RELATIONSHIP BETWEEN STOCK MARKET VOLATILITY AND MACROECONOMIC VARIABLES: EVIDENCE FROM PAKISTAN

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Abstract

This study explores the relationship between stock returns volatility and macroeconomic variables in Pakistan. This study has used monthly observations covering the period from 2001-01 to 2011-06. First, Exponential Generalized Autoregressive Conditional Hetroskedasticity (2, 2) model is used to analyze the volatility in stock returns. Graph of news impact curve shows that higher risk is contributed toward negative shocks in stock market as compared to positive shocks of the same magnitude. In the next step the researcher has explored the macroeconomic determinants of stock market volatility through ARDL approach because variables are I (0) in addition to I (1). Results from ARDL approach revealed that macroeconomic variables are responsible factors in explaining stock market volatility. Inflation, real exchange rate and oil prices are found encouraging factors of stock market volatility while Industrial sector output and real supply of money affects the volatility negatively.

Keywords: Stock Market Volatility, Inflation, Real Exchange Rate, EGARCH and ARDL

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Introduction

A stock market is an organization or institution recognized for dealing in securities whether integrated or not. The stock exchange provides a physical place for investors to trade their stocks and it is a significance source to raise funds. Affiliation between the stock markets is increasing obviously from the preceding decade with the incorporation of general economies in the course of international trade, flow of capital and technological advancement (Chan *et al*., 1998). Volatility is a variable which swamps major monetary tools and performs a vital job in the numerous fields of finance**.** Volatility in stock returns refers to deviation in stock prices varies throughout a time (Zafar *et al*., 2008). Stock market progress relies on the health of financial system, macroeconomic solidity and also disturbs with the outside markets (Aliyu, 2012). Officer (1973) is one of the pioneer researchers who linked stock price volatility with economic indicators. He found a high volatility in the times of great depression in 1930s.

Generally stock markets of both developed and underdeveloped economies are volatile (Choo *et al*, 2011). The investors are interested to identify the nature of volatility. Different studies have shown asymmetric relationship between stock returns and volatility. Good news and bad news have different impacts on volatility (Campbell and Hentschel, 1992). Karolyi (2001) argued that decrease in stock prices lead to increase volatility in stock market. Bollerslev *et al*. (1994) and brooks (2008) found that negative shocks contributed to more volatility as compared to positive shocks of the identical magnitude.

Higher stock market volatility in recent years has enhanced the conversation on stock price movements in developed countries in general and particular in case of developing countries including Pakistan. Unlike the established equity markets of developed economies, the stock markets of Pakistan begin to broad quickly and responsive to issues like changes in economic activities, political environment and macroeconomic variables. Several researchers underlined their consideration on the stock markets of emerging economies because stock markets of Asia provide good opportunities for foreign investment (Chiou-wei, 2011). Therefore, modeling stock market volatility is a very essential aspect in the developed as well as emerging economies.

The dynamics of stock market volatility is somewhat comprehensive and has a strategic meanings. Due to immense compass of volatility various issues of stock markets are discussed by researchers. General objective in this research is the investigation of the relationship between stock return volatility and macroeconomic variables. However, the following specific objectives are also framed in this study.

To investigate whether the nature of volatility is symmetric or asymmetric (impact of good news and bad news on stock market volatility).

To explore the relationship between stock market volatility and macroeconomic variables in Pakistan.

The evaluation of major assumptions of stock market and looking at the Pakistan history provides help for making choice about the appropriate variables and building econometric model to estimate the determinants of stock returns volatility in Pakistan. After review of information and objectives the following hypothesis are set:

H1; Stock return shocks have asymmetric effect on stock market volatility.

H1; There exists a significant relationship between stock market volatility and macroeconomic variables in Pakistan.

Capital Markets in Pakistan

The role of stock market is very important for any country. An efficient asset market improves the pecuniary strength of country by means of valuable management of resources. Stock market in Pakistan started in 1947 with the establishment of Karachi Stock Exchange (KSE). The other two stock exchange markets operating in Pakistan are Lahore stock exchange (LSE) and Islamabad stock exchange (ISE). LSE was set up in 1970 and ISE came into existence in 1989. KSE is the largest and most liquid exchange market operating in Pakistan where approximately 85% trade takes place. Nearly 670 companies are scheduled in KSE comprising a market capitalization of more than US$95.18 Billion (Rafique and Rehman, 2011). The companies belong to KSE correspond to different sectors of economy.

