A Link between Nominal Devaluation and Real Devaluation in Floating Exchange Regime an Empirical Investigation for Pakistan

MUHAMMAD NISAR KHAN
Lecturer, Bacha Khan University, Charsadda
nisarmgt@bkuc.edu.pk

IHTESHAM KHAN
Assistant Professor, Abdul Wali Khan University, Mardan
ihyishamkhan@awkum.edu.pk

RABIA INAM KHAN
Lecturer, Bacha Khan University, Charsadda
rabia.khan138@live.com

MUHAMMAD ILYAS
Lecturer, Abdul Wali Khan University, Mardan
Milyas_85@awkum.edu.pk

Abstract
The purpose of this paper is to examine the relationship between nominal devaluation and real devaluation with special reference to Pakistan. The data sample cover the monthly nominal effective exchange rate(NEER) and real effective exchange rate(REER) during the floating exchange regime from 2000-2009.To find this relationship, we have employed some sophisticated tests such as augmented dickey fuller (ADF), & Phillips-perron for unit root tests. As the order of integration of variables are different so ARDL Bounds Test is used to find the long run and short run relationship between nominal devaluation and real devaluation in the context of floating exchange regime of Pakistan, The findings of the study indicates that nominal devaluation leads to real devaluation both in the long run as well as in the short run in the case of Pakistan.

Keywords: *Nominal Effective Exchange Rate, Real Effective Exchange Rate, Augmented Dickey Fuller, Autoregressive Distributed Leg*

1. Introduction

According to international monetary fund (IMF) the average inflation rate reported in Pakistan was 20.78% in 2009 and they expect that the average inflation rate will increase with a passage of time. While trade deficit in Pakistan was $14 billion during 2009-2010. While in 2000 the average inflation rate was 4.41% and the trade deficit was $4 billion. Pakistan exports increases at the average rate but imports also rises at the higher rate of exports.So the result shows that imports ratio increases due to increase of domestic demands which lead to increases in trade deficits. So as a result the county's balance of payments goes to negative side. In this paper we investigate that the process of devaluation or depreciation of a local currency affects the economy can be positively or negatively. The surplus balance of trade one of the significant and important variable which affects the devaluation process because in positive trade balance the exports of a country exceed their imports. Higher inflation would lead to expensive imports that offset the growth of economy by the increase in exports which decrease the effectiveness of devaluation in narrowing trade deficit. Most of developing countries shifted their economies from fixed exchange regime to fluctuating exchange regime. In case of Pakistan, Government adopted the policy of floating exchange regime after 2000 in order to improve and utilize the resources and balance of payment situation in global market. According to Bahmani-Oskooee and Knadi (2007) exchange rate theory describe some major advantages of adopting flexible exchange rate policy:(i) adoption of flexible exchange rate policy improve the capacity of economy to adjust the external and real shocks.(ii) Inflexible exchange rate regime, country can exercise to an in dependent monetary policy and (iii) flexible exchange rate policy allows an economy to take use of foreign reserve to fulfill its demands.

In this paper we examine and describe the relationship between nominal devaluation and real devaluation in Floating exchange Regime from the empirical study of Pakistan. We will find this relationship by applied some tests such as ADF (Augmented Dickey-Fuller), P-P(Philip Peron) tests for stationary of the data, ARDL(Autoregressive distributed leg) for long run relationship, DOLS (dynamic Ordinary Least square model) and VECM (Vector Error Correction Model) for short run relationship, In findings we will try to find link between nominal and real devaluation in long run as well as in short run from the investigation of Pakistan. This paper is organized in the following sections; section1 describe the introduction of the paper. Section2 described the previous research conducted regarding the nominal devaluation and real devaluation in the floating exchange rate. Section3 deals with the data, methodology and results, section4 the empirical investigation of results and section 5 reported the conclusion of the study and the future directions.

2. Literature Review

There is a well-documented literature in the research paper regarding the devaluation or depreciation of currency as well as the exchange regimes followed by a country, according to standard theory nominal devaluation of local currency encourages competitive environment in the international market by making its products economical resulting in improvement in trade balance. On the other hand nominal devaluation lead to reduce import in terms of domestic currency because of expensive imports, it is said that moderate inflation eats up satisfactory impact of nominal devaluation. According to Bahmani-Oskooee (1998) and Gelan (2007) suggest that "nominal exchange rate need to be adjusted for variation in local and international prices. After adjustment, nominal devaluation policy would be effective and improve the trade balance, if nominal devaluation leads to real devaluation". Another researcher named Vaubel (1976) open new side in the international finance and trade by "arguing that real devaluations resulted from nominal devaluations effectively from 1959-1975. Connolly and Taylor (1976,1979) Bruno (1978) and Edwards,(1988,1994) studied that nominal devaluation is effective to promote real devaluation only in short run to medium span of time.

