Pakistan Economic Review
3:1 (Summer 2020), pp.24 - 49

EXCHANGE RATE VOLATILITY AND EXTERNAL DEBT IN PAKISTAN: A CASE STUDY

Abstract

Ambreen Zahra and Bushra Yasmin[1]

This study aims to empirically examine the effect of exchange rate and its volatility on external debt in Pakistan over the time period 1970-2017. The exchange rate volatility is measured through standard deviation, Generalized Autoregressive Conditional Heteroscedasticity and structural shocks retrieved from the Structural Vector Autoregressive model, using quarterly data. The short and long-run cointegrating relationship among the variables is estimated by Bound testing approach of Autoregressive Distributed Lag (ARDL) model. The empirical findings suggest that real exchange rate and its volatility has tremendously increased external debt burden in Pakistan. The other factors responsible for rising external debt are fiscal deficit, terms of trade and inflation while real GDP growth and trade openness have contributed significantly in reducing external debt burden. The evidence of non-linear relationship is established through the incorporation of interaction term of GDP growth and exchange rate volatility which depicts moderating role of GDP in exchange rate volatility and external debt nexus. Moreover, the comparison of GDP growth rate with its computed threshold level demonstrates substantially high GDP growth rate only for few years. The findings recommend controlling exchange rate and its volatility by using bilateral exchange rate in international transactions and to avoid currency devaluation as a steady export-promotion policy because it has remained less effective due to highly elastic and low value-added exports of Pakistan. Besides the fiscal consolidation through tax revenue generations and expenditure controls along with increasing GDP growth through supply-side measures are also recommended.

Key Words: Debt, Exchange Rate Volatility, Pakistan, ARDL

JEL Classification: F3; F4

1. INTRODUCTION

The external debt burden is a widely debated issue pertaining to its enduring effects on the world economies. The countries with low savings and high current account deficit have to rely on the foreign borrowing which ultimately leads towards accumulation of external debt. External debt is generally termed as the

[1] The authors are MPhil graduate and Associate Professor, Department of Economics, Fatima Jinnah Women University, Rawalpindi, respectively.

foreign currency-denominated debt owed to non-residents which includes public and publicly guaranteed debt, non-guaranteed private debt and loans from the International Monetary Fund (IMF). Pakistan is one of those developing countries who have been facing severe external debt issue especially when the borrowed money has not served well in generating productive capacity of the country. According to the latest figures reported in Economic Survey (2018-19), the stock of external debt reached at Rs. 8,537 billion in 2018-19 with an interest payment of Rs. 182.4 billion that makes 5.1 % of total revenues and 3.8 % of current expenditures. Moreover, the debt bearing capacity measured by debt to GDP ratio was 22.3 % while the debt servicing capacity was 10.8 %.

A number of factors are responsible for the overwhelming external debt situation in Pakistan. Historically, the abrupt disruption in oil-supply and unprecedented increase in oil prices put severe strain on the balance of payment of country that ultimately led towards high external debt. However, external debt generally tends to rise due to shortage of domestic resources, deteriorating terms of trade, fiscal deficit and low economic growth (Ishfaq and Chaudhary, 1999; Zafar and Butt, 2008). The budget deficit has reached its highest level during last five years standing at Rs 2,260 billion i.e., 6.6 percent of GDP while in itself the GDP growth has not exceeded than 5 % these years. Additionally, exchange rate and its volatility can affect the external debt particularly due to its connection with international trade, through direct valuation effect and indirectly due to uncertain business environment in the wake of highly fluctuating exchange rate. The uncertain movements in currency's value plays a dynamic role in shaping the macroeconomic policies of the countries. Since the breakdown of Bretton Wood system and fixed exchange rates, both nominal and real exchange rates have been fluctuating widely and its impact on the international trade is extensively debated. The general belief is that exchange rate volatility creates an uncertain and risky environment for the traders thereby depressing the international trade. Such uncertainty plays important role in external debt accumulation of a country as external debt is the direct outcome of large current account deficits due to trade imbalances.

Since the adoption of floating exchange rate system in 1982 by Pakistan, the exchange rate volatility has increased tremendously and is expected to have several internal and external consequences for the economy. The literature has mostly focused on the impact of exchange rate on external debt in Pakistan besides other determinants including fiscal deficit, terms of trade, exchange rate and GDP. The impact of exchange rate fluctuations is mostly estimated for overall international trade though (Aqeel and Nishat, 2006; Khan, Azim and Syed, 2014). However, the impact of exchange rate volatility on trade can have its effect on the external debt through the channel of current account balance. The negative impact of exchange rate volatility on international trade can transmit into adverse current account position of the country leading towards increase in external debt of the country. By and large, the role of exchange rate volatility in affecting external debt has remained an unexplored dimension. Furthermore, there are various methods to measure exchange rate volatility. In past studies,

mostly the exogenous treatment of exchange rate volatility has remained the focus with the help of GARCH and Standard deviation methods while our study added the endogenously determined volatility through structural innovation technique of VAR to measure exchange rate volatility.

With this background, this study is an attempt to fill this gap by empirically investigating the impact of exchange rate and its volatility on external debt by using observed and forecasted volatility measured through four quarters' moving standard deviation and Generalized Autoregressive Conditional Hetroscedasticity (GARCH) based variance series along with the endogenously determined exchange rate volatility through structural shocks based on Structural Vector Autoregressive Model (SVAR). The impact of exchange rate volatility along with other macroeconomic variables including fiscal deficit, terms of trade, trade openness, GDP growth, inflation and exchange rate on external debt is empirically estimated for Pakistan over the time period 1970-2017. Moreover, this study worked out the interactive role of real GDP growth and real exchange rate volatility in affecting external debt and calculated the threshold levels of real GDP that outweighs the effect of volatility on external debt. A careful comparison of GDP growth with the threshold provides new insight into this relationship.

The rest of the study is organized as follows: Section 2 presents literature review. Third section provides the historical overview of exchange rate fluctuations and external debt position in Pakistan. Fourth section elaborates the methodology including empirical model, data description along with the estimation technique and reporting of empirical findings and discussion. Fifth section concludes the study and lists certain policy implications based on the empirical findings.

2. LITERATURE REVIEW

2.1 Theoretical Foundation

Three approaches to the balance of payments provide us the theoretical background for the relationship under investigation. The *elasticity approach* is a Neo-Classical view first provided by Bickerdike (1920) and extended by Metzler (1945) and Robinson (1947). According to this approach, the adjustments in trade balance depend on the responsiveness of exports and imports demand. The devaluation of currency can only improve the balance of payment if demand elasticity of exports is greater than that of imports. This largely hinges on the Marshall-Lerner condition which states that the sum of exports and imports demand elasticities should exceed one for such relationship to hold. Second is the *absorption approach*, provided by the Keynesians, who criticized the elasticity approach for being a partial equilibrium approach.[2] The theory postulates that the balance of payment depends on the difference between nation's income and domestic absorption from public and private consumption and investment.

[2] According to them, elasticity approach only takes into account the macroeconomic response to the changes in prices due to exchange rate fluctuations.

Hence, devaluation in exchange rate can improve the trade balance if it increases the rate of substitution from foreign to domestic goods by the amount it raises the output of the country more than domestic absorption.

Third is the *monetary approach* to the balance of payments introduced by Johnson (1972), following the pioneering work of Mundell (1963). This approach regarded the exchange rate changes and its impact on the balance of payment a monetary phenomenon. According to this approach, exchange rate devaluation leads to increase in domestic prices thus a reduction in real money supply, and hence improves the balance of payment position. The main idea of the monetary approach to balance of payment is that the deficit or surplus of balance of payment depicts disequilibrium in the money market hence requires a monetary measure.

Additionally, the two-gap model pioneered by Chenery and Strout (1966) provides the justification for external borrowing. First is the saving-investment gap model while the second is the export-import gap. In order to fill in these gaps, foreign borrowing is required so that investments and output growth of the economy can be raised (Quibria, 1980). Later, Bacha (1990) extended the model by incorporating fiscal gap along with saving and external gaps, known as three-gap model which provides that fiscal constraints limit the economic growth in developing countries and therefore necessitate the external borrowing. According to Chisari and Fanelli (1990) even if a country has enough domestic savings and foreign earnings, the fiscal deficit forces the government to borrow from external sources.