KSE 100 index is the most important standard to evaluate prices at Karachi stock exchange. The index is constructed with the stocks of 100 companies. It is a capital weighted index and the companies with maximum market capitalization are chosen. KSE provides data for a reasonable time period and it is also known as a well recognized market of emerging economy. The KSE was declared as the best performing world stock market in 2002 (Business Week)[4].

Literature Review

According to Fisher's Hypothesis, the market rate of interest included the projected inflation and expected real rate of interest (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. The relationship between exchange rates and stock returns is based on a simple financial theory. When the domestic currency decrease in

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value against foreign currencies, prices of export products decline, and consequently, the volume of the country's export will increase a devaluation of the domestic currency has a negative relationship with return.

Liljeblom and Stenius (1997) examined the relationship between macroeconomic volatility and stock market volatility for Finland. GARCH model was used for the estimation of conditional volatility at stock market. This study found a significant linkage between macroeconomic volatility and stock market volatility and a predictive power in both direction.

Beltratti and Morana (2002) studied the relationship between stock market volatility and macroeconomic volatility. The variables used in this study were S&P 500 index, industrial production, CPI, federal fund rate, treasury bills and ten-year treasury bonds. A significant finding of this research was that there exist a significant relationship between stock market and macroeconomic volatility.

Chowdhury et al. (2006) explored how predicted macroeconomic volatility is related to the stock market volatility in Bangladesh. The study used monthly data on stock prices, CPI, exchange rate and industrial production for 1990:01-2004:12. The study used GARCH model and found that there exists unidirectional causality from industrial production volatility to stock return volatility. This study also found direction of causality from stock return volatility to inflation volatility.

Saryal (2007) examined the impact of inflation on the conditional stock market volatility in Turkey and Canada. GARCH (1, 1) and Quadratic GARCH model were employed for modeling stock market volatility. This study found that the greater the inflation rate, the higher is the volatility in the stock market.

Wang (2010) examined the linkage among macroeconomic volatility and stock market volatility for China. The study used monthly data on real stock return, real GDP, CPI and interest rate from the period 1992 to 2008. This study investigated the time-series relationship using EGARCH and lag-augmented VAR models. The study found no causal relationship between stock market volatility and real GDP volatility, bilateral causality between stock market volatility and inflation volatility and uni-directional causality from stock prices to interest rate.

Choo *et al*. (2011) tried to examine the relationship of stock market volatility with some macroeconomic variables in Japan. The study used daily data on Nikkei 225 index, currency exchange rate, oil price and gold price from May 1997 to July 2009. The study employed ten dissimilar models for forecasting. The study found no impact of macroeconomic variable on the volatility of Japan's stock market and better results were obtained through simple GARCH (1, 1) model and suggested that GJR GARCH model was better in predicting volatility than simple GARCH (1, 1) model. This study recommended that macroeconomic variables did not improve the forecasting accuracy of GARCH (1, 1) which showed that macroeconomic uncertainty did not explain the volatility of Nikkei 225 Index.

Aliyu (2012) investigated the inflationary force in explaining volatility and returns of stock market. Additionally, this study explored the effect of asymmetric shocks using quadratic GARCH model. Variables of interest in this study comprised CPI and stock price index of the relevant country. The investigation covered the time of 1998:01 to 2010:05 and 1999:12 to 2010:05 for the Nigeria and Ghana respectively. GARCH (1, 1) model was used to model the volatility in the stock markets of both states. Outcomes showed that the impact of bad news on stock volatility was larger than good news for the case of Nigeria stock exchange (NSE), while for Ghana stock exchange (GSE) results were different. Study also proved the inflation as an important determinant of stock volatility in both the markets.

