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IMPACT OF SELECTED MACROECONOMIC FACTORS ON INVESTOR'S INVESTMENT DECISIONS AT KSE 100 INDEX

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ABSTRACT

This research study empirically explores the long run and short run effects and trends of inflation rate, interest rate, exchange rate and FDI with investor's decisions at KSE 100 index. To evaluate short and long run relationship, monthly data of fifteen years from the period January 2001 to December 2015 was used to obtain the results of the study. The data was transformed into stationary to avoid the spurious results by employing ADF Test. Co integration test was used followed by VECM, BG LM test, Heteroskedasticity, Granger causality test and IRF. The result of the study reveals that all the variables had positive and significant impact on investor's investment decisions at KSE 100 index except inflation rate. Results reveals that there was also one cointegrating vector among these variables. The interest rate and FDI had also short run impact on investor's decisions at KSE 100 index, it means change in monetary policy and FDI effects on the investor's decisions. Furthermore, the results show that there is a significant strong relationship among the variables in long run. Investors at KSE 100 index and exchange rate had Granger cause on each other.

INTRODUCTION

Investment decisions at Karachi stock exchange are greatly affected by macroeconomic variables. When any changes occur in macroeconomic factors that ultimately effect stock prices differently according to the economic conditions of the country and different policies of the government. This study contributes by evaluating the effect of selected macroeconomic variables on stock prices in Pakistan especially at KSE 100 index. Investors usually consider the macroeconomic variables when they value stocks. Interest rate, inflation

rate, exchange rate and foreign direct investment are very important among these variables which impact the performance of Karachi stock exchange 100 index. This study is very important for investors of Pakistan because Pakistan's economy faces lots of troubles and threats due to persistent rising inflation rate and interest rate structure. The sound Stock market is distinguished through economic health, confidence of domestic and universal investors (Nadeem, 2020 and Riaz, 2020). Stock market position can be affected through inflation rate, interest rate, exchange rate and foreign direct investment. Interest rate is directly related to economic growth and impacts on the performance of stock exchange. During the period interest rate has a significant negative relation with stock market in Pakistan. When banks offer higher rates of interest then investor shall switch from share market to banking sector and demand of shares will automatically be decreased. So stock market index would fluctuate and prices of shares will be reduced. When inflation and interest rates increase automatically firms borrowing costs will be increased. The increase in cost of the borrowing will decrease net income and stock prices. Khan et al, (2012) deeply highlighted the monetary indicators including the rate of exchange, interest rate, inflation and FDI. These fundamental macroeconomic variables are very crucial for investors to make rational investment decisions in stock market. Farsio & Fazel (2008) provided empirical evidence in support of a positive relationship between inflation and stock prices. During the period from 2001 to 2015, interest rate, exchange rate and FDI impacts on the investment decisions at KSE 100 index and short-term impact was also found, it means change in monetary policy, government regulations and political situation might impact the investors investing in Karachi stock exchange 100 index.

LITERATURE REVIEW
Substantial number of research articles can be found globally to ascertain the interrelationship and trend of macroeconomic variables with Karachi stock exchange. The financial and economic theory states that a mixed and possible association found between the macroeconomic variables and stock exchange. Sohail and Husain, (2006) found the long and short run relationship between Karachi stock exchange and multiple macroeconomic factors by applying VECM. Mansoor and Adam (2009) has determined the causal association between macroeconomic factors and stock market by performing granger causality test.

Salem, Zafar and Rafique, (2013) discussed that passive association flanked by inflation and stock prices has turn out to be one of the majorities usually documented sensible particulars. But with the view of Aurangzeb, (2012) explored the consequences of various macroeconomic factors on stock market. He obtained short- and long-term interest rates; predictable and unpredictable inflation, exchange rate. Khan et al, (2012) stated that there is an opposite association in the middle of stock returns and predictable inflation and optimize the significant study in this background is the work of Ali, (2012) established that in inflation targeting countries, inflation targeting has lowered inflation prospect also establish that, in inflation targeting countries, inflation prospect are improved anchor. Aurangzeb, (2012) concluded that medium-term trends in interest rates are not significantly affected by the exact choice among a range of suitable proxies for trend inflation, although the timing of turning points can

vary remarkably in periods where inflation is exceptionally variable. The contrary relationship was found between expected inflation and the stock market when using the leading yardstick of inflation as a data source. Saleem et al. (2013) examined the long-haul relationship between stock market, interest rate and inflation rate. The research concluded that stock market is affected by inflation and exchange rate too. The investors in stock market usually keep inflation under close observation and other factors that includes exchange rate and interest rate to analyze and minimize risks in investment decisions. Alam and Salah Uddin, (2009) explains that anticipated inflation is negatively associated with expected real activity, which in turn is positively associated to stock market index.

Khan et al., (2012) determined macroeconomic variables that are pivotal as these influence on the stock exchange index. For analyzing the trend of stock market index, exchange rate, inflation rate and interest rate was used as macroeconomic indicators which have significant effect on stock market in Pakistan.

Rehman, Md. Uddin (2009) perceived an interaction among the South Asian countries, i.e. Pakistan, India and Bangladesh. This study covered the time period from January 2003 to June 2008, to explain interrelationship of exchange rate with stock prices. This research study concluded that there exists insignificant interdependence among selected variables.

Lee & Wang, (2012) pointed out that an exchange rate and sock market is positively correlated in Thailand, Taiwan and in Japan but exchange rate and stock return is negatively correlated in Singapore and no association was found.

Inflation rate is the general rise in prices in which the prices of goods and services are increased over the period in an economy. Increase in supply of money usually influence the value of existing money which is in circulation in an economy of the country therefore Money supply has a significant effect on an economy however it decreases or increases. It also decreases the buyer's purchasing power as money supply increases in country's economy. Thus, monetary policy should be in closed equilibrium with treasury funds to achieve the prerequisites of all targets in an economy. Mohamed et al. (2007) examined the influence of macroeconomic variables on stock returns in Malaysia which shows a significant and positive relationship between stock prices and inflation.

SalahUddin (2009) investigated two important elements which are part of a country's growth i.e. Interest rate and stock exchange. Interest rate impacts not only stock market but monetary policy too. SalahUddin studied the impact of interest rate on stock market with the help of fifteen years monthly data and fifteen countries sample was also selected. Few of them were developed and the rests were developing countries. After the empirical analysis the conclusion was made that there is a significant negative relationship between stock market and interest rate. Zahid, (2010) determined variables that are related to macroeconomics and stock market and finally he found that interest rate and inflation has a negative impact on stock market. Researcher also argued that

positive but not a strong relation was shown on stock market of Pakistan during the selected period.

In general, it is recognized that an established and well-organized financial system of the country guarantees substantial development and economic stability. The stock market is considered as a crucial part of the financial system of an economy. Investors invest in it for generating anticipated profits (Kalim and Shahbaz, 2009). This has been demonstrated that significant increase in Foreign Direct Investment (FDI) influence the development of the stock market (Adam and Tweneboah, 2008). The Stock Exchange development has a positive impact on development of FDI (Olasukanmi, 2009). There is a positive and strong association found between FDI and stock exchange which proved that there is a pivotal role of foreign direct investment in the stock market of Pakistan (Shabaz, Ahmad and Ali, 2008).

Pal & Mittal, (2011) studied long haul relationship between two Indian capital markets and some macroeconomic elements such as inflation rate, exchange rate, interest rate and gross domestic savings by using quarterly data from the period January 1995 to December 2008 and with the help of ADF test, co integration and error correction model, they analyzed that the inflation rate have significant and positive influence on both capital markets whereas exchange rate and interest rate have an insignificant effect on the selected stock markets.