2.2 Empirical Literature

A number of internal and external factors responsible for external debt accumulation are identified by the empirical studies. The study by Ajayi (1991) provided that poor macroeconomic performance due to fiscal irresponsibility and economic mismanagement, exchange rate instability and deteriorating terms of trade and high interest rate in Nigeria over the period 1970-1988 are major factors behind high external debt. On the other hand, Ahmad (1996) stimulated the future time paths of resource deficit in Pakistan and provided a policy for reducing foreign debt in the country. It states that increasing the rate of return on foreign capital could help in decreasing the external debt of Pakistan.

While, Osuji and Olowolayemo (1998) applying OLS on a sample of 7 Sub-Saharan African countries found out the effect of exchange rate quite varying depending on the nature of exports and imports of the countries for the time period 1972-1992. The countries with competitive exports gain from the exchange rate devaluation which in turn improves the current account deficit and reduces the external debt burden. Tille (2003) for the period 1990-2002 regarded the growing current account deficit as a major source of huge increase in borrowing and hence external debt of USA. The large appreciation in dollar through valuation effect remain a major factor behind the huge external debt.

For Pakistan, Ishfaq and Chauhary (1999) found out the prominent role of fiscal deficit in debt accumulation supplemented by the excessive debt servicing for the time period 1980-98. The fiscal deficit and debt are as well appeared to cause and affect each other. In another study for Pakistan, Awan, Asghar, and Rehman (2011) provided that the depreciation of domestic currency has increased the cost of external debt obligation leading towards high external debt for the time period 1974-2008. The deteriorating terms of trade is another factor responsible for high external debt. On the contrary, Zafar and Butt (2008) found almost negligible but negative effect of exchange rate on the external debt in Pakistan for the years 1972-2007. They suggested that an effective implementation of exchange rate and trade policies can help in reducing the external debt burden of the country.

Similar evidence is documented by Neaime (2010) who found that despite large accumulation of external debt in Egypt and Turkey, the flexible exchange rate policy helps the country to reduce interest rates pressure that in turn reduces the servicing of huge external debt.

Furthermore, Rehman, Adil and Anis (2012) examined the existence of J-curve phenomenon in Pakistan for the time 1982-2007. And provided that J-curve phenomenon does not exist as the exchange rate has not improved the trade balance of the country. Rather it has increased the external debt pressure which is times higher than the total trade volume of Pakistan with its partner countries. On the same count, Alam and Taib (2013) investigated the relationship of external debt with exchange rate, current account deficit and budget deficit for a panel of selected Asian countries divided into two groups; debt trapped countries and non-debt trapped countries for the years 1971-2000. The study found out positive relationship among the selected variables and external debt with a varying strength for the group of countries. The external borrowings are relatively low in non-debt trapped countries than the trapped ones.

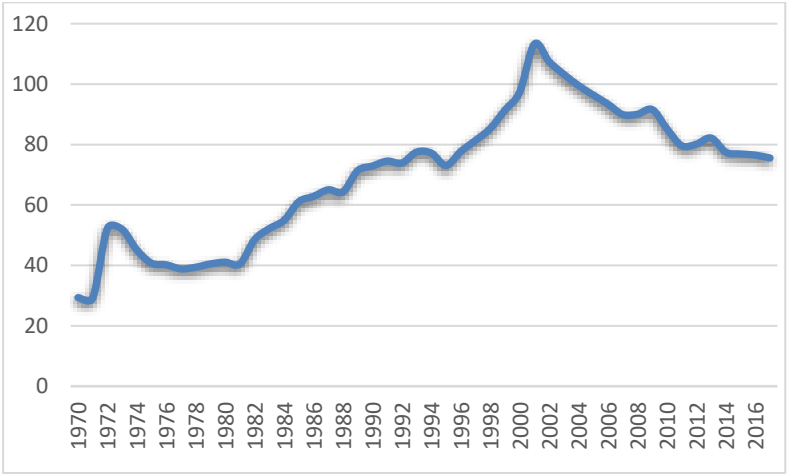
The review of theoretical and empirical literature highlighted the importance of exchange rate volatility in determining external debt burden of any country along with other important determinants such as fiscal deficit, current account deficit, trade openness and output growth. Furthermore, taking into account the existing literature, two types of evidences are recorded where one provides that currency depreciation can lead to improve the external debt position of the country through improving foreign exchange earnings due to cheap exports. While, on the other hand, the external debt may tend to increase due to servicing of more expensive debt in the wake of domestic inflation that is the outcome of domestic country devaluation. The ambiguity in the said relationship entails in the case of Pakistan where exports are considered to be less competitive and due to high elasticity of export demand trade balance generally tends to deteriorate, worsening the foreign exchange and country's debt position. Therefore, it seems pertinent to empirically investigate the impact of exchange rate volatility on external debt as there exists a major gap in literature in this regard. Various measures of exchange rate volatility along with the real exchange rate can provide a better picture of the

nature and responsiveness of external debt to exchange rate fluctuations in Pakistan.

3. HISTORICAL OVERVIEW OF EXCHANGE RATE FLUCTUATIONS AND EXTERNAL DEBT IN PAKISTAN

This section throw light on the historical trends in exchange rate fluctuations and external debt in Pakistan during period 1970-2017. Figure 3.1 provides the trend in real exchange rate over the given time period when the country shifted towards floating exchange rate system from the fixed system.

Figure 3.1 Real Exchange Rate Trend in Pakistan (1970-2016)



Data Source: International Financial Statistics (2018)

Prior to 1970s, Pakistani rupee that was pegged with pound sterling linked to the US dollar when US emerged as the economic power. The currency was devalued by 10 percent (from 4.76 rupees per dollars to 7.90) in 1971 with an objective to achieve trade balance. The exchange rate remained fixed at the rate of 9.90 rupees per dollar from 1973 till the end of 1981. Pakistan shifted towards floating regime in 1982, when the appreciation in US dollar affected the international competitiveness of the country in early 1980s. In order to maintain export competitiveness in the international market and to bring sustainable balance of payment position, Pakistan adopted managed floating exchange rate system.

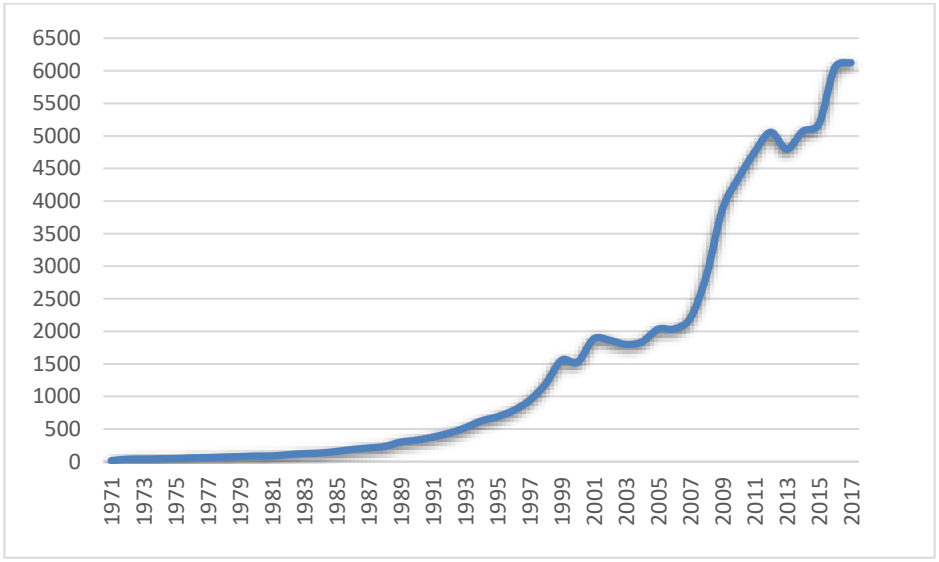
Later, as a result of the restrictive stand by multilateral financial institutions and economic sanction by major donors as a reaction to the nuclear tests in 1998, State Bank of Pakistan (SBP) implemented new exchange rate mechanism. Two-tier multiple exchange rate system was adopted to shift the benefits of currency

devaluation to the exporters and to the Pakistanis living abroad to increase the foreign remittances and to reduce the import of un-necessary items.

