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Real Exchange Rate and its Impact on Export, Import and Trade Balance: Is there any J curve effect in Bangladesh?

by

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Real Exchange Rate and its Impact on Export, Import and Trade Balance: Is there any J curve effect in Bangladesh?

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Abstract

The intention of this paper is to examine whether Real Exchange Rate (RER) depreciation has any impact on export, import and trade balance of Bangladesh. Real exchange rate is calculated using Tk./dollar nominal exchange rate with the consumer price index of US and Bangladesh. Trade-weighted real effective exchange rate (REER) has also been used to examine the effects of depreciation on the variables. The real effective exchange rate is calculated by using eight (8) major trading partner countries exchange rate and the consumer price Index. The industrial production index of Bangladesh and trading partners are used as a proxy for the domestic and foreign income. Cointegration test, Vector Error Correction model (VECM), and Impulse Response Functions (IRFs) derived from the unrestricted VAR have been used to estimate the models using monthly data for the sample period from June 2003 to June, 2014.

The empirical results show short-run and long-run relationship between trade balance, RER, and domestic income. An evidence of reverse L-shaped impact is observed while estimating the model with RER implying that real exchange rate depreciation is effective in influencing export, import and trade balance in Bangladesh. However, this study does not find any impact of trade-weight real effective exchange rate on the trade balance and imports though J curve effect is noticed with respect to exports.

JEL Classification: C22, F31, F32

Keywords: Real Exchange Rate, Real Effective Exchange Rate, J-curve, Cointegration, VECM, Impulse Response Functions.

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*Suggestions/comments for the improvement of the article sent to the corresponding author would highly be appreciated.

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Real Exchange Rate and its Impact on Export, Import and Trade Balance: Is there any J curve effect in Bangladesh?

I. Introduction

The intention of this paper is to examine the impact of the real exchange rate changes on exports, imports and the trade balance in Bangladesh. Bangladesh pursued active exchange rate policies since independence in 1971 to improve its trade balance. Like other developing countries devaluation of the currency as a policy tool used by the decision makers in Bangladesh. Bangladeshi currency Taka went through several regimes change since 1972 to 2002 to improve its trade balance. Bangladesh floated its exchange rate and followed an entirely market-based exchange rate for the Taka effective from 31st May, 2003 in place of a policy of occasionally adjusting the exchange rate.Under the present arrangement, the exchange rate is determined on the basis of demand and supply of the respective currencies.

In this regard, due to the importance of the real exchange rate depreciation on economy, this paper attempts to examine whether real exchange rate (RER) changes have any impact on export, import and the trade balance in Bangladesh. An attempt has also been made to examine whether trade-weighted real effective exchange rate (REER) changes had any impact on exports, imports, and the trade balance. Finally, the presence of the J curve effect where a country's trade balance deteriorates with its currency devaluation or depreciation initially but improves eventually examined for Bangladesh.[2]

The paper is organized as follows: after introduction in section I, section II describes empirical studies done in other countries. Section III, contains data analysis, methodology, model specifications, variables and empirical results of the study. Finally, conclusion and comments are in section IV.

I.1 Exchange Rate Policy in Bangladesh

Following independence in 1971, Bangladesh's currency, the Taka continued to be pegged to UK's pound sterling, the latter being the intervention currency. Government of Bangladesh imposed restrictions on foreign exchange to control capital flight after independence. In the controlled exchange regime, a secondary market developed to satisfy the excess demand for foreign currency. In the secondary market, the exchange price was much higher than the official exchange rate. In May 1975, a major step towards efficient exchange management took place

[2] The J-curve is a phenomenon where a country's trade balance deteriorates with its currency devaluation or depreciation initially but improves eventually.

with a massive devaluation (by 37 percent) of the Bangladeshi Taka. Since then, the central bank pursued a policy of devaluating the Taka to improve the balance of payment deficits. It is worthwhile to mention that Bangladesh devalued her currency (BDT) about 130 times from 1972 to 2002 (Younus and Chowdhury, 2006) to reduce the balance of payment deficits.

In 1985, the intervention currency was changed to the U.S. dollar because most of the official trades in Bangladesh took place in the U.S. dollar rather than the pound sterling. A real effective exchange rate (REER) index introduced to determine the strength of the BDT against foreign currency in 1985, after that the nominal exchange rate of BDT in relation to the U.S. dollar is determined daily by monitoring the REER index.

Under the 'Structural Adjustment Program' and the 'Financial Sector Reform Program,' Taka made convertible on the current account beginning March 24, 1994 (Annual Report, 1994-95). The exchange rate occasionally adjusted by monitoring the trend of REER to maintain competitiveness of export. Trade-weighted basket of currencies of major trading partner countries acted as a benchmark for the banks to set their rates. Finally, Bangladesh authorities decided to float the currency and abandoned the pegged exchange rate regime moved to a floating exchange rate system on May 31, 2003. Since then the exchange rate is determined in the inter-bank market in Bangladesh by supply and demand pressures for foreign currencies at a point in time and at large by macroeconomic fundamentals. Bangladesh Bank intervenes in the inter-bank market from time to time, but these interventions are only to reduce excessive volatility in the market. This action is temporary as the injections are subsequently re-purchased, but help in avoiding harmful disruptions and preventing risks of speculative opportunities.

