1} + \varepsilon_t \quad \text{.....(4.3)}$$

$\partial_0, \partial_1, \partial_2, \partial_3, \partial_4, \partial_5$

In Equation (4.3) are the intercept term and the coefficient of explanatory variables respectively to capture the short run effects on stock price index (dependent variable). ECM_{t-1} represents the error correction term and coefficient value of ECM is shown by λ. ε_t is the white noise error.

The Error Correction Term (EC_{t-1})

The error correction mechanism estimates the rate at which factors comes back in long term sense of balance, the Ect_{t-1} should have negative sign and statistically significant (Pesaran *et al.* 2001).

DISCUSSIONS

Descriptive Statistics

Table 5.1 contains descriptive statistics of five variables for empirical investigation. The variables are KSE-100 index, money supply, 3-month Government Treasury bills rate, exchange rate and industrial production index. Mean value is the average of sum of numbers observed. KSE-100 observed to have a mean value of 8284.

Table 5.1

Descriptive Analysis of Variables

Sample: January 1999, June 2016					
	KSE	M2	IR	ER	IP
Mean	8284	394764	10.73	69.6	205.
Median	8899	340596	10.00	60.7	198.
Maximum	2657	938569	15.000	108.	454.
Minimum	11.0	122510	7.5000	46.1	99.9
Std. Dev.	5913	232482	2.2401	15.9	71.7
Skewness	0.63	0.6415	0.1132	0.72	0.73
Kurtosis	3.04	2.2822	1.7776	2.21	3.50
Jarque-Bera	12.1	16.300	11.655	20.2	18.4
Probability	0.002	0.0002	0.0029	0.000	0.000 1

Source: Authors calculations

Further if values for both skewness and kurtosis have zero and three, it shows that given time series data is normally distributed. From table given above, it is observed that KSE-100 and industrial production index follow the lepokurtic distribution, on the other hand interest rate, exchange rate and money supply follow the platykurtic distribution.

Test for Stationary

The ADF test statistics given in Table 5.2 disclose that money supply (M2) is non-stationary at level but the series becomes stationary at first difference with trend and intercept and five lagged values. Exchange rate (ER), interest rate (IR) and KSE are also non-stationary at level.

Table 5.2

Results of ADF Test

Variable	**ADF (At Level)**		**ADF (At First Difference)**		**Order of Integratio**	**Comments**
	Intercept	Trend and Intercept	Intercept	Trend and Intercept		
M2	5.69	1.89	-1.87	-6.05	I(1)	*H_0 Not Rejected*
ER	0.34	-1.12	-6.95		I(1)	*H_0 Not Rejected*
IP	-2.03	-4.18			I(0)	*H_0 Rejected*
IR	-1.37	-1.42	-12.50		I(1)	*H_0 Not Rejected*
KSE	1.49	-0.34	-10.40		I(1)	*H_0 Not Rejected*

Source: Authors calculations; the null hypothesis – H_0 is that the data series has unit root. * Denotes statistical significance at 10% level.

Bounds Test for Co-integration

Based on the results of ADF test, study is enabling to employ the ARDL approach for determining the long run and short run relationship among concerned variables

because there is mix level of integration among variables. First, before the study estimates the long run coefficients and error correction mechanism, ARDL approach demand to confirm the existence of long term relationship among underlying variables. However, to ascertain the existence of long run relationship among underlying variables H0 and H1 hypothesis can be formulated as follows:

Null Hypothesis: No long run relationship	Alternative Hypothesis: A long run relationship
$H_0 : \beta_{a1} = \beta_{b1} = \beta_{c1} = \beta_{d1} = \beta_{e1} = 0$	$H_1 : \beta_{a1} \neq \beta_{b1} \neq \beta_{c1} \neq \beta_{d1} \neq \beta_{e1} \neq 0$

Table 5.3 presents the results of Wald test conducted to investigate the existence of co-integration. However, the decision of co-integration and no co-integration among the concerned variables depends on the following procedures (Pesaran et al. 2001).

F-statistic > Upper critical bound value	Co-integration among variables
F-statistic < Lower critical bound value	No co-integration among variables
F-statistic ≥ Lower bound ≤ Upper bound	Conclusion is inclusive

Table 5.3

Wald Test for Co-integration

Model	*F*-statistic	Significance Level	Critical Bound Value		Conclusion
			Lower	Upper	
– 3.2	4.041372				
		10%	2.45	3.52	
		5%	2.86	4.01	Co-integration
		1%	3.74	5.06	

Note: The critical upper and lower bound values for *F*-statistics are cited from Table CI(iii) Case III: Unrestricted intercept and no trend: Critical Values at *k =5-1=4* (Pesaran et al. 2001, pp. 300).

