Pakistan Social Sciences Review
www.pssr.org.pk

RESEARCH PAPER

The Expansionary or Contractionary Effects of Devaluation: Empirical Evidence from Pakistan

Dr. Mahmood ul Hasan[1] Saifullah*[2] Dr. Rehmat Ullah[3]

1. Assistant Professor, Department of Economics, University of Sargodha, Sargodha, Punjab, Pakistan
2. Lecturer, Department of Economics, University of Sargodha. Sargodha, Punjab, Pakistan
3. Associate Professor, Department of Economics, University of Sargodha, Sargodha, Punjab, Pakistan

PAPER INFO

Received:
April 19, 2021
Accepted:
July 15, 2021
Online:
July 30, 2021

Keywords:
Contractionary Effects,
Devaluation Expansionary Effects,

***Corresponding Author**

saifullah.zafar@uos.edu.pk

ABSTRACT

The current research is the long-term and short run impact of real exchange rate variations on growth for Pakistani annual data from 1973 to 2011. Pesaran and Shin (1999) and Pesaran et al. (2001) introduced the Autoregressive Distributed Lag (ARDL) approach to Co-integration which is employed for empirical analysis. The findings revealed a negative relationship between growth and real effective exchange rate, which is statistically significant at 1%, implying that 1% devaluation in the real effective exchange rate induces a 0.16 percent drop in real GDP, implying that devaluation is contractionary for Pakistan in the long run. The real effective exchange rate has a negative impact on economic growth in the short run, but this is statistically insignificant, suggesting that devaluation is neutral for Pakistan. Other factors such as money supply, government spending, and worker remittances have a positive impact on economic growth, while crude oil prices have a negative impact in the long run. These variables have almost identical impacts on economic growth in the short term.

Introduction

Exchange rate devaluation was suggested by International Monetary Fund as a central element for promoting economic growth in developing countries. The effect of exchange rate fluctuations on economic growth is an unresolved topic in the economic literature, and it is considered a central element of stabilization programs. Traditional theory holds that depreciation of the currency has a positive effect on output and real income. This viewpoint is based on the fact that devaluation increases the actual quantity of exports while decreasing the number of imports. Devaluations lift import rates, making them more costly, causing spending to shift from foreign to domestically manufactured goods, resulting in an increase in the

production of tradable goods. Increased demand for domestically produced goods boosts the economy's aggregate demand, wages, and productivity. As a result of this viewpoint, economists have been compelled to use exchange rate devaluation as a tool for the improvement of the foreign sector of the economy.

Devaluation would have a positive impact on the balance of trade if the sum of export elasticity of foreign demand and import elasticity of domestic demand exceeds one, which is known as the Marshall Lerner condition, suggested by Alfred Marshall and Abba Lerner in the 1950s, Devaluation, according to Meade (1951), would be detrimental to a country's balance of payment and real income if the ML condition does not hold. In the short run, the elasticity values are small because the exports and imports are less elastic for developing countries therefore, Marshall Lerner (ML) condition does not hold in the short run. These values begin to be high in the long run and ML condition is likely to exist and thus, devaluation leads towards improvement in the balance of trade.

The opponents of the traditional view suggest that devaluation has an adverse impact on output through a negative real balance effect. They argue that traditional economists have ignored the supply side effects of devaluation which leads to a contraction in output. According to "New Structuralists" devaluation raises the domestic price level due to which interest rate and wages increase in the economy that can reduce aggregate supply curtailing output. In addition, currency devaluation increases the prices of imported raw materials which can decrease aggregate supply implying a decline in output. Finally, if the trade balance is not in equilibrium and the response of imports and exports to exchange rate fluctuations is very low, the devaluations will result in lower output. From the above discussion, it is concluded that traditional economists have ignored the supply side effects of devaluation while "New Structuralists" argue that supply side effects dominate demand side effects therefore devaluation is contractionary. The most important demand side and supply side channels of devaluation which are responsible for harmful effects on aggregate demand and output are explained briefly. The increased price level due to devaluation decreases purchasing power of consumers and consumers will reduce their consumption expenditures leading to a decline in aggregate demand.

A dramatic rise in world oil prices and intermediate goods since the 1970s has forced economists and policy makers to focus on the aggregate supply side in their analysis of economic performance in less developed and developed countries. International oil prices increased since 2003 are twice the April 2006 price (Bacon, 2005). The higher oil prices in turn affect budget deficit and balance of payment negatively. Pakistan heavily relies on imported oil as the share of imported oil in total imports has increased up to 25 percent in 2012-13 (GOP, 2013) and oil is an important input into the production function. The production cost increases due to an increase in oil prices leading to an increase in the prices of commodities which will in turn decrease aggregate supply. So the effect of oil prices must also be incorporated in the empirical model and this situation may be best described in the case of Pakistan (Bahmani-Oskooee & Kutan, 2008). Similarly, earlier studies did not

incorporate the effect of rising oil prices into analysis which leaves room for new empirical research. Most probably, this is the first study for Pakistan which uses a large sample in the context of exchange rate analysis ranging from 1973 to 2011.

