# Nexus between Stabilization Policies and Stock Market Performance: Evidence from Pakistan Stock Exchange

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## Abstract

This study investigates nexus between stabilization policies, and stock market, in different scenario. For instance, the study assesses interactive effect of the monetary and fiscal policies on the behavior of the stock market, on one hand and volatility of these policies in a volatile stock market, on the other hand. To achieve the aforementioned objectives, we employ quarterly time series data, for a period from 1991 to 2018, of the related macroeconomic indicator and Karachi Stock Exchange (KSE) 100 Index of Pakistan. We estimate ARDL model and find long run relationship between KSE, and monetary and fiscal policies. Moreover, for estimation in volatile condition, we use E-GARCH model and confirm the induced volatility in KSE subsequent to volatility fiscal and monetary policy instruments. The study suggests a dire need for calibration of these policies, when combined in to a single model especially while devising stock market policies, as to examine interaction between these policies, jointly and collectively, and their effects on the stock market's behavior. The findings stressed on the policy makers to device policies in line with their joint and collective behavior in a macroeconomic framework.

**Keywords:** ARDL, E-GARCH, Fiscal Monetary Interaction, Stock Market

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## 1. Introduction

Pakistan Stock Exchange which was formerly known as Karachi Stock Exchange was incorporated on March 10, 1949 as a limited company by guarantee. Being the best performing exchange market in Asia, Pakistan Stock Exchange aspires to be best among leading exchange markets of the world. In the recent past PSX showed an annual growth rate of 26 percent from 2012 to 2017. Pakistan Stock Exchange made a significant position among others with having only a small number of listed companies in the past having paid up capital of Rs 37 Millions Only. With passage of time by 1960 it witnessed a massive increase both in the number of listed companies as well as paid up capital amounting to Rs 1.8 Bn. At present there are 546 listed companies with a paid-up capital of Rs 7.692 Trillion by year ended 2018. The listed companies on PSX are categorized among 35 sectors/groups of industries. The primary role of PSX is to provide the investors a reliable, safe, and efficient market place to trade their financial securities. The role that PSX plays in the development of a country and apart from all other factors that influence the stock market behavior the role of government policies particularly fiscal and monetary policies is the most important one.

Literature shows that in order to comprehensively explain the economic system (Stock market inclusive) as whole or in partial not only by explaining just from one stance i.e. either monetary or fiscal but their mutual interaction plays a significant role in the economy. A bulk of notable studies earlier have examined the role of monetary policy on stock market behavior exist for example (Leitemo, 2009), (Galí, 2007), (Conover, 1999), (Jensen, 1999 a, b), (Thorbecke, 1997), (Patelis, 1997), (Afonso, 2011), (Afonso, 2012), (Ajao, 2015), (Gertler, 1993), (Fama, 1989), whereas from the fiscal policy aspect some of the notable studies include; (Agnello, 2010), (Darrat, 1988), Besides, we know of very few (Jansen, 2008), (Chatziantoniou, 2013) that examined the effect of the interaction of both policies on stock market.

Besides, the already available literature of the interaction among fiscal and monetary policies focused mostly for advanced economies with very little studies that focused developing Besides, the already available literature of the interaction among fiscal and monetary policies focused mostly for advanced economies with very little studies that focused on developing economies. In the context of Pakistan economy most of the studies that already have taken place have centered on stock market volatility.

Some studies examined the relationship between the macroeconomic variables and stock prices for example (Ali, 2010). There is no study so far that has taken in account mutual interaction of monetary and fiscal policy on the stock market behavior of Pakistan, so in this context this study is novel. Our study will add to existing literature by exploring the interaction of both monetary and fiscal policy on the stock market behavior for Pakistan for study period from 1991 to 2018.

This paper aims to investigate monetary-fiscal policy interaction and their volatility on the stock market behavior of the Pakistan stock exchange by using quarterly data of the Pakistan economy. This study will be helpful in examining the relationship of monetary-fiscal policy on stock market behavior of Pakistan Stock exchange. If we find any relationship between these two policies and stock market behavior, we are also interested in tracing the channel through which it is affecting the Pakistan stock exchange. Apart, this study also focuses to inspect the impact of volatility of interaction between monetary and fiscal policy on stock market behavior in Pakistan. This study is mainly focusing on either fiscal or monetary alone in affecting the stock market behavior or whether there is also interaction among these.

The rest of the study is structured as follows: section 2 provides the literature review, section 3 deals with the data and methodology of study, section 4 presents the results and discussion of the study and section 5 finally concludes and gives policy recommendations.

## 2. Literature Review

As noted in the work of (Mishkin, 2001), (Bernanke, 2005), (Agnello, 2010) the impact of monetary policy on stock market performance works independently through distinct five channels which are as, (i) interest rate (ii) credit (iii) wealth effect (iv) monetary hypothesis and (v) exchange hypothesis. In contrast the channel through which the fiscal policy affects stock market hypothesis is as (i) "Keynesian positive hypothesis" (ii) "Classical crowding out effect hypothesis" (iii) "Ricardian neutrality hypothesis".

The interaction of both fiscal and monetary policies and the impact on stock market performance can be seen in the work of following (Chatziantoniou, 2013), (Darrat, 1988), (Chowdhury, 2004) identified the policy interactions both monetary and fiscal that have effect on stock market returns through two channels; (i) role of government inter-temporal budget constraint on monetary policy (ii) the role of use of fiscal policy on monetary variables.

