Exchange Rate Volatility and Import Demand Function: A Comparative Analysis of Selected SAARC Countries

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Abstract

This study used the panel ARDL approach and GARCH model to study the impact of exchange rate volatility on the import demand in the SAARC region covering Bangladesh, India, Pakistan and Sri Lanka from 1980 to 2014,. Our results show that GDP and relative prices have positive impact on imports in selected countries, but in case of India relative prices has negative impact on imports. While REER and VREER volatility nave negative impact on imports of the sample SAARC countries, while in case of Bangladesh VREER has positive relationship with import demand. It is recommended to the policy maker, that Pakistan should need to trade with the countries in their own currency rather than vehicle, which brings less volatility in exchange rate as well as in imports and hence in make less volatile domestic market dynamics.

Keywords: volatility of exchange rate**,** Import demand, Economic growth, SAARC
JEL Classification: C32, F31, F10, F41.

1. Introduction

The prices of goods and services in different countries are influenced by exchange rate between countries. The exchange rates affect the volume of transaction that take place between the countries. Most of the low income countries' exchange rate fluctuates sharply, due to which, there is a lot of uncertainties in their trade. However, these uncertainties can be addressed by using a single common currency as the vehicle currency between them[1].

Many studies have examined the impact of exchange rate volatility on the import demand of the countries, but there is still no hard and fast method found that is appropriate to all of the researchers. Different findings can be briefly mention here as; some studies have found that exchange rate volatility impede the trade between the countries, but in regression the coefficient of volatility is statistically insignificant Korey and Lastropes (1989), Deveriux and Engel (2002); Bachetta and van Wincop (1998); Aristotilous (2001) and Tenriyro (2004).

Some of the studies (Saocier and Lee (2005), Arizi *et al.* (2008); Tamerisa *et al*, (2005); Bauk (2004); Vergel (2002); Duganlar (2002); Boon and Hook (2000) had established that

[1] ***Note:*** This study is extracted from the student **(Aminah Ghulam Nabi)** thesis title" **Exchange Rate Volatility and Import Demand Function: A Comparative Analysis of selected SAARC Countries,** Department of economics university of Punjab, Lahore 2015.

exchange rate volatility has significant negative effect on trade of the countries. While, numerous studies have noted that exchange rate volatility have positive insignificant influence on trade in countries and other stream of studies (Lea and Hwong (2005); Peal and Assery (1991); Méndiz and Brade (1988); Broks and McKenze (1997); Kasmen and Kasman (2005); McKenze (1998); Eckwart and Brol had confirmed positive and statistically significant relationship between exchange rate volatility and trade of the countries. These will lead the research question of does exchange rate volatility affects the import demand in Pakistan and other selected SAARC countries (India, Bangladesh, and Sri Lanka)?

To answer this question, the present study contributes to the existing literature by using GARCH and long and short run analysis. Therefore, it is very important to check the sign and strength of the relationship between the volatility of exchange rate and import demand of Pakistan and compare it with some selected countries in SAARC countries (Pakistan, India, Bangladesh, and Sri Lanka).

2. Literature Review

There are many studies at national and international level has checked the relationship between exchange rate volatility and import demand for various countries, and they had estimated different potential coefficients for different countries. Here is the summary of some studies: Cheong (2003) studies the import demand function for the countries of Organization of Islamic Conference (OIC). The import demand function is derived from a dynamic optimizing inter-temporal approach. And select 18 countries due to absence of data. Outcomes of bounds test showed that import volume, relative prices and domestic real activities of the 10 sample countries are co-integrated. In the long run, estimated price and domestic activities are inelastic. The estimated elasticities of relative price and real income for Pakistan are discovered inelastic. Price elasticity is only elastic for Algeria. Estimated long run price elasticities for Pakistan and are below unity which suggested that large relative price swings are necessary to produce an appreciable reallocation of trade flows. The countries where price elasticities are inelastic (with negative domestic activity elasticities) government should promote production of import substitute goods, particularly developed resource based industries that has higher import components, may be used to suppress the increased import demand.

Emran and Shilpi (2010) examined the impact of import demand in developing countries which are India and Sri Lanka. The author has used the GDP-growth as the variable that indicates the economic growth of country. As the data for the GDP growth is not available on quarterly basis the author has used the data generated by some other researchers. So this study is open to all those critics that are made over that study. The authors have used the autoregressive distributed lag for the empirical estimation. The exchange rate volatility is measured by the author themselves by the use of GARCH model. The estimated exchange rate volatility is used in the ARDL model, along with other interested and control variables. The empirical results showed that the exchange rate volatility has the insignificant positive impact by on the major macroeconomic indicators, which is against the theory. Based on the results, the authors have concluded that the economic performance is very sensitive to the

exchange rate volatility and they recommended to the policy makers that they should formulate the policies that are very conducive for the better economic environment through stabilizing the exchange rate.