II. Literature Review

Trade can play an important role in increasing economic growth of a country. In this connection, a large number of literatures focused particularly on examining the impact of exchange rate devaluations on the trade balance for both developed and developing countries. For example, Ng Yuen-Ling et al. (2008), Aziz (2012), Shirvani and Wilbratte (1997), Dhasmana (2012) argued for the improvement of trade balance following devaluation or depreciation of the exchange rate. While others such as Weliwita and Tisujii (2000), Perera (2009), Bhattarai and Armah (2005) found no or worsening effect of exchange rate fluctuations on the trade balance. A few researches explain the dynamics of the real effective exchange rate changes in the context of Bangladesh, mainly due to the limitations or unavailability of relevant data particularly REER index data in Bangladesh. This study made an attempt to fill in the gap in the literature with real data as opposed to constructing the REER index.

Ng Yuen-Ling et al. (2008) explored the relationship between the real exchange rate and the trade balance in Malaysian economy employing annual observations for the period from 1955 to 2006 find the impact of the real effective exchange rate impact on the trade balance. The study also concludes relevance of Marshall-Lerner condition and the absence of J-curve effect6 in Malaysia. 3

In contrast, Weliwita and Tisujii (2000) delineated the responsiveness of Sri Lanka's trade deficit to devaluation using quarterly data from 1978.I to 1997.IV. Three explanatory variables: domestic income, real effective exchange rate and the rest of the world income have been used to explain trade balance in Sri Lankan economy. Using cointegration techniques, impulse response functions from a VAR model, the authors conclude that persistent devaluation of the Sri Lankan currency (rupee) could not affect the trade balance. The rest of the world income has a positive effect on the Sri Lankan trade balance. On the other hand, applying autoregressive distributed lagged (ARDL) model Perera (2009) examine the impact of real depreciation of Sri Lankan Rupee on the trade balance using quarterly bilateral time series data from 1996:Q1 to 2008:Q2. The empirical results show that the trade balance between Sri Lanka & its trading partners does not hold the J-curve phenomenon. To examine the relationship between India's real exchange rate and its trade balance with her major trading partners, Dhasmana (2012) uses quarterly trade data for 15 countries over the period 1975Q1-2011Q1 and finds positive association of real exchange rate depreciation with the trade balance.

Aziz (2012) examine the impact of real devaluation on the trade balance of Bangladesh using annual data from 1976 to 2009. The author uses error correction model, multivariate cointegration tests, and impulse response functions to test the impact in both the short and long-run on export, import and trade balance. The estimated results of Aziz (2012) supports the significant positive impact of real effective exchange rate devaluation on the trade balance in Bangladesh. Aziz study also finds evidence of J-curve effect in Bangladesh while using real effective exchange rate (REER).

Ali and Kamal (2012) examine the way exchange rate fluctuations affect economy's overall balance of trade using evidence from the bilateral trade between Bangladesh and India, the EU; Norway and the US. Authors also examine the role of Marshall-Learner's condition and J-curve phenomenon in influencing a country's trade balance comparing Kuwait's trade balance with the U.S. using monthly data for the period from 2006 to 2009. The paper finds that an appreciation of domestic currency leads to the deterioration of the trade balance of Bangladesh and improvement in the trade balance for depreciation.

[3] The Marshall-Lerner condition, which states that currency devaluation will only lead to an improvement in the balance of payments if the sum of demand elasticity for imports and exports is greater than one, is named after English economist Alfred Marshall (1842-1924) and the Romanian born economist Abba Lerner (1905 - 1985). [6] The J-curve is a phenomenon where a country's trade balance deteriorates with its currency devaluation or depreciation initially but improves eventually.

Khan and Hossain (2010) evinced the impact of democracy on the trade balance of Bangladesh. Their model incorporated real effective exchange rate (REER), domestic income, foreign income, and a democracy index as independent and the trade balance as a dependent variable. Both the long-run and short-run patterns in the relationship between variables of the model tested using annual time series observations for the period from 1977 to 2006. The study finds that more democracy leads to an improvement in the trade balance of Bangladesh.

Backus et al. (1994) explain cross-correlation between net exports and the terms of trade for 11 developed countries (Australia, Austria, Canada, Finland, France, Germany, Italy, Japan, Switzerland, United Kingdom and United States). The study finds uniformly countercyclical and negative correlation of the trade balance with current and future variations in the terms of trade, but positive correlation with the past changes. The cross-correlation function found in the authors' theoretical structure of two countries economy is S-shaped, but the economy produces a tent-shaped cross-correlation function in the absence of capital in the economy.

Miles (1979) examines the statistical relationship between devaluation and both the trade balance and the balance of payments for 16 devaluations of 14 countries for the period 1956-72. The paper finds improvement in balance of payment following devaluation.

Kalyoncu et al. (2009) examine the impact of devaluation on the trade balance using Johansen Juselius cointegration(1992) test and impulse response function. Using quarterly data for four countries: Brazil (1991-2005), Argentina (1993-2005), Mexico (1981-2005) and Peru (1979-2005), the paper concludes that J-curve pattern available for Argentina and Peru.