### *2.1 Monetary Policy and Stock Market Returns*

The existence of two way causality between returns of stock market and monetary policy are based on the earlier works of (Fama, 1989), (Jensen, 1999 a, b), (Bernanke, 2005), (King, 1995), (Patelis, 1997), (Conover, 1999), (Mishkin, 2001). These studies explained that there is an existence of two-way causality of monetary policy and stock market performance. In addition, stock market gives feedback to monetary authorities about the expectations of private sector regarding macro fundamentals at one end whereas on the other hand stock market performance is affected by monetary policy instrument shocks through five distinguished channels/hypothesis which are follows,

a. Interest Rate hypothesis: It is known as the traditional "Keynesian hypothesis of transmission of interest rate". It says that the firm cost of capital is affected by the fluctuations in interest rate due to which the discounted present value of future cash flows are altered. It indicates that higher interest rates fall the discounted present values of future cash flows that lead to reduction of stock prices.

b. Credit effect hypothesis: This channel is also known as "Indirect transmission of monetary policy on interest rate adjustment". According to this hypothesis the changes in interest rate through using any monetary policy instrument will affect the level of corporate investment and thereby result in stock prices. Change in investment affects a firm's market value that also influences the present values of future cash flows. Specifically, higher corporate investment as a result of expansionary monetary policy results in the generation of higher future cash flows that will ultimately increase firm market value and vice versa.

c. Wealth Effect: This hypothesis explains the effect of monetary policy on stock market performance through the channel of investor wealth. This explains any change in interest rate will directly affect the stock prices that have an effect on the wealth of investors.

d. Exchange Rate Hypothesis: Another link of monetary policy on stock market can be explained through exchange rate. It implies that any change in interest rate affects the exchange rate resulting in an impact on trade balance. For example, if there is an increase in interest rate it will appreciate domestic currency which induces imports in the economy and reduces the exports.

The decline in export negatively affects the export industry which will negatively affect its production base and resulting in an extension in lower stock price.

e. Monetary Hypothesis: This hypothesis stems from the "Tobin's Q theory of investment"; it says any change in interest rate (for instance a rise/fall in interest rate) will move funds between debt and equity markets thereby forcing stock prices of all/rise.

### *2.2 Fiscal Policy and Stock Market Behavior*

The theoretical linkage between the role of government fiscal policy and stock market behavior is explained in the work of (Tobin, 1969), (Blanchard, 1981), (Shah, 1984), and (Darrat, 1988). The channel of fiscal policy can be split into three channels which are discussed above as,

a. The Keynesian Hypothesis: This hypothesis centers on automatic stabilization and discretionary measures of fiscal authority through which it can support aggregate demand, boost economy resulting stock market performance. This hypothesis favors the use of fiscal policy instruments as policy makers use several discretionary measures to alter interest rates that results in the improvement of performance of stock market.

b. The Crowding out Effect hypothesis: It focuses on the negative aspect of fiscal policy on stock market performance. According to it, use of fiscal policy crowd out private investment in capital markets which results in deterioration of private sector activities which results in having negative effect on stock prices.

c. Ricardian Neutrality hypothesis: This hypothesis explains the ineffectiveness of fiscal policy in influencing either real or financial sector. The reason of this is that the ability of fiscal policy through which it affects aggregate demand is prevented because there exist disequilibrium in financial markets on the part of lender and borrowers.

### *2.3 Fiscal-Monetary Policies Interaction*

There are two strands in the literature that explains the role of fiscal-monetary policies interaction on output, interest rates and stock market performance. The first strand in literature focuses on the substitutability of these two policies whereas the other one opposes the first stance and explains the competing effects on the movement of these two policies in opposite directions.

(Mélitz, 1997) identifies that the movement of these two policies are in opposite directions which mean if one of the instruments is tightened (eased) then the other instrument works in the opposite direction. Apart, (Wyplosz, 1999) argues that if the movement of these two policies is the same for example to check on inflation, then while conducting countercyclical policies then either of the two policies will lead.

In contrast noted in the work of (Muscatelli, 2005), (Sargent, 1981), (Sargent T. J., 1999), (Buti, 2001), (Zoli, 2005), (Fatás, 2001), (Dedi, 2016), (Sousa, 2010), (Kyophilavong, 2013), (Cevik, 2014), (Chatziantoniou, 2013), the interaction of two policies will work through two channels. Firstly, inter-temporal budget constraints of government will have an impact on monetary policy that recommends financing the expenditure of government either through taxes, debt, or seigniorage. The issue of concern here is that if the government faces unsustainable fiscal policy, then there must be complementarity between fiscal and monetary policy. In the case of insolvency of fiscal policy, the monetary instruments become weaker and weaker that ends in higher inflation.

Secondly, fiscal policy has its effect on monetary variables like inflation, interest and exchange rates. Apart noted in the work of (Chatziantoniou, 2013) it can be observed from the perspective of debt when it is dominated in foreign currency. Any appreciation of the domestic currency will increase the debt burden of the economy that will lead to inflationary pressure in the economy which will increase the interest rate and decline the stock prices.

### *2.4 Empirical Literature Overview*

Kuralbayeva (2013) in his study applied dynamic stochastic general equilibrium model (DSGE) on a sample of developing economies from Latin America and G-7 developed economies to investigate the role of choice of fiscal policy on economic growth and stock market performance. The study focuses on the role of government expenditures in the framework of public consumption and public investment on the development of stock market performance. The study finds that the stock market is developed if the supply of foreign capital is elastic and the market return is increased by foreign borrowing and both public expenditures and taxes are required to meet this development. On the other hand, for emerging economies where foreign capital is inelastic, the role of optimal fiscal policy is to adjust the public expenditure in a positive direction in order to attract funds for the stock market resulting in altered returns.

For advanced economies the study by (Chatziantoniou, 2013) investigated the tool of monetary and fiscal policies interaction for developed economies that includes Germany, USA and UK. The study used quarterly data spanning 1991 to 2010. Results of structural vector autoregression SVAR shows the stock market performance is influenced by both direct and indirect channels through monetary & fiscal policies interaction.

