

The Impact of Macroeconomic Variables on Stock Prices: A Case Study of Karachi Stock Exchange

Jawad Khan

MS student, COMSATS Institute of Information Technology, Abbottabad

Dr. Imran Khan

Assistant Professor, COMSATS Institute of Information Technology, Abbottabad

Abstract

Investment decisions are highly influenced by macroeconomic variables as changes in macroeconomic variables effect stock markets differently according to the country economic conditions and government policies. The study contributes by determining the effect of various macroeconomic variables on stock prices of Pakistan by analyzing the monthly data from May 2000 - August 2016. As all the variables are stationary at first difference thus ideal ARDL approach of bound testing is applied to check the short term and long term cointegration of the macroeconomic variables on stock prices. The findings suggest that stock prices of Karachi Stock Exchange in long term are significantly affected by money supply, exchange rate, and interest rate. In short term all the variables are insignificant except exchange rate which is negatively cointegrated with stock prices. The central bank shall be vigilant while changing the money supply in market because too much increase in money supply could effect investment as well as stock market. The regulator should keep interest rate relatively low to encourage economic activities, improve external economic environment through rule based exchange rate policy and avoid discretionary measures.

Keywords: Karachi Stock Exchange, Macroeconomic variables, Time series analysis, KSE-100 index, Cointegration, ARDL, Bound testing approach.

Introduction

Emerging markets keep on attracting an expanding level of investments by specialized and institutional investors. Against a background of decreased performance from traditional markets, greater returns are accessible in emerging markets give an attractive opportunity of investment to employ capital. However, investors face challenges in figuring how, where, and with whom to invest (Wilton, 2013). Companies performance heavily depend on their economic situations, similarly changes in stock prices are linked to the domestic as well as international economic conditions that are occurring or being anticipated by the market (Peiro, 2015). Stock exchanges attract general public to invest spare resources in financial instrument, at the same time it also facilitates firms that are in need of long term capital for their projects and operations thus stock market bring together the parties for stock trading and mobilizes funds from savers to investors for efficient use. A stable and harmonious equity market is very crucial to buoy activities among financial elements so that firms can without much of a stretch raise reserves by issuing securities as equity is the attractive source of financing. Thus, to investigate the issue, measurement of both stock prices and economic activities is required. When stock markets deteriorate, the value of companies listed in the stock market also fall. In the last decades, a large number of less developed stock markets have gone through a substantial improvement in their financial structures. The accessibility of financial resources by mean of capital markets enhances the performance and development of industries, agriculture and services sector. Capital market supply finance for long term investments and in addition pulls in the investors by giving them desirable returns on their investments. Developed and efficient stock markets draw in foreign direct investment in local industry and adds to economic progress. This implies that capital markets play a key role in improving economic growth and development (Shahbaz et al., 2016). The relationship found between stock prices and macroeconomic variables is very strong (Diamandis and Drakos, 2011; Fama, 1981; Kim et al., 2004; Merikas and Merika, 2006; Wei and Wong, 1992). Previous empirical studies recommend that there is association among macroeconomic variables and prices of stock. The signs of such relationship vary depending upon the effects of any or more macroeconomic forces on stock prices (Hussainey and Ngoc, 2009). Consequently, the causal relationship and interaction between macroeconomic variables and stock prices are vital in preparation of the state's macroeconomic plans and policies (Maysami et al., 2004).

Karachi Stock Exchange (KSE) was built up in 1949, and is Pakistan's biggest stock market. The Pakistan capital market primarily contains three stock exchanges that are Karachi Stock Exchange, another Lahore Stock Exchange and then Islamabad Stock Exchange with various brokerage firms and the Securities and Exchange Commission of Pakistan, being as a regulatory authority. Since the formation of Karachi Stock Exchange, Pakistani capital market has developed tremendously (Pakistan Economic Survey, 2014-2015). KSE-100 Index comprises 100 companies chosen based on sector representation and capital, and represent over 80% of the