In recent studies, FDI has captured substantial attention for academicians, researcher's economists, and policymakers (Durusu-Ciftci et al., 2017). Ample of researchers have considered FDI as a tremendous boom to an economy due to the technological dissemination (Carkovic &Levine, 2005; Iamsiraroj, 2016). FDI represents an intermediary force in country's financial systems due to their absorptive position (Yeboua, 2019).

OBJECTIVES:
The research aims to focus on achieving the following objectives.

1. To analyze the impact of inflation rate on investors investment decisions at KSE 100 index.
2. To analyze influence of interest rate on investors investment decisions at KSE 100 Index.
3. To ascertain the effect of Exchange rate on investors investment decision at KSE 100 index.
4. To analyze the impact of FDI on investors investment decision at KSE 100 index.

HYPOTHESIS:
On the basis of objectives, following hypothesis were developed.

1. There is a positive and significant impact of inflation rate on investor's decisions at KSE 100 index
2. There is a positive and significant impact of interest rate on investor's decisions at KSE 100 index

3. Exchange rate has a significant impact on investor's decisions at KSE 100 index

4. FDI has a positive impact on investor's decisions at KSE 100 index.

RESEARCH METHODOLOGY

In this study monthly time series data have been collected through secondary sources like official website of State Bank of Pakistan (SBP) from its economic data and its quarterly and monthly published journals and reports, international financial statistics and official website of Pakistan Stock Exchange (PSX) and Pakistan Bureau of Statistics (PBS).15 years data period from 2001 To 2015 have been collected of 4 selected independent variables and one dependent variable.

The present study employs quantitative method of analysis in defining the selected and important macroeconomic factors that influences the investor's investment decisions at KSE 100 index.

Different statistical tools and techniques e.g., Multiple Regression, Johansan Cointegration, ADF test, serial correlation LM Test, Granger casualty test, VECM are used to obtain the results of the study. Entire statistical analysis for this study is performed through E.Views.

ANALYSIS AND DISCUSSION OF RESULTS

Table 1 Augmented Dicky-Fuller Data Stationary Test

Test Critical Values At Level			Test Critical Values After First Difference		
1% Level	5% Level	10% Level	1% Level	5% Level	10% Level
-3.469691	-2.878723	-2.576010	-3.469691	-2.878723	-2.576010
Variable	**t-Statistic**	**Prob.**	**Variable**	**t-Statistic**	**Prob.**
KSE 100 Index	1.641621	0.9996	KSE 100 Index	-10.83888	0.0000
Inflation Rate	-1.279196	0.6388	Inflation Rate	-6.828111	0.0000
Interest Rate	-1.349325	0.6060	Interest Rate	-15.95533	0.0000
EXR	-0.152310	0.9407	EXR	-8.162552	0.0000
FDI	-2.070142	0.2571	FDI	-11.45232	0.0000

Table 1 presents the results of stationary; Prob values are greater than 0.05 which suggest all variables are non-stationary but after first difference, all variables are found stationary. According to guidelines by Tsay (2003) when variables are stationary at I(1) and non-stationary at I(1) we can apply co-integration test, the regression tool can only be applied after converting all variables in first difference. The following table summarizes the results of regression and it would be followed by co-integration and related tests.
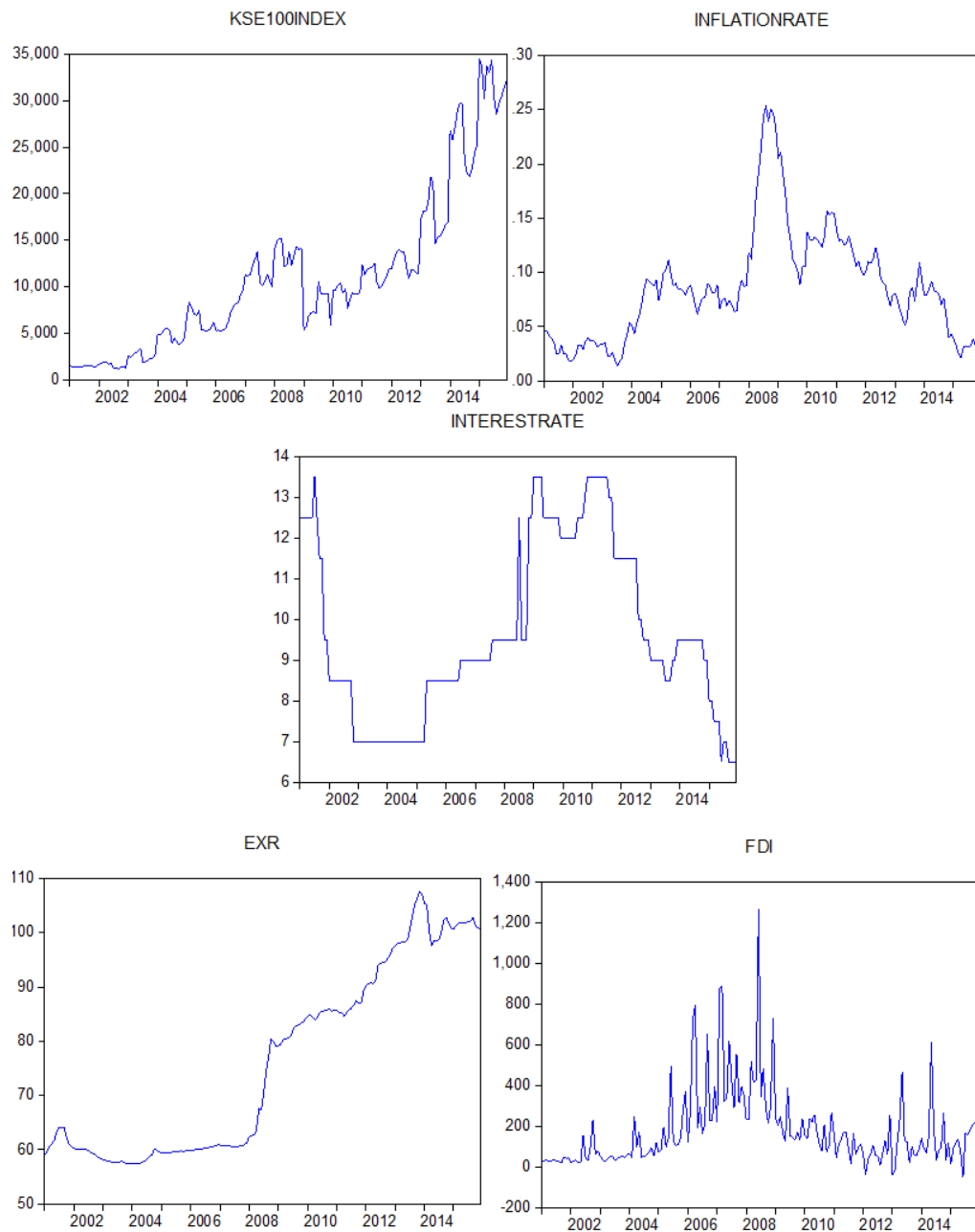
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Figure 1 Stationary Graphs at Level