In (1991) Rose studied the practical relationship between the real effective exchange rate and the trade balance of five OECD countries, and concludes that the exchange rate has statistically not the significant element of the balance of trade. Similarly Rose and Yellen do not find any significant relationship between real exchange rate and balance of payment since 1989. They use two-sided trade flows between US and other OECD countries using quarterly data. In (1992) Last rapes use bi variate SVAR model and conclude that the real shocks are vital for real exchange rate variations for develop countries, and in (1993) Evans and Lothian find out similar results in case of Italy, UK and Germany, Clarida and Gali in (1994) used trivriate SVAR and establish that nominal shocks are essential for Japan and Germany, while real shocks are important in UK and Canada to find out the fluctuations in the real exchange rates. Kent and Najain (1998) founded that the nominal devaluation leads more real devaluation when country has a more movable exchange rate regime.

The correction of external inequalities that is current account deficits, will generally require both real exchange rate devaluation an demand management policies. In the recent policy evaluation of the performance of the less developed countries it has been also argued that more successful developing countries are successful by having been able to maintain the exchange rate at its right level. In 2000 Bahmani-Oskooee and mirai founded the changes in real effective exchange rate and existence of purchasing power parity (PPP) by applying KPSS test in the most developing economies. Then in 2001 Bahmani-Oskooee estimate that the trade balance has long run response to nominal devaluations in the case of some Middle Eastern countries, and in (2002) the set wo researcher (Bahmani-Oskooee and miteza) use error correction model to investigate the association between the nominal effective exchange rate and the real effective exchange rate by using error correction model not just in the short run but also in the long run in the group of less develop countries including Philippines. And conclude that there is no long run impact of effective nominal exchange rate on the effective real exchange rate.

After this study another researcher named holmes in (2004) find out long term relationship of real effective exchange rate and nominal effective exchange rate and find out that nominal devaluation look like to improve real devaluation in the maximum African economies. In (2007) Bahmani-Oskooee and Gelan stated that changes in nominal devaluation bring changes in the real devaluation only in the long run not in the short run, Bahmani-Oskooee and Gelan in (2007) also studied the existing of PPP in some African countries. And also studied the relationship between nominal devaluation and real devaluation in MENA countries by Bahmani-Oskooee and kandi in (2007) by the validity of purchasing power parity, and with the help of this study they founded that nominal exchange rate do have impact on the real effective exchange rate. In (2007) Bahmani-Oskooee and Harrvey also used quarterly data of these included variables over the period (1975 to 2004) for less develop countries, and shows substantial impact of nominal devaluation changes on the real devaluation changes for the nominated countries, Then in (2009) Shahbaz also founded that nominal devaluation changes leads to real devaluation changes from the period (1975 to 2006) in developing economies like Pakistan.

3. Data and Methodology

According to Bower and pierce (1975), Ehrlich's (1975) and layson (1983) reported in the literature that log-linear form perform very well than linear form. So we also use the log-linear modeling in the context of Pakistan. We use the following algebraic equation model as below;

$LREER=\alpha 0+ \alpha 1LNEER+ \varepsilon t$ (1)

Where;

LREER=log of real effective exchange rate LNEER=log of nominal effective exchange rate α=alpha

εt=error tem in time t.

3.1 Unit root test by using Augmented Dickey Fuller(ADF):

In time series data first we check trend in the data. Here we find interference about the stochastic process realization is used. So stationery test is very important to draw inference from time series analysis. In this paper we apply ADF test to test the stationarity of the time series which is based on the following equation model;

$\Delta yt=\beta 1+\beta 2t+ \delta yt\text{-}1+\alpha i\Sigma mt=1\Delta yt\text{-}1+ \varepsilon t$ (2)

$\Delta yt\text{-}1=(Yt—1–Y\ t\text{-}2)and\Delta yt\text{-}2= (Yt—2– Y\ t\text{-}3)etc.$

3.2 Philip Perron test:

ADF test assume that errors statistically independent and have constant variance but this test allow the disturbance which is being dimly dependent and heterogeneously dispersed.

The equation for this regression as given as follow;

$Xt =\delta 1^*+\delta 2^*Xt\text{-}1+Vt$ (3)

$Xt=\varphi 1+\varphi 2Xt\text{-}1+ \varphi 3(t\text{-}n/2)+ \eta t$ (4)

Where;

n=number of observation

V=η=E (ut)=0 ….

The hypothesis are δ1=1,φ1=1andφ3=0.

3.2 Auto Regressive Distributed Lag (ARDL) approach for co-integration:

We use ARDL test for examining co-integration between REEL and NEER. Long run relationship can be achieved by using to estimate ARDL model as below;

$$\begin{aligned} Dlnreer \;=\; & \beta_0 + \beta_1 Dlnreer(-1) + \beta_2 Dlnreer(-2) + \beta_3 Dlnneer \\ & + \beta_4 Dlnneer(-1) + \beta_5 Dlnneer(-2) + \beta_6 lnreer(-1) \\ & + \beta_7 lnneer(-1) + \in \end{aligned}$$

Now we are going to find the relation between REER and NEER in the context of Pakistan by applying Pesaran, Shin and Smith (2001) (PSS) and applying ARDL model. We compare the F=statistics calculate value with critical value tabulate. If F-statistics value exceeds than critical value than we reject the null hypothesis that is there is no relationship between REER and NEER in long run. And we will accept the alternative hypothesis i.e there is long run relationship between variables, by using the ARDL model to when we estimate the long run relationship then there also exist an error correction representation. We also estimate the error correction model to describe the speed of adjustment back to the long equilibrium after the short run shock.