Falkberg (2012) analyzed the impact of macroeconomic variables on volatility and returns of Standard and Poor's (S & P) 500 index. The other seven variables used with the exception of seasonal dummies were: default spread, inflation volatility, Industrial production volatility, slope of the yield curve, implied volatility and volatility of 3-months treasury bills. The data used for this study was collected on monthly basis ranges from 1957:01 to 2011:08. Empirical outcomes were obtained by using VAR, granger causality test and some additional econometric techniques. The results also showed the presence of seasonal patterns plus asymmetric volatility. According to the results of this study no relationship was found between macroeconomic volatility and stock market volatility.

Research Methodology and Data Description

The formulation of accurate econometric methodology and apposite data handling are believed as the heart of every research work. Sample selection bias and selection of inappropriate estimation technique lead to biased results. The study used secondary data to scrutinize the determinants of stock market volatility in Pakistan. Equation 1 is the general form of model estimated in this research.

$$H_T=b_0+b_1(GMP)_{t-i}+b_2(RM_2)_{t-i}+b_3(OP)_{t-i}+b_4(REER)_{t-i}+b_5(INF)_{t-i}+u_t \quad \ldots\ldots\ldots\ldots\ldots\ldots \quad 1$$

Here, stock returns volatility (H_T) is the dependent variable in this study and the other independent variables are growth rate of industrial production (GMP), real supply of money (RM_2), oil prices (OP), real effective exchange rate (REER) and inflation rate (INF). Data on these variables is used on monthly basis and it ranges from 2001:01 to 2011:06. The researcher has collected statistics from different data sources like statistical bulletin[5] (State Bank of Pakistan), hand book of statistics on Pakistan economy[6] (2011) and International Financial Statistics (IFS).

5-http://www.sbp.org.pk/reports/stats_review/bulletin2011
6-http://www.sbp.org.pk/department/stats/PakEconomy_HandBook/2011

Modeling Conditional Variance

Engle (1982) in macroeconomic analysis originated unbalanced variance for a few categories of data. The case of uncertainty in stock returns is calculated via variances, and it varies with time. The researchers focus on hetroskedasticity in dealing with time series investigations.

Autoregressive Conditional Hetroskedasticity (ARCH) Model

Engle (1982) recommended ARCH model as a choice to the typical time series handling. The model allows the conditional variance to vary with time and implies that residual variance at present time rely on the precedent squared error term. ARCH (q) model examines the mean and variance as follow:

$$\pi_t = \pi_0 + \sum_{i=1}^{n} \pi_i X_{t-i} + \varepsilon_t \text{ .... } 2$$

X_{t-i} and α_i signify k x 1 vector of independent variables and coefficients respectively. ε_t is independently distributed residual term.

$$h_t = \gamma_0 + \sum_{j=1}^{q} \gamma_j \varepsilon_{t-j}^2 \text{ .... } 3$$

Equations 2 and 3 are mean and variance equations respectively. One shortcoming of the ARCH model according to Engle (1995) is that it resemble extra moving average pattern than auto regression.

Generalized ARCH (GARCH) Model

Bollerslev (1986) introduced GARCH model. Model permits conditional variance to depend on its own lag value. Bollerslev says that volatility depends on both AR and MA terms. GARCH (p, q) model can describe as in equation 4:

$$h_t = \gamma_0 + \sum_{i=1}^{p} \delta_i h_{t-i} + \sum_{j=1}^{q} \gamma_j \varepsilon_{t-j}^2 \quad \ldots\ldots\ldots\ldots 4$$

Exponential GARCH (EGARCH) Model

Nelson (1991) planned EGARCH model. Variance equation of EGARCH model can be expressed in different ways. The model is superior to GARCH model because it ignores the non-negativity constraint and it doesn't impose any constraint on the parameters. EGARCH also explores the impact of bad innovation that is very important in financial markets.

$$\log h_t = \gamma + \sum_{j=1}^{q} \alpha_j \left| \frac{\varepsilon_{t-j}}{\sqrt{h_{t-j}}} \right| + \sum_{j=1}^{q} \beta_j \frac{\varepsilon_{t-j}}{\sqrt{h_{t-j}}} + \sum_{i=1}^{p} \delta_i \log(h_{t-i}) \quad \ldots\ldots\ldots 5$$

In the variance equation, γ, α, β and δ are the parameters. On the left side of equation log of series is taken to compose exponential leverage effect. The model is symmetric for:

$\beta 1 = \beta 2 = \cdots = 0$ Here, if $\beta_j < 0$ it represents more impact of negative news than positive.