capital of the companies listed in KSE (Karachi Stock Exchange). Year 2014-2015 witnessed a momentous and constant growth in the Karachi stock market indices reaching notable levels with KSE-100 index total growth of 16%. Some of the reasons that have added to these noteworthy achievements of the Karachi Stock Exchange are balanced political situations, investment projects upheld by China, stable dollar exchange rate, improving law and security environment, foreign interest in domestic stocks and developments in energy sector (Securities and Exchange Commission of Pakistan, 2015). During financial year 2015, macroeconomic variables of Pakistan economy has been improved. By support of globally cheap oil prices and implementing reforms program Pakistan economic growth is recovering with GDP growth projected at 4.3 - 4.6 along with equity markets retaining their upward movement (The World Bank, 2015). Recently the three stock exchanges of Pakistan; Karachi Stock Exchange, Lahore Stock Exchange, and Islamabad Stock Exchange arranged to assimilate and form a single national stock exchange to be known as Pakistan Stock Exchange. It will make Pakistani stock market stronger, competitive and will attract foreign direct investment. The link between stock prices and macroeconomic variables has been extensively analyzed in the literature. Stock markets are vulnerable to internal and external economic environments, and these factors effects stock markets depending upon domestic economic conditions, government policies, and international linkages. Pakistan stock market remains highly volatile due to economic and political unrest. This study empirically analyzed the impact of macroeconomic variables such as inflation, interest rate etc. on stock prices of KSE.

Most of the literature on economic growth and financial development suggest that macroeconomic variables, financial system development and economic growth are associated with each other but precise nature of their association has been uncertain. Economist hold different opinions on the nature of relationship among macroeconomic variables and financial system development. The question why stock returns change over time was tried to identify by Schwert (1989) and observed mixed results regarding the causality direction between instability of stock return and changes in macroeconomic variables. Most of the studies related to stock market with macroeconomic variables are based on Arbitrage Pricing Theory given by Ross in (1976) that links single asset and portfolio return with various independent macroeconomic variables. The major determinants that are identified to have impact on stock prices are inflation, interest rate, industrial production and exchange rate (Bekhet and Matar, 2013; Fama, 1981; Merikas and Merika, 2006). There are also some studies such as (Chan et al., 1998; Flannery and Protopapadakis, 2002; Ali et al., 2010; Maio and Philip, 2015) unable to find any relationship between macroeconomic indicators and stock returns.

Pradhan et al. (2015) conducted study for G-20 countries by taking a set of variables including stock market turnover ratio, market capitalization, stocks traded, GDP, oil prices, inflation rate, foreign exchange rate, and interest rate. The study found general long term equilibrium association between all these variables and if any deviation occurs between them, it is then adjusted by economic growth. Assessing the relationship between several financial and macroeconomic variables for 11 European Union countries by utilizing tests for Granger causality, VAR and impulse response. The evidence shows that stock market returns granger causes interest rate and GDP (Agiakloglou et al., 2016). Using dynamic factor models estimated through Bayesian methods, a sample of 34 countries were studied. Macroeconomic variables have strong effects on the stock prices if properly identified, in addition to domestic macroeconomic variables global factors also have strong effects on the stock market for countries that are closely integrated with global economy and financial risks (Chen and Wu, 2013). Khan et al. (2015) studied four South Asian countries India, Bangladesh, Sri Lanka, and Pakistan. They applied PCA method to extract the most important variables in a large pair of regional and global variables and found that stock market returns of these South Asian countries are mainly explained by real interest rates, real exchange rates, and trade. These stock markets are weakly incorporated with international financial markets thus foreign investors can achieve diversification by investing in these South Asian countries. Investigating the short run and long run relationship among macroeconomic variables and US stock prices (S&P 500 index) it is observed that stock prices are negatively related with stock prices and has positive relation with money supply, short term interest rate, inflation, exchange rate and industrial production. The mixed results about interest rate may possibly be due to two reasons. First, betterment in the profit perspective elevate aggregate demand and thusly, investment and lastly increases the interest rate. Additionally, the long dterm interest rate is connected more intently to stock prices than short term interest rate (Ratanapakorn and Sharma, 2007). Bekhet and Mugableh (2012) via bound testing approach find association between stock prices and a group of macroeconomic variables, stock prices showed to have positive relationship with GDP and negative relationship with producer price index, M3, CPI, and exchange rate for emerging stock market of Malaysia. For Taiwan Stock Exchange, Wang and Chen (2012) found that there is interaction between macroeconomic variables, investor sentiment and market momentum. Using VAR, Basci and Karaca (2013) concluded that exchange rate and imports have significant impacts on the ISE 100 index. Ozcan (2012) found that for Istanbul Stock Exchange stocks are effected by their own previous values and the selected macroeconomic variables that are interest rate, exchange rate, gold price, money supply, export volume, oil price and current account deficit show a long run equilibrium association with the Istanbul Stock Exchange industry index. Mazuruse (2014) using canonical