Chang *et al*. (2011) examines the determinants of import demand for South Korea. Data used over the period 1980 to 2000. Robust estimation method employed which referred as unrestricted error correction model to reanalyze the long run relation between the import demand and its determinants for South Korea. Results showed that imports volume, relative prices and income are all cointegrated. The estimated long and short run elasticities of import demand function with respect to relative prices and income are -0.2 (-0.05) and 1.86 (0.86). The implication of study is that neither monetary policy nor fiscal policy may be expended and used as instruments to hold and maintain the trade balance in South Korea's favor during the sample period.

Samimi, A. J. *et al*, (2012) views that the impact of the exchange rate volatility on the imports of the Iran. The authors have argued, like most of the other economists, that the economic growth is much driven from the growth of the trade in any country. Keeping in view this stance, the authors check the importance of the imports and exports for the Iranian economy. They check the impact of the exchange rate volatility on the import demand in Iran over the period of 1979-2007. The authors have estimated the exchange rate volatility by the GARCH model, and then that estimated exchange rate uncertainty is used with some other variables in the regression of the imports as the dependent variable. As the given expectation by the theory, the empirical estimates showed that the exchange rate uncertainty have the significant negative impact on the import demand of the economy.

Chani and Chaudhary (2012) investigate the impact of various macro-economic elements on the import demand function of Pakistan. They check the impact of the household consumption, government consumption, the net exports and the relative prices of the imports on the import demand function of Pakistan. They have used the data over the period of 1980 to 2010. They have used the autoregressive distributed lag technique in order to check the long run relationship between the variables, and the error correction model for the short-run analysis. They have found that the all the macro-economic variables have positive significant impact on the import demand function of Pakistan, while the relative prices has insignificant impact on the import demand in Pakistan. The most significant impact is driven by the government consumption, than all the other final consumption such that the household consumption and the investment demand in Pakistan.

Tirmazee and naveed (2014) investigate the import demand for Pakistan. Coefficient of import demand function estimated using vector error correction and impulse response function. Data used from 1970 to 2010 for measuring import demand. Result showed that income and relative prices are not good long run determinants of import demand. The residual of conventional import model compared with foreign exchange volatility and term o trade as determinants of demand for imports model. The

reasons of rends in imports to GDP ratio also analyzed in paper. Analysis showed that falling net capital inflow is the reason of this falling of import to GDP ratio.

ORG, W. I. (2015) have studied the impact of the exchange rate volatility on the trade between the Pakistan and India. Empirically they check the relationship between the trade, inflation and interest rate in India and Pakistan. They have used the data over the period of 1971-2013. The authors have found that, if the exchange rate increases more than the inflation in the country, this means that there is cost push for the imported products in the country. If the inflation is higher this will result in higher interest rate by the Fischer equation. As an important determinant, the higher interest rate will hamper the investment in the country. The authors check the effects of the inflation, interest rate and the exchange rate on the imports and exports of these two countries. The authors have used the auto regressive distributed lag (ARDL) approach to co-integration for the purpose of finding the long-run relationship between the above mentioned variables. For the selection of the bound testing the authors have performed the entire prerequisite, such that they have check the variables for the possible non stationarity and found that some of the variables are stationary and some are not.

Theoretical Framework

There are many studies that discuss the impact of the exchange rate volatility on the trade of the countries. Some of these research studies suggest that the exchange rate volatility may have the positive impact for the trade of the country and most of them suggest that the exchange rate volatility have the negative impact on the trade of the economies. The studies on the some countries shows that the exchange rate volatility positively affects the trade of that countries, while in most of the countries data shows that the exchange rate volatility affects the trade of the countries negatively. Different studies for the different countries give the different rationale for this discrepancy between their results.

As described above, the exchange rate volatility has the dubious effect on the import export of the countries. (Kasman and Kasman (2005); McKenzie (1998); Eckwert and Broll (1999)) have the positive and some (Kohlhagen, 1978; Cote, 1994; Baron, 1976; Grauwe, 1996; Vergil, 2002; Zeng, 2004; Saucier, 2007) have found the negative relationship between the import demand and the exchange rate volatility. The two major debates in this regards are as: the first debate concerns about the rationale that how the exchange rate volatility has the positive impact on the import of the countries and the second tells how the exchange rate volatility affects the imports of the countries negatively. According to the first argument, that the exchange rate volatility means the uncertainty and the prevailed risk in the international trade, so the peoples involve in the international trade will try to enhance the imports and the exports in order to compensate the loss incurred due to the exchange rate volatility. The researcher of this school of thought claims that the risk avert and the risk neutral agents will enhance the trade related activities in order to compensate the losses

occurred to the investor due to the intensified volatility of exchange rate. The volatility of exchange rate have attracted the concentration of the policy makers for many year, as countries have formulate many of the schemes and programs to deal with the high volatility of exchange rate. Some of the institutes are also established in order to deal with the high volatility of exchange rate. Some examples of such institutes involve the trade unions, such as North American Free Trade Area (NAFTA), and many of the institution the Europe, such as the European free trade. Some other schemes involve the dollarization, and the currency board in the countries. But all these schemes are failed in some sense, as the main drawback the difficult and complex entry rule in the unions. So all in all the volatility of exchange rate have major concern for the policy maker over the year, in order to stabilize the trade in the countries.