Figure 1 presents the results of stationary in graphical form; these results are compiled at level. The non stationary data show trend, it can be noticed in above graphs they have upward or downward movements over the time. It further endorses results presented in table 1.
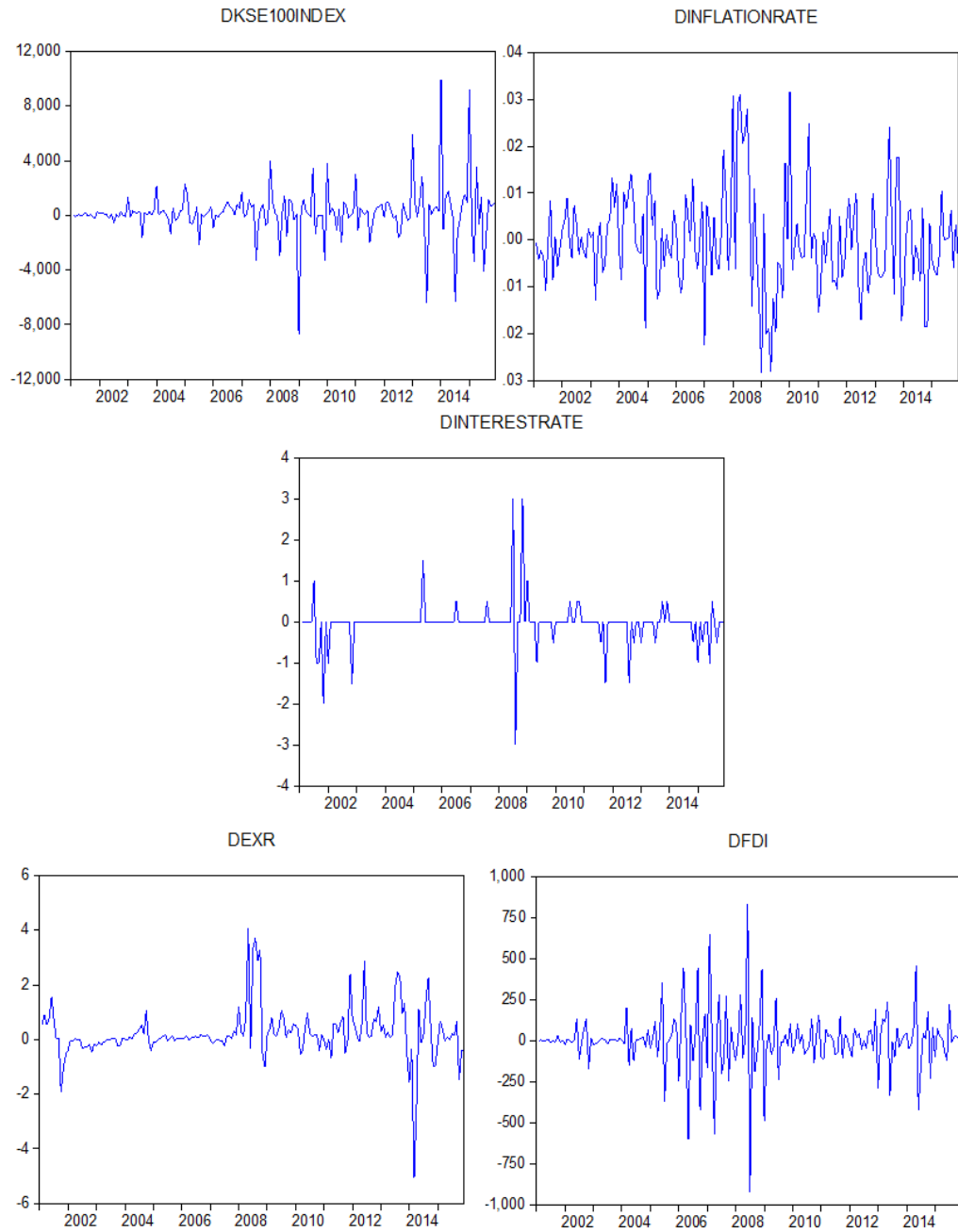
Figure 2 Stationary Graphs after first difference

Figure 2 presents the graphs of converting the data into first difference. Table 1 presents the results that data is stationary after first difference, the same is noticed in above graph because they show random pattern which is the indication of stationary pattern over the time.

Table 2 Hypotheses Testing with Investors' decisions at KSE 100 index as a Dependent Variable

Variable	Coefficient	Std. Error	t-Statistic	Prob.
INFLATION RATE	-2977.731	7530.170	-0.395440	0.6930
INTEREST RATE	-1309.054	169.4560	-7.725037	0.0000
EXR	451.4189	18.05093	25.00806	0.0000
FDI	11.21922	1.740443	6.446189	0.0000
C	-12407.94	1812.571	-6.845495	0.0000
R-squared	0.787475	Mean dependent var		10964.20
Adjusted R-squared	0.782618	S.D. dependent var		8476.944
S.E. of regression	3952.315	Akaike info criterion		19.42938
Sum squared resid	2.73E+09	Schwarz criterion		19.51807
Log likelihood	-1743.644	Hannan-Quinn criter.		19.46534
F-statistic	162.1084	Durbin-Watson stat		1.549133
Prob(F-statistic)	0.000000			

Table 2 presents the results of regression. According to guidelines if the t-statistic ≥ 2 and prob ≤ 0.05 null hypothesis is rejected means there is significant impact of explanatory variable on response variable. The t-statistic and prob values of all variables are > 2 and <0.05 except inflation rate indicate there is significant impact of interest rate, exchange rate and foreign direct investment on KSE-100 index but there is no impact of inflation rate on the KSE-100 index. The other parameters R-squared is 79% approximately indicate above explanatory variables explain response variable by 79% which shows the strength of the model. Similarly, F-statistic is 162 which is > 4 also confirms model is useful for prediction. The AIC, SC, HQC are closer and Durbin Watson is 1.55 indicate positive signs for the model.
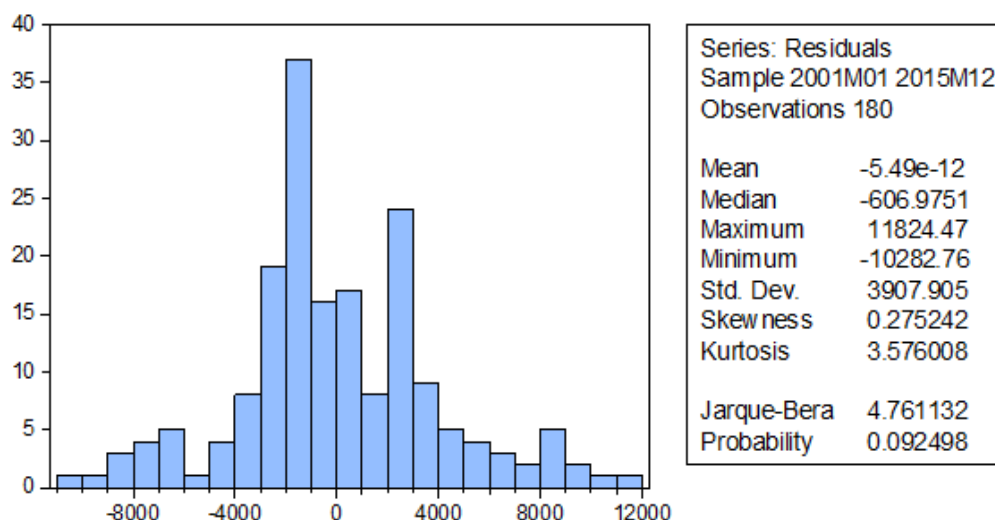
Figure: 3 Normality of Residuals

Figure 3 presents the normality of residuals the results of Jarque Bera confirm residuals are normally distributed. The normality of residuals is desirable and it is one of the characteristics of the best regression model. The results endorse the model of the study is useful to forecast future of the stock market index.

Table 3. Heteroskedasticity Test: Breusch-Pagan-Godfrey

F-statistic	2.175044	Prob. F(4,174)	0.0737
Obs*R-squared	8.523975	Prob. Chi-Square(4)	0.0742
Scaled explained SS	49.53679	Prob. Chi-Square(4)	0.0000

Table 3 summarizes the results whether model is homoskedastic or heteroskedastic. It is required that it should be homosksedastic because it validates the model. The prob Chi-Square value in row two is 0.0742 confirms this model is homoskedastic. It is the one of the characteristics of the best regression model and proved conditional variances are equal.