correlation analysis studied the link between macroeconomic variables and stock return of the eight top trading companies listed in Zimbabwe Stock Exchange. The volatility of stock prices is mainly effected by money supply, exchange rate, inflation and treasury bills which in turn then effect the stock returns of the companies. Applying cointegration and VECM on data taken from 2002-2008 of Lahore Stock Exchange stock prices, CPI, industrial production, money supply, exchange rate and 3-month treasury bills, Sohail and Hussain (2009) posits long-term positive relationships for all variables except CPI.

Interest Rate

When interest rates increase, investors go for bonds which imply that stock prices will fall, similarly when interest rate decrease stock prices rise. Such negative relationship has been noticed by Paul and Mallik (2003), Nasseh and Strauss (2004), McMillan (2005), Hasan and Nasir (2008), Hussainey and Ngoc (2009) and Peiro (2015). Interest rate when increases result in the increase of discount rate which means an ultimate decrease in present value of the future cash flows thus it is expected to negatively effect the stock prices (Hasan and Nasir, 2008). While there are some studies (Erdem et al., 2005; Lobo, 2002) that found positive relationship with interest rate. They explained the reason as Federal Reserve raises interest rate more (less) than expectations then it is contemplated bad (good) news to stock market, it means that effect of interest rate is positive nevertheless bad news has strong impact on stock market.

Inflation Rate

Empirical evidence suggests negative relationship between inflation rate and stock prices because high and varying inflation rate generate more uncertainty and thus demand for minimum return will also rise which will decrease the market valuation as proved by (Kyereboah-Coleman and Agyire-Tettey (2008) for Ghana, Sohail and Hussain (2009), Mehr-un-Nisa and Nishat (2011) for Pakistan and Bekhet and Mugableh (2012) for Malaysia. Wongbangpo and Sharma (2002) also found negative relationship between inflation and stock prices in five Asian countries that are Indonesia, Malaysia, Singapore, Philippines and Thailand. Olowe (2007) and Rjoub et al. (2009) does not support the negative impact of inflation rate on stock prices and suggested that it may be due to the use of stock itself as hedge against inflation. Relationship between stock returns and inflation are demonstrated differently by different studies mainly relying on the measure of inflation utilized (Oxman, 2012). Tiwari et al. (2015) deeply investigated the relationship between stock prices and inflation for Pakistan using the technique of wavelet phase angle and wavelet coherency. From overall results of both inflation measures that are consumers' price index and producers' price index, study concluded that inflation does not affect the estimation of stock prices in Pakistan and stock could be utilized as fence against inflation over the long run at least.

Money Supply

A wide range of studies cover the impact of changes in supply on the stock market. Some studies (Abugri, 2008; Bekhet and Matar, 2013; Rizwan and Khan, 2007) shows negative relationship while some of them (Aspremi, 1989; Rjoub et al., 2009; Sohail and Hussain, 2009) shows positive relationship. The different impacts of change in money supply by these studies were concluded in several ways. If increase in money supply leads to rise in discount rate which in turn leads to decrease in stock market returns, then the impact of money supply is negative on stock market. The positive influence of money supply can be connected to economic expansion due to rise in corporate profitability and earnings and thus more return on stock (Fama, 1981). Dividends expected growth rate is primarily effected by money supply arising as a permanent change in firm earnings from positive NPV projects picked up at low cost of capital when interest rate fall due to increase in money supply (Chung et al., 2012). If the monetary policy is expansionary it may cause an increase in economic growth in turn raises stock market returns, and thus shows a positive effect of money supply on stock market (Eita, 2012). According to Hsing (2011) money supply can be slightly increased to adjust more economic activities that would be conducive to stock market. But overmuch money supply would cause expectations for rise in inflation and would harm stock market.

