Impact of Devaluation on Trade Balance in Pakistan

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Abstract: *The purpose of this paper is to find the impact of devaluation on trade balance in Pakistan in both long and short run using bound testing approach to Cointegration and Error Correction Mechanism (ECM). The result shows that devaluation is effective in improving trade balance and there is a cointegrated relationship between the real effective exchange rate and trade balance in the long run.*

Keywords: *REER, Devaluation, Trade Balance, Cointegration, Pakistan.*

Introduction

Devaluation is undertaken as a mean of correcting a deficit in trade balance and the balance of payments. It raises the domestic price of imports and reduces the foreign price of exports. According to Alse and Oskooee (1995), it is common to find arguments for and against devaluation but the issue is to find the effects of devaluation in terms of trade, as devaluation lowers the prices of exports and raises the prices of imports. Some economists believe that the necessary and sufficient condition for an improvement in the trade balance is a combination of a sufficiently large price elasticity of demand and a sufficiently small price elasticity of supply (Brahmasrene and Jiranyakul, 2002). Thanh and Kalirajin (2006) find that devaluation can be implemented to encourage the exports and to improve the trade balance and also to reduce the real exchange rate appreciation in short run. Narayan (2006) finds that in short and long run, a real devaluation of currency improves the trade balance. Oskooee (1998) finds that devaluation improves the trade balance in the less developed country. Cooper (1971) proves that devaluation improve the trade balance, while studying the impact of devaluation in 19 developing countries including Pakistan. Halicioglu (2008) suggests that there is a long run relationship between real effective exchange rates and the trade balance using bound testing cointigration approach, if the trade balance is used as a dependent variable. Upadhayaya (1999) finds the long run effects of devaluation in six Asian countries including Pakistan. He suggests that devaluation has a long run contractionarey effect in Pakistan.

Pakistan has been facing the problem of trade deficit since its creation in 1947. To improve the trade balance, Pakistan had experienced a series of devaluation in different periods of time from 1955 to up till now. After 1982 the country is experiencing a continuous devaluation in the rupee against dollar (Zaiby, 2009). The government and policy makers of Pakistan tried different exchange rate policies. To strengthen the balance of trade and balance of payments (BOP) and keeping in view this frequent appreciation of dollar against other major currencies, Pakistan adopted the managed floating exchange rate system in January 1982. The exchange rate observed much larger devaluation in nominal terms as there is a higher level of inflation in Pakistan in the beginning of 1990’s compared to other major trading partners. In July 2000, State Bank of Pakistan moved away from managed exchange rate to floating exchange rate regime. There was a sharp nominal depreciation of 18.5 percent during fiscal year 2001, which showed the market overvaluation during fiscal year 1999 and 2000 (Hyder and Mehboob, 2005).

There are several empirical evidences found for developing countries including Pakistan. In previous studies, attempts have been made to investigate the j-curve phenomenon in Pakistan. Due to the advent of new econometric techniques it is expected to find better results for future policy making. Therefore, objective of this study is to find the impact of devaluation on trade balance in Pakistan in longer run using Auto Regressive Distributed Lag (ARDL) approach.

Data and Methodology

The annual data over the period from 1981 to 2008 is used to estimate the ARDL equation. The data set was extracted from the annual reports of the State Bank of Pakistan. The real effective exchange rates from 1981 to 2005 were gathered from the study of Hyder and Mehboob (2005). The real effective exchange rate (REER) is a key macro economic relative price, which plays an important role in the broad allocation of resources in production and spending behavior in the economy. The real effective exchange rate (REER), as a measure of competitiveness, also determines and influences the performance of export sector.

The impact of real effective exchange rate on trade balance can be analyzed through Auto Regressive Distributed Lag (ARDL) model. The same model is used to study the long run and short run relationship among the variables.

The model can be written in the log linear form as:

$$TB = f(REER) \quad (1)$$

$$\ln(TB) = \alpha_0 + \alpha_1 \ln(REER)_t + \varepsilon_t \qquad (2)$$

where the trade balance (TB), is the ratio of exports to imports and REER is the logarithm of the real effective exchange rate. According to j-curve phenomenon, an increase in real effective exchange rate initially reduces the demand for the home country's export but increases its demand for imports. As a result, the balance of trade worsens initially but it will improve after a while as export and import volumes adjust to price changes.

The impact of exchange rate changes is unpredictable, i.e. α_1 could be positive or negative. If there is a real devaluation of domestic currency i.e. RER increases, then the increased competitiveness in prices for domestic country should result in exporting more and importing less. However, the higher RER also increases the value of each unit of import, which would tend to diminish the trade balance. In the short run there prevails an "import value effect", whereas the "volume effect" dominates in the longer run.

To investigate the cointegrated relationship between trade balance and exchange rate, several econometric methods were implemented. A recent single cointegration approach, known as Auto regressive Distributed Lag (ARDL) of Pesaran et al. (2001), has become popular amongst the researchers. The ARDL approach to test the existence of a long run relationship between the variables in levels is applicable irrespective of whether the underlying regressors are purely I(0) i.e. integrated at level or I(1) i.e. integrated at first order. According to Narayan (2004), the small sample properties of the bounds testing approach are far superior to that of multivariate cointegration.