4. Result

Table 1 shows ADF augmented dickey fuller and Philips-perron test results for stationarity of real effective exchange rate and nominal effective exchange rate with intercept

Table: 1 ADF and Phillips Perron with intercept

Variables	ADF test values	Phillips-Perron	Order of integration
Lnreer	-3.227575*	-2.710969**	I(0)
Lnneer	-7.911196	-7.918890	I(1)

*(**) denote rejection of hypothesis at 5 %(10%) significance level.

Table: 2 shows ADF augmented dickey fuller and Philips-perrontest results for stationarity of real effective exchange rate and nominal effective exchange rate with trend and intercept.

Table: 2 ADF and Phillips Perronwith trend and intercept

Variables	ADF test values	Phillips-Perron	Order of integration
Lnreer	-3.197167**	-8.644987	I(0)
Lnneer	-8.036574	-8.032276	I(1)

(**) denote rejection of hypothesis at (10%) significance level.

As the variables are stationary at different order of integration so we will use autoregressive distributed lag (ARDL) for cointegration between variables.

ARDL equation with two lags,

$$Dlnreer = \beta_0 + \beta_1 Dlnreer(-1) + \beta_2 Dlnreer(-2) + \beta_3 Dlnneer + \beta_4 Dlnneer(-1) + \beta_5 Dlnneer(-2) + \beta_6 lnreer(-1) + \beta_7 lnneer(-1) + \in$$

Table 3: Akaike info criterion and Schwarz criterion are used for lag selection, the result after VAR is.

Lag	Akaike info criterion	Schwarz criterion
0	-5.040509	-4.991964
1	-13.10920	-12.96356
2	-13.22071*	-12.97798*

As indicated by the results in table 3 both the AIC and SC criterion are significant at second lag so for estimation of the ARDL model for the long and short run relationship we would use two lags of dependent and independent variables for the purpose of analysis.

Table 4: shows the long run relationship of independent variables with dependent variable

	Coefficient	Std. Error	t-Statistic	Prob.
LNREER(-1)	-0.011403	0.017395	-0.655543	0.5135
LNNEER(-1)	-0.013029	0.004353	-2.993033	0.0034

The lag value of nominal effective exchange rate is significantly negatively cointegrated with real effective exchange rate which means that real effective exchange rate has negative long run relationship with the lag value of nominal effective exchange rate, and insignificantly co integrated with his own lag value. Walt test results for long run relationship of variables

Wald Test:

Equation: Untitled			
Test Statistic	Value	df	Probability
F-statistic	5.800162	(2, 109)	0.0040
Chi-square	11.60032	2	0.0030
Null Hypothesis Summary:			
Normalized Restriction (= 0)		Value	Std. Err.
C(7)		-0.011403	0.017395
C(8)		-0.013029	0.004353
Restrictions are linear in coefficients.			

The null hypothesis assumes that there is no cointegration between the variables whereas the alternative hypothesis supports the existence of this association.Compare the F-value with the tabulated values of Pesaran, et al. (2001) or of Narayan (2004). As the F-value is greater than the tabulated value, 5.80 › 4.11, it means that there is cointegration between the variables and we reject the null hypothesis of no cointegration between variables. We also estimate the error correction model to describe the speed of adjustment back to the long run equilibrium after the short run shock.

	Coefficient	Std. Error	t-Statistic	Prob.
D(LNREER(-1))	0.868393	0.187563	4.629875	0.0000
D(LNREER(-2))	0.076609	0.101799	0.752543	0.4533
D(LNNEER)	0.909077	0.038496	23.61461	0.0000
D(LNNEER(-1))	-0.746971	0.175127	-4.265309	0.0000
D(LNNEER(-2))	-0.172529	0.101624	-1.697727	0.0924
ECM(-1)	-0.829121	0.212797	-3.896303	0.0002

As we know that the value of ECM (error correction term) ranges from (0, -1) here ECM value is equal to -0.82, it means that 82% of coefficients are adjusted back to equilibrium in short run from disequilibrium.

5. Conclusion

This study has attempted to examine the long run relationship between nominal effective exchange rate and real effective exchange rate, it examines that nominal devaluation lead to real devaluation or not? Results and finding suggest that nominal devaluation lead real devaluation not only in the long run but also in short run in case of Pakistan, because the value of ECM is -0.82 which means that 82% of disequilibrium in coefficients are adjusted back to equilibrium in short run, the earlier findings are also consistent with our findings, this association is of nominal devaluation and real devaluation is stronger in flexible exchange rate regime.

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