Exchange rate

Currency is regularly incorporated as an investment in asset portfolios. And knowledge about the impact of exchange rate on the stock market is important for the performance of fund portfolios. Studies show mixed results for impact of exchange rate movements on stock prices (Dimitrova, 2005). Hondroyiannis and Papapetrou (2001), Kyereboah-Coleman and Agyire-Tettey (2008), Hasan and Nasir (2008) and Diamandis and Drakos (2011) concluded positive effect for exchange rate on stock prices. This positive effect can be explained by the fact that local firms become more competitive with the depreciation leading to an increase in their exports thus increase in stock prices (Muhammad & Rasheed, 2002). The negative effect was found by Alvarez-Plata and Schrooten (2004), Olowe (2007), Pal and Mittal (2011), and Bekhet and Mugableh (2012). According to

Erdem et al. (2005), currency depreciation result in relatively decreased product prices of the country in international market, thus demand of those goods increases and more cash inflows into the country. At the same time currency depreciation also makes imported goods costly, thus if a country heavily depends on the imports of production inputs, currency depreciation will effect the economy negatively.

Economic Activity

Among the studies researching dependencies of stock return on economic activity, the economic confirmations are mixed. As indicated by Hassapisa and Kalyvitis (2002), in the G-7 countries economic activity with expected stock returns is portrayed by negative relationship and not at all times significant. The economic activity has not granger caused stock return and reaction of stock return to economic activity shocks is negative. Hassapis (2003) also gave same confirmation in case of Canada. Kim (2003) showed that only the sign of real activity influences stock return and not the magnitude of changes. McMillan (2005), and Abugri (2008) tested how stock prices respond to changes in production and found significant positive effect of production on stock prices. The reason behind it is that increase economic activities always lead to higher cash flow in future and thus with higher dividend expectation investors demand shares at higher prices. Some studies found wrong sign for economic activity effect on stock prices. Merikas and Merika (2006) reason out the negative effect as collinearity among the variables. Olowe (2007) explained this effect as neglectedness of industrial production by Nigeria.

Exports

US stock returns are negatively impacted by trade deficit (Abdullah and Hayworth, 1993). For economy with significant imports sector, effects of currency depreciation may cause bearish stock market and vice versa (Yang and Doong, 2004). When the trade deficit is prolonged investors notice decline in spending on goods domestically produced and thus it will adversely affect the firms and their stock prices. Decrease in exports results in contraction of firm activities and thus show negative implications on stock prices (Olowe, 2007).

Data and Methodology

The data used in the study is time series secondary data and it ranges from May 2001 to August 2016 with 184 monthly observations. Missing data of few observation have been filled by moving averages. KSE-100 index data have been collected from State Bank of Pakistan Annual Reports – Statistical Supplement. Data of money supply is obtained from Pakistan Monetary Survey and exchange rate data are gathered from Historical Exchange rates data both issued by State Bank of Pakistan. The data of interest rate, inflation rate, industrial production manufacturing index and exports is taken from International Financial Statistics published by International Monetary Fund.

When checked for stationarity it is found that all the variables are integrated at order I(1). Also, the study sample is not very large. Thus, the most appropriate model with good properties of small sample, high power and the one that can be applied to time series data with 1st order of integration is ARDL model developed by Pesaran et al. (2001), which has turn out to be widespread in the previous years. The test can efficiently detect the long run relationship of dependent variable with a pair of independent variables (Sari et al., 2008). The model used by the study to find the impact of macroeconomic variables on equity market is;

$$LnKSE_t = \beta_0 + \beta_1 LnR_t + \beta_2 LnCPI_t + \beta_3 LnM2_t + \beta_4 LnEXR_t + \beta_5 LnEA_t + \beta_7 LnEXPR_t + \epsilon_t \quad (1)$$