Time Series Analysis

This study first checked stationary of data in order to avoid the prospect of spurious results. Advancement in econometrics with the passage of time expose that some of the time series are non stationary and to scrutinize such data with ordinary least square (OLS) leads to incorrect conclusion. Box and Jenkins (1970, 1976) devised regressions at first difference stationary data with the rationale of spurious outcomes and supposed that by differentiating a series again and again non-stationary series transforms into stationary series. This method is defeat of costly information and for that reason Davidson *et al*., (1978) considered it the foremost weakness of this procedure.

Dickey and Fuller provided augmented edition of test to remove the problem of autocorrelation. They used additional lag term of dependent variable to solve the problem. AIC and SBC are used to determine the optimal lags. Three possible shapes of ADF test are given below. The diversity in the three equations is of elements δ_0 and $\delta_2 t$ where an intercept term is and represent trend in a series.

$$\Delta Y_t = \alpha Y_{t-1} + \sum_{k=0}^{n} \beta_k \Delta Y_{t-k} + \varepsilon_t$$

$$\Delta Y_t = \delta_0 - \alpha Y_{t-1} + \sum_{k=0}^{n} \beta_k \Delta Y_{t-k} + \varepsilon_t$$

$$\Delta Y_t = \delta_0 - \alpha Y_{t-1} + \delta_2 t + \sum_{k=0}^{n} \beta_k \Delta Y_{t-k} + \varepsilon_t$$

Autoregressive Distributed Lag (ARDL) Approach for Cointegration

ARDL model is initiated by Pesaran and Shin (1999) and broaden by Pesaran *et al*. (2001). The model is useful for several reasons. It is not necessary for all the variables to be I(1) like Johansen technique. The model is appropriate if some variables are I(0) and others I(1). Estimation of ARDL involves two major stages. It tests long run relationship at initial stage and in the second stage long run and short run coefficients are estimated.

The General Form of Unrestricted ECM model in ARDL (p,q,r,x,y,z) formulation

$$dHT_i = a_0 + \sum_{i=1}^{p} B_i dHT_{t-i} + \sum_{i=0}^{q} C_i dGMP_{t-i} + \sum_{i=0}^{r} D_i dRM2_{t-i} + \sum_{i=0}^{x} E_i dop_{t-i} + \sum_{i=0}^{y} F_i dRER_{t-i} + \sum_{i=0}^{z} G_i dINF_{t-i} + \theta 1HT_{t-i} + \theta 2GMP_{t-i} + \theta 3RM2_{t-i} + \theta 4OP_{t-i} + \theta 5RER_{t-i} + \theta 6INF_{t-i} + u_t$$

Here,

- "d" is the first difference operator
- The coefficients of first fraction such as Bi,C_i, D_i,Ei,Fi and Gi, correspond to the short run dynamics
- The coefficients θ_1,θ_2, θ_3, θ_4, θ_5 and θ_6 stand for the long run relationships between the variables
- And u_t for white noise error term

Long run relationship is investigated using bound test under the procedure of Pesaran *et al*. (2001) its mechanism is based on F-test. If cointegration found in the general form of unrestricted ECM model in ARDL (p,q,r,x,y,z) formulation, then subsequent long-run model is projected:

$$HT_t = a_1 + \sum_{i=1}^{p} B_i HT_{t-i} + \sum_{i=0}^{q} C_i GMP_{t-i} + \sum_{i=0}^{r} D_i RM_{2t-i} + \sum_{i=0}^{x} E_i OP_{t-i} + \sum_{i=0}^{y} F_i RER_{t-i} + \sum_{i=0}^{z} G_i INF_{t-i} + u_t$$

If the study found long-run relationship between the variables, the next step is to estimate short-run coefficients. The following ECM model is applied to estimate short-run relationship between the variables.