So keeping in view the fact that the volatility of exchange rate has major effect for the trade of the countries, many of the studies in the different countries have checked the empirical sign of the volatility of exchange rate in the import demand equation. Since single theory, have not given the exact direction of relationship between the volatility of exchange rate and the import demand, as some countries have the negative and some have the positive relationship between the volatility of exchange rate and the import demand of the respective countries. So the empirical estimation is supplement to the theoretical relationship between the volatility of exchange rate and the import demand of the countries (Crowley *et al.* 2003; Aizenman, 1992; Camp Goldberg, 1993 and Goldberg, 1995).

3. Model specification

The literature to find the economic factors that influence the imports in any country is much saturated. Many of the studies have examined the traditional factors, such as the price level and the income of the country, as the major determinants of the imports in the countries. In recent past, some of the studies have included the exchange rate as another major factor that can influence the inflow stream of the imports in many countries. But it is stated, after careful explore, that there are not much literature is available, that can check the impact of the volatility of the exchange rate on the import demand stream in countries and especially in Pakistan. Further it is very important to note that, there is no study available that estimate the impact of the volatility of the exchange rate on the import demand in Pakistan and compare it with the some selected countries in the SAARC (India, Bangladesh and Sri Lanka).

Now in this study, we have tried to investigate the impact of the volatility of exchange rate on the import demand in Pakistan, and then we will compare the resultant coefficient if the volatility of exchange rate, with the coefficient of the volatility of exchange rate attained from the regression of the import demand from the selected SAARC countries (India, Bangladesh and Sri Lanka). The estimate model for all the selected countries are as

$$LnIMP_t = \beta_0 + \beta_1 LnGDP_t + \beta_2 LnRPL_t + \beta_3 LnREER_t + \beta_4 LnVREER_t + \varepsilon_t \ldots\ldots\ldots (1)$$

Where, for each equation:
IMP= real imports of respective country
GDP= GDP of respective country
RPL= relative price level in respective country[2]
REER= real effective exchange rate.
VREER= volatility of the exchange rate of the respective country.
ε_t= regression equation stochastic error term for respective country

All these models, with the similar specification, are used for the analyzing the direction and strength of the volatility of exchange rate and the import demand of above mentioned counties.

3.1 Data sources

The data on the variables are collected over the period of the 34 year from the 1980-2014. The same set of the variables are used for all the selected countries to make the easy comparison between the countries, which is one of the major task of the study. Most of the data is collected from the world development indicator. Data on the gross domestic product, import volume, import value index and the consumer price index is collected from the world development indicator for all the selected countries. However the data for the real effective exchange rate is collected from the central bank of the selected countries. For example the data for the real effective exchange rate for Pakistan is collected from the state bank of Pakistan. The data for the real effective exchange rate for India is collected from the reserve bank of India. The data for the real effective exchange rate for Bangladesh is collected from the Bangladesh bank. The data for the real effective exchange rate for Sri Lanka is collected from the central bank of Sri Lanka.

3.2 Tests of Stationarity

As for the present study is concerned, the study uses the time series data over the period of 1980 to the 2014 (annually), so the data possibly carry the non-stationarity element in it. So it is very important to check all the variables for the possible non-stationarity between the variables. If the variables are non-stationary, we will check for the possible cointegration among the variables by using the appropriate available technique, as it is necessary before one have another option. If one not checks the co-integration among the variables and applies the first difference operator in order to get rid of the non-stationary from the data set, it is possible that the long-run relationship may eliminate from the data set (Engle, Granger 1989).