Whereas in Equation (1),

KSE = KSE-100 index

R = Interest rate

CPI = Inflation

M2 = Money supply

EXR = Exchange rate

EA = Industrial manufacturing production index

EXPR = Exports

Equation (1) in ARDL form can be presented as;

$$\Delta LnKSE_t = \beta_0 + \beta_1 (LnKSE)_{t-1} + \beta_2 (LnR)_{t-1} + \beta_3 (LnCPI)_{t-1} + \beta_4 (LnM2)_{t-1} + \beta_5 (LnEXR)_{t-1} + \beta_6 (LnEA)_{t-1} + \beta_7 Ln(EXPR)_{t-1} + \sum_{i=1}^n \beta_8 \Delta (LnKSE)_{t-1} + \sum_{i=1}^n \beta_9 \Delta (LnR)_{t-1} + \sum_{i=1}^n \beta_{10} \Delta (LnCPI)_{t-1} + \sum_{i=1}^n \beta_{11} \Delta (LnM2)_{t-1} + \sum_{i=1}^n \beta_{12} \Delta (LnEXR)_{t-1} + \sum_{i=1}^n \beta_{13} \Delta (LnEA)_{t-1} + \sum_{i=1}^n \beta_{14} \Delta (LnEXPR)_{t-1} + \epsilon_t$$

In the ARDL equation the coefficients with first lagged variables show long term cointegration relationship while difference operator show short term dynamics (Ibrahiem, 2015).

KSE-100 index is a main stock market index that follow the top performing companies individually from all 34 sectors of Karachi Stock Exchange. Remainder of the companies in index are chosen without considering the sectors to make it a 100 common stocks sample with base value of 1000 as of Nov. 1991 (Bloomberg, 2016). Monetary assets (M2) also known as ‘near money’ is based on various components that includes demand deposit,

time deposit, currency in circulation, foreign currency, and other deposits (apart from IMF account). These are highly liquid and easily convertible to cash (Pakistan Economic Survey, 2014-2015). The data taken for M2 is in million Pakistani Rupees. Pakistan is an open economy with no restrictions on the capital inflows and outflows and has strong global linkages. Thus, exchange rate is bound to have impact on stock prices (Kalyanaraman and Tuwajri, 2014). The data of exchange rate is measured in Pak Rupees per US Dollar on last working day of the month and are midpoints of the telegraphic transfer buying and selling rates. Deposit interest rate in study is taken as a proxy for interest rate measurement. It is an average interest rate paid by commercial banks on deposits to individuals. The variable is chosen for the study because it is an alternative to investment in stock market. Many investors due to lack of information or avoiding risks of stock market, keep their deposits with commercial banks. Consumer Price Index is treated as a proxy for inflation rate. The variable is chosen because of its wide base measure to estimate average change in price of goods and services. It will be of interest to study the effects of inflation rate on stock market. Industrial production manufacturing index is used as a proxy to measure economic activity. It refers to the production of overall industrial establishments and cover up various sectors. The indicator is measured in an index based on reference period which states change in the volume of output (OECD, 2016). Prospects to the country for exporting should be positively associated to its economic growth (Johnson and Soenen, 2002). In data, the exports value is given in million Pakistani Rupees.

Results

Descriptive statistics of the seven variables are gotten for empirical analysis as presented in the Table 4.1. It decreases size and volume of data, and computation of few numerical values that give information about overall data. Observations for each variable are 184 as from May-2001 to Aug-2016.

Table 4.1: Descriptive Statistics

Variables	N	Mean	Maximum	Minimum	Standard Deviation
KSE	184	13461.20	40030.52	1133.43	10091.34
Deposit Interest Rate (%)	184	5.67	9.15	1.42	2.30
Inflation Rate (%)	184	8.34	25.33	1.32	5.14
M2 (Billion Rs)	184	5,426	1,2641	1,470	3,111
Exchange Rate	184	77.75	108.39	57.23	18.02
Economic Activity (IPI)	184	95.69	143.84	43.56	21.28
Exports (Million Rs)	184	127,320.30	275,916.81	39,556.00	59,584.22

Correlation analysis tells us the degree of relationship between a pair of variables. Table 4.2 elaborate the results of correlation between dependent and independent variables. From results, exchange rate and money supply have very strong positive relationship with stock prices while exports and economic activity have strong positive relationship with stock prices. It means when exchange rate, money supply, exports and economic activity increases the stock prices will increase and they move in same direction. Interest rate and inflation rate are weakly associated with the stock price while inflation rate also has negative relationship. Although the interest rate is not negatively associated with stock prices as expected and is weakly associated.

