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LONG-RUN AND SHORT-RUN RELATIONSHIP BETWEEN MACROECONOMIC VARIABLES AND STOCK PRICES IN PAKISTAN
The Case of Lahore Stock Exchange

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Abstract. The movements in the stock prices are an important indicator of the economy. The intention of this study was to examine long-run and short-run relationships between Lahore Stock Exchange and macroeconomic variables in Pakistan. The monthly data from December 2002 to June 2008 was used in this study. The results revealed that there was a negative impact of consumer price index on stock returns, while, industrial production index, real effective exchange rate, money supply had a significant positive effect on the stock returns in the long-run. The VECM analysis illustrated that the coefficients of ecm1 (–1), and ecm2 (–1) were significant with negative signs. The coefficients of both error correction terms showed high speed of adjustment. The results of variance decompositions revealed that out of five macroeconomic variables consumer price index showed greater forecast error for LSE25 Index.

I. INTRODUCTION

The well-organized stock market mobilizes the savings and activates the investment projects, which lead to economic activities in a country. The key function of stock market is to act as mediator between savers and borrowers. It mobilizes savings from a large pool of small savers and channelizes these funds into fruitful investments. The preferences of the lenders and borrowers are harmonized through stock market operation. The Stock market also supports reallocation of funds among corporations and sectors. It also provides liquidity for domestic expansion and credit growth. The leading

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stock markets of the world observed negative growth ranging from 50.7 percent (Pakistan) to 2.9 percent (China) during the fiscal year 2008-09 (Economic Survey of Pakistan 2008-09).

There are three stock exchanges (Karachi Stock Exchange, Lahore Stock Exchange and Lahore Stock Exchange) operating in Pakistan. Lahore Stock Exchange (Guarantee) Limited was established in October 1970. There are nearly 600 listed companies and 37 sectors of economy. The turnover of shares of the exchange during July-March 2008-09 was 1.5 billion. The total paid up capital with the LSE increased from Rs. 664.5 billion in June 2008 to Rs. 721.1 billion in March 2009 (Economic Survey of Pakistan 2008-09).

The stock market of Pakistan remained highly volatile for the last fifty months. Three intense financial crises were observed during this period. First, stock market was crashed in March 2005. Second collapse was observed in the second quarter of the year 2006. Third and the most serious crash was observed from May 2008 to January 2009. In this period, KSE100 index dropped more than ten thousands points while LSE25 dropped more than three thousands points. During this period, the Board of Directors of Karachi stock exchange placed a floor in August 2008 due to sharp fall in share prices, later on removed in December 2008. The Lahore Stock Exchange performed well in the years 2002 to 2004 but it showed negative growth in 2008-09. The LSE-25 index, which was 3,868.8 points in June 2008, decreased to 2,085.2 points in March 2009. The market capitalization of the LSE has reduced from Rs. 3,514.2 billion in June 2008 to Rs. 1,953.1 billion in March 2009.

The major source of this volatility was political uncertainty and instability — such as judiciary crisis, terrorist attacks, assassination of Benazir Bhutto (Chairperson, Pakistan Peoples Party, and former Prime Minster of Pakistan) — for the last crisis in the stock market but the first two crashes were due to bad governance and hold of speculators in the stock market. Hence, there was a need to study the behavior of stock market and determine the economic factors for policy recommendations that could safeguard the investors of stock markets.

REVIEW OF LITERATURE

According to Fisher's Hypothesis, the market rate of interest included the expected real rate of interest and expected inflation (Fisher, 1930). As nominal rate of interest and rate of inflation moved one-to-one, then, real rate of interest was not affected by a permanent change in inflation rate in the long-run.

Thus, it was concluded that stock returns and rate of inflation moved in the same direction. Hence, real assets such as shares perhaps provide hedge against inflation. Chatrath *et al.* (1997) investigated relationship between stock returns and inflationary trends in India. The author's study provided an evidence of a negative relationship between market returns and inflationary trends in India. Ratanapakorn and Sharma (2007) reported a positive relationship between stock prices and inflation while; Humpe and Macmillan (2009), illustrated negative impact of inflation on stock prices.