A study by (Cevik, 2014) used quarterly data for the period of 1995 to 2010 for a set of selected emerging European economies of Czech Republic, Estonia, Hungary, Poland, Slovenia, and Slovak Republic in the post transition period. The methodology employed in the study is Marvov Regime model to assess interaction between monetary policies. The findings of the study suggests that the interaction between monetary and fiscal policy is characterized by movements passive between active and passive regimes up to year 2000 when it became passive to all economies as results of European enlargement. Study also finds that fiscal policy is more effective whereas monetary policy remains passive especially for Estonia, Hungary, Poland and Slovenia.

For the BRICS nation (Yuan, 2015) explained the transmission mechanism of monetary policy. The study included various channels including interaction of monetary-fiscal policy, exchange rate regimes, and external balances as they affect both economic growth and inflation. The study employed panel VAR methodology and results revealed that monetary policy shocks have a significant impact whereas the effects of fiscal policy shocks are relatively weak. The policy interactions and stock market behavior are found to be positive as seen from the interaction between inflation and interest rates.

(Chowdhury S. M., 2006) in their study applied GARCH and VAR models to investigate the weak relationship between monetary & fiscal policy for the economy of Bangladesh and found that stock market volatility exerts on inflation volatility.

For south Africa, (Chinzara, 2011) employed AR-GARCH and VAR models and they conclude that volatility in the stock market results from macroeconomic uncertainty with the most important ones being volatility in exchange rate and short-term interest rates. The Indian economy (Andrieș, 2014) employed various methodologies like cross-wavelet power, cross-wavelet

coherency and phase difference methodologies. They explained that co movement exists between macroeconomic variables and stock market behavior.

In nut-shell empirical literature on the mutual interaction of monetary-fiscal policy and its effect on stock market behavior found mixed results. Some studies favor fiscal policy role as moreimportantfactorinexhibitingmarketbehaviorwhileotherfavormonetarypolicymore. Various studies on interaction between both these policies and their resultant impact on stock market behavior have been quoted in the literature. From the point of view of the Pakistani stock market, there is no considerable literature that simultaneously exploring the behavior of the stock market with mutual interaction of these two policies.

## 3. Methodology

### *3.1 Data*

This study employs time series data. The study used time series data on quarterly basis for Pakistani economy for the period from 1991 to 2018. The data has been gleaned from the published reports (Statistical Bulletin) issued by State Bank of Pakistan and world development indictors (WDI).

### *3.2 Empirical Strategy*

Inspired from (Chatziantoniou, 2013), we use the macroeconomic indicators like CPI, RGDP, GE to capture fiscal policy stance; M2, INT, EXC to control for monetary policy measures; and value of KSE 100 Index as stock market performance indicators. We employ real values of all of the aforementioned variables after taking into account seasonal adjustments. Moreover, the annual data of the variables is being disaggregated at monthly level after being subjected to Gandalfo Algorithms.

The functional form of the model that we employ, takes the following form;

$$\boldsymbol{SM} = (\boldsymbol{MP}, \boldsymbol{FP}) \quad (1)$$

Where; SM is the stock market behavior proxied by the KSE 100 index. MP refers to monetary policy instruments which are proxied by interest rate, broad money, and exchange rate. FP refers to fiscal policy instruments proxied by government expenditure, real gross domestic product and inflation.

The econometric form of Equation 1 is as per following;

$$lnKse = \alpha_0 + \alpha_1 lnM2 + \alpha_2 Int + \alpha_3 lnExc + \alpha_4 lnRgdp + \alpha_5 lnGe + \alpha_6 lnCpi + \varepsilon_t \quad (2)$$

Where; $\boldsymbol{\alpha_0}$ is the drift component, $\boldsymbol{\alpha_1}, \ldots, \boldsymbol{\alpha_6}$ are the coefficients of model. We employ double log specification in the ARDL framework to take into account both the effects of semi elasticity (short run) and elasticity (long run) and to reduce heteroskedasticity by focusing the growth rate of variables.

### *3.3 Empirical Strategy*

The study has dual objectives, as on one hand it explores both relationships in short as well as long run between stock market behavior keeping in account the interaction between monetary

and fiscal policies and on the other hand it also explores the impacts of volatility of these policies on stock market behavior in Pakistan. For this we used two methodologies, for achieving first objective we used Auto Regressive Distributed lag (ARDL) method of Cointegration, whereas for achieving second objective we employed Exponential Generalized Autoregressive Conditional Heteroskedastic (E-GARCH) model.

### *3.3.1 Unit Root Test*

Theoretically while dealing with time series data, it is essential to check the existence of unit root of series to avoid spurious regressions, for this different unit root tests have been developed over time period. We adopted the most used unit root test i.e., Augmented Dicky Fuller (ADF) developed by Dicky and Fuller to examine the presence of unit root in individual time series. If all the individual series are found to be stationary at level, in this case we cannot examine the long run relationship between variables and we can apply either OLS or VAR methodology. In the case of non-stationarity of individual time series there can be two cases, first if the order of integration of series is found to be same across all series, then appropriate methodology should be Johansen and Juselius method of cointegration, otherwise if mixed integration is found among the series in that case we shall use ARDL method of cointegration. It must be assured that no individual series should be integrated to higher order other than1.

### *3.3.2 Auto Regressive Distributed Lag (ARDL) Bound Testing Approach*

In the literature of cointegration analysis in time series data several methodologies have been developed over the time period like (Engle, 1987), (Johansen, 1990), (Gregory, 1996) have been used in the area of economics and finance to investigate the cointegration of macroeconomic variables with stock prices.