Table 4.2: Correlation Matrix

	KSE	EXP	EXR	INF	EA	IR	M2
KSE	1						
EXP	0.7690***	1					
EXR	0.8162***	0.9308***	1				
INF	-0.1751**	0.1713**	0.0528	1			
EA	0.7669***	0.7608***	0.6901***	0.2281***	1		
IR	0.3084***	0.6908***	0.6733***	0.5181***	0.4944***	1	
M2	0.9477***	0.8923***	0.9466***	-0.0491	0.7854***	0.5131***	1

(***) represent 1% of significance level, (**) represent 5% of significance level

Unit Root Test

Although ARDL test does not need to test unit root in the data, still it is essential to perform unit root test to check the stationarity of data and that they are not integrated of order more than 1 so that ARDL approach can be used. Augmented Dickey-Fuller test experiences from low power and lack size properties thus for this purpose, Phillips-Perron test is also applied along ADF test to check the unit root of the variables with selection of Newey-West as bandwidth. Table 4.3 gives results of the ADF test and Table 4.4 gives results from P-P test with intercept and then taking intercept along linear trend. The results from both test show that all variables are non-stationary at level and becomes stationary at first difference.

Table 4.3: Augmented Dickey-Fuller Test

Variables	Level		First Difference		Conclusion
	Constant	Constant plus trend	Constant	Constant plus trend	
LnKSE	-1.610	-1.942	-12.530***	-12.555***	I(1)
LnR	-1.209	-1.145	-4.813***	-4.811***	I(1)
LnEXP	-2.069	0.721	-4.683***	-5.252***	I(1)
LnEXR	-0.005	-2.926	-6.555***	-6.628***	I(1)
LnINF	-1.111	-0.564	-5.713***	-6.189***	I(1)
LnM2	-1.753	-2.509	-2.787*	-3.218*	I(1)
LnEA	-2.425	-1.827	-4.675***	-5.007***	I(1)

(***), (**), (*) shows significance level of 1%, 5%, and 10%.

Table 4.4: Phillips-Perron Test

Variables	Level		First Difference		Conclusion
	Constant	Constant plus trend	Constant	Constant plus trend	
LnKSE	-1.601	-1.978	-12.515***	-12.529***	I(1)
LnR	-1.144	-1.262	-10.155***	-10.148***	I(1)
LnEXP	-1.427	-5.165	-24.380***	-24.430***	I(1)
LnEXR	0.107	-2.531	-10.325***	-10.393***	I(1)
LnINF	-1.735	-1.592	-11.656***	-11.726***	I(1)
LnM2	-2.604*	-2.745	-18.935***	-23.021***	I(1)
LnEA	-2.159	-3.867	-16.569***	-16.956***	I(1)

(***), (**), (*) shows significance level of 1%, 5%, and 10%.

Selection of Lags

After checking the stationarity of data, for lag selection the study has employed Breusch-Pagan-Godfrey test which is an alternative to classical Durbin-Watson which is limited only to first order correlation. So, to make sure before applying cointegration test that there is no serial correlation problem in the model. Table 4.5 report Akaike Info Criterion and Schwarz Criterion with one, two, three, and four lags are given with LM test of serial correlation. The column of serial correlation LM gives values of Breusch-Godfrey test statistic with corresponding probability values.

Table 4.5: Selection of Lags

No. of Lags	AIC	SC	Serial Correlation LM Test
1	-2.3788	-2.2209	1.7441 (0.186)
2	-2.3706	-2.1953	2.2500 (0.324)
3	-2.3599	-2.1670	2.2921 (0.514)
4	-2.3503	-2.1398	2.5185 (0.641)

From Table 4.5 it can be perceived that the values of Akaike Info Criterion and Schwarz Criterion are lowest at first lag thus only one lag is taken on with model to apply cointegration. Also, there is no evidence of serial correlation from LM test as the probability value to its Breusch-Godfrey test statistic at lag 1 is more than 5% thus null hypothesis is strongly accepted that residuals are not serially correlated.

Cointegration Test

For cointegration here Wald test is utilized to test the combined significance of all variables coefficients. Table 4.6 present the test statistics and accompanying probability values.