In year 2000, Pakistan adopted free floating exchange rate system. Country had to face 23.56 percent loss in the value of its currency against dollar as the exchange rate increased twice from 51.59 Rs. per dollar to 58.4 Rs. per dollar and a further devaluation to 64 Rs. per dollars in the last quarter of 2000 (Khan *et. al.*,2014). After five years of stable exchange rate, the rupee-dollar parity depreciated by 13.3 percent in nominal terms. The exchange rate in 2017 reached to a level of 105.46 Rs/$ with some fluctuations over time.

Now, we turn our focus to the historical evolution of external debt in Pakistan that has a close connection with the above discussed exchange rate trends. The trend of external debt over the period 1970-2017 can be observed from figure 3.2 which shows that Pakistan's external debt continued to increase since 1970 and reached from Rs.15 billion in 1970 to Rs.6300 billion in 2017.

Figure 3.2 Total External Debt of Pakistan (1970-2016)



Source: Economic Survey of Pakistan (various issues)

Pakistan has accumulated a huge amount of public debt since independence and the share of external debt remained more than 50 percent. The enormous increase in external debt created serious problems to the country due to lack of proper debt management policies and economic issues such as fiscal and current account deficits and inadequate exchange rate adjustments. Kemal (2001) argued that the high and persistent increase in budget and current account deficits are responsible for massive external debt burden in Pakistan. Instead of financing deficits by

attracting foreign investment, the country has become more dependent on foreign aids and loans. In 1982, Pakistan's first loan under the Structural Adjustment Programme (SAP) was approved by IMF with tough conditions and high interest rates. Approximately eighty percent of the loan was utilized for defense and other recurrent expenditures. Since then, Pakistan has been approaching IMF, Paris Club and World Bank at various stages to stabilize the budgetary situation but failed to fully implement the programs due to political instability. After the debt crisis in 1990s, World Bank declared Pakistan as Highly Indebted Country (HIC) due to its dismal debt situation.

4. METHODOLOGY AND EMPIRICAL FINDINGS

This section provides the theoretical framework, empirical model and findings based on the specified estimation technique.

4.1 Theoretical Framework

This is imperative to establish theoretical relationship between external debt and exchange rate which basically stems from the balance of payment approaches namely; elasticity approach, absorption approach and monetary approach, where first two approaches focuses on the current account component while the third one relates to the capital account. As external debt is the direct outcome of imbalance in balance of payment, the impact of exchange rate changes on balance of payment position further connotes it to the external debt standing of the country (Khan, 2016). As explained in theoretical foundation of literature review, Neo-Classical view about trade balance is based on the demand elasticities of exports and imports. According to this approach, the adjustments in trade balance largely depends on the responsiveness of exports and imports demand to the changes in prices due to exchange rate fluctuation. Hence, a devaluation of currency can improve the balance of payment if demand elasticity of exports is greater than imports [Bickerdike (1920); Metzler (1945) and Robinson (1947)]. The balance of trade equation reflects the elasticity approach as follows:

$$BOT = X(\frac{P_d}{P_f}, ER) - M(\frac{P_d}{P_f}, ER) \tag{4.1}$$

Where, P_d and P_f stands for price of exports and imports in domestic and foreign country, respectively and ER refers to the exchange rate.

Given the partial equilibrium setup of elasticity approach, the absorption approach was introduced to incorporate the moderating role of macroeconomic variables in the currency devaluation impact on balance of trade [Maede (1951); Alexander (1952)]. The income absorption equation indicates that trade balance can improve if the real output/income exceeds the domestic absorption, given as below:

$$y - d = x - m \tag{4.2}$$

Hence, devaluation can result in trade balance improvement if the changes in relative prices increases the rate of substitution from foreign to domestic goods by the amount of output increase worth more than domestic absorption.

The monetary approach to balance of payment pioneered by Johnson (1972) and later developed by Mundell (1963), presented exchange rate fluctuation and its impact on the balance of payment as a monetary phenomenon where devaluation influences the balance of payment only through the channel of money supply. According to this approach, exchange rate devaluation leads to an increase in domestic prices which is further reflected in the reduction in real money supply which ultimately improves the balance of payment position. The relationship is specified as below:

$$\frac{m^s}{p} = m^d(y, e) \tag{4.3}$$

Where, m^s refers to nominal money supply, *p* for domestic prices, m^d is money demand, *y* stands for income, and *e* shows the nominal exchange rate.

These approaches provide a background to develop a link between exchange rate and external debt. The fluctuations in external account lead towards balance of payment imbalance and affect the external debt burden of the country. Therefore, exchange rate volatility can have larger effect on the external debt position through its effects on trade balances.

4.2 Empirical Model

The empirical model based on theoretical foundation is given as below:

$$ED_t = \alpha_0 + \alpha_1 RER_t + \alpha_2 VRER_t + \alpha_3 TOT_t + \alpha_4 FD_t + a_5 TO_t + \alpha_6 RGDP_t + \alpha_7 CPI_t + \mu_t \tag{4.4}$$

Where, ED_t refers to external debt, while the independent variables includes real exchange rate (RER_t) and its volatility ($RERV_t$), terms of trade (TOT_t), fiscal deficit (FD_t), trade openness (TO_t) and the real GDP growth rate ($RGDP_t$). While, 'μ_t' is the error term and 't' refers to the time period from 1970 to 2017. An interaction term of real GDP growth rate and exchange rate volatility is added into equation (1) to find out the marginal effect of real exchange rate volatility on external debt controlling for real GDP growth, given as equation (4.5):

$$ED_t = \alpha_0 + \alpha_1 RER_t + \alpha_2 VRER_t + \alpha_3 TOT_t + \alpha_4 FD_t + a_5 TO_t + \alpha_6 RGDP_t * VRER_t + \alpha_7 CPI_t + \mu_t \tag{4.5}$$

Equation (4.5) will also serve to estimate the threshold level of GDP growth through interaction term that will determine the level of real GDP growth rate

which nullifies the effect of exchange rate volatility on external debt. Moreover, the marginal effect at the average value of real GDP is also computed to determine the nature of debt sustainability in Pakistan. Both the equations are estimated as double-log models.

4.3 Data Description and Justification of Variables

The exchange rate volatility is measured through three techniques: Standard deviation, the Generalized Autoregressive Conditional Heteroskedastic (GARCH) technique and the Structural shocks derived from Structural Vector Autoregression (SVAR). The moving standard deviation (S.D) method is used to measure the realized volatility in real exchange rate. Following Koray and Lastrapes (1989), Chowdhury (1993) etc, we employed standard deviation of the logarithmic exchange rate series to measure quarterly moving standard deviation. The GARCH technique developed by Bollerslev (1986) is used to compute the forecasted volatility based on conditional variances. It captures past values of the variable as opposed to ARCH and allow for more flexible lag structure. According to this approach, real exchange rate depends on its value in recent past and on the non-constant variance.