First column of table 5.3 shows Model-Equation (4.1), where KSE – dependent variable, is being explained by repressors – M2, IR, ER and IP. *F*-statistic value based on Wald test is being shown in second column. Next the critical bounds value and their significance level has been given and last column shows the decision taken on the base of the value of *F*-statistic.

Computed *F*-statistic for equation (4.1) is 4.041, which are higher than the upper bound value of 4.01 at 5% level of significance showing existence of co-integration between dependent and independent variables. Thus, null hypothesis H_0 is rejected and H_1 is accepted because it can be concluded from table 5.3 long run co-integration relationship exist among variables.

Long-Term and Short-Term Estimation

To ascertain the long run association between macroeconomic indicators and KSE-100 Index Model-Eq. 4.2 has been estimated. The calculated results are given in table 5.4(a). Money supply (M2) coefficient is positive and highly significant at 1% significance level or 99% level of confidence in both long run and short run analysis. Coefficient value of money supply is 0.009 which means one unit increase in M2 would increase stock price index by 0.009 points. Earlier in literature it has been discussed that portfolio theory suggests positive association of money supply with stock market because growing money supply as stimulus to industry shifts investment from risk free assets to risky financial assets like common stock equity. This study not only confirmed the portfolio theory suggestions but results are also consistent with Maysami *et al.* (2004), Liu and Shrestha (2008) and Adel (2004).

The positive association between money supply and stock index is therefore statistically strong and significant in this study finding. Thus it is confirmed by this study and many other empirical evidences available in literature assured short-run and long-run association between stock index and money supply (M2).

Table 5.4(a)

Long-Term Estimates

Model: ARDL(1,0,0,1,0) selected based on Schwarz Bayesian Criterion Dependent Variable : KSE

Regressor	Coefficient	Standard Error	T-Ratio	Prob.
M2	.0091119	.0026490	3.4398	[.001]
IR	-1253.7	536.8138	-2.3354	[.021]
ER	-351.1827	158.9023	-2.2101	[.028]
IP	11.1320	14.0014	.79507	[.428]
C	23767.7	7937.4	2.9944	[.003]
T	-141.3850	85.2527	-1.6584	[.099]

Source: Authors calculation by Micro fit, Version 4.1.

The study empirical results for exchange rate (ER) proposed negative relation with stock market at 5% level of significance in long run and strong significant level of 1% in short run. The results are consistent with two portfolio framework which suggests that diminishing of home currency can improve the profits of export oriented firms and devaluation of local currency lead the firm's profits downward, relying heavily on imports. Thence, for the relationship of exchange rate should be negative and positive for export oriented and import oriented firms respectively. The companies listed in Pakistan's stock market rely heavily on imports, thus depreciation of home currency PKR/US$ lead the import oriented companies towards worst condition as there import material cost will increase and consequently decreasing their equity price and stock market index.

Table 5.4(b)

Short-Term Estimates

Criterion
Dependent Variable : KSE

Regressor	Coefficient	Standard Error	T-Ratio	Prob.
ΔM2	.5838E-3	.1680E-3	3.4754	[.001]
ΔIR	-80.3209	23.0697	-3.4817	[.001]
ΔER	-176.9858	44.0124	-4.0213	[.000]
ΔIP	.71321	.90466	.78836	[.432]

ΔC	1522.7	620.3492	2.4547	[.015]
ΔT	-9.0582	3.6717	-2.4670	[.015]
Ect_{t-1}	-.064068	.027202	-2.3553	[.020]
R^2	.23015	Adjusted R^2	.19864	
Akaike Info. Criterion	-1393.3	Schwarz Criterion	-1406.1	
DW-statistic	1.8223			

Source: Authors calculation by Micro fit, Version 4.1.

The coefficient for ER in long run relationship is -351.18 which means one rupee depreciation of PKR against US$ like, (Rs. 100/1US$ to Rs. 101/1US$) will decrease KSE-100 index by 358.18 points. Many other empirical evidences are available which suggested the same results (e.g. Aburgi, 2008; Lee *et al.*, 2013; Kollias *et al.*; Agrawal, 2010).

Interest rate (IR) coefficients of long run and short run in this study suggest adverse effect or IR on the stock market index. Theory regarding interest relation with stock price index suggests negative impact of IR on stock index because this factor affects funds investment of an individual investor, cost for industrial production, thus, affecting earnings of equity and ultimately equity prices of corporate sector. When the rate on investment in risk free asset declines the investor switches their money from saving accounts to stock market. In turns, demand and share price of affected stock will increase, consequently fluctuating stock market index. This study confirms the phenomena of funds transfer from risk free assets to stock market. The value of coefficient or IR in long run is -1253.7 which mean 1% increase in interest rate will lead the stock index 1253.7 points downward. Thus, our results suggest adverse effect of IR on stock index in both long run and short run with 5% and 1% level of significance respectively. The study results matched with the findings of (Pal & Mittal, 2011; Bekhet & Mattar, 2013; Chen *et al.*, 2013; Wang & Mayes, 2012; Vithessonthi Techarongrojwong, 2012).