Fama (1981) examined the relationship between real output and stock prices and showed that there was strong relationship between stock prices and gross national product. Humpe and Macmillan (2009) explored positive long-run relationship between stock prices and the industrial production in US.

Several economists documented the impact of foreign exchange rate on stock prices during the last two decades. Aggarwal (1981), Soenen and Hennigar (1988), Bahmani-Oskooee and Sohrabian (1992), Abdalla and Murinde (1997), Bhattacharya and Mukherjee (2003), Smyth and Nandha (2003), Farooq and Keung (2004), Aquino (2004), Aquino (2005), Homma *et al.* (2005), and Hartmann and Pierdzioch (2007) tried to explore relationship between exchange rate and stock prices. The theory demonstrates that changes in the exchange rate have an important bearing on a firm's overall profits through firm's foreign operation which results fluctuations in stock prices. The intensity and direction of changes in share prices depends upon the nature of the firm. Mixed results were found among industrial countries by Aggarwal (1981) and Soenen and Hennigar (1988). Aggarwal (1981) established positive relationship between the exchange rate and US stock prices. Soenen and Hennigar (1988) found negative correlation between the two variables.

The money supply-stock market nexus was widely tested for various economies. Ratanapakorn and Sharma (2007) explored positive relationship between stock prices and money supply in US. While, Humpe and Macmillan (2009) found negative impact of money supply on NKY225 in Japan.

Some studies reported positive impact of interest rate on stock returns while; some studies explored negative relationship between these two variables, *e.g.* Ratanapakorn and Sharma (2007) reported positive relationship between S&P 500 and treasury bill rate in US and Humpe and Macmillan, (2009) found negative impact of treasury bill rate on SP55 in US.

STUDIES IN PAKISTAN

In Pakistan, some studies were conducted to explore the impact of macroeconomic variables on stock returns. For example, Farooq and Keung (2004) analyzed the impact of changes in exchange rate on stock returns and exchange rate by using four indices of Karachi stock Exchange: General index and three sector indices. The authors conducted Granger causality test and found that causality ran from general stock prices to exchange rate and causality ran from exchange rate to services indices. Nishat and Shaheen (2004) examined the relationship between a set of macro economic variables and the Index of Karachi stock exchange. The set of variables included index of industrial production, money supply (M_1), interest rate and CPI. Quarterly data stating from 1973:1 to 2004:4 were used. The results showed that five variables were cointegrated and two long-run relations were found among the variables. It was found that there was positive and strong impact of industrial production on stock prices. It was also found that inflation was negative determinant of stock market. Granger causality test showed that causality ran from macroeconomic variables to stock prices. While stock price affected industrial production. Shahbaz *et al.* (2008) analyzed whether there exist a relationship economic growth between and development of stock market in case of less developed countries like Pakistan. Findings suggested that there was a long-run relationship between stock market development and economic growth for Pakistan. Thus, the present study tried to find out the impact of macroeconomic variables on stock prices in Lahore Stock Exchange (Pakistan).

The rest of the paper is as follows. In section II we provide data sources and methodology to explore long-run and short-run relationships between stock prices and macroeconomic variables and section III gives empirical results. In the last, conclusion is explained in section IV.