Nasir and Malik (2011) employed Structural Vector Autoregression (SVAR) to decompose the exchange rate movements into nominal and real shocks using bivariate VAR model. However following Clarida and Gali (1994), this study used a trivariate VAR model in order to identify the endogenously determined nature of real exchange rate volatility due to aggregate supply shock, aggregate demand shock and the market specific shock. These shocks capture the behavior of endogenous variables used in the study including relative output (Δy), relative prices (Δp) and real exchange rate (Δrer).[3] The supply shock refers to productivity shock derived from Balassa-Simuelson effect of productivity differences which states that productivity in tradable sector is higher than non-tradable sector and increase in the price of tradable sector leads to increase in general price level which eventually leads to the increase in exchange rate. The demand shock is based on the difference in relative prices which provides that due to positive demand shock (such as changes in government expenditures that is a shock to goods market and shifts the IS curve) the domestic prices tends to increase which results in an appreciation of real exchange rate. The market-specific shock shows the market determined nature of exchange rate due to its demand and supply condition. All shocks are normalized and reflect increase in exchange rate.

$$x_t = (\Delta y_t, \Delta p_t, \Delta rer_t) \tag{4.6}$$

[3] 1) Relative output is defined as the level of real GDP in Pakistan minus the level of real GDP in US. Similarly, the relative prices are defined as the level of CPI in Pakistan minus the level of CPI in US.
2) Quarterly data for these variables are used.
3) Quarterly data of real GDP for Pakistan was not available therefore the annual data for the series is converted into quarterly series using frequency conversion method.

The model in its autoregression form can be written as:

$$x_t = \sum_{i=1}^{n} A_i Z_{t-i} U_t \tag{4.7}$$

Where "U_t"is a vector of serially uncorrelated structural shocks. A triangular long run restriction are imposed to identify the shocks in the structural model and allowed for an unrestricted short run dynamics in response to the shocks. The reduced form expression can be expressed as:

$$\begin{bmatrix} \Delta y_t \\ \Delta p_t \\ \Delta rer_t \end{bmatrix} = \begin{bmatrix} a_{11} a_{12} a_{13} \\ a_{21} a_{22} a_{23} \\ a_{31} a_{32} a_{33} \end{bmatrix} \begin{bmatrix} \varepsilon_{1t} \\ \varepsilon_{2t} \\ \varepsilon_{3t} \end{bmatrix}$$

where, "ε_{1t}" refers to the aggregate supply shock , "ε_{2t}" shows the aggregate demand shock while "ε_{3t}" is the market determined exchange rate shock. The variables are arranged in the order of endogeneity keeping real exchange rate as most endogenous while relative output as least endogenous. The triangular restrictions thus make the coefficient a_{12}, a_{13} and a_{23} equal to zero.[4] The description of other variables with data source is provided in Table 4.1.[5]

The impact of real exchange rate volatility on external debt depends on the behavior of traders towards risk associated with exchange rate fluctuations (De-Grauwe, 1998; Bahmani-Oskooee and Galen, 2017). The relationship may also vary with respect to the measures used to estimate the volatility. According to the Balassa-Samuelson (1964) effect, a positive productivity shock increases the demand for labors and hence wages in domestic country which leads to inflation and results in devaluation of the domestic currency. On the other hand, the impact of exchange rate shock due to market specific factors on external debt works through the demand and supply of domestic currency.

The expected relationship between real exchange rate and external debt is positive. Currency depreciation increases domestic cost of debt servicing as the borrowings are denominated in foreign currency (Asonuma, 2016). The expected effect of fiscal deficit on external debt is positive because it reduces government's ability to repay, and also creates additional demand for new loans. Terms of trade is expected to have negative effect on external debt. Term of trade improvement tend to increase foreign exchange earnings leading towards declining external debt. Trade openness is expected to have positive as well as negative effect on

[4] The structural shocks are retrieved from estimated SVAR in Eviews.

[5] The fiscal years' series are converted into annual series using moving average. Moreover, the variables are transformed into logarithmic form to use for empirical estimation.

the external debt. Increase in trade can increase foreign exchange earnings which leads to reduce external debt. On the other hand, Zakaria (2012) and Kizilgol and Ipek (2014) provided that imports grow faster than exports in the wake of trade liberalization policies which increases the demand for foreign exchange reserves to finance its imports expenditures. The shortage of foreign reserves forces the government to borrow from external sources that increases the external debt burden of country. The real GDP growth is expected to have negative impact on external debt. According to Kasidi and Said (2013), developing countries with low GDP growth have insufficient savings and capital that results in high external borrowings and hence the foreign debt burden and vice versa.

Table 4.1 Variables Description and Data Sources

Variables	Description	Data Sources
ED	Total external debt is the sum of publicly guaranteed and non-guaranteed long-term debt, loans from IMF and short-term debt, measured in billion Rupees.	Economic Survey of Pakistan (various issues)
TOT	Terms of trade, ratio of exports prices to the imports prices.	-do-
RGDP	Growth rate of real GDP measured in percentage.	-do-
FD	Fiscal Deficit is the difference between total revenues and total expenditures of government measured in billion Rupees.	-do-
CPI	Consumer Price Index	-do-
RER	Real exchange rate measured as the nominal exchange rate adjusted for the foreign price level relative to the domestic price level (2010=100).	International Financial Statistics, IMF (2018)
RERV	Real exchange rate volatility computed using three different measures namely; GARCH (forecasted volatility), Standard Deviation (realized volatility) and SVAR based shocks.	-do-
TO	Trade openness is measured as exports plus imports as percentage of GDP.	World Development Indicators, World Bank (2018)

4.4 Empirical Findings and Discussion

The first step in the estimation is to measure exchange rate volatility as discussed in section 4.3. The trends in volatility series are provided in section 4.4.1. Secondly, the stationarity properties of the selected series are examined using ADF Dickey Fuller test of unit root. The combination of the order of integration of order one and zero provides the justification for employing Autoregressive Distributed Lag Model (ARDL). For robustness, Toda and Yamamoto test for

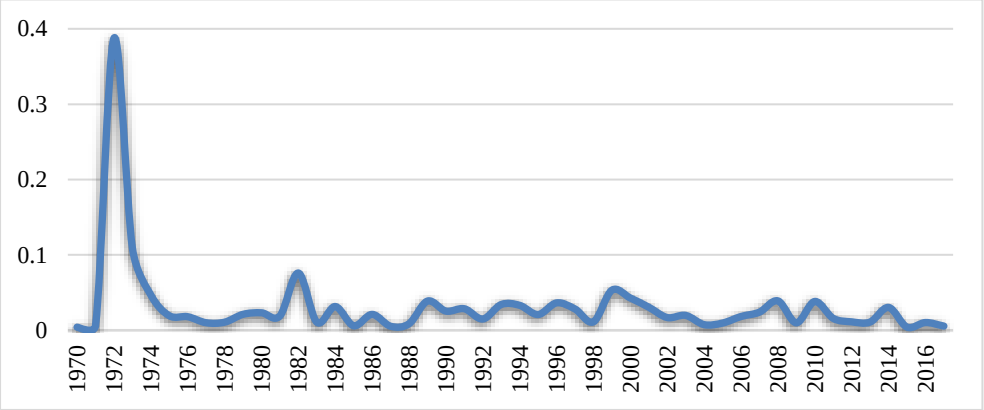
Cointegration is also applied to find out the existence of long-run causality among the series.

4.4.1 Exchange Rate Volatility Estimates

Observed Volatility

The exchange rate volatility series is obtained by employing four quarter moving standard deviation of the series of real exchange rate in log from. The graphical representation of the series obtained is presented in Figure 4.1.

Figure 4.1 Observed Exchange Rate Volatility

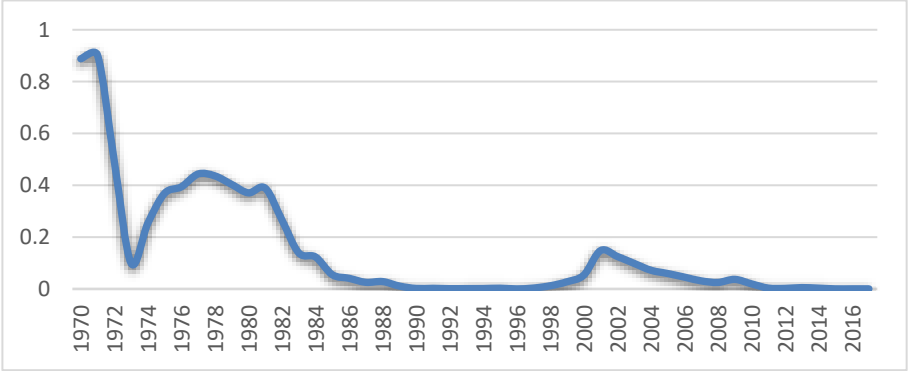


The result shows persistence in exchange rate volatility over the time with one period peak observed in 1972 due to large devaluation in Pakistani Rupee from Rs. 4.76 per dollar to Rs. 11 per dollar. Also, the huge increase in world's oil prices in 1973 increased the demand for foreign currency leading towards large fluctuation in the exchange rate.