Table 4.6: Wald Test

Test Statistic	Value	df	Probability
F-statistic	1315.996	(6, 177)	0.0000
Chi-square	7895.976	6	0.0000

From Wald test statistics, the probability value for both F-statistics and Chi-square is less than 0.05 i.e. 0.00 thus we conclude that the variables in model are significantly cointegrated.

Autoregressive Distributed Lag Model

As all our variables becomes stationary at first, a bound test of ARDL approach is used for checking cointegration among series which are integrated of same or different order but integrated less than order of 2 (Pesaran et al., 2001). The results from simple ARDL model based on Hannan-Quinn criterion (HQ) are given in Table 4.7. As from selection of lags criteria, results obtained by ARDL gives maximum of 1 lags, thus in results we can see for KSE, M2 and EXR automatically 1 lag is selected.

Table 4.7: ARDL (1, 0, 0, 1, 0, 1, 0) – Based on HQ Criterion

Variables	Coefficient	t-Statistics	Probability
LnKSE(-1)	0.807	20.141	0.000
LnR	-0.049	-2.804	0.005
LnEXP	0.042	0.968	0.334
LnEXR	-1.655	-3.629	0.000
LnEXR(-1)	1.135	2.531	0.012
LnINF	-0.017	-1.470	0.143
LnM2	-0.253	-0.703	0.482
LnM2(-1)	0.670	1.835	0.068
LnEA	0.042	0.777	0.437
C	-9.26	-4.344	0.000
R-squared	0.9937	Mean dependent var	9.1956
Adjusted R-squared	0.9934	S.D. dependent var	0.8715
S.E. of regression	0.0706	Akaike info criterion	-2.4077
Sum squared resid	0.8646	Schwarz criterion	-2.2323
Log likelihood	230.3079	Hannan-Quinn criter.	-2.3366
F-statistic	3054.071	Durbin-Watson stat	1.8032
Prob(F-statistic)	0.000000		

Now we require F-statistic value to confirm the cointegration among the variables. If the F-statistic is less than lower bound values than it is concluded that all variables are I(0) and we accept null hypothesis that there is no cointegration among the given variables and if the F-statistic is greater than upper bound values it is assumed that all variables are I(1) and there is cointegration among variables. And if the F value comes in between the bound values then the employed test is questionable.

Table 4.8: ARDL Bound Test

Test Statistic	Value	k
F-statistic	5.1017	6
Critical Value Bounds		
Significance	Lower Limit	Upper Limit
10%	1.99	2.94
5%	2.27	3.28
2.5%	2.55	3.61
1%	2.88	3.99

Table 4.8 gives result of the bound test for ARDL in which it can be see that there are different critical values of upper and lower bounds corresponding to different level of confidence. Here the F-statistic value is found to be greater than reported critical values of upper bound at 1%, 2.5%, 5%, and 10%. Therefore, it can be concluded from the ARDL Bound test findings that there is long run cointegration in our variables.

Table 4.9: ARDL Cointegration and Long Run Form

Panel 1: Cointegrating Form			
Variables	Coefficient	t-Statistics	Probability
LnR	0.0003	0.0298	0.9762
LnEXP	-0.0007	-0.1379	0.8905
D(LnEXR)	-1.6715***	-3.8161	0.0002
LnINF	-0.0027	-0.3013	0.7635
D(LnM2)	-0.1854	-0.5178	0.6052
LnEA	0.0052	0.1732	0.8627
CointEq(-1)	-0.1853	-4.5791	0.0000
CointEq = KSE - (-2.567*R + 0.2196*EXPR - 2.7004*EXR - 0.0889*INF + 2.1656*M2 + 0.2190*EA - 48.1105)			
Panel 2: Long Run Coefficients			
Variables	Coefficient	t-Statistics	Probability
LnR	-0.2657**	-0.0241	0.0029
LnEXP	0.2196	0.9869	0.3250
LnEXR	-2.7003***	-5.5193	0.0000
LnINF	-0.0889	-1.4662	0.1444
LnM2	2.1656***	8.5036	0.0000
LnEA	0.2189	0.7796	0.4367
C	-48.1104	-11.6001	0.0000

(***), (**), shows significance level of 1% and 5%.