II. DATA AND METHODOLOGY

Monthly time series data was used in exploring the relationship between the macro economic variables and LSE25 index relating Lahore stock exchange. The included variables in this study were consumer price index, real effective exchange rate, three month treasury bills rate, industrial production index, money supply (M_2), and LSE25 index for the period of December 2002 to June 2008. The main data sources were monthly bulletins of State Bank of Pakistan, The Business Recorder (Pakistani financial newspaper), Publications of the Federal Bureau of Statistics, and International Financial Statistics (IFS). The description of variables used in this research study was given as under:

LLSE25 = Log of LSE25 Index (Lahore Stock Exchange)

LCPI = Log of Consumer price index

LIP = Log of Index of industrial production

LREER = Log of Real effective exchange rate

LM_2 = Log of money supply (Broader money)

LTTBR = Log of three months treasury bills rate

STATIONARY CHECKS

Many of variables studied in macroeconomics, monetary economics and financial economics were non stationary time series (Hill *et al.*, 2001). If a time series was stationary, then shocks were considered transitory. On the other hand, mean or the variance or both the mean and the variance of a non-stationary time series depends on time. The variance depends on time and approach to infinity as time goes to infinity (Asteriou and Hall, 2006).

Augmented Dickey Fuller test (Dickey and Fuller, 1981), Phillips-Perron test (Phillips and Perron, 1988) and KPSS (Kwiatkowski, Phillips, Schmidt and Shin, 1992) unit root tests were applied to test the stationarity of the above mentioned series.

COINTEGRATION TEST AND VECTOR ERROR CORRECTION MODEL

Cointegration test was used to identify equilibrium or a long-run relationship among the variables. If there was a long-run relationship between variables, then divergence from the long-run equilibrium path was bounded and the variables were co-integrated. Johansen and Juselius (1990) procedure undertook the most of the problems of Engle and Granger approach such as (*i*) In EG approach we have to do with the order of integration, (*ii*) In case of more than two variables, there may be more than one cointegrating relationships, and (*iii*) It relies on two step approach. The Johansen and Juselius (1990) approach was based on maximum likelihood estimates and gives maximum Eigen Value and Trace Value test statistics for detecting number of cointegrating vectors. This procedure provides framework for cointegration test in the context of vector autoregressive approach. Johansen method was explained as follows:

$$x_t = A_0 + \sum_{j=1}^{k} A_j x_{t-j} + \varepsilon_t \qquad (1)$$

Where A_0 is an ($n \times 1$) vector of constants, x_t is an ($n \times 1$) vector of non stationary I(1) variables, k is the number of lags, A_j is a ($n \times n$) matrix of coefficients and ε_t 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:

$$\Delta x_t = A_0 + \sum_{j=1}^{k-1} \Gamma_j \Delta x_{t-j} + \Pi x_{t-k} + \varepsilon_t \tag{2}$$

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

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

'I' is an ($n \times n$) identity matrix, and Δ is the difference operator. The Trace and the Maximum Eigen Value test was used to find the number of characteristic roots that were insignificantly different from unity.

VARIANCE DECOMPOSITION

The vector autoregressive (VAR) by Sims (1980) was estimated to find short-run causality between macro economic variables and stock prices. To illustrate implication of relationships among macro economic variables and stock indices, variance decomposition was employed. In this study, Bayesian VAR model specified in first differences obtained in equations (3) and (4).

$$\Delta X_t = \alpha_1 + \sum_{i=1}^{k} \alpha_{11}(i) \Delta X_{t-i} + \sum_{j=1}^{k} \alpha_{12}(j) \Delta Y_{t-j} + \varepsilon_{xt} \tag{3}$$

$$\Delta Y_t = \alpha_2 + \sum_{i=1}^{k} \alpha_{21}(i) X_{t-i} + \sum_{j=1}^{k} \alpha_{22}(j) Y_{t-j} + \varepsilon_{yt} \tag{4}$$

Where ε's are the stochastic error terms, called innovations or shock in the language of VAR.