Forecasted Volatility

The graphical representation of the forecasted volatility measured through GARCH (1, 1) technique is presented in Figure 4.2.

Figure 4.2 Forecasted Exchange Rate Volatility



The figure shows the volatility clusters through GARCH measure of real exchange rate volatility in Pakistan during the given time period.

Structural Shocks

The structural shocks derived from SVAR as representatives of endogenously determined real exchange rate volatilities are presented in Figure 4.3, respectively.

Figure 4.3 Historical Decomposition of Structural Shocks

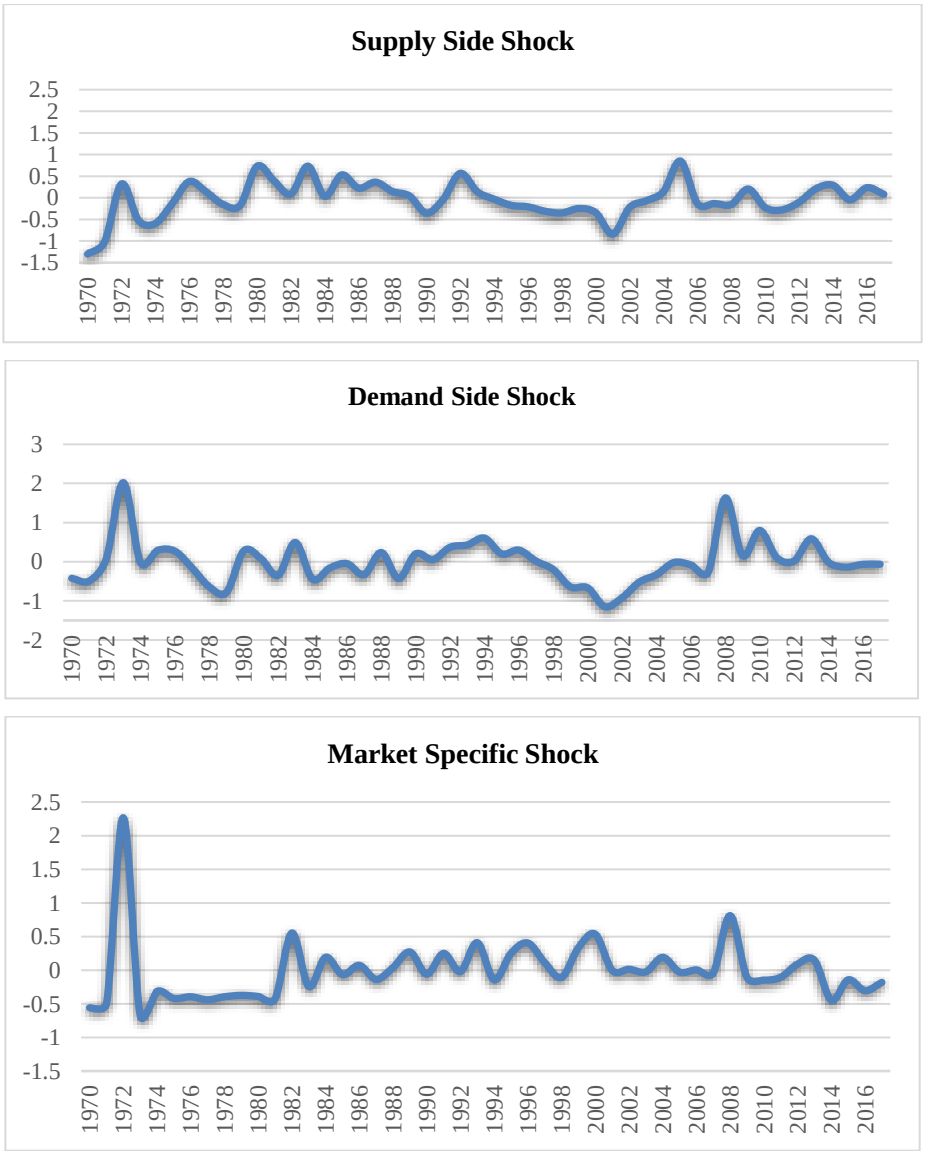


Figure 4.3 plots the time path of structural shocks including supply, demand and market specific exchange rate shocks.[6] The graphs show that real exchange rate sharply responds to the shocks, while the composition of responses changes over the time. First graph shows that volatility in real exchange rate in response to changes in relative output remained persistent with slight disruptions. However, second and third graph depicts large disruption in real exchange rate volatility during 1972-73 due to changes in relative prices and market-specific exchange rate associated with the huge increase in oil prices by Organization of Petroleum Exporting Countries (OPEC). Moreover, another peak in exchange rate volatility during 2008-09 is associated with the unanticipated change in relative prices and real exchange rate in the wake of Global Financial Crisis (GFC) which adversely affected both the financial markets and the real economy of Pakistan.

4.4.2 Stationarity Test Results

The results of univariate stationarity test for the series are reported in Table 4.2. The Augmented Dickey Fuller Test result suggests that external debt, real exchange rate, fiscal deficit, terms of trade and inflation are stationary at the first difference and are integrated of order 1. While the variables observed volatility, forecasted volatility, trade openness and real GDP growth are stationary at level i.e., I (0). So, the series are the combination of the order of integration I (0) and I (1) that allows us to proceed with the ARDL approach to Cointegration.

Table 4.2 Stationarity Test Results

Variables	Level	First Difference	Decision
lned	1.915	3.093**	I(1)
lnrer	2.471	6.161**	I(1)
lnfd	0.605	3.865**	I(1)
lnto	3.168**	-	I(0)
lntot	0.180	6.064**	I(1)
lnrgdp	4.500**	-	I(0)
lncpi	1.660	3.224**	I(1)
vrer1	5.703**	-	I(0)
vrer2	3.897**	-	I(0)

*Note: ** indicates 5 percent level of significance.*

[6] To improve the readability the graph are expressed as annual averages.

4.4.3 Toda-Yamamoto Causality Test Results

Toda-Yamamoto test, also known as modified Wald test, is used to check the causality among variables irrespective of the order of integration of the variables. The method involves two steps; in the first step the optimal lag length is selected for the VAR process. Also, a well-specified VAR model is constructed by ensuring that there is no serial correlation is the residuals. Secondly, a $(p + d_{max})^{th}$ order of VAR is estimated, where, p is the optimal lag length while $d_{max}$is the maximum order of integration in the model. The results for observed and forecasted volatility are reported in Table 4. 3, respectively.

Table 4.3 Estimates of Toda-Yamamoto Causality Test

	Lags	Wald-statistics	ARCH-LM-statistics
vrer1<=>lned	3	48.773***	45.042
		(0.000)	(0.634)
vrer2<=>lned	3	37.625***	37.946
		(0.004)	(0.873)

*Note: 1) *** denotes rejection of null hypothesis of no causality at 1 % level of significance. 2) p-values are in parentheses.*

The significant Wald-statistics reported provides the evidence of causality between exchange rate volatility and external debt in Pakistan during the given time period. This is expected, as exchange rate volatility is associated with high uncertainties for investment and trade which affect the current account position of the country and thus external debt.