Bhattarai and Armah (2005) observed the consequence in the trade balance resulting from exchange rate fluctuations for Ghana applying annual data from 1970 to 2000. Trade balance is addressed as a function of real exchange rate, domestic and foreign income in the paper. Authors used cointegration analyzes of both single equation models & VAR-error correction models ratifying a firm relationship between trade balance and exchange rate in the long-run for Ghana.

Guechari (2012) estimates the effects of Real Effective Exchange Rate (REER) on Algeria's Trade Balance (TB). The paper includes REER, foreign income and real domestic income in the model to examine the behavior of the trade balance in the general case (Algeria-world) and particular cases (Algeria-France and Algeria-US). Author uses cointegration techniques, error correction model (ECM) and impulse response function for time series data covering 1981.Q1-2009.Q4. The empirical results show that REER effects significantly and positively in the long run while negatively in the short run on the Algeria’s bilateral trade balance with respect to US and France.

III. Data Analysis, Model Specification, Model variables, Methodology

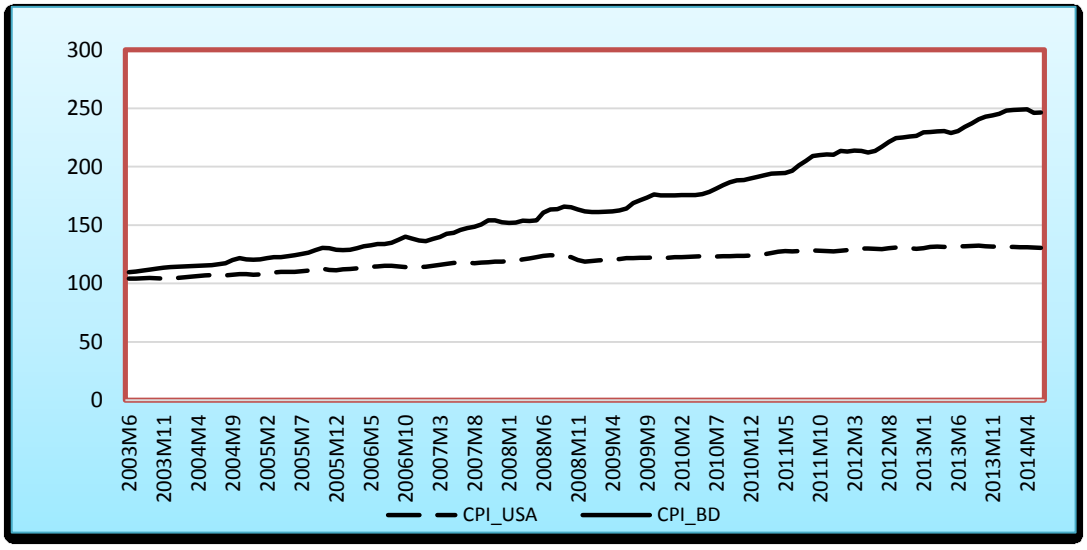
This study seeks to examine whether real exchange rate and real effective exchange rate changes have any impact on exports, imports and trade balance in Bangladesh. Monthly data for the sample period from 2003:6 to 2014:6 is used to estimate the models. Two models using four variables namely, RER/REER, domestic income, and foreign income are employed. Impulse response functions derived from VAR used to examine the J curve impact. Base year 2000-01 is used for CPI, REER, Industrial Production, and RER. All the variables are in log form and local currency. This model has the similarity with the model used by Aziz (2012). However, the current study differs from that of Aziz (2012) in several ways, such as in data frequency, data constructions, the sample period, model variables and model specifications.

III.1 Real Exchange Rate

Data Analysis

In order to estimate the model, monthly data from June 2003 to June 2014 have been used to examine the impact of real exchange rate depreciation, foreign income and domestic income on exports, imports and the trade balance of Bangladesh. The data for real exchange (RER) rate is constructed using CPI of Bangladesh, CPI of USA, multiplied by taka-dollar nominal exchange rate. Chart-1 shows the trends of domestic price level and USA price level. In this study weighted average industrial production (IP) for major trading partner countries has been used as a proxy for foreign income to capture trading partner's income/output effects.

Chart-1: Trends in CPI_USA and CPI_BD



The present study uses IPs for seven trading partner countries of Bangladeshi. For example, India, Japan, Euro Area, China, Singapore, the USA and the U.K.), these countries altogether explain 94.01% of total trade with Bangladesh. The weighted average IP of each month for the trading countries of Bangladesh got through summation of IPs multiplied with respective country's trade weight for the individual month.