The most possible situations of the estimated Dickey Fuller test are following:

$$\Delta Z_t = \beta Z_{t-1} + \sum_{i=1}^{p} \alpha_i \Delta Z_{t-i} + u_t \ldots\ldots\ldots\ldots\ldots\ldots (2)$$

[2] It is calculated as the ratio of the import value index of the country to the inflation rate of foreign country. This shows the difference between the prices of the countries.

$$\Delta Z_t=\gamma_0+\beta Z_{t-1}+\sum_{i=1}^{p} \alpha_i \Delta Z_{t-i}+u_t \ldots\ldots\ldots\ldots\ldots\ldots\ldots(3)$$

$$\Delta Z_t=\gamma_0+\beta Z_{t-1}+\beta_1 t+\sum_{i=1}^{p} \alpha_i \Delta Z_{t-i}+u_t \ldots\ldots\ldots\ldots\ldots\ldots\ldots(4)$$

Same three equations are trailed for all the available variables in testing the stationarity of the variables. The selection of the equation from these depends upon the trend, constant availability in the variables. The lags are selected on the basis of their significance (data-mining).

3.3 Pesaran and Shin Bound testing

Spurious regression (meaning less regression results) results are quite possible, when we have the non-stationarity element in our data sets. In spurious regression, the data may have any type of trend in it and the coefficients are even not statistically significant individually, but the model shows overall goodness of fit. The clear understanding of the ARDL approach to cointegration require that one must consider the following possible cases, that one may encounter while performing his empirical analysis.

- All the considered variables in the regression model are stationary, that the considered variables are integrated of order zero, than the data must follow the assumptions of the ordinary least square and we can apply the OLS directly.
- All the considered variables in the regression model are non-stationary that the considered variables are integrated of order one, than the data must not follow the assumptions of the ordinary least square as if there is no cointegration among the variables and we cannot apply the OLS directly. We must apply the first difference operator to make the data in accordance with the assumptions of ordinary least square.
- All the considered variables in the regression model are non-stationary that the considered variables are integrated of order one, and then the data may follow the assumptions of the ordinary least square as if there is cointegration among the variables and we can apply the OLS directly.

But forth situation is very interesting one, in which one have the mixture of the variables that are integrated of order one and integrated of order zero. It is the case when we cannot apply the Johansen cointegration approach and may use the ARDL approach to cointegration to check the cointegration among the variables.

In my study, I have used the ARDL approach to cointegration, because of the mixture of I (1) and I (0) variables. It is also very important to note one very important assumption of the ARDL approach to cointegration that is, one must check the variables for integrated of order two. The key assumption of the ARDL approach to cointegration is that, there is no variable in the data set that is integrated of order two. So to satisfy the assumption I performed the “Augmented-Dickey fuller” test. All the estimation results are presented in the next chapter.

3.4 GARCH model

One very important variable, volatility of the exchange rate, is not observable, so we need to estimate the variable by the method that is guided by the available literature. I have used the GARCH model to estimate the volatility of the exchange rate. This method is used by many of the researcher as described in the literature review in chapter 2. The procedure is given by the Bollerslev (1986). The GARCH model is developed after the Granger critique that the ARCH- auto regressive conditional heteroskedasticity- looks more like the moving average that the autoregressive. The GARCH model has the following specification, and the same specification in used in our study.

$$Z_t = \beta_0 + \beta' Y_t + \varepsilon_t \ldots\ldots (5)$$

$$\varepsilon_t | \Omega_t \sim iidN(0, h_t) \ldots\ldots (6)$$

$$h_t = \alpha_0 + \sum_{i=1}^{p} \alpha_i h_{t-i} + \sum_{i=1}^{q} \beta_i u^2_{t-j} \quad \ldots.(7)$$

Here the $Z_t$is the variable forwhich we want to generate the volatility index, here the exchange rate in our case. We have made the variables stationary before we put it in our analysis. Y_t is the lagged value of the dependent variable. We have used the simple GARCH model, and have not included the other independent variables in our analysis. In equation 6, the error term has the zero mean, but the variance is allowed to vary across the observations. The variance of the error term is dependent on the previous error term and the variance of the past error term too, it is shown in equation 7. The volatility of the exchange rate is attained in this fashion by using GARCH (1,1) and then used in each of the regression for the different countries.

4. Empirical Analysis

First of all, the stationarity of the variables, used in all the countries regression, is checked. In this regard, first of all the stationarity of the Pakistan's data checked. The following table shows the stationarity of the variable.

Table 1

Unit root test (Pakistan)

Variable	Test equ.	Levels			Test equ.	First difference		
		ADF	5%-critical value	P-value		ADF	5%-critical value	p-value
Imports	C & T (2)	-2.537	-3.572	0.3099	C (2)	-3.321*	-2.983	0.0139
GDP	C & T (2)	-1.976	-3.572	0.6142	C (1)	-4.428*	-2.980	0.0003
RPL	C & T (2)	-2.243	-3.572	0.4657	No cons (1)	-3.504*	-1.950	

REER	**C & T (2)**	-0.750	-3.572	0.9697	**No cons (6)**	-2.548**	-1.950	
VREER	**C & T (2)**	-0.320	-3.572	0.9890	**C (2)**	-3.833**	-3.576	0.0150

Note: In first column, the name of the variables is given. In second column, the format of the estimated equation is given. In third, fourth and fifth column ADF, critical value and the p-value are given. (The variables significant at, one, five and ten percent respectively, are represented by, *, ** and *** respectively.