Table 1. Serial Correlation Test: Breusch-Godfrey Serial Correlation LM Test

F-statistic	2.254871	Prob. F(4,174)	0.0854
Obs*R-squared	7.548725	Prob. Chi-Square(4)	0.0687

Table 4 presents the results of serial correlation though it has already been tested in table 2 using Durbin Watson test. The findings suggest there is no serial

correlation prob Chi_Square is 0.0687 which is endorses there is no correlation between residuals and their lags. It is desirable.
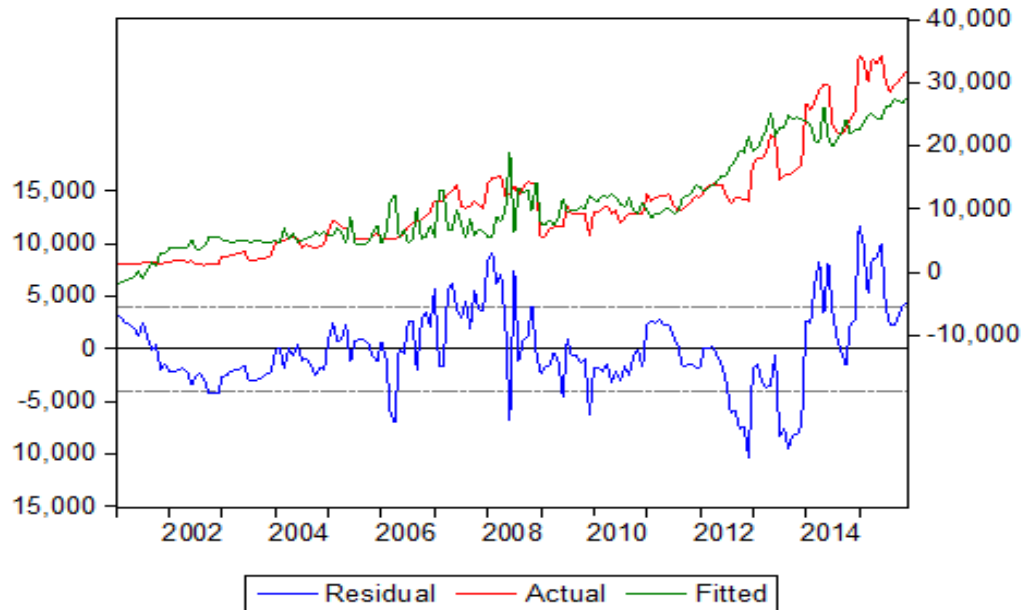

Figure 4. Residual, Actual and Fitted Graph

The figure 4 is the graphical representation of R-squared, the behavior between red and green lines indicates they are moving in closer direction. It is because our R-squared is 79% which is near to 1.

Table 5. Co-integration Test-Trace and Max-Eigen Statistics

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.171187	71.04907	69.81889	0.0398
Atmost 1	0.112376	38.19091	47.85613	0.2937
Atmost 2	0.053052	17.32968	29.79707	0.6157
Atmost 3	0.043425	7.790324	15.49471	0.4881
Atmost 4	0.000120	0.021002	3.841466	0.8847
Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None	0.171187	34.85816	33.87687	0.0458
Atmost 1	0.112376	20.86123	27.58434	0.2847
Atmost 2	0.053052	9.539360	21.13162	0.7867
Atmost 3	0.043425	7.769321	14.26460	0.4026
Atmost 4	0.000120	0.021002	3.841466	0.8847

Table 5 summarizes the results of co-integration; both Trace Max-Eigen statistics suggest there is co-integrating equation because prob values of none are < 0.05. To find how many co-integrating equations is there it requires checking next values. It is found there is one co-integrating equation because prob values of At most 1 are > 0.05. The guidelines suggest co-integration results are following by VECM model.

D(KSE100INDEX) = C(1)*(KSE100INDEX(-1) + 52698.4340822 *INFLATIONRATE(-1) +778.105250636*INTERESTRATE(-1) - 529.386861255*EXR(-1) - 46.1651477019*FDI(-1) + 25384.0748033) + C(2)*D(KSE100INDEX(-1)) + C(3)*D(KSE100INDEX(-2)) + C(4) *D(INFLATIONRATE(-1)) + C(5)*D(INFLATIONRATE(-2)) + C(6) *D(INTERESTRATE(-1)) + C(7)*D(INTERESTRATE(-2)) + C(8)*D(EXR(-1)) + C(9)*D(EXR(-2)) + C(10)*D(FDI(-1)) + C(11)*D(FDI(-2)) + C(12)

Table 6. VECM Equation One with Investors' decisions at KSE 100 index Dependent Variable

	Coefficient	Std. Error	t-Statistic	Prob.
C(1)	-0.066229	0.028216	-2.347210	0.0201
C(2)	0.004628	0.077328	0.059850	0.9523
C(3)	-0.052754	0.075517	-0.698573	0.4858
C(4)	2338.592	13144.56	0.177913	0.8590
C(5)	2271.862	13348.20	0.170200	0.8651
C(6)	54.12440	263.9165	0.205082	0.8378
C(7)	-767.4497	256.4728	-2.992323	0.0032
C(8)	-227.7977	166.9595	-1.364389	0.1743
C(9)	45.18323	162.7962	0.277545	0.7817
C(10)	-1.413442	1.143746	-1.235801	0.2183
C(11)	-2.984788	0.953856	-3.129180	0.0021
C(12)	204.9217	143.1139	1.431879	0.1541

Table 6 presents results of first vector of error correction model. The first coefficient C (1) is negative and its corresponding prob value is < 0.05 indicates there is long term impact of interest rate, exchange rate, inflation rate and FDI. It means positive or negative changes among these variables will hit Investors' decisions at KSE 100 index after couple of months. On the other hand other coefficents from C(2) to C(12) are mostly insficant except C(7) anc C(11). The coefficient other than C(1) show short term impact of explanatory variables on response variable. The coeffecent C(7) represtns the intresest rate lag 2 it is significant, similarly C(11) represent FDI lag 2 is also significant. It is found there is impact of both intrest rate and FDI of previous two months on Investors' decisions at KSE 100 index.
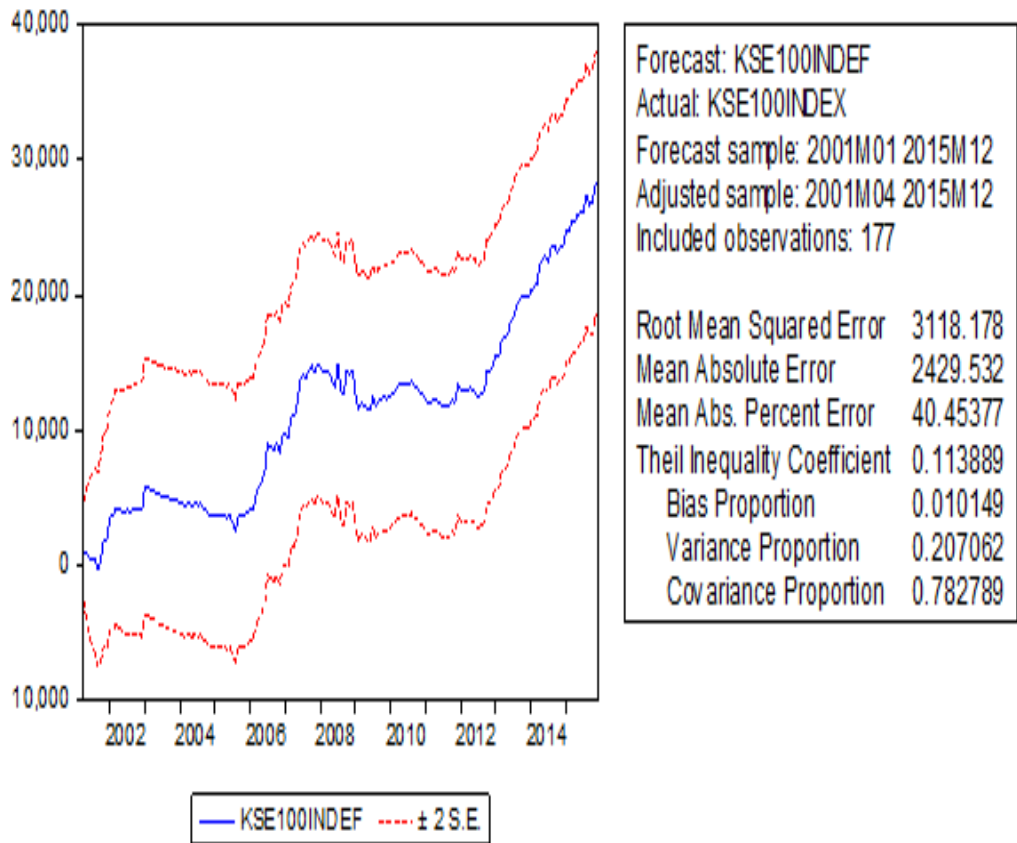
Figure 5. Forecasted Model with Investors' decisions at KSE 100 index Dependent Variable