MODEL

To explore long-run relationship between macro economic variables and LSE25 Index, following econometric models was specified in the study.

$$\text{LLSE25} = \beta_1 \text{L CPI} + \beta_2 \text{LIP} + \beta_3 \text{LREER} + \beta_4 \text{L M}_2 + \beta_5 \text{LTTBR} + \varepsilon_t$$

To capture both the short-run dynamics between time series and their long-run Equilibrium relations following models were estimated.

$$\Delta LLSE25_t = \alpha_1 + \gamma_1 U_{t-1} + \sum_{i=1}^{P} \theta_{1i} \Delta LCPI_{t-1} + \sum_{i=1}^{P} \beta_{1i} \Delta LIP_{t-1} + \sum_{i=1}^{P} \mu_{1i} \Delta LREER_{t-1} + \sum_{i=1}^{P} \eta_{1i} \Delta LM2_{t-1} + \sum_{i=1}^{P} \lambda_{1i} \Delta LTTBR_{t-1} + \varepsilon_t \quad (5)$$

III. EMPIRICAL RESULTS

E-Views 6 software was used for estimation.

SUMMARY OF DATA

The summary of the data collected for this study is presented in Table 1.

TABLE 1

Descriptive Statistics

Variables	LLSE25	LCPI	LIP	LREER	LM2	LTTBR
Mean	8.15	4.87	5.19	4.54	14.91	1.60
Median	8.28	4.87	5.21	4.54	14.90	2.09
Maximum	8.64	5.17	5.51	4.59	15.36	2.44
Minimum	7.32	4.68	4.79	4.48	14.46	0.19
Std. Dev.	0.34	0.13	0.18	0.03	0.26	0.71
Skewness	–0.79	0.23	–0.52	–0.19	–0.07	–0.68
Kurtosis	2.58	2.13	2.46	1.86	1.85	1.80
Jarque-Bera	7.51	2.71	3.85	4.04	3.75	9.19
Probability	0.02	0.26	0.15	0.13	0.15	0.01
C V	0.04	0.03	0.03	0.01	0.02	0.44
Observations	67	67	67	67	67	67

UNIT ROOT TEST

It is compulsory to test the economic time series for stationarity before proceeding for cointegration test and establishing long-run relationships. The study used three different tests, *i.e.* Augmented Dickey Fuller (ADF) test, Phillips-Perron (PP) test and KPSS test (Kwiatkowski, Phillips, Schmidt. and Shin, 1992) for finding unit roots in time series. All these tests revealed that

all the variables were non-stationary in levels and stationary at first difference which is the common phenomenon in most of the economic time series. Hence, all three tests were undisputedly declared that all the variables were integrated of order one, *i.e.* I (1) as shown in Table 2.

TABLE 2

Unit Root Test

Variables	Augmented Dickey-Fuller test statistic		Phillips-Perron Test Statistics		Kwiatkowski-Phillips-Schmidt-Shin test statistic	
	Null Hypothesis: Variable is Non-stationary		Null Hypothesis: Variable is Non-stationary		Null Hypothesis: Variable Is stationary	
	Level	First Difference	Level	First Difference	Level	First Difference
LLSE25	–2.01	–7.02*	–2.09	–7.01*	0.90	0.31*
LCPI	3.42	–5.61*	2.70	–5.79*	1.06	0.46**
LIPI	–1.20	–7.75*	–1.91	–9.78*	0.90	0.03*
LREER	–1.73	–7.86*	–1.73	–7.84*	0.59	0.10*
LM2	–0.95	–3.15*	0.07	–14.61*	1.06	0.04*
LTTBR	–0.57	–5-25*	–1.73	–7.84*	0.59	0.10*
Test critical values (MacKinnon, 1996)						
5% Level	–2.90		–2.906923		0.463000	
10% Level	–2.59		–2.591006		0.347000	

* implies that the coefficient is significant at 0.05 percent probability level and

** implies significant at 0.10 percent probability level

COINTEGRATION ANALYSIS

The results of stationarity analysis shown in the Table 2 showed that all the modeled variables were integrated of same order, so the study applied the Johansen and Juselius (1990) (JJ) technique to explore the long-run relationships among the variables as this technique is appropriate, if all the model variables are integrated of same order. The first step in multivariate cointegration analysis is the appropriate lag selection for the variables. For selection of appropriate lag length, the study used two criteria Akaike Information Criteria (AIC) and Schwarz Bayesian Criteria (SBC). Both the criteria AIC and SBC selected lag length of 1. In order to find out the number of cointegrating vectors, Trace statistic and Maximal Eigen value tests were used.