After the analysis of the table, we have found that, none of the variable is stationary at the level as shown in the first half of table. In the second half, the differenced data is given and have found that all the variables in the differenced form are stationary. There is no variable that is non-stationary even at first difference.

Secondly the stationarity of the variables of the Bangladesh is check in the third table, given below.

Table 2

Unit root test (Bangladesh)

Variable	**Test equ.**	**Levels**			**Test equ.**	**First difference**		
		ADF	**5%-critical value**	**P-value**		**ADF**	**5%-critical value**	**p-value**
Imports	**C & T (1)**	-2.982	-3.568	0.1371	**C (1)**	-4.348*	-2.980	0.0004
GDP	**C & T (2)**	-0.209	-3.572	0.9914	**C (1)**	-3.967*	-2.980	0.0016
RPL	**C & T (2)**	-3.763**	-3.572	0.0185	Stationary at level			
REER	**C (1)**	-2.466	-2.978	0.1241	**C (1)**	-4.125**	-2.980	0.0009
VREER	**C (2)**	-4.157*	-2,980	0.0008	Stationary at level			

Note: In first column, the name of the variables is given. In second column, the format of the estimated equation is given. In third, fourth and fifth column ADF, critical value and the p-value are given. (The variables significant at, one, five and ten percent respectively, are represented by, *, ** and *** respectively.

After the analysis of the table, we have found that, two of the variables (the relative prices and the real effective exchange rate) are stationary at the level as shown in the first half of table. In the second half, the differenced data is given and have found that all the remaining variables in the differenced form are stationary. There is no variable that is non-stationary even at first difference. So in the case of the Bangladesh, it is found that, we have mixture of the integrated of order one and integrated of order zero variables.

Thirdly the stationarity of the variables of the Indian-data is check in the fourth table, given below.

Table 3

Unit root test (India)

Variable	Test equ.	Levels			Test equ.	First difference		
		ADF	5%-critical value	P-value		ADF	5%-critical value	p-value
Imports	C & T (2)	-2.219	-3.572	0.4792	C (1)	-3.059**	-2.980	0.0297
GDP	C & T (2)	-1.674	-3.572	0.7622	C (1)	-2.899**	-2.980	0.0454
RPL	C & T (2)	-1.888	-3.572	0.6610	No cons (0)	-4.233*	-1.950	
REER	C (1)	-1.849	-2.978	0.3563	No cons (1)	-3.423*	-2.649	
VREER	C (2)	-2.285	-2.980	0.1770	No cons (2)	-3.455*	-1.950	

Note: In first column, the name of the variables is given. In second column, the format of the estimated equation is given. In third, fourth and fifth column ADF, critical value and the p-value are given. (The variables significant at, one, five and ten percent respectively, are represented by, *, ** and *** respectively.

After the analysis of the table, we have found that, none of the variable is stationary at the level as shown in the first half of table. In the second half, the differenced data is given and have found that all the variables in the differenced form are stationary. There is no variable that is non-stationary even at first difference.

Fourthly the stationarity of the variables of the Sri-Lankan-data is check in the fifth table, given below.

Table 4

Unit root test (Sri Lanka)

Variable	Test equ.	Levels			Test equ.	First difference		
		ADF	5%-critical value	P-value		ADF	5%-critical value	p-value
Imports	C & T (1)	-2.738	3.568	0.2206	C (1)	-4.068*	-2.980	0.0011
GDP	C & T (2)	-1.078	-3.572	0.9327	C (1)	-2.986**	-2.980	0.0470
RPL	C & T (2)	-3.687**	-3.572	0.0233	Stationary at level			
REER	C & T (2)	-1.672	-3.572	0.7629	C (1)	-3.339**	-2.980	0.0132
VREER	C (0)	-3.081**	-2.975	0.0280	Stationary at level			

Note: In first column, the name of the variables is given. In second column, the format of the estimated equation is given. In third, fourth and fifth column ADF, critical value and the p-value are given. (The variables significant at, one, five and ten percent respectively, are represented by, *, ** and *** respectively.

After the analysis of the table, we have found that, two of the variables (The relative prices and the volatility of real effective exchange rate) are stationary at the level as shown in the first half of table. In the second half, the differenced data is given and

have found that all the remaining variables in the differenced form are stationary. There is no variable that is non-stationary even at first difference. So in the case of the Sri Lanka, we have found that, we have mixture of the integrated of order one and integrated of order zero variables.

4.2 Long run estimation

Here I have presented the long-run estimates of the regression equation given above for four countries separately.