Figure 5 presents forested model of Investors' decisions at KSE 100 index, the graph shows this model actually moves between intervals of two standard errors. It means one can forecast the model discussed in table 6 and estimate the results which will lie between conditional mean ± 2 standard error.

D(INFLATIONRATE) = C(13)*(KSE100INDEX(-1) + 52698.4340822 *INFLATIONRATE(-1) + 778.105250636*INTERESTRATE(-1) - 529.386861255*EXR(-1) - 46.1651477019*FDI(-1)+25384.0748033) + C(14)*D(KSE100INDEX(-1)) + C(15)*D(KSE100INDEX(-2)) + C(16) *D(INFLATIONRATE(-1)) + C(17)*D(INFLATIONRATE(-2)) + C(18) *D(INTERESTRATE(-1)) + C(19)*D(INTERESTRATE(-2)) + C(20) *D(EXR(-1)) + C(21)*D(EXR(-2)) + C(22)*D(FDI(-1)) + C(23)*D(FDI(-2)) + C(24)

Table 7. VECM Equation Two with Inflation Rate Dependent Variable

	Coefficient	Std. Error	t-Statistic	Prob.
C(13)	-1.52E-07	1.65E-07	-0.920834	0.3585
C(14)	-5.40E-07	4.51E-07	-1.197653	0.2328
C(15)	3.05E-07	4.41E-07	0.691495	0.4902
C(16)	0.262633	0.076692	3.424512	0.0008
C(17)	0.081403	0.077880	1.045237	0.2974
C(18)	0.000288	0.001540	0.187056	0.8518
C(19)	-0.003041	0.001496	-2.032467	0.0437
C(20)	-0.000870	0.000974	-0.893204	0.3730
C(21)	0.000621	0.000950	0.653620	0.5143
C(22)	-3.78E-06	6.67E-06	-0.567185	0.5714
C(23)	3.57E-06	5.57E-06	0.641487	0.5221
C(24)	-3.32E-05	0.000835	-0.039816	0.9683

Table 7 summarizes the results of second vector of error correction model. The findings of the models suggests that there is no long run impact of interest rate, exchange rate FDI and inflation rate on investors investment decisions at KSE 100 index because prob value of C (13) is > 0.05 though its coefficient is negative but it is insignificant. The other coefficients C (14) to C (24) are also insignificant except C (16) and C (19). It means there is no short run impact of these variables on inflation rate except inflation rate lag one and interest rate lag one because C (16) and C (19) represent inflation rate (-1) and interest rate (-1). The inflation is influenced by its previous months as well as by interest rate of
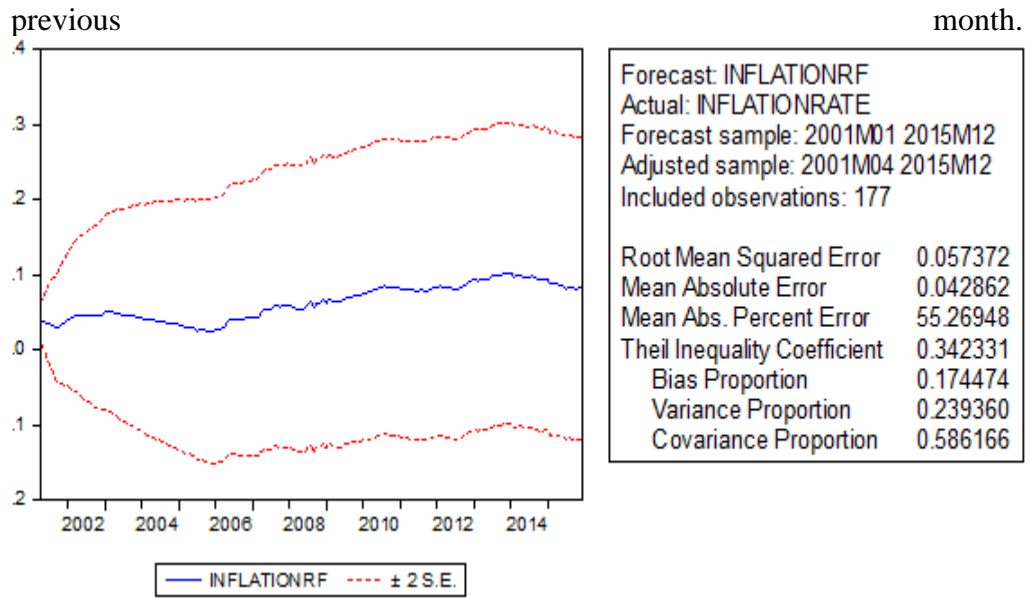
previous   month.

Figure 6. Forecasted Model with Inflation Rate Dependent Variable

Figure 6 presents forested model of inflation rate, the graph shows this model actually moves between intervals of two standard errors but this interval is very wide. It means the margin of error is higher though one can forecast the model discussed in table 7 but precision of the results would be lower.

$$D(INTERESTRATE) = C(25)*(KSE100INDEX(-1) + 52698.4340822 * INFLATIONRATE(-1) + 778.105250636*INTERESTRATE(-1) - 529.386861255*EXR(-1) - 46.1651477019*FDI(-1) + 25384.0748033) + C(26)*D(KSE100INDEX(-1)) + C(27)*D(KSE100INDEX(-2)) + C(28) *D(INFLATIONRATE(-1)) + C(29)*D(INFLATIONRATE(-2)) + C(30) *D(INTERESTRATE(-1)) + C(31)*D(INTERESTRATE(-2)) + C(32) *D(EXR(-1)) + C(33)*D(EXR(-2)) + C(34)*D(FDI(-1)) + C(35)*D(FDI(-2)) + C(36)$$