The study's main goal is to determine whether devaluations are expansionary or contractionary, as well as the impact of devaluation on output in the short and long run for Pakistan. The following is the scheme for the remaining paper: The literature review is given in section 2, and the model specification is elaborated in section 3. Data and methodology are presented in section 4, while findings and discussion are provided in section 5. Concluding remarks are given in the last section.

Pakistan has been facing severe external and internal problems including load shedding and gas shortage for the last few years. These problems have retarded the pace of economic growth. Despite all crises, stock exchanges are performing better, indicating the improvement of the economy. The GDP growth rate is estimated at 3.6 percent for the fiscal year 2012-13 as compared to 4.4 percent in the fiscal year 2011-12. Trade deficit reduced to 12.5 billion US dollars in the fiscal year 2012-13 against 12.9 billion US dollars in the fiscal year 2011-12. The reduction in the trade deficit was due to a 0.15 percent increase in exports and a 0.9 percent decrease in imports. Worker remittances were estimated at 11.6 billion US dollars as compared to 10.9 billion US dollars in the fiscal year 2011-12 indicating 6.4 percent growth. The broad money supply growth rate was measured to be 9.9 percent against 9.1 percent in the last year. Foreign direct investment grows at a remarkable rate by 29.7 percent in the current year. The national debt has increased to Rs 14.8 trillion and foreign exchange reserves have decreased from 8.7 billion US dollars to 6.7 billion US dollars due to repayments of debt to the International Monetary Fund. The per capita income has increased from 897 US dollars to 1,368 US dollars in 2012-2013. National saving decreased to 13.5 percent of Gross Domestic Product (GDP) against 15.2 percent in 2005-06. Pakistan needs to minimize its structural problems like reforms in tax structure, reforms in trade policies and other necessary reforms for sustainable development (GOP, 2013).

The exchange rate regime and international trade are closely interlinked throughout the history of Pakistan. As in 1949, the Government of Pakistan decided not to devalue its exchange rate against the pound sterling which created a great disturbance for the economy. Pakistan’s major trading partner i.e. India refused to accept the new exchange rate and suspended trade with Pakistan. Although, this decision taken by the government of the time was considered important and careful at that time due to the inelastic demand of Pakistan’s exports it caused serious problems for different sectors of the economy. Due to the Korean War boom, the recession government had not to face the difficulty at that time but the new government had to face the damaging situation on the issue of the exchange rate, which resulted in several other crises at that time. The relationship between

macroeconomic variables and the exchange rate has always remained a key issue in the history of Pakistan.

In 1949 and 1952 all the members of the pound sterling devalued their currencies but Pakistan did not decrease the value of the rupee. Due to not devaluing the currency, the government had to face several crises and it introduced different schemes to enhance exports and imposed imports control and tariff on imports to manage the crisis. The government prepared the list of commodities that was given the name of Bonus and Cash Cum List. The only products that were included in the list were being imported. The government introduced Export Bonus Scheme and several incentives were given to the industrialists to promote exports. The analysts criticized the government for restricting imports and not lowering the value of the currency. Analysts were of the view that these measures of the government may be beneficial in the short run and will lead to misallocation of resources in the long run due to the selective nature of government measures. These measures of government also result in multiple exchange systems.

The value of the rupee was lowered by 30 percent being the first devaluation in the history of Pakistan i.e. from Rs. 3.31 to Rs. 4.76 against one US dollar in July 1955. The purpose of this evaluation concerning the pound sterling was to bring the rupee in line with other currencies of pound sterling members. The effects of devaluation on the economy were satisfactory as the balance of trade was surplus in 1955-56 but domestic prices of food items increased and the government had to provide subsidies to the consumers to maintain retail prices. This nominal exchange rate of Rs. 4.76 against one US dollar remained stable till December 1971. But in 1971, Pakistan linked its currency with the US dollar at a previous rate of Rs 4.76 against one US dollar. According to economists, the rupee was overvalued from July 1955 to December 1972 and multiple exchange rate systems remained applicable during these seventeen years.