The prerequisite of all of these models is the existence of integration to be the same among the variables which is not likely while dealing with time series data. To overcome this problem problem (Pesaran, 2001) developed a new cointegrating technique known as Auto Regressive Distributed Lag (ARDL) bound approach which has several advantages over other methods of cointegration. For example, we can use the ARDL model of co integration for regressors including endogenous whether they are purely I (0), I (1), or having mixed co integration. Also, it permits the variables to exhibit different optimal lags which are convenient in other models of co integration. Similarly, for small sample sizes this methodology is applicable unlike other estimation strategies that need larger data sets for validity. The framework of model is as,

$$\Delta lnkse_t = \beta_0 + \sum_{i=1}^{n1} \beta_{11} \Delta lnkse_{t-i} + \sum_{i=0}^{n2} \beta_{12} \Delta lnRgdp_{t-i} + \sum_{i=0}^{n3} \beta_{13} \Delta lnM2_{t-i} + \sum_{i=0}^{n4} \beta_{14} \Delta lnGe_{t-1}$$
$$+ \sum_{i=0}^{n5} \beta_{15} \Delta lncpi_{t-i} + \sum_{i=0}^{n6} \beta_{16} lnexc_{t-i} + \sum_{i=0}^{n7} \beta_{17} lnint_{t-i} + \varphi_{11} lnkse_{t-1}$$
$$+ \varphi_{12} lnRgdp_{t-1} + \varphi_{13} lnM2_{t-1} + \varphi_{14} lnge_{t-1} + \varphi_{15} lncpi_{t-1} + \varphi_{16} lnexc_{t-1}$$
$$+ \varphi_{17} lnint_{t-1} + \varepsilon_t (3)$$

The ARDL model used above has both short run as well as long run coefficients. $\beta_{11}$, $\beta_{12}$,…, $\beta_{17}$ are short run or impact multipliers whereas $\varphi_{11}$, $\varphi_{12}$,…, $\varphi_{17}$ are long run coefficients. The null hypothesis of model is $\varphi_{11}$, $\varphi_{12}$,…, $\varphi_{17}$=0 against the alternative $\varphi_{11}$, $\varphi_{12}$, …, $\varphi_{17}\neq 0$. If null hypothesis is rejected, it implies presence of cointegration between macroeconomic variables and stock market behavior, otherwise no cointegration. Apart from long run relationships it is also necessary to explore the short run dynamics between the variables through an error correction model known as ECM model to analyze whether the short run disturbance in the model approaches towards its long run equilibrium path or not. For this purpose, the ECM of proposed ARDL model will be as,

$$\Delta lnkse_t = \beta_0 + \sum_{i=1}^{n1} \beta_{11} \Delta lnkse_{t-i} + \sum_{i=0}^{n2} \beta_{12} \Delta lnRgdp_{t-i} + \sum_{i=0}^{n3} \beta_{13} \Delta lnM2_{t-i} + \sum_{i=0}^{n4} \beta_{14} \Delta lnGe_{t-1} + \sum_{i=0}^{n5} \beta_{15} \Delta lncpi_{t-i} + \sum_{i=0}^{n6} \beta_{16} lnexc_{t-i} + \sum_{i=0}^{n7} \beta_{17} lnint_{t-i} + \alpha ECT_{t-1(4)} \quad (4)$$

The essence of the ECM model lies in analyzing the adjustment speed towards the long run equilibrium path as a result of some shocks in short runs. In order to have this adjustment it is assumed that the value of $\alpha$ which shows speed of adjustment must be less than zero and negative. In addition, we also employed stability tests on the model to assure the correct specification of model, serial correlation, normality etc.

### *3.3.3 Exponential Generalized Autoregressive Conditional Heteroskedastic (E-Garch) Model*

For analyzing volatility of interactions between monetary and fiscal policy with stock market behavior the study also employed E-GARCH model which was first proposed by (Nelson, 1991) The same approach has been employed by various other studies to examine volatility of stock market behavior like (Lawal, 2013), (Lawal A. I., 2015), (Babajide, 2016) The choice of E-GARCH over simple GARCH models was made on the fact that in E-GARCH there is no issue presence of non-negative constraints, it also allows for leverage effects, and it also allow for more explanation of size and persistence. It also allow to interpret size and persistence of shocks due to the fact that it is unit free and conditional variance is in log linear form that implies that magnitude of ln(ht) , the implied value of ht can't negative, thus for having coefficient value to be negative is permissible (Enders, 2010).

Following (Lawal A. I., 2015) the modified EGARCH to effectively capture the policy instruments as discussed in theoretical framework is as;

$$\log h_t = w + \log h_{t-1} + \gamma \frac{\varepsilon_t}{h_{t-1}^{0.5}} + \alpha \left[ \frac{|\varepsilon_{t-1}|}{h_{t-1}^{0.5}} - \frac{2}{\sqrt{\pi}} \right] \quad (5)$$

Where $h_t$ implies conditional variance for year t, $h_{t-1}^{0.5}$implies "conditional volatility prediction" for year t, $\frac{\epsilon_t}{h_{t-1}^{0.5}}$ represents standard shock for year t that measures the number of standard deviations $\epsilon_t$ deviated from its mean.

## 4. Results and Discussions

### *4.1 Findings*

Results of descriptive statistics are reported in table 4.1 given below. The results show that all variables are showing normal distribution as shown by values of Jarque-Bera statistics, kurtosis and skewness. The results of standard deviation imply the consistency of time series over the time period.