Table 8. VECM Equation Three with Interest Rate Dependent Variable

	Coefficient	Std. Error	t-Statistic	Prob.
C(25)	2.76E-07	8.18E-06	0.033764	0.9731
C(26)	3.62E-07	2.24E-05	0.016169	0.9871
C(27)	-1.24E-05	2.19E-05	-0.567039	0.5715
C(28)	1.751415	3.809283	0.459775	0.6463
C(29)	4.114342	3.868296	1.063606	0.2891
C(30)	-0.148647	0.076483	-1.943540	0.0537
C(31)	0.091396	0.074326	1.229675	0.2206
C(32)	-0.017296	0.048385	-0.357467	0.7212
C(33)	0.107430	0.047178	2.277106	0.0241
C(34)	0.000680	0.000331	2.050108	0.0419
C(35)	8.71E-06	0.000276	0.031516	0.9749
C(36)	-0.055790	0.041474	-1.345164	0.1804

Table 8 summarizes the results of third vector of error correction model. The findings of the models suggest there is no long run impact of Investors'

decisions at KSE 100 index, inflation rate, exchange rate and FDI on interest rate because prob value of C (25) is > 0.05 and its coefficient is positive. The other coefficients C (25) to C(36) are also insignificant except C(33) and C(34). It means there is no short run impact of these variables on interest rate except exchange rate lag two and FDI lag one because C (33) and C (34) represent exchange rate (-2) and FDI (-1). The interest rate is influenced by exchange rate of previous two months as well as by FDI of previous month.
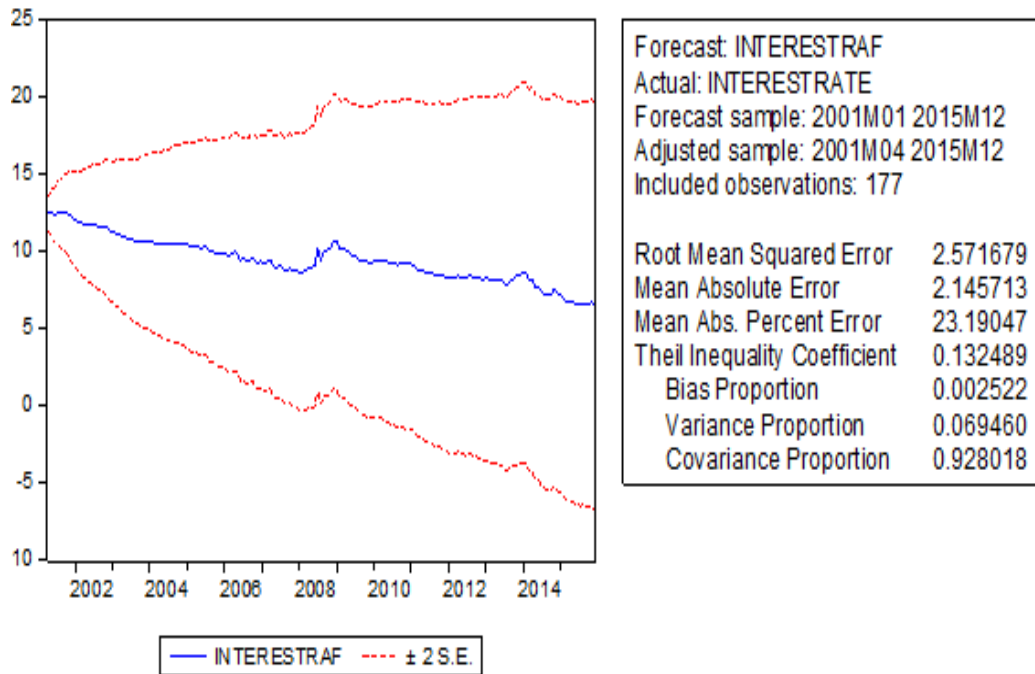

Figure 7. Forecasted Model with Interest Rate Dependent Variable

Figure 7 presents forested model of interest rate; the graph shows this model actually moves between intervals of two standard errors but this interval is widening over the time. It means the margin of error is getting higher over the time though one can forecast the model discussed in table 8 but precision of the results would be lower.

D(EXR) $=$ C(37)*(KSE100INDEX(-1) $+$ 52698.4340822*INFLATIONRATE(-1) $+$ 778.105250636*INTERESTRATE(-1) $-$ 529.386861255*EXR(-1) - 46.1651477019*FDI(-1) + 25384.0748033) + C(38)*D(KSE100INDEX(- 1)) + C(39)*D(KSE100INDEX(-2)) + C(40)*D(INFLATIONRATE(- 1))+ C(41)*D(INFLATIONRATE(-2)) + C(42)*D(INTERESTRATE(-1)) + C(43) *D(INTERESTRATE(-2)) + C(44)*D(EXR(-1)) + C(45)*D(EXR(-2)) + C(46)*D(FDI(-1)) + C(47)*D(FDI(-2)) + C(48)

Table 9. VECM Equation Four with exchange Rate Dependent Variable

	Coefficient	Std. Error	t-Statistic	Prob.
C(37)	-1.29E-05	1.29E-05	-0.997724	0.3199
C(38)	-2.14E-05	3.54E-05	-0.606370	0.5451
C(39)	-0.000135	3.45E-05	-3.906010	0.0001
C(40)	11.76078	6.009900	1.956901	0.0520
C(41)	9.498289	6.103004	1.556330	0.1215
C(42)	-0.042486	0.120667	-0.352095	0.7252
C(43)	-0.113239	0.117263	-0.965684	0.3356
C(44)	0.364273	0.076337	4.771940	0.0000
C(45)	0.012448	0.074433	0.167238	0.8674
C(46)	-0.000347	0.000523	-0.663542	0.5079
C(47)	0.000174	0.000436	0.398845	0.6905
C(48)	0.159928	0.065434	2.444119	0.0156

Table 9 summarizes the results of fourth vector of error correction model. The findings of the models suggest there is no long run impact of Investors' decisions at KSE 100 index, inflation rate, interest rate, and FDI on exchange rate because prob value of C (37) is > 0.05 though its coefficient is negative but it is insignificant. The other coefficients C (38) to C (48) are also insignificant except C (39) and C (44). It means there is no short run impact of these variables on exchange rate except KSE 100 index lag two and exchange rate lag one because C (39) and C (44) represent Investors' decisions at KSE 100 index (-2) and exchange rate (-1). The exchange rate is influenced by its previous month as well as by Investors' decisions at KSE 100 index of previous two months.
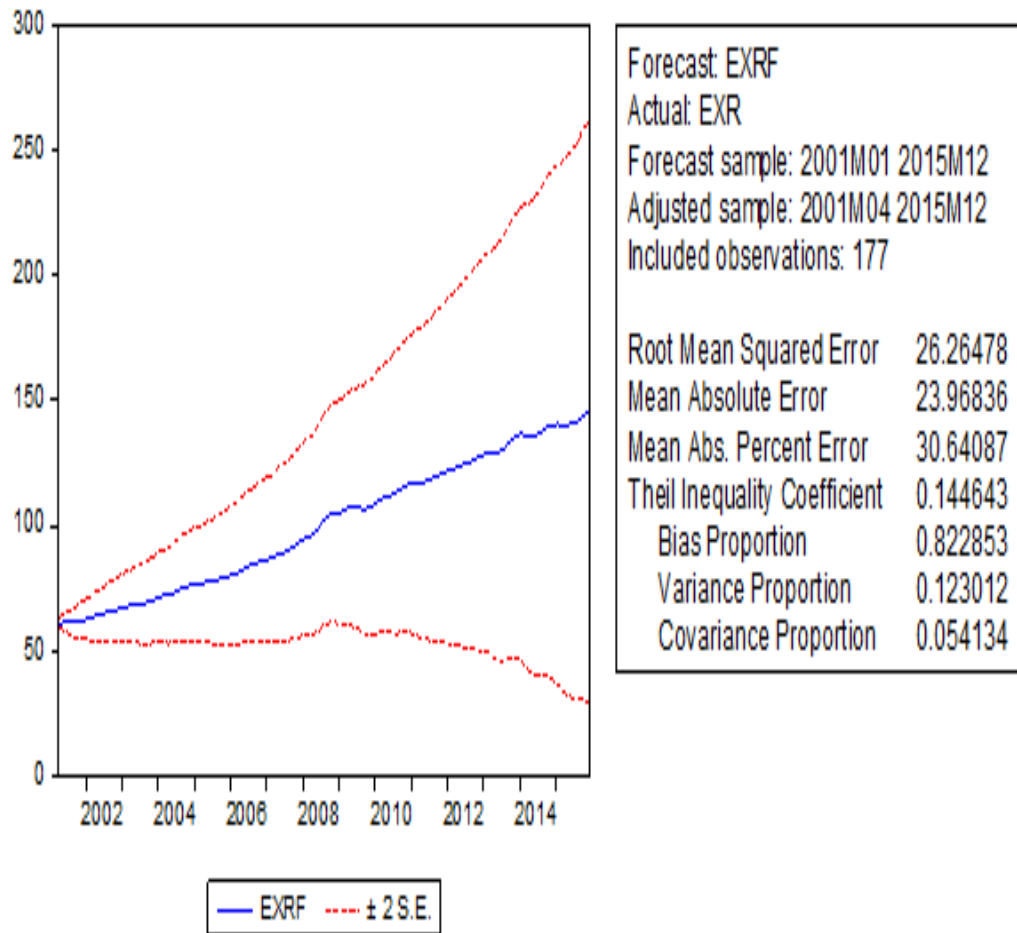
Figure 8. Forecasted Model with Exchange Rate Dependent Variable