Bretton Wood system was abolished in 1973, and many countries of the world moved toward flexible exchange rate mechanisms from fixed exchange rate systems. Following these industrial countries, Pakistan adopted managed float exchange rate mechanism in place of a fixed exchange rate system in January 1982 on the suggestion of IMF and World Bank. Under this exchange rate system, the central bank of Pakistan was given the authority to adjust the value of the rupee with US dollar fluctuations on the recommendations of the government. In this mechanism, necessary adjustments in the country's currency were revisited on daily basis in relation to the weighted average of the currencies of major trading partners. During managed floating regime State Bank of Pakistan made minor nominal changes in the exchange rate whenever required. The rupee was being exchanged at the rate of Rs. 10.10 to one US dollar initially when the managed float exchange rate was adopted in 1982. The Pakistani rupee was depreciated by 38.5 percent in managed float period from 1982 to 1988 (Zaidi, 2000).

Now the exchange rate was settled by the equilibrium of demand and supply forces of the exchange market. The exchange rate market was relaxed in the 1990s as

compared to the 1980s to reduce the gap between the official rate and market rate. In July 1993 devaluation took place on the recommendation of IMF to enhance exports and the rupee was being exchanged at the rate of Rs 30.15 against one US dollar. In 1998, different economic restrictions were imposed by donor countries and financial institutions on Pakistan due to nuclear tests and to cope with this financial issue a system of multiple exchange rate system was brought into use by the State Bank of Pakistan in July 1998. This multiple exchange rate consisted of official rate and floating interbank rate. The third component of multiple exchange rates was the composite rate determined by combining the official rate and floating interbank rate. The purpose of the interbank rate was to ensure the role of the banking sector in business activities and commercial banks were given the rights to use their desired rates for international currencies except for the US dollar.

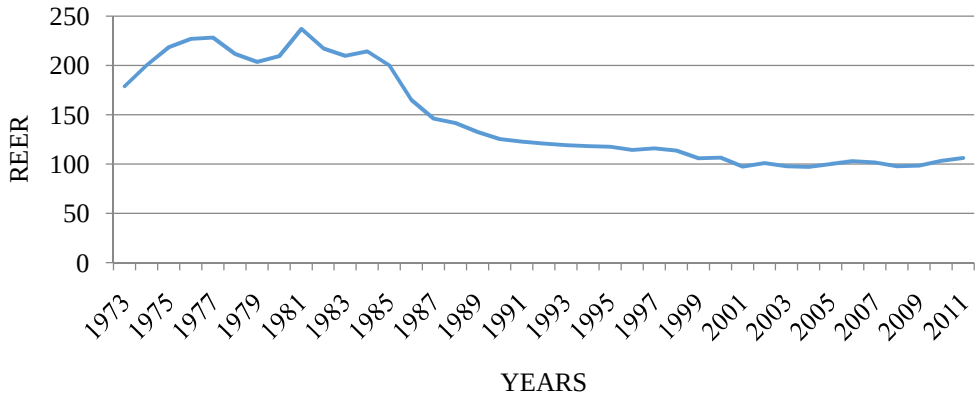

Figure 1: Real Effective Exchange Rate (REER) of Pakistan
Note: Authors' calculations based on Bruegel database (2012)

Figure 2.1 shows the trend of the real effective exchange rate of Pakistan from 1973 to 2011. The graph depicts that the real effective exchange rate is depreciating more rapidly since 2000 compared to other years. Different reasons are given below for this depreciation. The basic idea of devaluation is that it makes exports cheaper in the international market as compared to other countries' exports leading to an increase in the volume of exports. From the day of managed float exchange rate mechanism in 1982 to 2002 rupee has been depreciated from 9.90 to 60 against one US dollar. This 500 percent depreciation of the rupee is very large although the volume of exports has risen but not as much. The reason is that Pakistan exports textile commodities in the international market and textile exports are characterized by quotas and other trade restrictions in the international market due to which exports have increased to a limited level. The net result of the falling rupee is likely to be highly negative.

Another reason for lower exports is an increase in production costs due to devaluation. Due to the power crisis investors have started to install their textile units in other countries. According to estimates of the Pakistan Bureau of Statistics

100 paisa depreciation in the rupee will increase the servicing cost by Rs one billion against one billion US dollars of external debt. 100 paisa depreciation in the rupee will add Rs. 60 billion of total 60 billion US dollar debt.