4.4.4 Autoregressive Distributed Lag (ARDL) Results

The combination of the order of integration i. e., I (0) and I (1) of the variables allows us to proceed with estimation by employing the Bound testing approach of Autoregressive Distributed Lag (ARDL) model introduced by Pesaran, Shin and Smith (2001). The reduced form ARDL model used is given as:

$$\Delta lned_t = \alpha + \sum_{i=1}^{k} \beta_i \, \Delta lned_{t-i} + \sum_{i=0}^{k} \gamma_i \Delta X_{jt-i} + \sum_{i=0}^{k} \delta_i \Delta shock_{t-i} + \sum_{i=0}^{k} \theta_i \Delta vrer_{t-i} + \vartheta_1 lned_{t-1} + \delta_2 X_{jt-1} + \delta_3 shock_{t-1} + \delta_4 vrer_{t-1} + \mu_t \quad (4.6)$$

Where, X_{jt-i} is the vector of other control variables. The Error Correction Model (ECM) based on ARDL is applied to determine the speed of adjustment and is expressed as:

$$\Delta lned_t = \alpha + \sum_{i=1}^{k} \beta_i \Delta lned_{t-i} + \sum_{i=0}^{k} \gamma_i \Delta X_{jt-i} + \sum_{i=0}^{k} \delta_i \Delta shock_{t-i} + \sum_{i=0}^{k} \theta_i \Delta vrer_{t-i} + \varphi ECT_{t-1} + \mu_t \quad (4.7)$$

Where, φ shows the adjustment speed of residuals obtained from the model. The conditions of no serial correlation in the error term and model's dynamic stability is tested through Breusch-Godfrey Correlation LM test and the coefficient of error correction term, respectively. The results of the bound testing approach are presented in Table 4.4. The long-run and short-run estimates of ARDL based on equation (4.6) and (4.7) are reported in Table 4.4 along with the diagnostic test results.

Table 4.4 ARDL Estimation Results

Dependent Variable: External Debt			
	Long-Run Estimates		
Variables	**S.D**	**GARCH**	**SVAR**
Lnfd	0.208* (0.122)	0.232*** (0.059)	0.104 (0.096)
Lnrer	1.155*** (0.151)	1.246*** (0.076)	1.223*** (0.195)
lnrgdp	-0.245** (0.105)	-0.113** (0.055)	-0.359*** (0.112)
lnto	-1.260*** (0.379)	-0.329** (0.143)	-0.990*** (0.289)
lntot	0.471* (0.249)	0.333*** (0.106)	0.306 (0.187)
lncpi	0.967*** (0.185)	1.019*** (0.078)	1.054*** (0.145)
vrer1 (S.D)	-0.353 (0.841)	-	-
vrer2 (GARCH)	-	0.769*** (0.168)	-
shock1	-	-	-0.027 (0.067)
shock2	-	-	0.133** (0.064)
shock3	-	-	-0.121 (0.124)

Continued on next page

(continued) Table 4.4 ARDL Estimation Results

Dependent Variable: External Debt			
	Short-Run Estimates		
Variables	**S.D**	**GARCH**	**SVAR**
lned(-1)	0.654*** (0.105)	0.331*** (0.122)	0.605*** (0.098)
Lnfd	0.232*** (0.057)	0.255*** (0.057)	0.227*** (0.061)
lnfd(-1)	-0.160*** (0.061)	-0.001 (0.063)	-0.186*** (0.061)
lnrer	0.399*** (0.124)	0.833*** (0.161)	0.482*** (0.134)
lnrgdp	-0.144*** (0.028)	-0.075*** (0.029)	-0.141*** (0.025)
lnrgdp(-1)	0.059* (0.032)	-	
lnto	-0.435*** (0.112)	-0.220** (0.101)	-0.390*** (0.097)
lntot	0.163** (0.069)	0.222*** (0.079)	0.121* (0.064)
lncpi	0.932** (0.380)	1.175*** (0.398)	0.415*** (0.132)
lncpi(-1)	-0.598* (0.310)	-0.493* (0.283)	-
vrer1 (S.D)	0.476** (0.204)	-	-
vrer1(-1)	-0.598*** (0.198)	-	-
vrer2 (GARCH)	-	0.514*** (0.140)	-
shock1	-	-	-0.010 (0.027)
shock2	-	-	0.052** (0.023)
shock3	-	-	0.021 (0.025)
shock3(-1)	-	-	-0.069** (0.030)
ECT	-0.345*** (0.105)	-0.668*** (0.122)	-0.394*** (0.098)

Continued on next page

(continued) Table 4.4 ARDL Estimation Results

Diagnostic Tests			
Bound test's F-statistics	6.02*	3.89*	3.68*
Wald test's χ^2-statistics	-	-	16.99*** (0.0007)

*Notes: 1) Standard errors are reported in parentheses of coefficients. 2) *, ** and *** indicates the significance at 10%, 5% and 1% level of significances. 3) The critical values for bound test are based on Narayan (2005) for small sample size i.e., 2.457-3.650 at 5 % level of significance. 4) P-values are reported in parentheses for Wald test.*

The Bound test results shows that F-statistics are greater than the upper critical value at 10 percent level of significance based on Narayan (2005) and therefore rejects the null hypothesis of no long-run relationship. Moreover, the Wald test's χ^2-statistics rejects the null hypothesis of insignificance of structural shocks in the model validating the significance and distinct nature of introducing structural shocks in the model. The Error Correction Terms (ECT) in all estimations are statistically significantly negative which provides evidence for the stability of the models. The coefficients illustrate that about 35, 66 and 39 percent short run deviations in variables are corrected annually towards the long run equilibrium, respectively.

The empirical result for exchange rate volatility shows statistically significantly positive impact on external debt. The increase in exchange rate tends to decline the value of domestic currency and increases the debt burden through direct valuation effect. Also, increase in exchange rate discourages the foreign investment in the country therefore increasing the dependence on external borrowing indirectly.

Regarding volatility measures, observed exchange rate volatility has insignificant effect on external debt while forecasted volatility has statistically significantly positive effect on the external debt in Pakistan. The coefficient value shows that one percent increase in forecasted volatility leads to 0.76 percent increase in external debt in the long run. The result implies that increase in exchange rate volatility creates uncertain environment for the exporters therefore they shift from foreign trade towards domestic non-tradable sectors (Aqeel and Nishat, 2006). This inversely affects the trade balance (due to reduction in exports) by reducing foreign reserves and tends to increase the external debt.

The results of structural shocks provides that supply shock and market-specific shock has negatively insignificant effect on external debt. While the demand shock to real exchange rate (shock2) has significantly positive impact on external debt. An increase in relative prices (demand shock) leads to contraction in aggregate demand which exerts downward pressure to domestic interest rate and increases the capital outflow. This results in declines in foreign exchange reserves and increase in external debt of the country.

The fiscal deficit has significantly positive effect on external debt. High fiscal deficit reduces the government's ability to repay debt due to low fiscal space. Therefore, the fiscal deficit is financed through external borrowings which consequently lead to an increase in external debt. The findings are consistent with Ishfaq and Chaudhary (1999) and Kemal (2001). The coefficient of real GDP growth is significantly negative in all three equations. The result shows that one percent increase in real GDP growth leads to 0.24, 0.11 and 0.35 percent reduction in external debt, respectively. Increase in real GDP growth can reduce the fiscal deficit by increasing savings and investment which eases the dependence on foreign borrowings and result in low external debt. The result is consistent with the study of Waheed (2017).

Inflation has statistically significantly positive effect on external debt. Inflation makes the exportable expensive and less competitive that contract its demand in international market. This results in reduction in the foreign reserves and ultimately increases the external debt burden of the country. The result is consistent with the study of Zakaria (2012) who argued that inflation results in more foreign debt in Pakistan because it reduces exports demand and also reduces the real value of government revenues.

The impact of trade openness on external debt is statistically significantly negative in all estimations. The value of the coefficient represents that one percent increase in trade openness leads to 1.26, 0.32 and 0.99 percent reduction in external debt, respectively. With the increase in trade volume foreign exchange earnings tends to increase by lowering the external debt pressure. Comparatively, the impact of terms of trade on external debt is positive. Improvement in terms of trade reduces the competitiveness of exports (which includes low value-added products) in international market leading towards the reduction in exports demand and hence the foreign exchange earnings. The result is consistent with Zakaria (2012) who found significantly positive impact of terms of trade on external debt for Pakistan's economy.