Chart-2: Trends in NER and RER

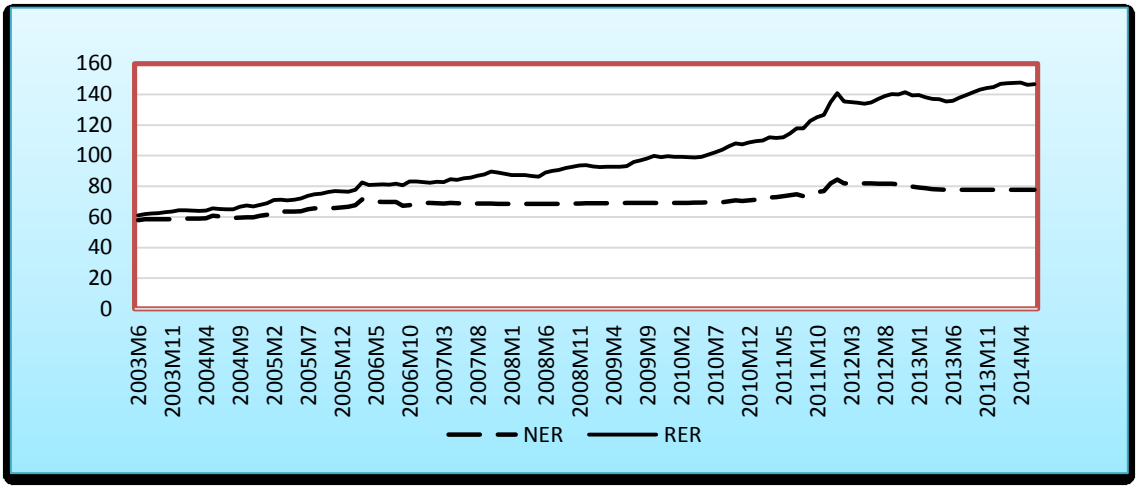
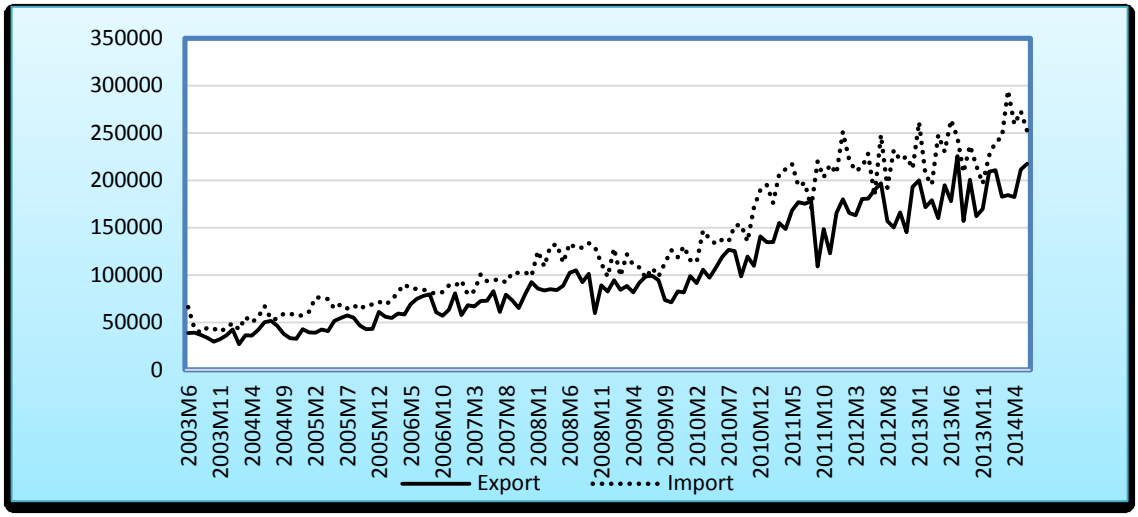


Chart-2 depicts the trends of Taka/Dollar nominal exchange rate and real exchange rate. The real exchange rate increased faster than nominal exchange rate as because domestic price level increased relatively faster than foreign price level.

Chart-3: Trends in Export and Import



The trends of exports and imports (Chart-3) also showed similar movements since 2003. However, imports increased faster than exports since 2010, worsening trade balance.

Model Variables

The following variables used to perform cointegration test by Johansen (1988) to examine any long-run relationship among the variables.

ln_R_TB=log of real trade balance (log real export-log real imports)
ln_REAL_EX=log of real exports (Exports/CPI_BD)
ln_REAL_IM=log of real imports (IMPORTS/CPI_BD)
ln_RER=log of (Tk/$*(CPI_USA/CPI_BD)

Model Specification

The theoretical basis of the empirical model can be given as follows:

$$TB = f(RER, Y, Y^*)$$

TB=Trade balance

Y=Domestic Income

Y*=Foreign Income

RER=Real Exchange Rate is used as a proxy for relative prices of export and Import in the real exchange rate.

A log-linear time series specification of the model stated as follows:

$$lnTB = \beta_0 + \beta_1 lnRER + \beta_2 lnY + \beta_3 lnY^* + \varepsilon t$$

The expected sign for $\beta 1 < 0, \beta 2 > 0\ or < 0$, and $\beta 3 < 0$

Test for Order of Integration

The Augmented Dickey-Fuller (ADF) and the Kwiatkowski-Phillips- Schmidt-Shin (KPSS) tests have been used to check the unit root for all the variables in log level. The tests results indicate that all variables are non-stationary at log level except for trade balance; however, they are stationary at their first difference. The test result is given as follows.