**Table 4.1 Descriptive Statistics**

| *Variables* | *lnkse* | *lnRgdp* | *lnM2* | *lnexc* | *Int* | *lncpi* | *lnge* |
|---|---|---|---|---|---|---|---|
| **Mean** | 5.7123 | 25.5844 | 0.9400 | 1.9327 | 29.6355 | 74.1844 | 29.6988 |
| **Median** | 5.8387 | 25.6652 | 0.9102 | 1.9995 | 29.5590 | 53.0004 | 29.6767 |
| **Maximum** | 6.7689 | 26.126 | 1.9951 | 2.5265 | 30.0977 | 167.649 | 30.3237 |
| **Minimum** | 4.3391 | 25.039 | 0.3501 | 1.0591 | 29.143 | 19.2541 | 29.1436 |
| **Std.Dev.** | 0.6653 | 0.3161 | 0.5045 | 0.4684 | 0.2658 | 46.8235 | 0.31167 |
| **Skewness** | -0.2318 | -0.3392 | 0.6232 | -0.3791 | 0.0045 | 0.6639 | 0.14682 |
| **Kurtosis** | 1.9523 | 2.1768 | 2.4113 | 1.8560 | 1.7532 | 1.9466 | 1.95983 |
| **Jarque-Bera** | 5.4696 | 4.7411 | 8.8673 | 7.8480 | 6.4765 | 13.406 | 5.45149 |
| **Probability** | 0.0649 | 0.0934 | 0.0118 | 0.0197 | 0.0392 | 0.0012 | 0.06549 |
| **Sum** | 571.23 | 2558.444 | 105.2846 | 193.2748 | 2963.555 | 8308.66 | 3326.27 |
| **Sumsq.Dev** | 43.8199 | 9.8977 | 28.25411 | 21.7264 | 6.9958 | 243361.3 | 10.7826 |

Source: Authors' Computations

After the analysis of descriptive statistics, the results of correlation matrix among the variables are shown in table 4.2 as;

**Table4.2 Correlation Matrix**

| | ***lnkse*** | ***lnge*** | ***Int*** | ***lncpi*** | ***lnexc*** | ***lnRgdp*** | ***lnM2*** |
|---|---|---|---|---|---|---|---|
| ***Lnkse*** | 1.00 | 0.76 | -0.47 | -0.15 | 0.62 | -0.58 | -0.60 |
| ***Lnge*** | 0.76 | 1.00 | -0.52 | -0.32 | 0.95 | -0.93 | -0.94 |
| ***Int*** | -0.47 | -0.52 | 1.00 | -0.32 | -0.55 | 0.41 | 0.49 |
| ***Lncpi*** | -0.15 | -0.32 | -0.32 | 1.00 | -0.42 | 0.55 | 0.46 |
| ***Lnexc*** | 0.62 | 0.95 | -0.55 | -0.42 | 1.00 | -0.97 | -0.99 |
| ***lnRgdp*** | -0.58 | -0.93 | 0.41 | 0.55 | -0.97 | 1 | 0.99 |
| ***lnM2*** | -0.60 | -0.94 | 0.49 | 0.46 | -0.99 | 0.99 | 1.00 |

Source: Authors' Computations

After preliminary analysis the result of unit root test are reported in table4.4 as;

**Table4. Augmented Dicky Fuller Test Results**

| ***Variable*** | ***t-statistic*** | | | ***tcritical*** | | | ***Pvalues*** | ***Decision*** |
|---|---|---|---|---|---|---|---|---|
| | ***None*** | ***Trend &Intercept*** | ***Intercept*** | **1%** | **5%** | **10%** | | |
| *Lnkse* | | | -2.06 | -3.49 | -2.81 | -2.58 | 0.2589 | |
| *dlnkse* | | | -9.52 | | | | 0.0000 | I(1) |
| *lnRgdp* | | -2.37 | | -4.04 | -3.45 | -3.15 | 0.3898 | |
| *dlnRgdp* | | 4.55 | | | | | 0.0020 | I(1) |
| *lnEr* | 6.59 | | | -2.58 | -1.94 | -1.61 | 1.0000 | |
| *dlnEr* | -4.29 | | | | | | 0.0000 | I(1) |
| *lnCpi* | -0.06 | | | -2.58 | -1.94 | -1.61 | 0.6578 | |
| *dlnCpi* | -10.47 | | | | | | 0.0000 | I(1) |
| *lnGe* | | -2.31 | | -4.04 | -3.45 | -3.15 | 0.4242 | |
| *dlnGe* | | -3.55 | | | | | 0.0391 | I(1) |
| *lnM2* | | | -0.61 | -3.49 | -2.88 | -2.52 | 0.8624 | |
| *dlnM2* | | | -9.58 | | | | 0.0000 | I(1) |
| *int* | | | -2.61 | -3.49 | -2.88 | -2.52 | 0.0925 | |
| *dint* | | | -4.54 | | | | 0.0003 | I(1) |

Source: Authors' Computations

It can be seen in the table that all the variables under study are rejecting the null hypothesis of having no unit root therefore confirming presence of unit root process. KSE has order of integration 1 at all levels of significance. RGDP, EX, AND CPI are also integrating of order 1a 1%, 5%, and10% level of significance. GE is also integrated of order1 but at 5 and 10 % level of significance only. Similarly, M2 and INTR are also seen to be integrated of order 1 at all levels of significance. From the results it is evident that we can have a long run relationship since presence of unit root confirms it.

After analysis of unit root results of Auto Regressive Distributed Lag (ARDL) models as;

**Table 4.4 Bound Test Results of Cointegration**

| Models | Coefficient | Decision |
|---|---|---|
| $F_{KSE}$ $(lnkse/lnR\text{gdp}, lnC\text{pi}, \text{Int}, lnG\text{e}, lnM2, lnE\text{xc})$ | 8.43* | ***Cointegration*** |
| $F_{RGDP}$ $(lnR\text{gdp}/lnR\text{gdp}, lnC\text{pi}, \text{Int}, lnG\text{e}, lnM2, lnE\text{xc})$ | 11.91** | ***Cointegration*** |
| $F_{M2}(lnM2/lnR\text{gdp}, lnC\text{pi}, I\text{nt}, lnG\text{e}, lnM2, lnE\text{xc}$ | 4.35* | ***Cointegration*** |
| $F_{EXC}$ $(lnE\text{xc}/lnR\text{gdp}, ln\text{Cpi}, I\text{nt}, lnG\text{e}, lnM2, lnE\text{xc})$ | 1.99 | ***No Cointegration*** |
| $F_{CPI}$ $(lnC\text{pi}/lnR\text{gdp}, lnC\text{pi}, I\text{nt}, lnGE, lnM2, lnE\text{xc})$ | 11.31** | ***Cointegration*** |
| $F_{CPI}$ $(lnC\text{pi}/lnR\text{gdp}, lnC\text{pi}, I\text{nt}, lnGE, lnM2, lnE\text{xc})$ | 6.94** | ***Cointegration*** |
| $F_{GE}$ $(lnG\text{e}/lnR\text{gdp}, lnC\text{pi}, I\text{nt}lnGE, lnM2, lnE\text{xc})$ | 3.28 | ***No Cointegration*** |
| *,**represents1%and5% level of significance respectively Source (Authors' Computations) | | |