Table 5

Long run estimates

Dependent variable: Imports (IMP)				
	Pakistan	**India**	**Sri Lanka**	**Bangladesh**
GDP	**0.244*** **[4.35]** **(0.000)**	**1.443*** **[11.23]** **(0.000)**	**0.697*** **[15.22]** **(0.000)**	**0.783*** **[12.17]** **(0.000)**
RPL	**0.335*** **[5.12]** **(0.000)**	**-0.093** **[-0.68]** **(0.499)**	**0.169** **[1.18]** **(0.246)**	**0.462*** **[3.66]** **(0.000)**
REER	**-0.059** **[-0.28]** **(0.783)**	**-0.562**** **[-2.18]** **(0.037)**	**-0.112** **[-0.42]** **(0.774)**	**-0.686*** **[-2.67]** **(0.01)**
VREER	**-0.287**** **[-2.36]** **(0.025)**	**-.0414**** **[-2.00]** **(0.046)**	**-0.097***** **[-1.97]** **(0.062)**	**0.0128** **[0.432]** **(0.769)**
Cons	**18.35*** **[10.48]** **(0.000)**	**-11.15**** **[-2.42]** **(0.022)**	**7.0611**** **(0.000)**	**6.95*** **[3.31]** **(0.002)**
Goodness of fit	**R^2= 0.93** **Obs= 35** **Prob> F= 0.00**	**R^2= 0.98** **Obs= 35** **Prob> F= 0.00**	**R^2= 0.94** **Obs= 35** **Prob> F= 0.00**	**R^2= 0.97** **Obs= 35** **Prob> F= 0.00**

Note: in first column, the name of the variables is given. In second, third, fourth and fifth column are for the regression equations of Pakistan, India, Sri Lanka and Bangladesh respectively. "[-]" carries the t-value of the

coefficient and the "(-)" carries the respective p-value. (The variables significant at, 1, 5 and 10 % respectively, are represented by, *, ** and *** respectively.

4.3 Short run error correction model

Here I have presented the short run error correction estimates of the regression equation given above for four countries separately. The used equation is as:

$$\Delta LnIMP_t = \beta_0 + \beta_1 \Delta LnGDP_t + \beta_2 \Delta LnRPL_t + \beta_3 \Delta LnREER_t + \beta_4 \Delta LnVREER_t + \beta_4 \varepsilon_{t-1} + u_t \ldots\ldots (12)$$

Where the ε_{t-1} is the lagged error term for each the country, derived from the equation 1. Though these results are of little interest, except of the lagged error term, but they are presented here briefly. Our main interest is to check the long run behavior of the volatility of the exchange rate in the SAARC economies.

Table 6

Short run error correction mechanism

Dependent variable: D. Imports (IMP)				
	Pakistan	**India**	**Sri Lanka**	**Bangladesh**
D.GDP	**0.107** **[0.54]** **(0.596)**	**0.803*** **[3.36]** **(0.002)**	**0.52*** **[6.08]** **(0.000)**	**0.67*** **[4.22]** **(0.00)**
D.RPL	**0.304*** **[3.01]** **(0.006)**	**0.292***** **[1.73]** **(0.095)**	**0.26*** **[4.08]** **(0.000)**	**0.28***** **[1.86]** **(0.07)**
D.REER	**-0.011** **[-0.05]** **(0.906)**	**-0.54***** **[-1.83]** **(0.079)**	**0.085** **[0.48]** **(0.636)**	**-0.46** **[-1.46]** **(0.154)**
D.VREER	**-0.285*** **[-3.07]** **(0.005)**	**-.021** **[-0.67]** **(0.507)**	**-0.046**** **[-1.91]** **(0.06)**	**.009** **[0.02]** **(0.728)**
L.resid	**-0.732*** **[-3.76]** **(0.001)**	**-0.172*** **[-2.14]** **(0.007)**	**-0.16**** **[-2.04]** **(0.05)**	**-0.44*** **[-2.67]** **(0.01)**

R-square	**R^2= 0.58** **Obs= 34** **Prob> F=0.000**	**R^2=0.57** **Obs= 34** **Prob> F=0.000**	**R^2= 0.65** **Obs= 34** **Prob> F=0.000**	**R^2=0.50** **Obs= 34** **Prob> F=0.000**

Note: in first column, the name of the variables is given. In second, third, fourth and fifth column are for the regression equations of Pakistan, India, Sri Lanka and Bangladesh respectively. "[-]" carries the t-value of the coefficient and the "(-)" carries the respective p-value. (The variables significant at, 1, 5 and 10 % respectively, are represented by, *, ** and *** respectively.