Table 1: UNIT ROOT TESTS

		ADF		KPSS	
		No Trend	With Trend	No Trend	With Trend
Test for I (0)	$lnTB_t$	-9.7	-7.72	0.3	0.04
	$ln\ RER_t$	-0.53	-1.94	1.4	0.14
	lnY_t	0.62	-1.2	1.23	0.12
	lnY_t^*	-1.35	-2.24	0.84	0.11
	LN_REER	-1.13	-2.53	0.79	0.2
	LN_REAL_EX	-1.25	-1.72	1.33	0.12
	LN_REAL_IM	-1.62	-4.04	0.31	0.10
Test for I (1)	$\Delta lnTB_t$	-8.18	-8.15	0.19	0.17
	$\Delta lnRER_t$	-9.29	-9.39	0.06	0.06

	ΔlnY_t	-10.63	-10.63	0.05	0.04
	ΔlnY_t^*	-4.37	-4.29	0.11	0.06
	ΔLN_REER	-8.63	-8.73	0.21	0.04
	ΔLN_REAL_EX	-2.94	-2.94	0.16	0.15
	ΔLN_REAL_IM	-19.08	-18.99	0.07	0.06

Note: The critical values for ADF are -3.65 (no trend),-4.26 (trend) at 1%, -2.96 (no trend) -3.56 (trend) at 5% and -2.62 (no trend), -3.21 (trend) at 10% level of significance which is tabulated from Mackinnon (1996) one-sided p-values. The critical values for KPSS are 0.739 (no trend), 0.216 (trend) at 1% 0.463(no trend), 0.146 (trend) at 5% and 0.347 (no trend), 0.119 (trend) at 10% level of significance.

Co-integration Test for Exports

Johansen (1988) multivariate approach, to examine long-run relationship between log of export, log of imports, log of RER, log of domestic income and the log of income of the trading partners. Instead of the trade balance, export is used to examine whether exports has any long run relationship with real exchange rate, domestic and foreign income. Both the 'trace' statistic and 'maximum eigen value' test leads to the rejection of the null hypothesis of (no co-integrating vectors) against the alternative hypothesis (one or more cointegrating vectors) while the null of against the alternative cannot be rejected at 5% level of significance.

Empirical Results

Table 2: JOHANSEN'S COINTEGRATION TESTS for Exports

Null Hypothesis	Alternative Hypothesis	Trace Test		Maximal Eigen value Test	
		Statistics	95% Critical Value	Statistics	95% Critical Value
r=0	r=1	47.21*	47.08	31.96*	27.07
r≤1	r=2	18.94	29.68	10.97	20.97
r≤2	r=3	7.97	15.41	7.87	14.07
r≤3	r=4	0.10	3.76	0.10	3.76

Trace test indicates 1 cointegrating equation(s) at both 5% and 1% levels Max-eigenvalue test indicates 1 cointegrating equation(s) at both 5% and 1% levels.

Vector Error Correction Model (VECM): Exports[4]

A vector error correction (VEC) model is a restricted VAR designed for use with non-stationary series that are known to be co-integrated. The VEC has cointegration relations built into the specification so that it restricts the long-run behavior of the endogenous variables to converge to their co-integrating relationships while allowing for short-run adjustment dynamics. The

[4] The cointegration test and VEC for imports also have been estimated which are reported in the appendix.

cointegration term is known as the error correction term since the deviation from long-run equilibrium is corrected gradually through a series of partial short-run adjustments (pp-545, Eviews user guide). The study employs the following vector error correction model to construct a dynamic particular model for exports since trade balance variable is stationary. In order to test cointegration and use vector error correction models, variables need to be integrated in order one.

$$\Delta lnEX_t = \alpha_0 + \sum_{i=1}^{3} \alpha_i \, \Delta lnEX_{t-i} + \sum_{i=1}^{3} \beta_i \, \Delta lnRER_{t-i} + \sum_{i=1}^{3} \gamma_i \, \Delta lnY_{t-i} + \sum_{i=1}^{3} \delta_i \, \Delta lnY^*_{t-i} + \gamma EC_{t-1}$$

Given that all variables are in their first difference, this study allows a lag structure of up to three periods (on the basis of the Akaike Information Criteria, and final prediction error criteria). Insignificant lags and variables are eliminated sequentially while significant lags have been reported in the Appendix. The simplified results are given as follows (t-statistics are in parentheses):

$$\Delta lnEX_t = \underset{(2.02)}{0.30}\Delta lnRER_{t-1} - \underset{(-4.32)}{0.70}\Delta lnIM_{t-1} + \underset{(1.25)}{0.47}\Delta lnY^*_{t-1} - \underset{(-6.74)}{1.07}EC_{t-1} + \underset{(2.14)}{0.03}$$

The above dynamic estimate suggests that the real exchange rate depreciation has a significant effect on export in the short-run implying that the real exchange rate depreciation will increase exports. The domestic real imports also increase exports as most of the imported goods in Bangladesh are industrial raw materials. The coefficient of output of major trading partners is not significant. The coefficient of ECt-1 is negative and significant, which implies that the model converges. The speed of adjustment is very high -1.07 indicates that if there is any disequilibrium these variables adjust rapidly to get back to the equilibrium.