Source: Authors' Computations)

Table 4.5 reports bound test results of cointegration among variables. It can be seen in the table that there exists a relationship between stock market behavior and fiscal and monetary policy variables in the long run when we use KSE as a dependent variable. The tabulated value of F statistic is clearly significant at 1 percent level of significance clearly indicating long run relationship. Following there commendation of (Alkhathlan, 2013), (Babajide, 2016), (Lawal A. I., 2015), (Dhaoui, 2017), (Murthy, 2016) original model of ARDL is re-estimated again by using other variables as independent variables to avoid problem of endogeneity. So, it can be seen that when exchange rate and government expenditures were modelled as dependent variables, we failed to reject the null hypothesis of no-cointegration. Similarly, in all other models long run cointegration is found among variables.

Given these results the estimated results of ARDL model using AIC information criteria are given in table 4.5 and 4.6 respectively as;

**Table 4.5:[4] ARDL Long Run Results (Selected Model (4, 4, 0, 4, 4) on basis of AIC Criteria)**

| *Variable* | *Coefficient* | *Standard Error* | *t-Statistic* | *Prob* |
|---|---|---|---|---|
| ***LnRGdp*** | 4.8670** | 0.3974 | 12.2456 | 0.0000 |
| ***LnGe*** | 5.1674** | 0.4094 | 12.6208 | 0.0000 |
| ***LnCpi*** | −1.433742** | 0.1300 | -11.0249 | 0.0000 |
| ***Int*** | -17.2842** | 1.9065 | -9.0657 | 0.0000 |
| **Constant** | -267.2595 | 21.3573 | -12.5136 | 0.0000 |
| *,**,***represents significance at 1%, 5%, and 10% level of significance | | | | |
| Source: Authors' Computations | | | | |

[4]In estimated ARDL model two variables were found to be insignificant. These insignificant variables are dropped and again the model is reestimated. The result given are for reestimated model

**Table 4.6: ARDL Short Run (ECM) Results (Selected Model (4, 4, 0, 4, 4) on basis of AIC Criteria)**

| *Variable* | *Coefficient* | *Standard Error* | *t-statistic* | *Prob* |
|---|---|---|---|---|
| Δ ***Ln RGdp*** | 2.1587** | 0.9275 | 2.3272 | 0.0227 |
| Δ***LnGe*** | 3.0685** | 0.5502 | 5.5762 | 0.0000 |
| Δ***LnCpi*** | −0.7118** | 0.0992 | -7.1737 | 0.0000 |
| Δ ***Int*** | -5.0145 | 3.2980 | -1.5204 | 0.1326 |
| **ECT** | −0.5938** | 0.0871 | -6.8137 | 0.0000 |
| *, **, *** represents significance at1%, 5%, and10% level of significance | | | | |
| Source: Authors' Computations | | | | |

The long results of the ARDL model indicated that RGDP, government expenditures and Inflation are having significant relationships with stock market behavior. For example, if we look at real GDP it shows that stock market behavior and GDP of Pakistan are positively associated indicating a positive direct relation. The coefficient of RGDP is 4.86% which represents long run elasticity between stock market behavior and GDP and results are significant at 5% significance level.

The results support Keynesian Hypothesis which states that the use of instruments of fiscal policy helps in improving the stock market behavior as a result of the automatic stabilization process. Similarly, GE that was used as a fiscal policy instrument also supports the Keynesian hypothesis that argues that authorities have the option to use various measures including budget deficit, tax, and other discretionary measures to change interest rates that result in improvement of stock market performance. The coefficient of GE represents long run government expenditure elasticity that is about 5.1% and is highly significant. Similarly, the role of inflation used as a proxy of fiscal instruments is negative and highly significant. The channel of inflation supports the classical "crowding out hypothesis" that support the argument that the use of fiscal policy embarks negative impact on the real sector and consequently the financial sector due to classical crowding out hypothesis that any fiscal policy instrument crowd out availability of loanable funds in market and deter private sector activity thus negatively affecting stock prices and stock market behavior. The coefficient of inflation represents long run inflation elasticity which is about 1.41%. All of these findings are inconsistent with earlier studies as ( (Blanchard, 1981), (Tobin, 1969), (Chatziantoniou, 2013).

Apart from fiscal policy instruments the results also show the significance of monetary policy instruments in examining stock market behavior. Three variables namely interest rate, exchange rate, and broad money were used as proxy of monetary policy. Out of these the role of interest rate is highly significant and negative with stock market behavior is reflected in stock prices. This supports three hypotheses which were discussed in the literature as interest rate channel, credit channel and wealth effect hypothesis. The findings are in line with the findings of (Osamwonyi, 2012) and monetary policy channels proposed by (Mishkin, 2001). All these channels explain that changes in interest rate have an effect on a firm's cost of capital that later affect their present value of future cash flows implying a negative relationship between interest rate and stock prices. The channel of exchange rate was found to be insignificant in our case, which implies that in the case of Pakistani stock market the relationship of monetary policy with exchange rate is not significant. The reason for this can be that the exchange rate in the case of Pakistan is not determined by the monetary authorities and is being influenced outside the market. Finally, our results also favor the Tobin Q theory of investment which says that increasing the interest rate shifts funds from stock market to bond market.