The results of non-linear models with interaction term of exchange rate volatility and GDP growth are reported in Table 4.5. The computed threshold values of GDP growth rate where it nullifies the effect of exchange rate volatility on external debt is 1.434 % and 2.17 % for equation (1) and (2) of Table 4.5, respectively.[7] Comparing the threshold level with the (log of) real GDP growth, this is observed that the GDP growth remained above the threshold level during 1980s and 2000-2008 which implies that external debt was sustainable during 1980s because the economic growth was substantially high during this decade. Moreover, during 2000 to 2008 the pressure on external debt was reduced due to

[7] $lned = \gamma_2\ vrer1 + \gamma_6\ vrer1 * lnrgdp$

$\frac{\partial lned}{\partial vrer1} = \gamma_2 + \gamma_6 lnrgdp$ Applying first order condition gives;

$\gamma_2 + \gamma_6 lnrgdp = 0$

$lnrgdp = -\frac{\gamma_2}{\gamma_6}$

debt re-profiling by the Paris Club and increase in accumulation of official reserves (Khan, 2016). And also the GDP growth was reasonable at that time period which declined to 0.4 % only in following year.

Table 4.5 ARDL Long-run Estimates for Non-linear Models

Dependent Variable: External Debt		
Variables	**(1)**	**(2)**
Lnfd	0.227	0.141
	(0.145)	(0.123)
Lnrer	1.086***	1.059***
	(0.122)	(0.199)
Lnrgdp	-	-
Lnto	-1.024***	-0.072
	(0.380)	(0.239)
Lntot	0.202	0.624***
	(0.193)	(0.206)
Lncpi	0.888***	1.295***
	(0.239)	(0.181)
vrer1	13.026***	-
	(5.055)	
vrer2	-	2.734***
		(0.869)
vrer1*lnrgdp	-9.082***	-
	(3.354)	
vrer2*lnrgdp	-	-1.261**
		(0.638)
Diagnostic Test		
Bound Test F-statistics	5.419**	5.251**

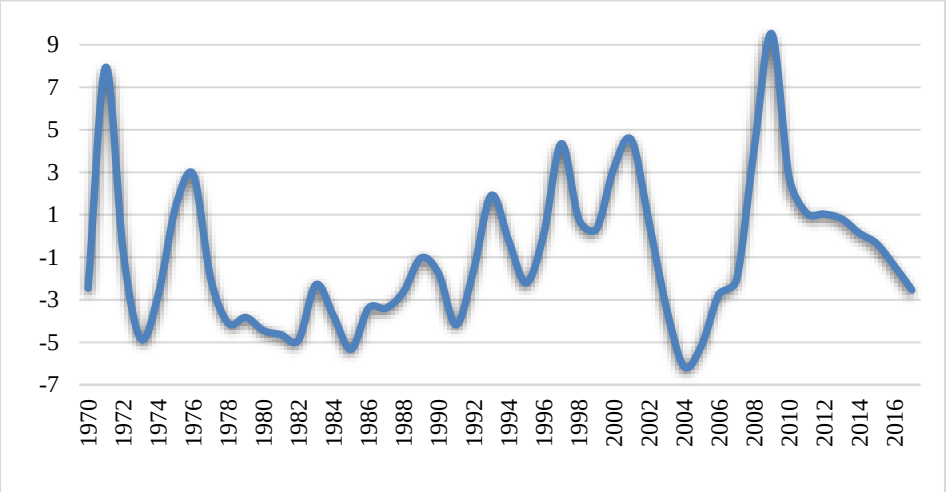
*Notes: 1) Standard errors are reported in parentheses. 2) *, ** and *** indicates the significance at 1 %, 5% and 10% level of significances. 3) The critical values for bound test are based on Narayan (2005) for small sample size i.e., 2.457-3.650 at 5 % level of significance.*

For further analysis of the results, we calculated the marginal effects of exchange rate volatility on external debt on the average level of (log) real GDP growth. The marginal effect at the average value of real GDP (1.53) is calculated at -0.887 from the volatility results of equation (1) of Table 4.5 that shows the effect of exchange rate volatility tends to decline by the given margin when GDP is controlled.[8]

[8] $\frac{\partial lned}{\partial vrer} = coefficientofvrer1 + coefficientofinteractionterm * \overline{lnrgdp}$

Furthermore, the marginal effect of exchange rate volatility on external debt at various level of real GDP growth in Pakistan during 1970 to 2017 is presented in Figure 4.4.[9]

Figure 4.4 Marginal Effect on External Debt at various level of Real GDP Growth



The figure illustrates that the marginal effect of real exchange rate on external debt remained highly volatile in itself during the time period 1970-2017. The figure shows a peak at the year 1971 and 1975 when the effect of real exchange rate volatility on external debt increased sharply due to large domestic currency devaluation and also the East-West partition shrinks the industrial base of the country. Moreover, in 1970s economic growth declined to 3.7 per annum from 6 percent recorded in 1960s, also inflation accelerated with an average of 16 percent during the decade. During 1980s the effect remains relatively low and even negative due to improved economic growth while sharp rise with positive values is again observed during 2008-09 due to the Global Financial Crisis which badly affected the financial and economic condition of the country. This completes the discussion of the empirical findings.

5. CONCLUSIONS AND POLICY IMPLICATIONS

This study focuses on the effect of real exchange rate and its volatility on the external debt in Pakistan during 1970-2017. The exchange rate volatility is computed using three techniques viz; Standard Deviation, GARCH and the Structural shocks based on the SVAR model. The result shows that exchange rate volatility measured through structural shocks is higher than the forecasted and observed volatility. Toda-Yamamoto (1995) test is used to check the long-run

[9] $\frac{\partial lned}{\partial vrer} = coefficientofvrer1 + coefficientofinteractionterm * lnrgdp$

causality among the variables which verifies the existence of long run causality among the variables. The Autoregressive Distributed Lag (ARDL) model is employed for estimation as the variables are integrated of order zero and one. The estimation results overall show that exchange rate and its volatility increases the external debt in Pakistan. Regarding different measures of volatility, the demand side shock to exchange rate has significantly positive impact on external debt. The effect of other control variables on external debt remained same in all equations. Real exchange rate, fiscal deficit, terms of trade and inflation has significantly positive while real GDP growth and trade openness have negative effect on the external debt.

Real exchange rate has a direct effect on external debt through the valuation effect which states that increase in real exchange rate increases the cost of debt obligation by raising the value of foreign currency denominated debt in terms of domestic currency. Similarly, large fiscal deficits increase the external debt burden because it reduces the capacity of government to repay debt due to large non-productive expenditures. Moreover, improvement in terms of trade cannot reduce the external debt in Pakistan due to price elastic and low value-added exports. Furthermore, high inflation has positive effect on external debt because it reduces the demand of exports thus increasing the current account deficit and the external debt. On the contrary, real GDP growth and trade openness helps the country in reducing external debt through increasing the debt repayment capacity of the country.

Certain policy implications flow out from the empirical findings. As the exchange rate volatility tends to increase the external debt due to its risk attached with uncertain movement in exchange rate, a stable exchange rate could be an effective policy instrument to reduce external debt in Pakistan. Using bilateral exchange rates in trade transactions can reduce the risk for the investors and can boost non-debt creating capital inflows. Both the devaluation of domestic currency and its fluctuations tends to discourage the investors to invest in the country therefore currency devaluation is not more recommended as a desirable policy tool in order to improve the economy, as a long-run measure.

Besides, measures need to be taken to control inflation as it aggravates the external debt situation in Pakistan. Controlling aggregate demand through fiscal and monetary policy measures by reducing non-development government expenditures and money supply and improving the aggregate supply can help to combat inflation. Fiscal consolidation through tax revenue generations and expenditure controls is also recommended to decrease the external debt burden. Moreover, the increase in real GDP growth can help in reducing external debt in Pakistan where endemic corruption in public institution, shortage of power and water supply and large non-productive expenditures are obstacle to economic growth in Pakistan. Solving these issues can help the country to boost economic growth and thus to reduce external debt.