Figure 8 presents forested model of exchange rate; the graph shows this model actually moves between intervals of two standard errors but this interval is widening over the time. It means the margin of error is getting higher over the time though one can forecast the model discussed in table 9 but precision of the results would be lower.

$$D(FDI) = C(49)*(KSE100INDEX(-1) + 52698.4340822*INFLATIONRATE(-1) + 778.105250636*INTERESTRATE(-1) - 529.386861255*EXR(-1) - 46.1651477019*FDI(-1) + 25384.0748033) + C(50)*D(KSE100INDEX(-1)) + C(51)*D(KSE100INDEX(-2)) + C(52)*D(INFLATIONRATE(-1)) + C(53)*D(INFLATIONRATE(-2)) + C(54)*D(INTERESTRATE(-1)) + C(55) *D(INTERESTRATE(-2)) + C(56)*D(EXR(-1)) + C(57)*D(EXR(-2)) + C(58)*D(FDI(-1)) + C(59)*D(FDI(-2)) + C(60)$$

Table 10. VECM Equation Five with Foreign Direct Investment Dependent Variable

	Coefficient	Std. Error	t-Statistic	Prob.
C(49)	0.011915	0.002308	5.162874	0.0000
C(50)	-0.001260	0.006325	-0.199208	0.8423
C(51)	-0.002808	0.006177	-0.454594	0.6500
C(52)	-1493.803	1075.108	-1.389445	0.1666
C(53)	1095.047	1091.763	1.003007	0.3173
C(54)	51.57961	21.58602	2.389492	0.0180
C(55)	-14.85117	20.97719	-0.707967	0.4800
C(56)	13.69259	13.65580	1.002694	0.3175
C(57)	-25.46439	13.31528	-1.912419	0.0576
C(58)	-0.154193	0.093548	-1.648275	0.1012
C(59)	-0.247761	0.078017	-3.175736	0.0018
C(60)	6.781870	11.70544	0.579378	0.5631

Table 10 summarizes the results of fifth vector of error correction model. The findings of the models suggest there is no long run impact of Investors' decisions at KSE 100 index, inflation rate, interest rate, and exchange rate on FDI because its Coefficient C (49) is positive though its prob is < 0.05 which is significant but positive coefficient nullifies the significant impact. The other coefficients C (49) to C (60) are also insignificant except C (54) and C (59). It means there is no short run impact of these variables on FDI except interest rate lag one and FDI lag one because C (54) and C (59) represent interest rate (-1) and FDI (-1). The FDI is influenced by its previous month as well as by interest rate of previous month.
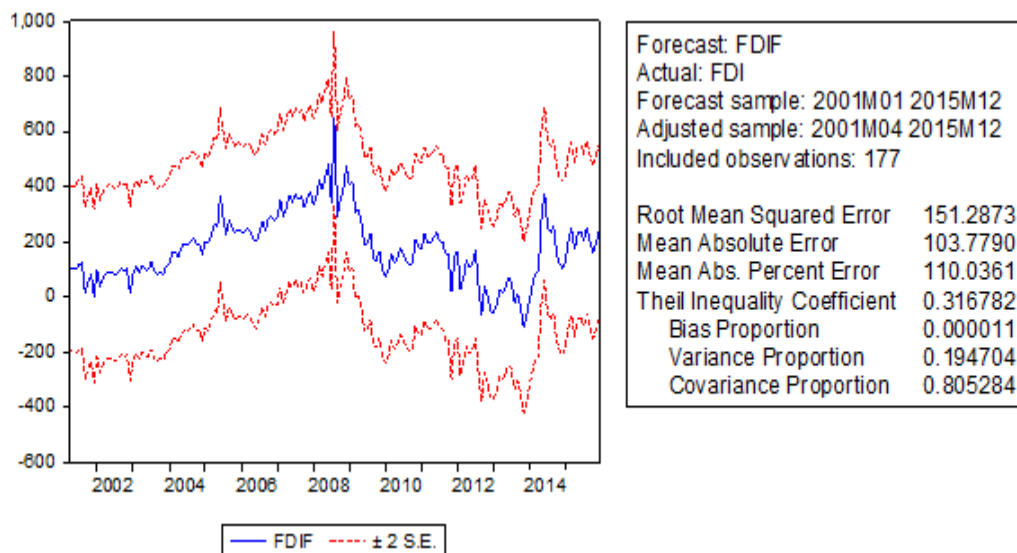
Figure 9. Forecasted Model with FDI Dependent Variable

Figure 9 presents forested model of foreign direct investment; the graph shows this model actually moves between intervals of two standard errors. It means one can forecast the model discussed in table 10 and estimate the results which will lie between conditional mean ± 2 standard error.

Table 11. Granger Causality Test

Null Hypothesis:	Obs	F-Statistic	Prob.
INFLATION RATE does not Granger Cause KSE100INDEX	175	0.77101	0.5719
KSE100INDEX does not Granger Cause INFLATION RATE		0.52698	0.7556
INTEREST RATE does not Granger Cause KSE100INDEX	175	1.27308	0.2780
KSE100INDEX does not Granger Cause INTEREST RATE		0.88733	0.4910
EXR does not Granger Cause KSE100INDEX	175	2.31010	0.0464
KSE100INDEX does not Granger Cause EXR		4.06886	0.0017
FDI does not Granger Cause KSE100INDEX	175	1.53766	0.1808
KSE100INDEX does not Granger Cause FDI		1.44814	0.2097
INTERESTRATE does not Granger Cause INFLATIONRATE	175	0.92680	0.4651
INFLATIONRATE does not Granger Cause INTERESTRATE		5.27599	0.0002
EXR does not Granger Cause INFLATIONRATE	175	0.24445	0.9421
INFLATIONRATE does not Granger Cause EXR		3.14308	0.0098
FDI does not Granger Cause INFLATIONRATE	175	1.53602	0.1813
INFLATIONRATE does not Granger Cause FDI		0.77122	0.5718
EXR does not Granger Cause INTERESTRATE	175	2.06275	0.0726
INTERESTRATE does not Granger Cause EXR		0.46114	0.8047