Pakistan is an exporter of primary products and it has to face severe competition in the international market due to which exports remain low while it imports machinery, crude oil, minerals and manufactured goods. These imports cannot be reduced at a large scale because these are important for the development of the country. When exports do not increase despite all the efforts the gap becomes wider between exports receipts and imports payments deteriorating the balance of payment. In this situation, the government has no other way except devaluation to reduce the gap. Pakistan has a lack of foreign exchange reserves that are necessary for capital formation and these also compel the government for evaluation. A significant part of capital formation has consisted of Foreign Direct Investment (FDI) and Pakistan has failed to catch foreign direct investment since the last few years because of the dangerous security situation and political disturbance. Government should assure the security of foreign investors so that foreign direct investment can be attracted to the country and the balance of payment should be corrected.

Literature Review

Khondker et al. (2012) used annual data from 1980 to 2012 to study the association between output and exchange rate variations for Bangladesh. The data were collected from the Bangladesh Economic Survey of Bangladesh. For empirical estimations, the Johansen Juselius (1990) approach to co-integration with Error-Correction Model was used. Devaluation, according to the results, slowed economic growth in the short run while increasing it in the long run. Wan (2012) studied the effect of RMB revaluation on the economic growth of China over the period 1980 to 2010. The empirical findings have been obtained by employing the ARDL cointegration approach and error correction technique. In the long run, RMB revaluation was found to be negatively related to output, while in the short run, it was found to be positively related to output.

Yilanci and Hepsag (2011) used quarterly data over the period 1987I to 2008IV to study the correlation between devaluation and output in the case of Turkey. ARDL bounds testing approach was adopted for empirical results. The empirical model incorporated exchange rate, fiscal variables, monetary variables and foreign income. The foreign income showed a neutral effect in the short run but had an adverse effect in the long run. Output was negatively correlated with real devaluation in the short run and there was a positive association between output and devaluation in the long run for Turkey.

Galebotswe and Andrias (2011) looked at the relationship between domestic production and devaluation using an error correction model. The analysis was carried out for Botswana employing quarterly data over the period 1993 III to 2010 IV gathered from the Bank of Botswana. The devaluation showed expansion in output for the short run while output was negatively affected in the long run in the

case of Botswana. The earlier studies conducted for Pakistan regarding the effects of devaluation on output have mixed results. Dimitris (2004) studied the association between exchange rate changes and domestic output in Pakistan. He found that devaluation was negatively correlated with output while in another study Asif et al. (2011) found the expansionary effect of devaluation. The rupee was being exchanged at the rate of Rs. 10.10 to one US dollar initially when the managed float exchange rate was adopted in 1982. The Pakistani rupee was depreciated by 38.5 percent in managed float period from 1982 to 1988 (Zaidi, 2000).

Abida (2011) used panel data from 1980 to 2010 to examine the impact of exchange rate variation on economic growth in three Maghreb countries: Tunisia, Algeria, and Morocco. The econometric methodology was based on Panel cointegration techniques. The negative coefficient of exchange rate misalignment demonstrated that depreciation improved economic growth while appreciation decreased economic growth in three Maghreb countries. Bahmani-Oskooee and Kandil (2011) used annual data from 14 Middle Eastern countries from 1980 to 2010 to examine the relationship between currency depreciation and economic development. For empirical estimations, the bounds testing approach to co-integration was used. Unexpected exchange rate depreciation was found to be negatively associated with output in the long run and to have an expansionary impact in the short run, according to the findings. In the long run, expected depreciation was positively associated with economic growth.

Kalyoncu, Artan and Ozturk (2008) examined how currency devaluation affects economic growth using annual data from 1980 to 2005. In 23 OECD nations, the study was conducted over a long and short period. The Unit Root and Error Correction model was applied for analysis. The findings affirmed that devaluation was negatively related to output for Portugal, Austria, Poland, Turkey, Hungary, and Switzerland in the long run. Devaluation was positively associated with output for Sweden, Germany, and Finland in the long run. The correlation between exchange rate and devaluation was found to be positive for Hungry and Switzerland. In the short run, devaluation has no impact on output growth in the remaining countries. Datta (2012) examined the association between output growth and currency depreciation for Pakistan through annual data from 1993 to 2011. For the study, Engle Granger and the Vector Error Correction model were used. The results confirmed that the exchange rate and output growth are unidirectionally related. Furthermore, empirical findings showed that devaluation had a positive effect on output for a short time but had a negative effect in the long run.