If we look upon the interaction of monetary and fiscal policy with stock market behavior, we found mixed results. For example, as noted in the work of (Mélitz, 1997) if both policies operate in reverse direction, then tightening (easing) of one instrument will imply less tightening (easing) of another. The results of this study are consistent with the findings of the previous studies as it was shown fiscal policy exerts positive effect on stock market behavior and monetary policy exerts negatively.

Similarly, if we look the interaction of polices on each other fiscal policy instruments have impact on monetary policy instrument which guides government to finance its expenditures through debt, tax or seignorage. If this is so then fiscal policy instruments have an effect on inflation, exchange rate and interest rate. For example, as noted in work of (Chatziantoniou, 2013) we can see this effect from the perspective of debt if the country debt is highly denominated in foreign currency, then depreciation of exchange rate will increase debt burden. In addition, depreciation in exchange rate provokes inflationary pressures forcing interest rate to rise and finally negatively impacting the stock market behavior. In the case of the Pakistan stock exchange, the findings of our study support this hypothesis, but the channel of exchange rate was found to be insignificant. Last, the coefficient of interest rate is about 1728 percent that represent long run semi-interest rate elasticity which is highly significant.

Looking into the short run results of the study we found no major difference from the long run apart that interest rate in the short run is insignificant. The short run elasticity of RGDP, GE and INF were found to be 2.1%, 3.01% and -0.7% respectively. The short run elasticities are approximately half of their long run elasticities. Similarly, the coefficient of error correction term is negative and highly significant at 5% level of significance. It implies that there is some sort of error correction mechanism for our model. The value of -0.59 represents that in case of any disequilibrium in short run then there is approximately 60 percent adjustment that is taken place in each quarter to restore the equilibrium which means that after every 1 quarter and 2 months approximately the short run disequilibrium is adjusted to restore its long run equilibrium path.

### *4.2 Diagnostic Tests*

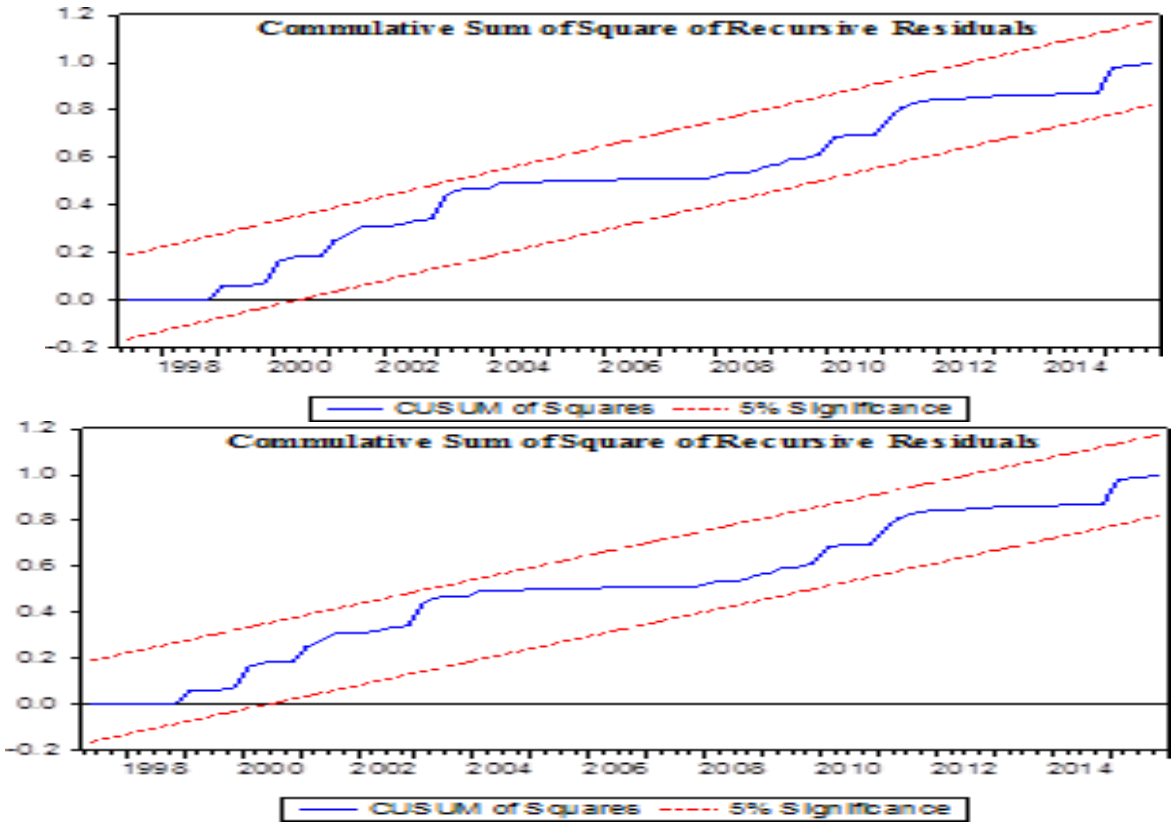
The diagnostic test reveals that model estimated is free of problem of heteroskedasticity and autocorrelation. JB test of normality shows that residuals are normally distributed.

**Table 4.7 Diagnostic Tests**

| | |
|---|---|
| Breusch Godfrey Serial Correlation F-test: | 0.79(0.4558) |
| Wald Test on Coefficient of KSE=1 | 15.25($X^2$, $DF$= 1) |
| Breusch Pagan Heteroskedasticity F=Test | 0.91(0.5810 |
| JB Normality Test: 27.11(0.00001) | |

**Source: Author Computations)**

Table4.8: Plot of CUSUM and CUSUM Square of Residuals:




The plot of CUSUM and CUSUM square test also indicates the stability of the model

### *4.3 Interpretation of Volatility Estimates*

After the analysis of long and short run results table 4.8 report the result of Exponential GARCH for volatility estimates. It can be seen that for KSE 100 index the coefficient of $\alpha$ is positive and also significant at 5% significance level which indicates the volatility of stock returns is sensitive to macroeconomic shocks and large innovations in shock both positive as well as negative aggravates an increase in volatility of returns. It is further confirmed by the insignificance of leverage effects shown by the coefficient of $\gamma$ that traces to theory of arbitrage pricing and complementary as well as theory of substitutability of monetary-fiscal policies instruments nexus. These results also confirm the association between macroeconomic variables and stock market behavior in Pakistan. Fiscal-monetary policies variables as it exerts on the KSE 100 Index.