The next step is to calculate short term and long term cointegration between dependent and independent variables from estimated ARDL. From Table 4.9 analysis, Panel 1 shows the results for short run cointegration among the variables and Panel 2 report the coefficient of variables for long term. Cointegration equation value as can be seen in Panel 1 must be negative value and significant to verify that there is short term cointegration relationship between the variables. The short term cointegration shows that all variables are insignificant except exchange rate which is negatively cointegrated with stock prices.

Long term cointegration results from Panel 2 show that money supply, exchange rate, interest rate has long term significant effect on stock prices while exports, economic activity and inflation are statistically insignificant. In long run money supply has been significant in increasing the stock prices and has positive effect on the stock prices, the result is consistent with the study conducted by Hsin and Hsieh (2012), Eita (2012), Rjoub et al. (2009) where money supply had positive relation with most of the assets portfolio. Expansion in money supply increases demand for money which result in more economic activity and cash flows and thus fluctuations in money supply effects the investment climate in Pakistan. Exchange rate is found negatively significant and result match with that of Liang and Willett (2015), Rahman et al. (2009), and Kyereboah-Coleman and Agyire-Tettey (2008). That means with increase in exchange rate or depreciation in domestic currency will result stock prices to fall since exchange rate captures the sentiment of external factors and has a direct effect on the market activity. The interest rate has also long run significant effects on the equity market but they are negatively cointegrated with stock prices as expected and were found by Peiro (2015), Hsing and Hsieh (2012) and Abugri (2008). The coefficient of interest rate is -0.26, which means that if interest rate increases by one percent, stock prices will show decline by 0.26 percent. It is represented in equation as;

$$KSE = -48.11 - 0.26R + 0.21EXP - 2.70EXR - 0.08INF + 2.16M2 - 0.21EA$$

Conclusion

Findings show that there is a significant long term relationship of money supply, exchange rate and interest rate with stock prices. The money supply has strong positive impact on the stock prices thus expansion in money supply or loose monetary policy triggers the prices of shares to increase, and on the opposite, a strict monetary policy results in decrease of share prices. According to Sellin (2001), a positive change in the money supply with respect to future expectations, demand for money increases which result in more economic activity and cash flows and thus fluctuations in money supply effects the investment climate in Pakistan. Exchange rate is a great concern for both domestic and international investors as most of the listed companies profoundly rest on foreign trade. Especially high dependency of Pakistan on imports have put forth pressure on rupees to devalue. Exchange rate has strong and negative impact on the stock prices of Karachi Stock Exchange with coefficient of -2.70. In this case, it can also be concluded that developing countries such as Pakistan where enormous foreign exchange is needed and businesses are intensively hit by rupee depreciation, thus importers stay in a puzzled situation. The negative coefficient of exchange rate means that with increase in exchange rate by 1 percent (depreciation in PKR) will result stock prices to fall by 2.70% and similarly decrease in exchange rate by 1 percent (appreciation in PKR) will result 2.70% of increase in stock market index. Results also show that there is significant negative impact of interest rate on stock prices with coefficient of -0.26. Deposit interest rates is considered as an alternative to the investment in stock market. The negative coefficient of interest rate suggests that with increase in deposit interest rates by 1% will fall stock prices by 0.26% while decrease in deposit interest rate by 1% will boost stock prices by 0.26%. Currently in 2016 the deposit interest rates are continuously declining thus it is encouraging investors to make investments of their excess capital in equity market instead of taking interest on that from banks, as the current trend for Karachi Stock Exchange is growth in its share prices. Apart from that rise or fall in banks deposits rate also have effect on consumer and organizations psychology, both cut on spending as interest rates are high and in turn fewer loans are available. The cycle moves on to drop in earnings and decrease in stock prices. On the other hand, when interest rate fall drastically, consumers and organizations tend to spend more and thus increase in stock prices.

Further results from long term correlation coefficients determine that inflation rate, exports and economic activity is insignificant in explaining the stock prices of Karachi Stock Exchange but they have signs as were expected. Inflation rate show negative impact on stock prices while exports and economic activity signals positive impact on the equity market.

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