The coefficient for the industrial production index is also positive but statistically not significant in both long run and short run relationship. This supports the theory of how real activity affect stock market index but it is does not exert significant impact on stock index of Karachi Stock Exchange (KSE-100 Index).

The error correction mechanism estimates the rate at which factors comes back in long term sense of balance, the Ect_{t-1} should have negative sign and statistically significant (Pesaran *et al.* 2001). Ect_{t-1} in this study is -.064068 with 5% level of significance which connotes that divergence of variables from long-run state is rectified by 6.4% over each month at 5% level of significance. Negative and significant sign of Ect_{t-1} demonstrate the existence of long-term relationship and it can be concluded that stable long term association can be achieved (Narayan and Smyth, 2005.

Lagrange multiplier of residual serial correlation probability is more than 0.05 which is evidence of absence of serial correlation in residuals of model. Same Ramsay's reset test to check functional form of the model also demonstrates model is correctly specified. The residuals in the model are normally distributed as shown by probability higher than 0.05. The probability value of heteroscedasticity test is also higher than 0.05 which confirms the absence of autocorrelation in the deviation of error term.

Table 5.5

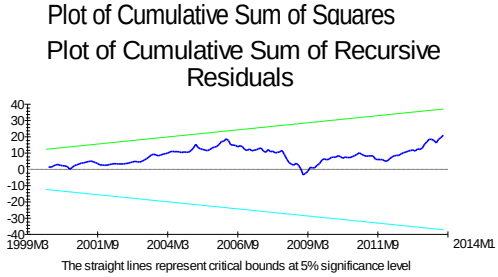
Diagnostic Tests

Test	Probability	
	LM Version	**F Version**
Serial Correlation	0.602	0.653
Functional Form	0.061	0.069
Normality	0.392	-
Heteroscedasticity	0.078	0.079

Source: Author's calculation by Microfit, Version 4.1.

Stability Test

In the end, long term and short term coefficients stability in the ARDL approach is being confirmed by employing cumulative sum of recursive residuals (CUSUM) and the cumulative sum of squares CUSUMQ. It is stated that graph of CUSUM and CUSUMQ lying within two straight lines is the evidence of stability of coefficients in ECM (Bahmani-Oskooee & Ng, 2002). Graph of CUSUM statistics are lying between the specified boundaries but CUSUMQ statistics are deviating from boundaries. Pesaran and Pesaran (2009) argued that one of these statistics must be within the critical boundaries and other one can be neglected for minor period. Thus, it can be concluded long run coefficients of the model are stable.



CONCLUSIONS

This empirical study ascertained the association between exclusive macroeconomic fundamentals and stock market index. The judgments of this study may be helpful for investors, policy makers and for risk mitigation.

The finding which suggests that economic fundamentals have statistical significant impact on Karachi Stock Exchange, the investors should consider these factors while investing in stock market to mitigate risk and increasing their returns. These findings are also helpful in selecting securities for portfolio development. For policy point of view, the economic policies can be explicated and applied to attain financial market constancy by using these

findings in an insightful manner. Because the financial markets are inherently interconnected with these macroeconomic factors, the flimsy economic plight, miserable policy explication and implementation may exert adverse effect on these financial markets. However, careful and wise policy explication and operational implementation by considering these findings may help to mitigate their inauspicious affects.

REFERENCES

Adjasi, Charles K.D. (2009). "Macroeconomic uncertainty and conditional stock-price volatility in frontier African markets Evidence from Ghana." *The Journal of Risk Finance* 10(4), 333-349.

Ang, A., and Bekaert, G. (2007), "Stock return predictability: Is it there?", *Review of Financial Studies*, 20 (3), 651-707.

Apergis, Nicholas, and Miller, S, M. (2009). "Do structural oil-market shocks affect stock prices?" *Energy Economics* 31 (4), 569-575.

Avramov, D., and Chordia, T. (2006). "Predicting stock returns", *Journal of Financial Economics*, *82 (*2).

Bekaert, G. Harvey, C. R. Lumsdaine, R. L. (2002). "The dynamics of emerging market equity flows", *Journal of International Money and Finance.* 21. 295−350.

Bekhet, A, H, and Mattar, A. (2013) "Co-integration and causality analysis between stock market prices and their determinates in Jordan." *Economic Modeling*, 32.