Material and Methods

This study uses the ARDL bounds testing approach to cointegration established by Pesaran and Shin (1999) and Peasran et al. (2001) to examine the effect of devaluation on output growth in Pakistan for the period 1973-2011. Data on all the variables have been taken from the International Financial Statistics database 2017. This technique has several advantages over conventional methods. This method of

cointegration yields coefficients that are reliable, stable, and unbiased. Endogeneity can be addressed using appropriate augmentation in the two-step procedure, and serial correlation can be addressed by using different lag structures for the variables (Halicioglu, 2004). The selection of variables and empirical model is made considering the Wan (2012), and Asif et al.,. (2012). The following reduced form model is employed in the study.

$$GDP_t = f(LMS_t, LGS_t, LR_t, LOP_t, LWR_t)$$

In the model GDP, MS, GS, R, OP and WR represent Gross Domestic Product, Money supply, Government spending, Real Effective Exchange rate, International crude oil prices and worker remittances respectively. The above mention model can be written in the following equation form.

$$LnGDP_t = \sim + \sim_1 LnMS_t + \sim_2 LnGS_t + \sim_3 LnR_t + \sim_4 LnOP_t + \sim_5 LnWR_t + e_t$$

To explore the long run association between exogenous and endogenous variables in Pakistan from 1973 to 2011, all variables are taken in log form. In the equation real output is measured by GDP, government spending and money supply are used proxies for fiscal and monetary policy respectively. α is a constant term and α_i reflects a percentage change in the dependent variable as a result of a 1% change in the explanatory variable while e_t denotes the error term. The sign α_3 may be positive indicating devaluation is expansionary or negative representing devaluation is contractionary depending upon the empirical results. According to previous studies parameters $\alpha_1, \alpha_2, \alpha_4$ will carry positive signs. . Increase in the world energy prices affects output negatively so the sign α_5 is expected to be negative in this study.

In the ARDL formulation, all variables are used in the first difference form, and their lags are described in the equation, which is the general form of the ECM model.

$$DLnGDP = \sim_0 + \sum_{i=1}^{q} a_1 \Delta LnGDP_{t-i} + \sum_{i=0}^{q} a_2 \Delta LnMS_{t-i} + \sum_{i=0}^{q} a_3 \Delta LnGS_{t-i} + \sum_{i=0}^{q} a_4 LnR_{t-i} + \sum_{i=0}^{q} a_5 \Delta LnOP_{t-i} + \sum_{i=0}^{q} a_6 \Delta LnWR_{t-i} +$$
$$\cdot_1 LnGDP_{t-1} + \cdot_2 LnMS_{t-1} + \cdot_3 LnGS_{t-1} + \cdot_4 LnR_{t-1} + \cdot_5 LnOP_{t-1} + \cdot_6 LnWR_{t-1} + £_t \ldots\ldots(1)$$

If a specific cointegration relationship is discovered, the next step is to calculate long run coefficients using the ARDL model. For long-term estimates, the following equation is estimated.

$$LnGDP = \sim_0 + \cdot_1 \sum_{i=1}^{q} LnGDP_{t-i} + \cdot_2 \sum_{i=0}^{p_1} LnMS_{t-i} + \cdot_3 \sum_{i=0}^{p_2} LnGS_{t-i} + \cdot_4 Ln \sum_{i=0}^{p_3} R_{t-i} + \cdot_5 \sum_{i=0}^{p_4} LnOP_{t-i} + \cdot_6 \sum_{i=0}^{p_5} LnWR_{t-i} + £_t \ldots\ldots(2)$$

After estimating the long run coefficients, the next step is to calculate the short run elasticities. The following ECM model can be used to calculate the short run coefficients.

$$\Delta LnGDP_t = \alpha_0 + \beta_0(ECM_{t-1}) + \sum_{i=1}^{p} \alpha_1 LnGDP_{t-i} + \sum_{i=0}^{q_1} \alpha_2 \Delta LnMS_{t-i} + \sum_{i=0}^{q_2} \alpha_3 \Delta LnGS_{t-i} + \sum_{i=0}^{q_3} \alpha_4 \Delta LnR_{t-i}$$

$$+ \sum_{i=0}^{q_4} \alpha_5 \Delta LnOP_{t-i} + \sum_{i=0}^{q_5} \alpha_6 \Delta LnWR_{t-i} + \varepsilon_t \ldots\ldots(3)$$

The ECM value should be negative and important statistically. Brown et al. (1975) developed the cumulative sum of recursive residuals (CUSUM) and cumulative sum of squared recursive residual CUSUMSQ tests to examine the consistency of short and long run regression coefficients over time.

Results and Discussions

To avoid spurious results, time series characteristics of data are examined by using Augmented Dicky Fuller (ADF) and Philips Perron (PP) unit root tests. Both PP and ADF tests are performed because the ADF test has poor small sample properties and power problems so, PP test results will be used for empirical analysis. The results are presented in table 5.1 and 5.2 of both tests.

Table 1
ADF test results with constant and trend

Variables	ADF level	ADF difference
LGDP	-1.158593	-4.770974*
LMS	-2.205282	-6.943214*
LGS	-2.623768	-5.312177*
LR	-1.667471	-4.382777*
LOP	-1.626665	-7.029044*
LWR	-1.952989	-3.913288**

Note:*indicate 1 % and ** represents 5 % level of significance.