4.4 Results discussion

The long run estimates and the short run error correction mechanism are shown in the two tables in the past two pages in table 10 and in table 11 respectively. First of all the stationarity of the variables is check by the use of the Dickey fuller test and after founding that we have the mixture of the stationary and non-stationary variables, we have estimated the ARDL, bound test statistics to check the possible cointegration among the variables. The ARDL equation is estimated on the basis of the significance of the variables. In other words, the lag length in the ARDL equation is started from the most general form and then dropped the variable and the lag length those are statistically insignificant. After measuring the most plausible ARDL equation we have estimated the bound test. All the bound test statistics shows that, there is long run relationship between the variables and we can perform the short run and long run estimates.

After taking the intuition from the bound test, in section 5.3, we have estimated the long run and the short run estimate of the regression equation for all four sample countries in section 5.4 and 5, 5 respectively of chapter 5. Though the short run results are of little interest, except of the lagged error term, but they are presented above briefly. Our main interest is to check the long run behavior of the volatility of the exchange rate in the SAARC economies.

In the first column of the long run estimates, it is shown that the gross domestic product behave positively with the imports in Pakistan. It is shown that as the gross domestic product increases by one percent the imports will also rise by 0.24 percent. It is expected that as the income of the country will raise the imports of that country will also rise, so results follow the theory's prediction. (Theory says that as the income of the country will rise the imports of the general public will also be rise). The coefficient of GDP is statistically significant in the regression equation. Secondly the relative price of imports is given in the second number. Higher the value of the relative price, the lower the imports in the country. The fact of the negative relationship between the relative price and the import demand in the country is that, as the ratio is higher this means that the foreign inflation is higher than the inflation prevail domestically and this will lead to lower the imports in the country.

The empirical result of our study shows that the relative price does not have the expected sign. This may be due the fact that Pakistan's major exports are the oil and

the machinery that does not have influence by the price level in the countries. This finding is same as of many studies which found that the relative price does not behave accurately (in accord to the theory) with the import demand. Thirdly the real effective exchange rate is present. It is expected that the real effective exchange rate behave negatively to the volume of the imports in any country. The empirical result follows the theoretical expectation, but the coefficient is statistically insignificant. The major concern of the study is the coefficient of the volatility of the exchange rate. Theory does not give the clear gesture about the sign of the coefficient, as described above. There are four possible results and all four results are equally following the theoretical perception. The most frequent case is that the volatility of the exchange rate behaves negatively with the volume of the imports in the country. So the coefficients of the volatility of the exchange rate in the case of Pakistan follow the theory, and have the statistically significant negative sign. The coefficient shows that, as the risk premium (volatility of exchange rate) increases by one percent the imports of Pakistan will decrease by 0.28 percent. Our results match with the Koray and Lastrapes (1989), and Tenreyro (2004).

In the second column of the long run estimates, it is shown that the gross domestic product behave positively with the imports in India. It is shown that as the gross domestic product increases by one percent the imports will also rise by 1.44 percent. The coefficient is statistically significant. Secondly the relative price of imports is given in the second number, shows that as the relative price raises the imports in India decreases, but the coefficient is statistically insignificant. Thirdly, the real effective exchange rate presented. It is expected that the real effective exchange rate behave negatively to the volume of the imports in any country. The empirical results follow the theoretical expectation and the coefficient is statistically significant. Again, the major concern of the study is the coefficient of the volatility of the exchange rate. Theory does not give the clear gesture about the sign of the coefficient, as described above. There are four possible results and all four results are equally following the theoretical perception. The most frequent case is that the volatility of the exchange rate behaves negatively with the volume of the imports in the country. The coefficients of the "volatility of the exchange rate" in the case of India, follow the theory, and have the statistically significant negative sign. The coefficient shows that, as the risk premium (volatility of exchange rate) increases by one percent the imports of India will decrease by 0.042 percent. Our results matches with Devereux and Engel (2002); Bacchetta and van Wincoop (1998).

In the third column of the long run estimates, it is shown that the gross domestic product behave positively with the imports in Si-Lanka. It is shown that as the gross domestic product increases by one percent the imports will also rise by 0.7 percent. It is expected that as the income of the country will raise the imports of that country will also rise, so results follow the theory's prediction. The coefficient is statistically significant. Secondly the relative price of imports is given. The empirical results of our study show that the relative price not only statistically insignificant but it also has unexpected sign. This may be due the fact that the country is growth driven. Thirdly, the real effective exchange rate is present. It is expected that the real effective

exchange rate behave negatively to the volume of the imports in any country. The empirical result follows the theoretical expectation, but the coefficient is statistically insignificant. The most frequent case is that the volatility of the exchange rate behaves negatively with the volume of the imports in the country. So the coefficients of the volatility of the exchange rate in the case of Sri-Lanka follow the theory, and have the statistically significant negative sign. The coefficient shows that, as the risk premium (volatility of exchange rate) increases by one percent the imports of Sri Lanka will decrease by 0.098. Our results match with percent Aristotelous (2001); Bayoumi (1996).