$$dHT_t = a_1 + b_1(ecm)_{t-1} + \sum_{i=1}^{p} B_i (dHT)_{t-i} + \sum_{i=0}^{q} C_i (dGMP)_{t-i} + \sum_{i=0}^{r} D_i (dRM_2)_{t-i} + \sum_{i=0}^{x} E_i (dOP)_{t-i}$$
$$+ \sum_{i=0}^{y} F_i (dRER)_{t-i} + \sum_{i=0}^{z} G_i (dINF)_{t-i} + u_t$$

Econometric Results and Explanations

The study first checked descriptive statistics of monthly stock returns. The main purpose to check this statistics is to know about the sequential features of data. Table 1 explains the descriptive statistics for stock return variable.

Table 1:
Descriptive Statistics of Stock Returns

Variable	Mean	Median	Std.dev	Skewness	Kurtosis	Jarque-Bera	Probability
SR	0.0172	0.0218	0.1908	-0.7667	10.5891	312.2123	0.0000

Statistics of skewness -0.7667 shows that data is skewed to left side. Value of kurtosis greater than 3 indicates leptokurtic distribution. Large figure of Jarque-Bera test and probability value do not accept the null hypothesis of normal distribution and confirms high volatile stock return at 1% significant level.

Modeling Stock Market Volatility

The first step in modeling volatility is to estimate mean equation and variance equation simultaneously. Mean equation is estimated through autoregressive moving average (ARMA) model. EGARCH (2, 2) model is estimated in the next step for the estimation of stock return volatility. The upper part in table 2 shows results of mean equation while the lower part explains variance equation. The model shows significant results for both mean and variance equation. Here the positive coefficient of α_1 shows that 1% increase in the volatility at current time being followed by the 0.6299% increase in volatility in the last period.

Table 2:

Results of EGARCH (2, 2) Model of Stock Returns

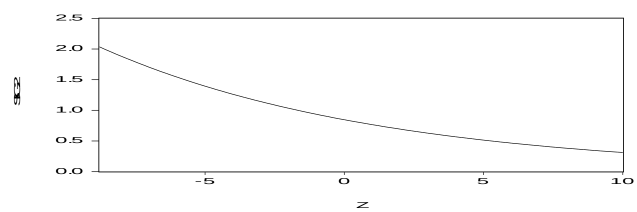
	Coefficient	Std. Error	Z-statistics	Prob.
Mean equation				
Π_0	-0.3055	0.0423	-7.2367	0.0000*
Π_1	15.2879	1.8145	8.4254	0.0000*
Π_2	1.3830	0.1742	7.9407	0.0000*
Π_3	0.0109	0.0471	0.2268	0.0000*
Π_4	0.2756	0.0481	5.7425	0.0000*
Π_5	1.4125	0.1601	8.8279	0.0000*
UT(-1)	-15.3643	1.8148	-8.4662	0.0000*
Variance equation				
γ	-11.4567	0.5017	-22.8387	0.0000*
α_1	0.6299	0.1075	5.8622	0.0000*
β_1	0.1846	0.1371	1.3463	0.1782
α_2	0.3639	0.1935	1.8815	0.0599**
β_2	-0.5117	0.1335	-3.8331	0.0001*
δ_1	-0.8472	0.0698	-12.1474	0.0000*
δ_2	-0.7629	0.0604	-12.6368	0.0000*
R-squared 0.3602		F-statistic	4.8399	
Adjusted R-squared 0.2686		Prob.(F-statistic)	0.0001	
SE of regression 0.1778		AIC	-1.0257	
Durbin-Watson stat 2.1312		SBC	-0.6987	
Note *,**,*** shows 1%,5%,10% significance level respectively				

Only the coefficient of β_1 is insignificant in explaining volatility. The negative sign link with the β_2 term shows more pressure of depressing shocks than the optimistic shocks. The model confirms the asymmetric volatility and statistically significant at 99% confidence level. Once EGARCH (2, 2) model is estimated for stock return variable after that researcher makes GARCH variances series to evaluate stock return volatility.