TABLE 3

Unrestricted Cointegration Rank Test (Trace)

Hypothesized		Trace Statistic	0.05 Critical Value	Prob.**
No. of CE(s)	Eigen value			
None*	0.674	**153.989***	95.754	0.000
At most 1*	0.488	**84.559***	69.819	0.002
At most 2	0.318	43.098	47.856	0.130
At most 3	0.162	19.346	29.797	0.468
At most 4	0.108	8.414	15.495	0.422
At most 5	0.021	1.308	3.841	0.253

Trace test indicates 2 cointegrating eqn(s) at the 0.05 percent Probability level

* denotes rejection of the hypothesis at the 0.05 percent Probability level

TABLE 4

Unrestricted Cointegration Rank Test (Maximum Eigen Value)

Hypothesized		Max-Eigen Statistic	0.05 Critical Value	Prob.**
No. of CE(s)	Eigen value			
None*	0.674	**69.430***	40.078	0.000
At most 1*	0.488	**41.461***	33.877	0.005
At most 2	0.318	23.752	27.584	0.144
At most 3	0.162	10.932	21.132	0.654
At most 4	0.108	7.106	14.265	0.477
At most 5	0.021	1.308	3.841	0.253

Max-Eigen value test indicates 2 cointegrating eqn(s) at the 0.05 percent Probability level

* denotes rejection of the hypothesis at the 0.05 percent Probability level

The results for both Trace statistic and Maximal Eigen statistic were reported in Table 3 and Table 4 respectively. Both tests, *i.e.* the Trace statistic and the Maximal Eigen statistics recognized two cointegrating vectors, therefore, the study used two cointegrating vectors in order to establish the long-run relationships among the variables.

LONG-RUN RELATIONSHIP

After normalization the first cointegrating vector on LLSE25 normalized cointegrating coefficients were estimated as reported in Table 5.

TABLE 5

Normalized Cointegrating Coefficients

LLSE25	LCPI	LIP	LREER	LM2	LTTBR
1	6.226	–2.020	–3.332	–2.241	–0.058
S. E.	–1.955	–0.291	–1.140	–0.939	–0.074
t-value	–3.185	6.938	2.922	2.388	0.776

The first normalized equation[1] was estimated as below:

$$LLSE25 = -6.226LCPI + 2.020LIP + 3.332LREER + 2.241\ LM_2 + 0.058LTTBR \quad (6)$$

According to the first normalized equation, stock prices (LLSE25) showed significantly negative relation with consumer price index (LCPI) in long-run which suggested that stock market did not provide hedge against inflation. The negative relationship between stock prices and consumer price index was consistent with the results of Humpe and Macmillan (2009) for US data. However, findings were at variance with the findings of Abdullah and Hayworth (1993) and Ratanapakorn and Sharma (2007). Normalized equation (6) showed that there was a significant positive relationship between stock prices and industrial production. The result was consistent with the findings of many researchers (*inter alia* Fama, 1981; Chen *et al.*, 1986; Abdullah and Hayworth, 1993; Eva and Stenius, 1997; Ibrahim and Yusoff, 2001; Nishat and Shaheen, 2004; Ratanapakorn and Sharma, 2007; Cook, 2007; Shahbaz *et al.*, 2008; Liu and Sinclair, 2008; Humpe and Macmillan, 2009). LLSE25 index was also influenced by the real effective exchange rate (LREER) positively. This implied that along with the increase in exchange rate or depreciation in domestic money, there was a positive effect on export-oriented firms that led to increase in returns of the firms and ultimately resulting in hike in stock prices. Aggarwal (1981) and Ratanapakorn and Sharma (2007) had also reported similar findings between