According to the results of the ADF test, the null hypothesis of no cointegration is rejected, implying that all variables are stationary at first difference.

Table 2
PP test results with constant and trend

Variables	PP level	PP difference
LGDP	-0.919501	-4.770974*
LMS	-2.235259	-6.919249*
LGS	-2.132385	-5.312177*
LR	-2.106124	-4.302960*
LOP	-1.613080	-7.838149*
LWR	-2.089025	-3.913288**

Note: *indicate 1 % and ** represents 5 % level of significance

It can be seen from table 5.2 that real GDP, money supply, government spending, real effective exchange rate, international crude oil prices and worker remittances are non stationary at level but rejects the null hypothesis of non stationary at level implying that all variables are integrated at order (1). We will use PP test results for further empirical analysis. After the recommendations of findings, ARDL procedure on equation 1 is performed. To begin, the F test is used to evaluate the existence of a long-run relationship. Long run coefficients are calculated using equation 2 after the long run relationship has been verified.

Table 3
Long Run Coefficients for equation 2

ARDL(2,1,2,2,0,2) selected based on Akaike Information Criterion The dependent variable is LGDP			
Regressors	**Coefficient**	**Standard Error**	**T Ratio [Prob]**
LMS	.25325	.023943	10.5770*[.000]
LGS	.097868	.044708	2.1891**[.039]
LR	- .16132	.062308	-2.5891*[.017]
LOP	-.028857	.0097231	-2.9679*[.007]
LWR	.052625	.019148	2.7483*[.012]
CONSTANT	25.2414	.61037	41.3544*[.000]

Note: * significant at 1% ** significant at 5% and *** significant at 10%.

The estimated coefficient of the money supply is positively related to real GDP that is a proxy for output growth. The coefficient indicates that a 1% increase in money supply raises real GDP by 0.25% and a 1% increase in government expenditure leads to a 0.10% increase in real GDP. The worker remittances and economic growth are positively concerned showing a 1% increase in worker remittances results in a 0.052% increase in real GDP. The results show that 1% depreciation in real effective exchange rate results in a 0.16% decline in real GDP. The impact of REER is negative and statistically significant therefore devaluation is contractionary in the long run for Pakistan. These findings are not only in line with the prior expectations but are consistent with the earlier research carried out by Shabaz *et al. (*2011) and Chaudhary and Chaudhary (2007) and Datta (2012) concerning Pakistan. The effect of crude oil prices is negative and significant indicating that a 1% increase in international prices of crude oil results in a 0.29% decline in real GDP which is consistent with Van (1986). The following table depicts short run results.

Table 4
Error Correction Representation for equation 3.

ARDL(2,1,2,2,0,2) selected based on Akaike Information Criterion Dependent variable is LGDP			
Regressors	**Coefficient**	**Standard Error**	**T-Ratio [Prob]**
dLGDP1	-.17770	.11728	-1.5152[.142]
dLMS	.086960	.051852	1.6771***[.106]
dLGS	.069173	.031845	2.1722**[.039]

dLGS1	.075897	.028981	2.6188*[.015]
dLR	-.022837	.047464	-.48113[.634]
dLR1	.11447	.046084	2.4839**[.020]
dLOP	-.018888	.0070328	-2.6857*[.012]
dLWR	-.011163	.010854	-1.0285[.313]
dLWR1	-.042910	.012289	-3.4917*[.002]
CONSTANT	16.5210	2.5510	4764*[.000]
ECM(-1)	-.65452	.10797	-6.0622*[.000]

R- Squared .84673
R-Bar-Squared .74919
Mean of Dependent Variable .048962
Residual Sum of squares .00222
S.D. of Dependent Variable .020065
F(10, 26) 12.1535[.000]
S.E. of Regression .010049
AIC 112.3287
DW-statistic 2.3819
SBC 100.2468
DH –Statistics is -1.6412

The money supply is positively related to economic growth in the short run. The coefficient of the money supply is 0.087 showing that a 1% rise in money supply results in a 0.087% increase in real GDP. Government expenditure proxied by the fiscal policy is positively related to Pakistan's output. The worker remittances have an adverse effect on output in the current year and with one year lag in the short run. The reason is that worker remittances may be invested in projects that take a longer time to affect output. The REER is inversely related to the output but statistically insignificant. The coefficient of REER indicates that 1% depreciation of rupee results in 0.011% decline in real GDP. It can be concluded that devaluation is neutral in short run for Pakistan. These results are in line with the previous studies conducted by Shahbaz *et al*. (2011) for Pakistan and Bahmani-Oskooee and Kandil (2011)

The coefficient of ECM is statistically significant at 1%, meaning that 65 percent of the previous year's disequilibrium is corrected in the current year, while the coefficient of R-Bar-Squared indicates that explanatory variables explain 74 percent of the variation in the regressand. The DH –Statistics is -1.6412, indicating no autocorrelation.