References

Ajayi, S. I. (1991). "Macroeconomic approach to external debt: The case of Nigeria." African Economic Research Consortium (AERC), Paper No. 8.

Alam, N. and F. M. Taib (2013). "An Investigation of the Relationship of External Public Debt with Budget Deficit, Current Account Deficit, and Exchange Rate Depreciation in Debt Trap and Non-Debt Trap Countries." European Scientific Journal, Vol. 9, No. 22, pp. 144-158.

Alexander, S. S. (1952). "Effects of a Devaluation on a Trade Balance." Staff Papers, International Monetary Fund, Vol. 2, No. 2, pp. 263–278.

Aqeel, A. and M. Nishat (2006). "The Effect of Exchange Rate Volatilities on Pakistan's Exports." Pakistan Economic and Social Review, Vol. XLIV, No. 1, pp. 81-92.

Asonuma, T. (2016). "Sovereign Defaults, External Debt, and Real Exchange Rate Dynamics." International Monetary Fund, Washington, D.C.

Bacha E.L. (1990). "A Three-Gap Model of Foreign Transfers and the GDP Growth Rate in Developing countries." Journal of Development Economics, Vol.32, pp 279-296.

Bahmani-Oskooee. M and A. Gelan (2017). "Exchange-rate Volatility and International Trade Performance: Evidence from 12 African Countries." Munich Personal RePEc Archive, Germany.

Balassa, B. (1965)." Trade Liberalization and Relieved Comparative Advantage." Manchester Scholl of Economic and Social Studies, Vol. 33, Pp 99-123.

Bickerdike, C. F. (1920). "The Instability of Foreign Exchange." The Economic Journal, Vol. 30, No. 117, pp. 118–122.

Bollerslev, T. (1986). "Generalized Autoregressive Conditional Heteroskedasticity." Journal of Econometrics, Vol. 31, pp.307-327.

Chenery, H. B. and A. M. Strout (1966). "Foreign Assistance and Economic Development." American Economic Review, Vol. 56, No. 4, pp. 679-733.

Chisari, O. O. and J. M. Fanelli (1990). "Three-Gap Models, Optimal Growth and the Economic Dynamics of Highly Indebted Countries." CEDES-CONICET (Argentina), pp. 176-206.

Chowdhury, A. R. (1993) "Does exchange rate volatility depress trade flows? Evidence from Error –correction models" The Review of Economics and Statistics, Vol. 75, No. 4, pp. 700-706.

Clarida, R. and J. Gali (1994). "Sources of Real Exchange Rate Fluctuations: How Important are Nominal Shocks?" Carnegie-Rochester Conference Series on Public Policy, Vol. 41, pp. 1-56.

De-Grauwe, P. (1988). "Exchange Rate Variability and the Slowdown in Growth of International Trade." Staff Papers, International Monetary Fund, Vol. 35, No. 1, pp. 63-84.

Ishfaq, M. and M. A. Chaudhary. (1999). "Fiscal Deficit and Debt Dimensions of Pakistan." The Pakistan Development Review, Vol. 38, No. 4, pp.1067-1080.

Johnson, H. G. (1972). "The Monetary Approach to Balance-of-Payments Theory." Journal of Financial and Quantitative Analysis, Vol. 7, No. 2, pp. 1555–1572.

Kasidi, F. and A. M. Said (2013). "Impact of External Debt on Economic Growth: A Case Study of Tanzania." Advances in Management & Applied Economics, Vol. 38, No. 4, pp. 59-82.

Kemal, A. R. (2001). "Debt Accumulation and Its Implications for Growth and Poverty." The Pakistan Development Review, Vol. 40, No. 4, pp. 263-281.

Khan, A. H. (2016). "Rising Debt: A Serious Threat to the National Security." S³H Working Paper, 03/2016, National University of Sciences and Technology (NUST), Islamabad, Pakistan.

Khan, A. J., P. Azim, and S. H. Syed (2014). "The Impact of Exchange Rate Volatility on Trade: A Panel Study on Pakistan's Trading Partners." The Lahore Journal of Economics, Vol. 19, No.1, pp. 31–66.

Kizilgol, O. A. and E. Ipek (2014). "An Empirical Evaluation of the Relationship between Trade Openness and External Debt: Turkish Case." International Economic Review, Vol. 6, No.1, pp.42-58.

Koray, F. and W. D. Lastrapes (1989). "Real Exchange Rate Volatility and U.S. Bilateral Trade: A VAR Approach." The Review of Economics and Statistics, Vol. 71, No. 4, pp. 708-12.

Meade, J. (1951). "The Removal of Trade Barriers: The Regional versus the Universal Approach." Economica, Vol. 18, No. 70, pp. 184–198.

Metzler, L. A. (1945). "Stability of Multiple Markets: The Hicks Conditions." Econometrica: Journal of the Econometric Society, Vol. 13, No. 4, pp. 277–292.

Mundell, R. A. (1963). "Capital Mobility and Stabilization Policy under Fixed and Flexible Exchange Rates." The Canadian Journal of Economics and Political Science, Vol. 29, No. 4, pp. 475-485.

Narayan P. K. (2005). "The Saving and Investment Nexus for China: Evidence from Co Integration Tests." Applied Economics, Vol.39, pp. 979-990.

Nasir, M. and W. Malik (2011). "Structural Decomposition of Exchange Rate Shocks in Pakistan: An Empirical Investigation using SVAR Methodology." Transition Studies Review, Vol. 18, No. 1, pp. 124-138.

Neaime, S. (2010). "Sustainability of MENA Public Debt and the Macroeconomic Implications of the Recent Global Financial Crises." Middle East Development Journal, Vol. 2, No. 2, pp.1-25.

Osuji, L. O. and S. O. Olowolaymo (1998). "The Impact of Trade Liberalization Policy on Sub Saharan African Countries' Debt Burden." African Economic and Business Review, Vol. 1, No. 2, pp. 59-73.

Pakistan, Govt. of (2018). Pakistan Economic Survey, Ministry of Finance, Islamabad: Various Issues.

Pesaran, M. H., Shin, Y. and Smith, R. J. (2001). "Bound Testing Approaches to the Analysis of Level Relationships." Journal of Applied Econometrics. Vol. 16, pp. 289-326.

Quibria, M. G. (1980). "Two Gap Models of Foreign Aid: A Survey." Journal of Economic Development, Vol. 5, No. 1, pp. 67-89.

Rehman, A., I. H. Adil, and H. Anis (2012). "Exchange Rate, J Curve and Debt Burden of Pakistan." Pakistan Economic and Social Review, Vol. 50, No. 1, pp. 41-56.

Robinson, J. (1947). Essays in the Theory of Employment, published by Basil Blackwell, Oxford: United Kingdom.

Samuelson, P.A. (1964). "Prove that Properly Anticipated Prices Fluctuate Randomly." Industrial Management Review, Vol.6, No.2, pp 41-49.

Tille, C. (2003). "The Impact of Exchange Rate Movements on U.S. Foreign Debt." Current Issues in Economics and Finance, Vol. 9, No. 1, pp. 1-8.

Toda H.Y. and T. Yamamoto (1995). "Statistically Inference in Vector Auto Regressions with Possibility Integrated Process." Journal of Econometrics, Vol.66, pp 225-250.

Waheed, A. (2017). "Determinants of External Debt: A Panel Data Analysis for Oil and Gas Exporting and Importing Countries." International Journal of Economics and Financial Issues, Vol. 7, No.1, pp.234-240.

World Bank (2018). World Tables, New York: Oxford University Press, Various Issues.

Zafar, S. and M. S. Butt (2008). "Impact of Trade Liberalization on External Debt Burden: Econometric Evidence from Pakistan." MPRA Paper No. 9548, Munich Personal RePEc Archive, Germany.

Zakaria, M. (2012). "Interlinkages between Openness and Foreign Debt in Pakistan." Doğuş Üniversitesi Dergisi, Vol. 13, No. 1, pp. 161-170.