Fiscal monetary nexus volatility that affects KSE through lnrgdpisal so found to be positive as well as significant, while leverage affect as shown by the coefficient of $\gamma$ is found

to be negative as well as highly significant. It signifies that both absolute size of innovation and asymmetric impact of innovation remain significant in exploring the impact of lnrgdp volatility as it exerts on stock market. The coefficients of $\alpha$o flnge and lnexc are found to be negative as well as significant whereas their leverage effects as shown by $\gamma$ are positive as well as significant which confirms "Keynesian positive effect hypothesis" holds for case of Pakistan. For LNCPI, the value of $\alpha$ is negative and significant, whereas $\gamma$ is insignificant. These shows large shocks in inflation are not transmitted in KSE and the volatility impact of inflation on KSE is indirect.

Interest rate results show that $\alpha$ is negative as well as significant whereas $\gamma$ is found to be positive and significant. It suggests that an inverse relationship holds between interest rate volatility and KSE such that any increase in interest rate volatility tends to decrease the proportionate impact on stock market. It also implies volatility of interest rate affects KSE asymmetrically including size innovation. At last, the volatility of money supply is seen to be negative as well as significant which confirms "interest rate channel". Our findings are in line with the previous findings of (Bernanke, 2005), (Leitemo, 2009) but contradicts with

| | ***lnrgdp*** | ***Prob*** | ***lnkse*** | ***Prob*** | ***lnge*** | ***Prob*** | ***lmM2*** | ***Prob*** | ***lncpi*** | ***Prob*** | ***lnint*** | ***Prob*** | ***lnexc*** | ***Prob*** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| $\omega$ | -3.07 | 0.0015 | -2.93 | 0.0695 | -1.92 | 0.0000 | -1.84 | 0.0003 | 0.03 | 0.7131 | -3.06 | 0.0003 | -0.92 | 0.0000 |
| $\alpha$ | 0.33 | 0.0005 | 0.18 | 0.0000 | -0.32 | 0.0162 | -1.19 | 0.0002 | -0.16 | 0.0429 | -0.63 | 0.0000 | -0.46 | 0.0000 |
| $\gamma$ | -0.82 | 0.0002 | -0.47 | 0.2263 | 0.18 | 0.0138 | -0.97 | 0.0009 | -0.05 | 0.1253 | 0.18 | 0.0124 | 0.14 | 0.0000 |
| $\beta$ | 0.71 | 0.0000 | -0.02 | 0.9675 | 0.77 | 0.0000 | 0.67 | 0.0000 | 0.99 | 0.0000 | 0.71 | 0.0000 | 0.84 | 0.0000 |
| Source: Authors' Computations | | | | | | | | | | | | | | |

(Castelnuovo, 2010), and (Castro, 2012).

**Table 4.8: Exponential GARCH for volatility estimates:**

## 5. Conclusion and Policy Recommendations

### *5.1 Conclusion*

The study explores monetary-fiscal policy interaction on the behavior of stock market behavior of Pakistan at one hand, and the volatility of interaction between these policy instruments on stock market volatility on other hand. For this purpose, we have taken time series data of KSE 100 index data and the Real GDP, Inflation, and Government expenditure (proxies of fiscal policy), and interest rate, broad money, and exchange rate (proxied for monetary policy) for year between 1991 to 2018 for economy of Pakistan. The frequency of data is quarterly. We employed two estimation methods, for long run cointegration we employed ARDL methodology whereas for volatility E- GARCH model is used.

The results of ARDL model clearly shows that there exists long run cointegration between monetary & fiscal policy instruments and stock market behavior in Pakistan. The study finds results in favor of both hypotheses (monetary & fiscal). The role of fiscal policy is seen to be more direct and significant as compare to monetary policy as we found all instruments to be significant. Whereas the channel of monetary policy is found to be indirect and working through channel of interest rate. The study also provides indirect impact of macroeconomic policy through different channels which include credit, wealth effect, exchange rate channel and Keynesian automatic stabilizer channel. Exchange rate channel was found to be insignificant in our study which implies weak association between monetary policy and exchange rate mechanism in Pakistan. The credit cannel points that monetary policy can influence through investment channel as interest rate alters by monetary policy which has significant impact on firm's value as reflected in the present value of cash flows.

Similarly, for wealth effect any increase in interest rate reduces the stock prices which effect stock market behavior. For exchange rate channel the increase of interest rate leads to appreciation of country's domestic exchange rate which may lead to rise in imports over exports that affect the competitiveness of country resulting in lower production and consequently lower stock prices .But in case of Pakistan this channel is not significant. The results of error correction mechanism suggest the adjustment in short run-in case of any disequilibrium as the coefficient of this term is negative and highly significant. The result of ECM reports that 60 percent adjustment is made in each quarter to remove any disequilibrium in short run.

The results of volatility indicate LNKSE is highly sensitive to volatility among monetary fiscal interactions. It also indicates that "monetary channel hypothesis" and "complementary and substitutability hypothesis of monetary fiscal nexus" holds for Pakistani stock market volatility. Also, the volatility of GDP shows that both magnitudes of innovation as well as asymmetric affects explain in examining volatility in stock market returns. Finally, interest rate founds direct relationship for volatility in interest rate and KSE 100 index.

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