[1]This equation was estimated by using E-views 6. Similar methodology was also used to estimate the equation and to explore the long-run relationships in the most recent studies (Nishat and Shaheen, 2004; Ratanapakorn and Sharma, 2007; Humpe and Macmillan, 2009).

stock prices and exchange rate but Soenen and Hennigar (1988) reported negative association between the two variables. The relationship between stock price and money supply was found significantly positive. The results were consistent with the study of Ratanapakorn and Sharma, (2007), however the results were contrary to the findings of Humpe and Macmillan (2009) for Japan. The study found that stock prices and three month treasury bills (LTTBR) had a positive but showed insignificant relationship with LLSE25 in the long-run. Ratanapakorn and Sharma (2007) also reported positive relationship between US stock market (S&P500) and three months treasury bills rate.

TABLE 6

Vector Error Correction Estimates

Variables	D (LLSE25)	D (LCPI)	D (LIP)	D (LREER)	D (LM2)	D (LTTBR)
Vecm1 (–1)	–0.201** (–2.49)	0.020* (2.71)	–0.099 (–1.19)	0.041* (3.75)	0.023 (1.31)	0.354* (3.66)
Vecm2 (–1)	–1.788* (–3.37)	0.085*** (1.74)	–1.173** (–2.14)	0.041 (0.57)	0.130 (1.21)	1.580* (2.49)
D(LLSE25(–1))	0.142 (0.92)	–0.003 (–0.2)	0.269 (1.7)	–0.071* (–3.49)	–0.056*** (–1.7)	–0.152 (–0.82)
D(LCPI(–1))	1.066 (0.59)	0.177 (1.08)	2.469 (1.33)	–0.746* (–3.11)	–0.316 (–0.82)	–1.269 (–0.59)
D(LIP(–1))	0.157 (1.32)	–0.002 (–0.19)	–0.095 (–0.77)	0.005 (0.34)	0.002 (0.06)	–0.020 (–0.11)
D(LREER(–1))	–0.240 (–0.25)	–0.065 (–0.74)	0.001 (0.01)	0.232*** (1.83)	–0.143 (–0.7)	1.499 (1.32)
D(LM2(–1))	0.073 (0.12)	0.073 (1.33)	0.130 (0.21)	–0.007 (–0.09)	–0.340* (–2.67)	–0.248 (–0.34)
D(LTTBR(–1))	–0.158 (–1.31)	–0.007 (–0.61)	0.138 (1.2)	–0.059 (–3.64)	0.010 (0.23)	0.184 (1.27)
C	0.004 (0.19)	0.005* (3.04)	–0.021 (–1.04)	0.007* (2.82)	0.020* (5.04)	0.030 (1.27)
R-squared	0.24	0.265	0.24	0.35	0.22	0.38
F-statistic	2.23	2.521	2.16	3.77	2.02	4.307

( ) shows 't' values of "t" statistics

* show the coefficient significantly different from zero at 0.01 percent probability level

** show the coefficient significantly different from zero at 0.05 percent probability level

*** show the coefficient significantly different from zero at 0.10 percent probability level

VECTOR ERROR CORRECTION MODEL

In order to capture the short-run dynamics of the model, error correction mechanism was applied. The results of vector error correction model were reported in Table 6. The coefficients of ecm1 (–1), and ecm2 (–1) showed the speed of adjustment of disequilibrium in the period of study. As both the error correction terms were significant with negative signs, hence the results of vector error correction model (VECM) depicted that the adjustments in LLSE25 were due to the first error correction term (ecm1) and the second error correction term (ecm2). Equation (7) showed that the coefficient of ecm1 (–1) was significant which implied that LLSE25 adjusted by 20.1 percent in one month to the long-run equilibrium. The results showed that it took more than approximately five months (1/0.201= 4.99) to eliminate the disequilibrium. The coefficient of second error correction term showed speedy adjustment.