Diagnostic Test for Exports

Diagnostic test results are given as follows: The R2 is 0.77 which implies that the estimated model is a good fit model. The F-test result indicates the overall significance of the model. The diagnostic test statistics are performed to check the stability of the error correction model. The autoregressive (AR) test examines up to the 10th order serial correction and cannot reject the null hypothesis that there is no autocorrelation. The autoregressive conditional heteroscedasticity, test cannot reject the null hypothesis that there is no heteroscedasticity. The Jarque Bera test statistics of the normality test implies that the errors are normally distributed.

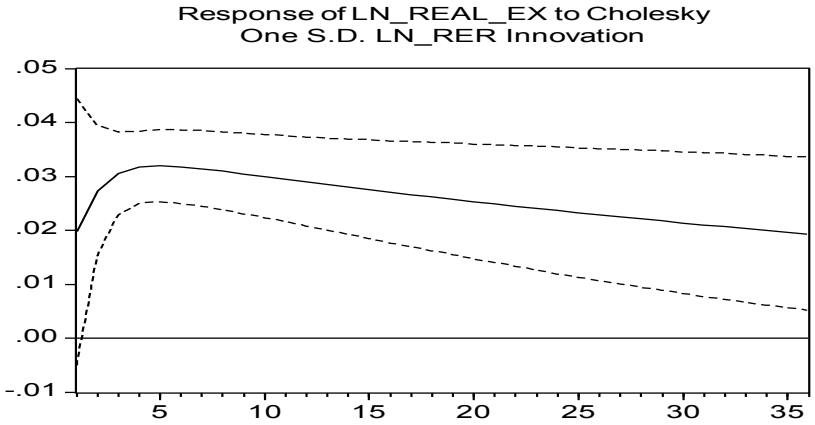
The Impulse Response Functions (IRFs): Evidence of J-Curve Impact

In order to test whether the impact of real exchange rate on the trade balance is, J shaped impulse response functions derived from VAR are used. The IRFs shows the response of a variable due to one standard deviation shock of other variables. The study examines the response of the trade balance, imports, and exports to the real exchange rate (RER) shock. Therefore, in this study the variable RER is placed first followed by the trade balance assuming that the real exchange rate has a contemporaneous impact on the trade balance, while the trade balance has effects on RER through lags. Similarly, RER place before exports and imports.

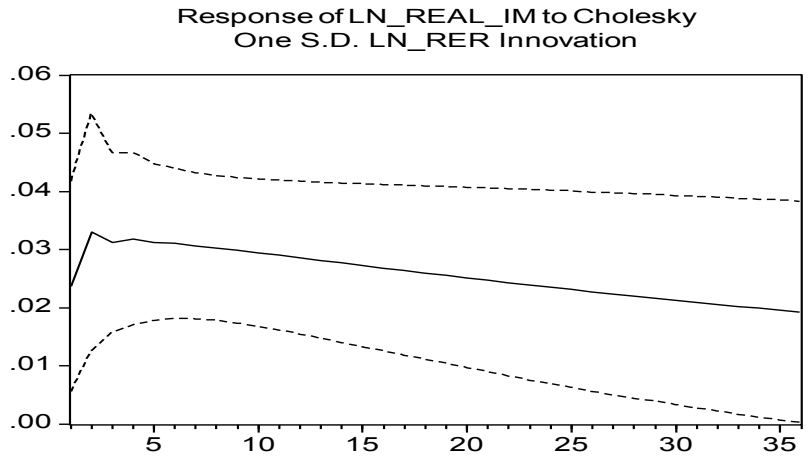
The study uses monthly data from 2003M6 to 2014M6 to find the responses of exports, imports and trade balance of Bangladesh to real exchange rate movements. Data for monthly exports and imports comes from the economic trends of Bangladesh Bank. Exports and imports are divided with the 12-month average consumer price index to construct real variables. All variables are in local currency unit. The impulse responses (Cholesky decomposition) of the trade balance, exports and imports are run separately to examine whether the J-curve phenomenon. The significance level is shown by standards error around the response functions. The impulse responses are given bellow:

Chart-4: IRFs OF EXPORTS, IMPORTS AND TRADE BALANCE TO REAL EXCHANGE RATE SHOCKS

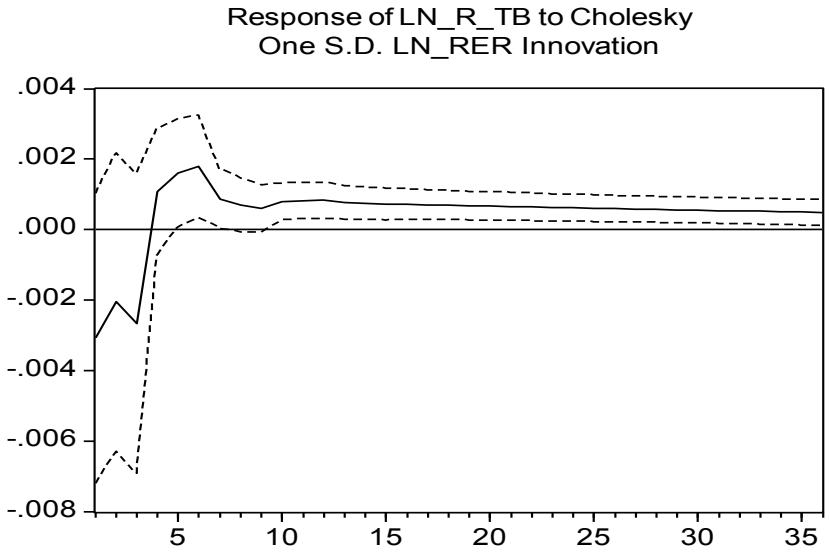
a. Response of Real Exports to Innovations to Real Exchange Rate