FDI does not Granger Cause INTERESTRATE	175	4.43268	0.0008
INTERESTRATE does not Granger Cause FDI		2.62464	0.0260
FDI does not Granger Cause EXR	175	2.74104	0.0209
EXR does not Granger Cause FDI		1.59913	0.1631

Table 11 summarizes the results of Granger Causality test. It is another parameter to test significance of the previous results. According to results both exchange rate Granger Cause on Investors' decisions at KSE 100 index and Investors' decisions at KSE 100 index Granger Cause on exchange rate, inflation rate Granger Cause on interest rate, inflation rate Granger Cause on exchange rate, both FDI Granger Cause on interest rate and interest rate Granger Cause on FDI, and FDI Granger Cause on exchange rate. The rest of the variables have no Granger Causality effect on one another.
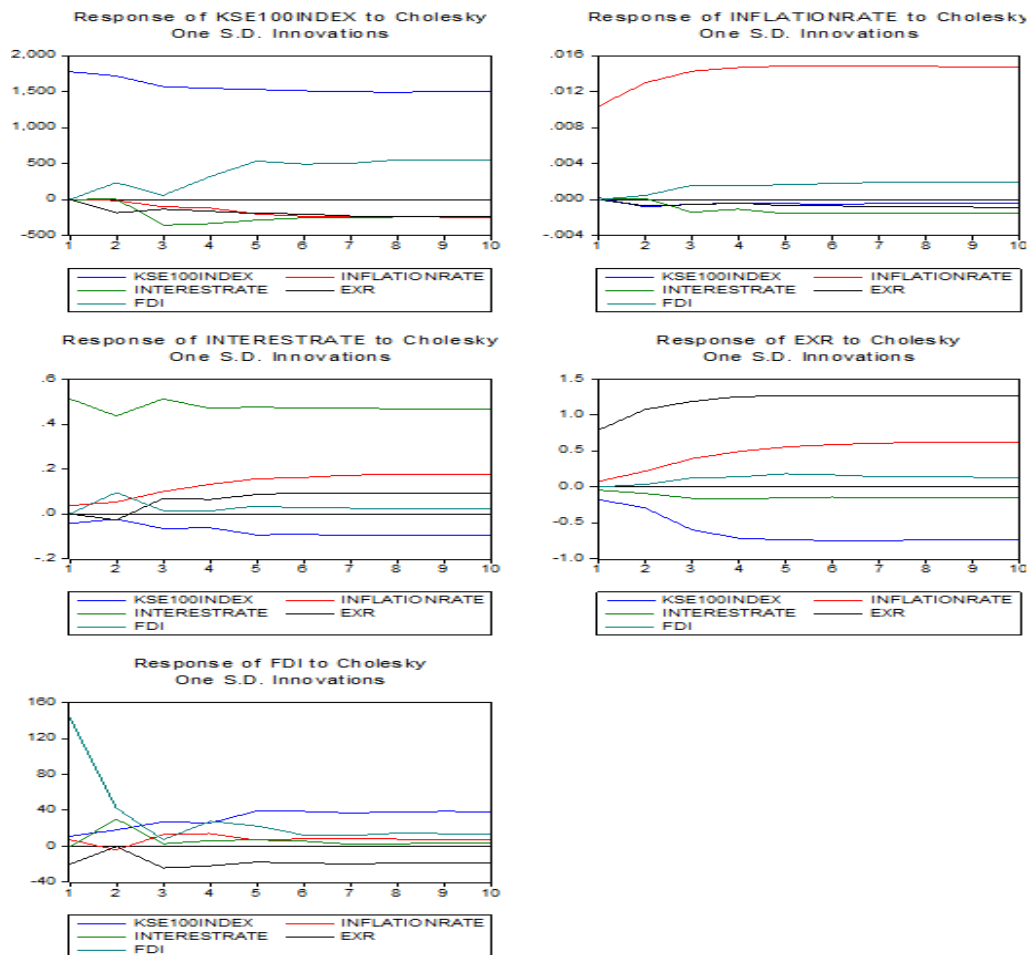

Figure 10. Impulse Response Multiple Graph

Figure 10. presents the results of impulse response graph. The first graph Investors' decisions at KSE 100 index shows how Investors' decisions at KSE 100 index volatility innovates (Impulse response) the rest of the variables. The Blue curve represents the Investors' decisions at KSE 100 index the movement

of curve is observed on the positive side it shows any shock of the Investor's decisions at KSE 100 index has positive impulse response on Investors' decisions at KSE 100 index. The red curve represents the inflation rate, it shows that any shock of Investors' decisions at KSE 100 index initially no impulse response on inflation rate but later on it has negative impulse response. The light green curve represents the interest rate it shows any shock of Investors' decisions at KSE 100 index has no impulse response on interest rate initially but later on it moves to negative and finally it is restored at positive. The black curve represents exchange rate, it shows Investors' decisions at KSE 100 index has negative impulse response on exchange rate. The dark green curve represents the FDI, it shows any shock of Investors' decisions at KSE 100 index has positive impulse response on FDI.

The second graph represents how inflation rate has impulse response on rest of variables. The graphs show the shock or volatility of inflation rate has positive impulse response or innovation on inflation rate itself as well as on FDI but negative impulse response on investors' decision at KSE 100 index, interest rate, and exchange rate. The third graph represents how interest rate has impulse response on rest of the variables. The graphs show the shock or volatility of interest rate has positive impulse response or innovation on interest rate, inflation rate, exchange rate, and FDI but negative impulse response on investors' decision at KSE 100 index. The fourth graph represents how exchange rate has impulse response on rest of variables. The graph shows the shock or volatility of exchange rate has positive impulse response or innovation on exchange rate, inflation rate and FDI but negative impulse response on investors' decision at KSE 100 index, and interest rate. The fifth graph represents how FDI has impulse response on rest of variables. The graphs show the shock or volatility of FDI has positive impulse response or innovation on FDI, investors' decision at KSE 100 index, inflation rate, and interest rate but negative impulse response exchange rate.

CONCLUSION
All the variables were found non-stationary at level but stationary after the first difference. The findings suggested that all variables had significant impact except inflation rate. It means, interest rate, exchange rate and FDI had significant importance in explaining investor's investment decisions at KSE 100 index. The results also revealed that there was one co integrating vector among these variables and it is confirmed that there is one response variable which were affected by explanatory variables in the long run. The co-integration results were followed by VECM and it was noticed that investor's decisions at KSE 100 index was influenced by the rest of the variables in the long run. Any change in inflation rate, interest rate, exchange rate, and FDI today would affect investor's investment decisions at KSE 100 index after a couple of months. It is confirmed that movement in these variables had significant impact in the long run. There were only a few variables which had impact in the short run. The interest rate and FDI had also a short run impact on investors' decisions at KSE 100 index; it means change in monetary policy and foreign direct investment affected investors' investment decisions at KSE 100 index immediately. It was also found that investors' decisions at KSE 100 index and exchange rate had Granger Cause on each other. The impulse response of investors' intentions,

interest rate, and exchange rate on investors' intentions at KSE 100 index was positive over the time but the impulse response of inflation rate and FDI on investors' intentions at KSE 100 index was negative. It showed the shock of investors' intentions, interest rate and exchange rate had positive contribution in helping investors' intentions at KSE 100 index but the shock in inflation rate and FDI had negative contribution in helping investors' intentions at KSE 100 index. It is concluded that interest rate, exchange rate and FDI are the key determinants in explaining investors' intentions at KSE 100 index. It has also been revealed that there is a long run impact of inflation rate, interest rate, exchange rate and inflation on investors' investment decisions at KSE 100 index. The changes occurring in these variables ultimately affect investor's investment decisions at certain stages.

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