Stability Test

CUSUM and CUSUMSQ tests are also applied to analyze the stability of estimated coefficients. The graph of CUSUM and CUSUMSQ are plotted in Figures 1 and 2. The null hypothesis is that all the regression coefficients are stable over the study period for Pakistan. The graphs indicate that CUSUM and CUSUMSQ

statistics are within the critical bounds at a five percent level of significance so the null hypothesis of stable coefficients cannot be rejected. Hence, the regression coefficients are stable over the study period.

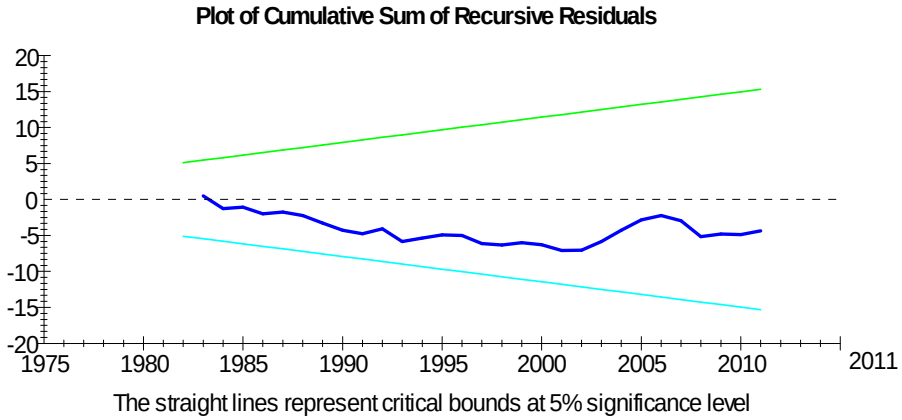

Figure 2: Plot of Cumulative

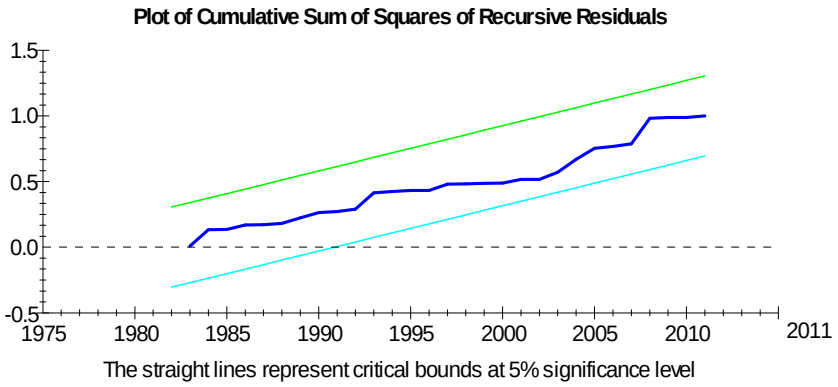

Figure 3: Plot of Cumulative Sum of Squares of Recursive Residuals

Conclusion and Policy Recommendations:

The study employs a co-integration analysis technique based on a newly developed ARDL bounds testing approach for the analysis of output reaction to devaluation over the period from 1973 to 2011 for Pakistan. The stability of long run coefficients is analyzed through CUSUM and CUSUMSQ test advanced by Brown et al. (1975) within the ARDL framework. The major concern of the study is to analyze the effect of exchange rate variations on output growth and its estimated coefficient is negative and significant at 1 percent. It shows that 1% depreciation in real effective exchange rate results in a 0.16% decline in real GDP. The impact of exchange is negative and statistically significant therefore devaluation is contractionary in the