In the fourth column of the long run estimates, it is shown that the gross domestic product behave positively with the imports in Bangladesh. It is shown that as the gross domestic product increases by one percent the imports will also rise by 0.79 percent. It is expected that as the income of the country will raise the imports of that country will also rise, so results follow the theory's prediction. The coefficient is statistically significant. Secondly the relative price of imports is given. The empirical result of our study shows that the relative price is statistically significant, but have unexpected sign. Thirdly the real effective exchange rate is present. It is expected that the real effective exchange rate behave negatively to the volume of the imports in any country.

The empirical follow the theoretical expectation and the coefficient is statistically significant. The coefficients of the volatility of the exchange rate in the case of Bangladesh follow the theory, and have the positive sign. The result follows the modern theory of the exchange rate volatility. The modern school of thought has argued that, higher the volatility of exchange rate, mean higher the risk and higher the risk means the higher the profitability in the international trade market. De Grauwe (1996) has claimed in his study that the profit related to the higher volatility of exchange rate and output is more than the loss incurred to the investor due to the higher volatility of exchange rate. All this scenario, enable trisk avert and risk neutral investors to entangle in the situation in which the foreign market is much volatile and risky due to the higher volatility of the exchange rate in the foreign market. The coefficient shows that, as the risk premium (volatility of exchange rate) increases by one percent the imports of Bangladesh will increase by 0.012 percent. My result matches with Peel and Asseery (1991); Méndez and Brada (1988); Brooks and McKenzie (1997); Kasman and Kasman (2005); McKenzie (1998); Eckwert and Broll (1999).

It can be observed very clearly that the imports in Pakistan are most sensitive to the volatility of the exchange than all the other countries in the sample. The coefficient is 0.29 for the Pakistan, in comparison with 0.041, 0.098, and the 0.013 for the India, Sri-Lanka and Bangladesh respectively. So Pakistan should need to more keen about its exchange rate policy in order to smoothen the trade follows in the country.

In the short run estimation table, it can be observed that the lagged error terms have the accurate signs and statistically significant, which fulfills the condition of the cointegration among the variables.

5. Conclusion and policy recommendation

5.1 Conclusion

This study consists on estimation of the import demand in the Pakistan, involving the most recent potential expected variable that is the volatility of the exchange rate. The study does not only estimate the impact of the exchange rate volatility on the Pakistan's import, but we have also compared it with the other countries in the region (India, Sri-Lanka and the Bangladesh) (as the magnitude of the import demand affected by the exchange rate volatility is compared between the countries). We have used the data over the period of 1980-2014 for all four countries and estimate the import demand involving the GDP, relative price, REER, and the VREER of in the regression of all the countries. We have used the ARDL method to estimate the long run and short run estimates of the regressions. In the long run model it has been found that all the variables in Pakistan regression equation except the relative price are statistically significant and have the expected sign. In the Indian regression equation all the variables have the theoretically expected sign, but the coefficient of the relative price is statically insignificant. In the Sri Lankan equation, the gross domestic product and the volatility of the exchange rate have the statistically significant correct sign, but the other two variables, which include the relative price and the real effective exchange rate, are statistically insignificant. In the Bangladesh equation the volatility of the exchange rate is statistically insignificant and the positive sign. All other variables in the equation are statistically significant.

5.2 Policy recommendation

Though we have estimate the effect of the exchange rate volatility for the four SAARC countries, including the Pakistan, but the policies recommendations are presented by focusing on the Pakistan economy. The policy makers should need to keep the exchange rate smooth, in order to have the less volatility in the exchange rate. As if the exchange rate becomes more volatile the import demand will decrease, and due to less imports in the country results as the inflationary (shortage of the input products) push in the country. The inflationary push will have the hysteresis in the country, which is not good in any way for an economy. During the literature review it has been found that, the countries that use their own currencies while trading in the international market, have less volatility for their exchange rate. So it is recommended to the policy maker, that Pakistan should need to trade with the countries which use their own currencies instead of the vehicle currency. In this way Pakistan can also have the less volatile exchange rate and resultantly less volatile import and less volatile domestic markets dynamics.

5.3 Study limitation

Though the study is done on care full parameters, but still there are many things that can ameliorate the finding of the study. One limitation of the study is that, the study is done on the low frequency data. The low frequency data is not good for the nature of the GARCH model. But due to non-availability of the high frequency

data, the low frequency data is used, which may have effects on the empirical estimation. So it is recommended that one may attain the high frequency data, so in order to ameliorate the results he/ she can perform the analysis by using high frequency data.

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