An ARDL representation of equation 1 is as under:

$$\Delta \ln(TB_t) = \beta_0 + \sum \beta_{1j} \Delta \ln(REER_{t-j}) + \sum \beta_{2j} \Delta \ln(TB_{t-j}) + \beta_3 \ln(REER)_{t-1} + \beta_4 \ln(TB_{t-1}) + \varepsilon_t \quad (3)$$

Once a long run relationship has been established, using an appropriate lag selection criterion, the second stage of ARDL cointegration procedure is to perform a parameter stability test for the selected ARDL representation of the Error Correction Model (ECM). A general equation of ECM of ARDL equation is as follows:

$$\Delta \ln(TB_t) = \gamma_0 + \sum \gamma_{1j} \Delta \ln(REER_{t-j}) + \sum \gamma_{2j} \Delta \ln(TB_{t-j}) + \lambda EC_{t-j} + \varepsilon_t \quad (4)$$

Where λ is the speed of adjustment parameter and EC are the residuals that are obtained from the estimated cointegration model. Furthermore, Δ is the first difference operator. The *F* test is used to find out whether a long-run relationship exists between the variables through testing the significance of the lagged levels of the variables. When a long -run relationship exists between the variables, the computed F statistic exceeds the upper bounds of the critical value (Halicioglu, 2008).

Empirical Evidences

The results of ARDL equation are reported in Table 1. The results show that there is a lack of relationship between the real effective exchange rate and trade balance in the short run. On the contrary, we have found a valid relationship between these variables in the long run. The short and long run elasticities are 0.45 and 1.14 respectively calculated as $\frac{\beta_1}{\beta_2}$ and $\frac{\beta_3}{\beta_4}$ are shown in Table 5. The results show that 46% of the trade balance is explained by the REER, which shows the goodness of fit. The Durbin Watson value is 1.9 which is approximately equal to the benchmark of lack of autocorrelation in the model. The value of Wald F-statistic is 5.15 as reported in Table 3, is greater than the upper critical bound value at 1 % level of significance of Pesaran as shown in Table 4. This suggests that there exists a cointegrated relationship between the REER and the trade balance. The results of equation 2 are reported in Table 2. The results suggest that one percent devaluation will improve the trade balance by 64 percent.

Table 1— Estimated Results of ARDL equation

Variables	Coefficients	Probability
Constant	-3.4921	0.0000
D(LNTB(-1))	-0.8318	0.0065
D(LNREER(-1))	-0.3706	0.4302
LNTB(-1)	0.6825	0.0009
LNREER(-1)	0.7977	0.0000
MA(2)	-0.9947	0.0000
R-squared = 0.456	Durbin-Watson stat = 1.92	Prob(F-statistic) = 0.023

Table 2— Estimated Results of OLS

Variable	Coefficient	Probability
Constant	2.629553	0.0000
LNREER	-0.640917	0.0000
R-squared = 0.575112	F-statistic =35.19253	Probability = 0.000003

Table 3 — Wald Test

Test Statistic	Value	Probability
F-statistic	5.159628	0.0210
Chi-square	10.31926	0.0057

From these results, it is obvious that there is a long run relationship amongst the variables because its F-statistic is higher than the upper bound critical values, 5.06 at 1 percent level of Pesaran. This implies that the null hypothesis of no cointegration among the variables cannot be accepted. Bounds test for cointegration analysis is presented below in Table 4.

Table 4— Bounds Test for Cointegration Analysis Based on Equation

Critical value	Lower Bound Value	Upper Bound Value
1%	3.74	5.06
5%	2.86	4.01
10%	2.45	3.52

Note: Computed F-statistic: 5.61 (Significant at 0.01 marginal values). Critical Values are cited from Pesaran et al. (2001)

Table 5— Short and Long Run Elasticities Calculated from Table 1

Short Run Elasticities	Long Run Elasticities
$\frac{\beta_1}{\beta_2}$	$\frac{\beta_3}{\beta_4}$
0.45	1.14

Table 6 — ECM Results

Variables	Coefficients	Probability
Constant	0.0005	0.9900
D(LNTB(-1))	-0.0370	0.8711
D(LNREER(-1))	-0.3611	0.3805
D(LNREER(-2))	-0.3419	0.5952
D(LNREER(-3)	0.7469	0.1771
D(LNREER(-4)	-1.1981	0.0185
D(LNREER(-5)	0.4287	0.3173
λ	-0.4945	0.0369
R-squared = 0.7105	Durbin-Watson stat = 2.1	Prob(F-statistic) = 0.0858

The ECM results indicate that the ECM term (λ) has a negative sign and its value lies between 0 and 1, hence showing the convergence of the model and implying that about 49 % adjustments take place every year. In the short run, the results are significant at fourth lag which indicates that 1 % decrease in REER leads to a 1.2 % increase in the trade balance.

Conclusions

In this study, an attempt is made to find the impact of devaluation on trade balance and balance of payments. We use the real effective exchange rates (REER) as a proxy for devaluation. In this study, the analysis is made on annual data ranging from 1981 to 2008. ARDL model is used for studying the long run relationship among the variables. The trade balance (TB) was used as the dependent variable for this study. The coefficient of REER is significant, which shows that devaluation is effective in improving the trade balance. Based on the findings of the study, it is suggested to increase the trade balance, increase exports volume and introduce import quotas and seriously consider devaluation in trade policy.

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