b. Response of Real Imports to Innovations to Real Exchange Rate



c. Response of Trade Balance to Innovations to Real Exchange Rate



The impulse response functions (IRFs) of log of real export, log of real imports and log of the real trade balance due to innovations to log of real exchange rate have been shown in Chart-4. The impulse response function of real exports due to one standard deviation shock to real exchange rate, real exports become significant and positive in the first period (month) peaked at period 4th and remain significant thereafter (Chart-4a). Impulse response function (IRF) of real imports due to one standard deviation shock to real exchange rate, also become significant and positive in the same month and peaked at period 6th and remain significant thereafter (Chart-4b).

The impulse response function of real trade balance due to one standard deviation shock to real exchange rate, becomes significant and positive at 5th period then becomes insignificant at 7th month which becomes significant again in period 10th and remain significant and positive thereafter (Chart-4c).

The response of the trade balance due to shock to real exchange rate is reverse L shaped instead of J curve impact though on the effects of exports and imports shows reverse J curve results. The main reason behind the reverse J-curve behavior for Bangladeshi export and imports is because, when exports demand increases following depreciation, the imports demand of intermediate inputs of exporting industries are substantially increased particularly in the Textile and RMG sectors. Therefore, the impact on the trade balance remain constant initially till about 5th period, after that exports increases more that imports that help trade balance to improve due to real exchange rate depreciation.

III.2. Real Effective Exchange Rate (REER)

Bangladesh uses Real Effective Exchange Rate (REER) index to gauge the competitiveness of Bangladesh currency compared with the movement of major trading partners' exchange rate and price level. Accordingly, a REER based exchange rate has been calculated to examine the trend of local currency against major trading partners. For this reason, it would be worthwhile to examine whether real effective exchange rate has any direct impact on Bangladesh exports, imports, and trade balance.

The data for REER is available in two base periods 2000-01 and 1994-95, therefore to convert REER index into single base, the paper uses the ratio of REER for June, 2013 of two different bases to get the converted data of 2000-01 base for the period from June 2003 to June, 2014. The nominal effective exchange rate has been constructed using following formula and trade weight.

$$NEER^t = \frac{ERI_B^t}{\prod_{i=1}^{8} ERI_i^{tWi}} \times 100$$

Where, ERI_B^t =Exchnage Rate Index of US$ against Taka

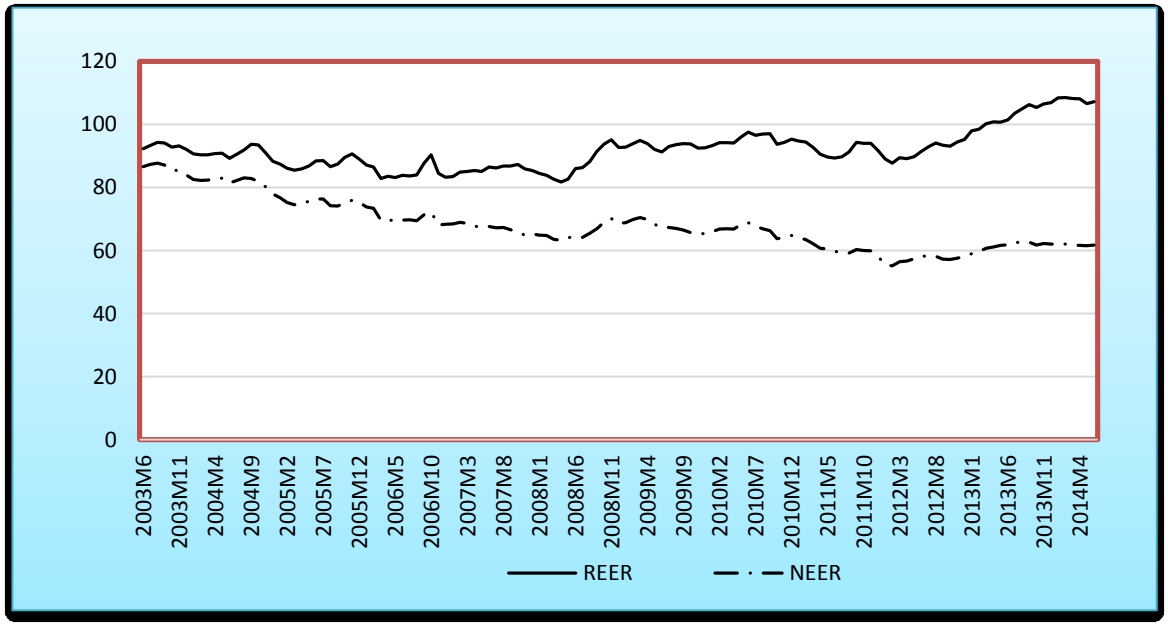
ERI_i^t = Exchange Rate Index of US$ against each partner country currency