Bekhet, H.A. and Matar, A. (2013), "Co-integration and causality analysis between stock market prices and their determinants in Jordan", *Economic Modeling*, 35 (2), 508-514.

Bernanke, B. and Kuttner, K.N. (2003), "What explains the stock market's reaction to federal reserve policy?" *Journal of Finance,* 60 (3), 1221-57.

Bernanke, B. Gertler, M. (2001), "Should central banks respond to movements in asset prices? *American Economic Review Papers and Proceedings,* XCI.

Bernanke, B. S., & Kuttner, K. N. (2005), "What explains the stock market's reaction to Federal Reserve policy?" *The Journal of Finance*, 60 (3), 1221-1257.

Bilson, C. M., Brailsford, T. J. Hooper, V. J. (2001), "Selecting macroeconomic variables as explanatory factors of emerging stock market returns", *Pacific-Basin Finance Journal*, 9 (2), 401-426.

Chiarella, C., and Gao, S. (2004), "The value of the S&P 500—A macro view of the stock market adjustment process", *Global Finance Journal*, *15* (2), 171-196.

Coleman, A.K. and Tettey, K.F.A. (2008), "Impact of macroeconomic indicators on stock market performance", *The Journal of Risk Finance*, 9 (4).

Dornbusch, R. and Fischer, S. (1980), "Exchange rates and the current account", *American Economic Review*, 70 (5), 960-71.

Fama, E.F. (1981), "Stock returns, real activity, inflation and money", *American Economic Review*, Vol. 71 (2), 545-565.

Fama, Eugene F. (1965) "The Behavior of Stock Market Prices." *The Journal of Business* 38 (1), 34-105.

Farka, M. (2009), "The effect of monetary policy shocks on stock prices accounting for endogeneity and omitted variable biases", *Review of Financial Economics*, 18 (1), 47-55.

Frankel, J. (1983), "Monetary and portfolio-balance models of exchange rate determination", in Bhandari, J.S. and Putnam, B.H. (Eds), *Economic Interdependence and Flexible Exchange Rates*, MIT Press, Cambridge, MA.

Ghosh, Sajal. (2009) "Import demand of crude oil and economic growth: Evidence from India." *Energy Policy*, 37 (2), 699-702.

Gonzalo, R. J., (2011) "Macroeconomic news, announcements, and stock market jump intensity dynamics." *Journal of Banking & Finance* 35 (5), 1263-1276.

Hooker, M. A. (2004), "Macroeconomic factors and emerging market equity returns: a Bayesian model selection approach", *Emerging Markets Review*, *5* (4), 379-387.

Joseph, N. L. (2002), "Modelling the impacts of interest rate and exchange rate changes on UK stock returns", *Derivatives Use, Trading and Regulation*, *7* (4), 306-323.

Kim, S, J., Mckenzie, M, D. and Faff, R, W. (2004): "Macroeconomic news announcements and the role of expectations: evidence for US bond, stock and foreign exchange markets." *Journal of Multinational Financial Management* 14 (3), 217-232.

Marquering, W., and Verbeek, M. (2004), "The economic value of predicting stock index returns and volatility", *Journal of Financial and Quantitative Analysis*, *39* (2), 113-125.

Maysami, C, R., Howe, L, C. and Hamzah, M, A. (2004). "Relationship between Macroeconomic Variables and Stock Market Indices: Cointegration Evidence from Stock Exchange of Signapore's All-S Sector Indices." *Jurnul Pengurusan*, 24, 47-77

Mohammed, O, and Pointon, J. (2001). "Does the inflation rate affect the performance of the stock market? The case of Egypt." *Emerging Markets Review* 2 (3).

Montes, G.C. and Tiberto, B.P. (2012), "Macroeconomic environment, country risk and stock market performance: Evidence for Brazil", *Economic Modeling*, 29 (1), 1666-1678.

Muhammad, N., Rasheed, A., & Husain, F. (2002), "Stock Prices and Exchange Rates: Are they Related? Evidence from South Asian Countries", The Pakistan Development Review, 33(4), 535-550.

Ross, S. (1976), "The Arbitrage Theory of Capital Asset Pricing", Journal of Economic Theory, 13 (3).

Sharpe, W, F. (1964). "Capital Asset Prices: A Theory of Market Equilibrium under Conditions of Risk." The Journal of Finance 19 (3), 425-442.

Sharpe, W.F. (1964). "Capital Asset Prices: A Theory of Market Equilibrium under conditions of Risk", Journal of Finance, 19 (3), 425–442.

Thomos, G, and Nejadmalayeri, A. (2010). "Macroeconomic news and risk factor innovations." Managerial Finance 36, 7: 566-582.