Nature of Stock Return Volatility

A graphic illustration of asymmetric instability toward positive and negative shocks is specified with “news impact curve” launched by Pagan and Schwert (1990). News impact curve conspires the next episode volatility *(h_t)* that might occur from a mixture of negative in addition to positive values of $_{t”1}$. Graph of this curve is shown in the figure 1. Here sig2 is the name for HT series. Figure 1 show more impact of bad news on stock market volatility as compare to good news of the same magnitude. The results are reconciled with the earlier studies of (Bollerslev *et al*.1994 and Choo *et al*., 2011).

Figure 1:
News Impact Curve of Stock Return Volatility



ADF test is performed at level and first difference with trend and intercept. Results of ADF statistics are specified in table 3. Table shows mix results for the different regressors. Results of ADF test confirmed that some variables are integrated of order one I (1) while other of order zero I (0). Hence, ARDL approach devised by (Pesaran et al., 2001) is used to find the relationship among the variables. The relationship is investigated in three steps.

In the first step study applies Bound test to find out the long run relationship between the variables. Results of Bound test shows that in our principle model $F_{(HT/GMP, RM2, OP, RER, INF)}$ value of F- statistics 7.183 is greater than upper critical bound and it rejects the null hypothesis of no cointegration and this recommend existence of cointegration at 5% significance level.

Table 3:

Results of Unit Root Test

ADF Test Statistics		
Regressors	**Level**	**1st Difference**
HT	-3.8963**	-8.4859*
GMP	-7.2777*	-7.1069*
RM_2	-1.3463	-5.9915*
OP	-3.3273***	-4.8638*
REER	-3.4342***	-5.7071*
INF	-4.4151*	-7.4508*
*,**,*** shows 1%,5%,10% significance level respectively		

Results of long run estimates using AIC are reported in table 4. The results are consistent with the Fisher's hypothesis that in the long run inflation and interest rate affect the stock returns.

Table 4:

The long run results: ARDL (2, 0, 2, 2, 2, 1) selected based on AIC

Dependent variable is HT				
Regressors	**Coefficient**	**Standard Error**	**T-Ratio**	**[Prob.]**
GMP	-0.0018	0.0275	0.0665	[0.947]
RM_2	-0.0463	0.0274	-1.6901	[0.094]***
OP	0.0215	0.0143	1.5027	[0.136]
RER	0.2777	0.0794	3.4983	[0.001]*
INF	0.0133	0.0061	2.2337	[0.028]**
C	-0.8529	0.4177	-2.0421	[0.044]
*,**,*** shows 1%,5%,10% significance level respectively				

Table 4 shows a significant relationship of real money supply, real exchange rate and inflation rate with stock return volatility. The study also found a significant impact of inflation on stock market volatility. This finding is reconciled with the previous findings of Saryal (2007) made for Turkey and Canada and Aliyu (2011) for Ghana and Nigeria but conflicts with Rashid *et al*. (2011). Positive impact of exchange rate on stock market volatility is found. Bilson *et al*. (2001) conclude that a depreciation of the home currency has a harmful impact on returns. Vardar *et al*, 2012 obtained same results of exchange rate for Istanbul stock exchange.

After testing long run relationship ECM approach is utilized for short run dynamics. ECM value is significant at 1% significance level. Here coefficient of ECM is (-0.6445) and shows a meaningful pace of adjustment. It means if there is disequilibrium in the long run then due to shocks in the short run nearly 64% of adjustment takes place in one year.

Table 5:

ECM Representation for the selected ARDL model

ARDL (2,0,2,2,2,1) based on AIC

Regressor	**Coefficient**	**Standard Error**	**T-Ratio**	**[Prob]**
dHT1	0.2787	0.0891	3.1278	0.002]
dGMP	-0.0012	0.0178	0.0664	[0.947]
dRM$_2$1	0.4498	0.1101	4.0842	[0.000]
dROP1	-0.0476	0.0181	-2.6371	[0.010]
dRER1	-0.3391	0.1213	-2.7948	[0.006]
dINF	0.0083	0.0026	0.3197	[0.750]
dINPT	-0.5497	0.2771	-1.9842	[0.050]
Ecm(-1)	**-0.6445**	**0.0807**	**-7.9813**	**[0.000]**