$$\begin{aligned} DLLSE25 = {} & 0.004 + 0.142\ DLLSE25\ (-1) + 1.066\ DLCPI\ (-1) \\ & + 0.157 DLIP\ (-1) - 0.240 DLREER\ (-1) \\ & + 0.073 DLM2\ (-1) - 0.158 DLTTBR\ (-1) \\ & - 0.201\ Vecm1\ (-1) - 1.788\ Vecm2\ (-1) \end{aligned} \quad (7)$$

VARIANCE DECOMPOSITIONS

The variance decomposition provided further evidence of relationships among the variables under investigation. The variance decomposition showed the proportion of the forecast error of one variable due to the other variables. Therefore, the variance decomposition makes possible to determine the relative importance of each variable in creating fluctuations in other variables (Ratanapakorn and Sharma, 2007). Table 7 showed that the LLSE25 index was relatively less exogenous in relation to other variables, *i.e.* LCPI, LIP, and LTTBR because almost 34 percent of its variance was explained by its own shock after 24 months. LCPI explained 44 percent impact on stock prices. Movements in other macroeconomic variables, *i.e.* LIP, LEER LM_2, and LTTBR explained forecast variance 7.19 percent, 1.77 percent, 7.53 percent, and 5.6 percent respectively for LLSE25.

TABLE 7

Variance Decompositions

VDC of	Months	S.E.	LLSE25	LCPI	LIP	LREER	LM2	LTTBR
LLSE25	1	0.08	100.00	0.00	0.00	0.00	0.00	0.00
	6	0.17	64.11	18.89	3.63	0.13	9.20	4.04
	24	0.39	33.79	44.12	7.19	1.77	7.53	5.60

LCPI	1	0.01	12.35	87.65	0.00	0.00	0.00	0.00
	6	0.02	5.26	82.39	2.51	9.36	0.07	0.40
	24	0.14	19.70	61.60	7.31	4.46	1.10	5.82
LIP	1	0.08	0.61	1.93	97.46	0.00	0.00	0.00
	6	0.10	2.30	1.77	79.97	1.65	2.29	12.01
	24	0.11	4.17	5.69	68.18	3.69	5.00	13.27
LREER	1	0.01	1.89	9.57	1.72	86.81	0.00	0.00
	6	0.02	18.15	6.49	9.82	56.17	1.06	8.30
	24	0.05	25.97	43.15	8.20	8.29	4.90	9.49
LM2	1	0.02	0.67	3.55	2.20	1.97	91.61	0.00
	6	0.02	2.26	15.80	1.45	1.76	77.86	0.87
	24	0.15	16.33	63.28	6.73	5.15	3.00	5.51
LTTBR	1	0.09	0.25	2.73	5.32	0.37	0.27	91.06
	6	0.24	17.48	1.99	6.74	8.69	1.04	64.06
	24	0.39	24.58	14.78	6.08	6.89	11.88	35.78

Cholesky Ordering: LLS25 LCPI LIP LREER LM2 LTTBR

IV. CONCLUSION

This study investigated long-run and short-run relationships between five macroeconomic variables and stock prices in Lahore Stock Exchange. All the series used in this analysis was found non-stationary at levels but stationary at first difference. Two long-run relationships were found between macro economic variables and LSE25 Index. In the long-run, inflation had a negative impact on stock prices while Industrial production index, real affective exchange rate, and Money supply affected stock returns positively. However, three month Treasury bills rate showed insignificant positive impact on stock returns in the long-run. The VECM analysis depicted that the coefficient of ecm1 (–1) and ecm2 (–1) was significant showing speedy adjustment. The results of Variance Decomposition illustrated that among the macroeconomic variables, inflation was explaining the maximum variance.

The study proposed that appropriate monetary measures should be adopted by monetary managers to control inflation so that the volatility of the stock markets can be minimized. The increase in Industrial production can play significant positive role in development of the capital markets of Pakistan. Thus, it was recommended that authorities should formulate such a policy which supports stock prices through the promotion of industrial production. The Competition Commission should keep a close watch on the functioning of stock markets.

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