long run for Pakistan. These findings are not only in line with the prior expectations but are consistent with the earlier researches carried out by Shabaz *et al. (*2011) and Chaudhary and Chaudhary (2006) and Datta (2012) concerning Pakistan. The real effective exchange rate is inversely related to the output but statistically insignificant. It can be concluded that devaluation is neutral in short run for Pakistan. These results are the same as the previous studies conducted by Shabaz *et al*. (2011) for Pakistan and Kalyoncu *et al.* (2008). Keeping in view the results, authorities and policymakers are advised to choose policies that will maintain a steady exchange rate in the economy. Variations in domestic and global prices should be incorporated in the nominal exchange rate to achieve desired results of nominal devaluation that will improve the trade balance. Government spending has a positive impact on economic growth so the expansionary fiscal policy would be beneficial for the economy. Worker Remittances are positively related to economic growth so government should devise policies that enhance worker remittance. Keeping in view the results, authorities and policymakers are advised to choose policies that will maintain a steady exchange rate in the economy. Variations in domestic and global prices should be incorporated in the nominal exchange rate to achieve desired results of nominal devaluation that will improve the trade balance. To decrease the cost of devaluation, the export sector must be accomplished with developed technology that will enhance the productivity of this sector by producing high quality commodities. Moreover, the government should explore oil reserves to meet domestic need and to reduce the dependence on imported oil.

References

Abida, Z. (2011). Real exchange rate misalignment and economic growth: an empirical study for the Maghreb countries. *International Journal of Economics and Finance*, 3(3):191-201.

Asif, M., Shah, S. Q., Zaman, K., & Rashid, K. (2011). Devaluation and output growth: Evidence from Pakistan. *Mediterranean Journal of Social Sciences*, 2:394-401.

Bahmani-Oskooee, M. & Kutan, A. M. (2008). Are devaluations contractionary in emerging economies of Eastern Europe? *Economic Change and Restructuring*, 41(2):61-74.

Bahmani-Oskooee. M. & Kandil. M. (2011). Are devaluations contractionary in MENA countries? *Applied Economics*, 41:139-150.

Brown, R. L., Durbin, J. & Evans, M. J. (1975). Techniques for testing the constancy of regression relations over time (with discussions). *Journal of the Royal Statistical Society*, 37:149-192.

Choudhary, M. A. & Chaudhry, M. A. (2007). Effects of the exchange rate on output and price level: evidence from the Pakistani economy. *Lahore Journal of Economics,* 12(1):49-77.

Datta, K. (2012). Relationship between currency depreciation and output growth in Pakistan: A time series study. *Scholarly Research Journal for Interdisciplinary*, 12:1-12.

Dornbusch, R. (1988). Open Economy Macroeconomics. 2nd edition. New York 1988.

Galebotswe, O. & Andrias, T. (2011). Are devaluations contractionary in small import-dependent economies? Evidence from Botswana. *Botswana Journal of Economics,*8(12):86-98.

Government of Pakistan (2013). Economic Survey of Pakistan. Federal Bureau of Statistics, Islamabad, Pakistan.

Halicioglu, F. (2004). Defense spending and economic growth in Turkey: An empirical application of new macroeconomic theory. *Review of Middle East Economics and Finance*, 2(3):193-201.

Kalyoncu, H. S., Artan, S.T. & Ozturk, I. (2008). Currency devaluation and output growth: An empirical evidence from OECD countries. *International Research Journal of Finance and Economics,* 14:232-238.

Khondker, B. H., Bidisha, S. H. & Razzaque, M. A. (2012). *The exchange rate and economic growth: an empirical assessment on Bangladesh*. working Paper, Country project on Bangladesh, International Growth Centre (IGC), UK.

Narayan, P. K and Narayan, S. (2007). Is devaluation expansionary or contractionary? Empirical evidence from Fiji? *Applied Economics*, 39:2589-2598.

Pesaran, M. H. and Shin Y. (1999). An Autoregressive Distributed Lag Modeling Approach to Co-integration Analysis. Chapter 11 in *Econometrics and Economic Theory in the 20th Century: The Ragnar Frisch Centennial Symposium*, Strom S (Ed.). Cambridge University Press: Cambridge.

Pesaran, M., Shin, Y., and Smith, R. (2001). Bounds testing approaches to the analysis of level relationships. *Journal of Applied Econometrics*, 16:289-326.

Shahbaz, M., Islam, F. and Aamir, N. (2012). Is devaluation contractionary? Empirical evidence for Pakistan. *Economic Change and Restructuring*, 45(4):299-316.

Van Wijnbergen, S. V. (1986). Exchange rate management and stabilization policies in developing countries. *Journal of Development Economics*, 23:227-247.

Wan, L. (2012). *Output's response to change in the exchange rate: Empirical evidence from china*. Master of Science Thesis INDEK 2012:43 KTH Industrial Engineering and Management SE-100 44 STOCKHOLM

Yilanci, V. & Hepsağ, A. (2011). The contractionary and expansionary effects of devaluation: Empirical evidence from Turkey. *Journal of Economic Cooperation & Development*, 32(1).

Zaidi, S. A. (2000). Issues in Pakistan's Economy. 2nd edition. Oxford University Press, Karachi, 90-97.