R- Squared	0.4748	R-Bar-Squared	0.4034
Mean of Dependent Variable	0.4036	F(10, 107)	9.311[0.000]
S.D. of Dependent Variable	0.0183	AIC	327.9161
DW-statistic	1.9858	SBC	307.1362

Diagnostic tests are performed in order to check accuracy of model. Results of both LM version and F version statistics are given in table 6. In the final step CUSUM and CUSUMSQ tests are applied to observe the stability in parameters.

Table 6:

Diagnostic Tests

Test Statistics	LM Version	F Version
A:Serial Correlation	CHSQ(12)= 12.7713[0.386]	F(12, 91)= 0.9204[0.530]
B:Functional Form	CHSQ(1) = 1.9947[0.158]	F(1, 102)= 1.7539[0.188]
C:Normality	CHSQ(2) = 0.3957[0.821]	Not applicable
D:Heteroskedasticity	CHSQ(1) = 0 .9923[0.319]	F(1, 116)= 0.9837[0.323]

Graphs of both these tests are shown in the figure 2 and 3. The figure shows that recursive residual are bounded by the critical boundaries and do not reject null hypothesis of stability at 5% significance level.

Figure 2:

CUSUM Test

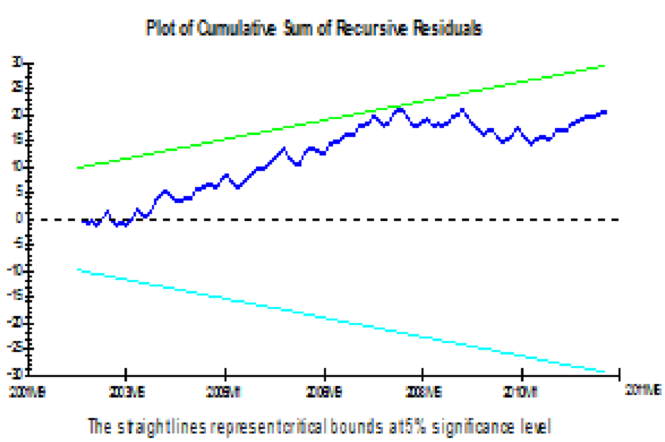
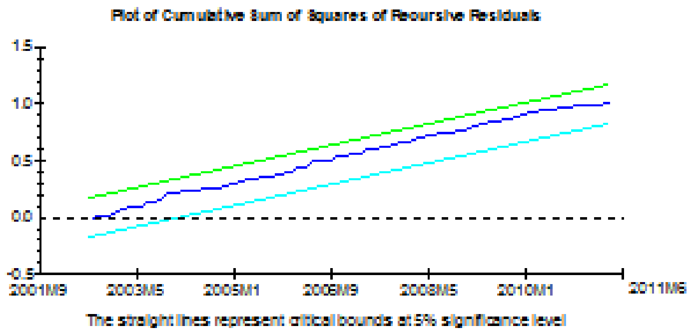


Figure 3:
CUSUMSQ



Conclusion and Policy Implications

The present research is a step toward investigation of determinants of stock return volatility in Pakistan. Volatility in stock returns is estimated through EGARCH model and then the news impact curve is drawn to check the asymmetric behavior of stock returns. It is found that macroeconomic indicators are important in explaining stock market volatility. In particular the variables like inflation, real exchange rate and money supply are found significant determinants of stock market volatility. Coefficient of ECM (-0.642) shows a meaningful adjustment pace toward equilibrium. CUSUM and CUSUMSQ tests show that estimated parameters are stable at 5% level of significance. This study clearly suggests that reduction in inflation rate can reduce the volatility of stock market. Investor must consider monetary policy of the country in which he is interested to make investment. The results has also proved the equation of exchange i.e. MV=PY. The study also suggests that the investors should look at exchange rates and inflation as the major basis of risk involved in stock market. Financial managers and strategy makers should consider macroeconomic aspects whenever they formulate or implement financial stability.

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