W_i^t = Trade weight of Bangladesh with each major trading partner country.

t = time

Moreover, REER is calculated using following formula=NEER*(Domestic Price/Weighted Average Foreign Consumer Price Index)[5]

Chart-5: Trends in NEER and REER



Empirical Results from cointegration test, VEC and impulse response functions

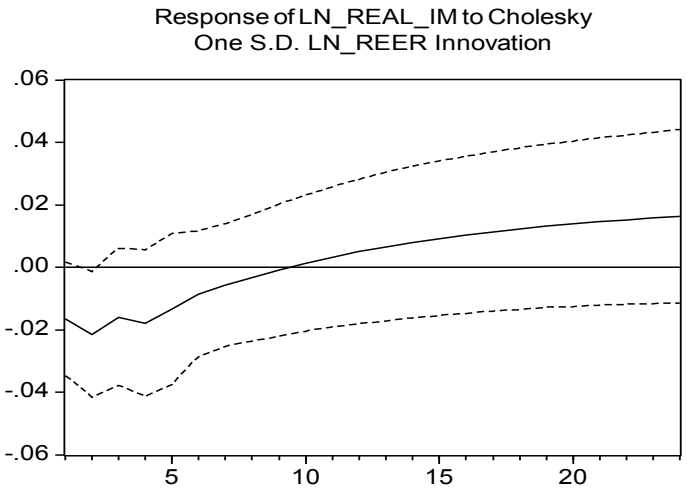
In order examine the impact of REER on trade balance cointegration analysis has been performed using lag 4 suggested by Akaike information criteria (AIC) and final prediction error (FPE). Following Johansen (1987, 88) multivariate approach assuming linear deterministic trend and intercept, this study finds no cointegration among trade balance, real effective exchange rate, domestic income, and foreign income. This is implying that there is no long-run relationship between trade balance with the log of real effective exchange rate index, domestic income, and foreign income.

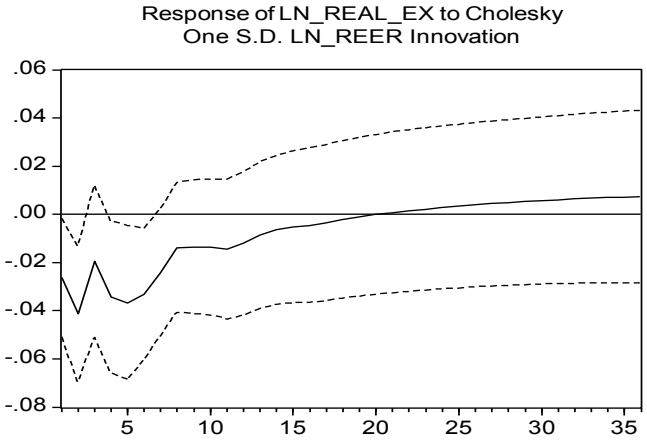
The vector error correction (VEC) models also show that there is no short run impact of REER on the trade balance in Bangladesh. Finally, impulse response

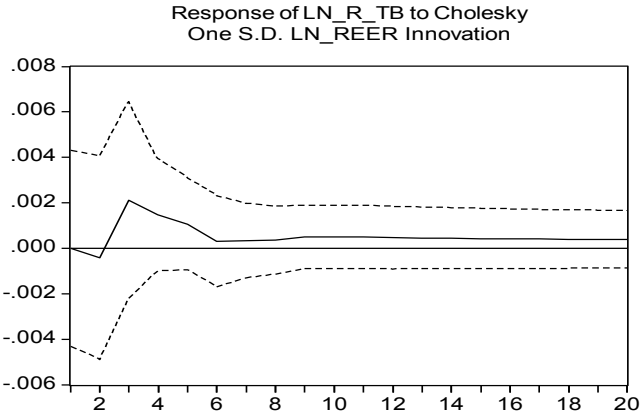
[5] WAFCPI= weighted average foreign CPI has been calculated as the summation of trade weight of 8 major trading countries of Bangladesh with log of the price level of respective countries. Unit root test results by ADF and KPSS test confirms the presence of Unit root in the series.

functions derived from Vector Autoregression (VAR) also confirms no J curve effect on the trade balance and imports. However, a small J-curve impact was depicted from response of exports.

Chart-6: IRF of Trade Balance, Imports, and Exports to Real Effective Exchange Rate Shocks







IV. Conclusions and Recommendations

The paper examines the impact of real depreciation of the currency on export, import and trade balance of Bangladesh. The study constructs and applies the real exchange rate and real effective exchange rate variables in monthly frequencies to estimate the models. The estimated results from cointegration and vector error correction models depict that real exchange rate has a significant impact on exports, imports and balance of trade of Bangladesh. The impulse response function suggests that there is reverse L-shaped effect for trade balance while the impact on exports and imports are reversed J curve that is, following a real depreciation, the balance of trade of Bangladesh remains insensitive for 5 months than become significant and improves eventually. This is may be because an increase in export demand from foreign countries following currency depreciation increase competitiveness of domestic goods compared with foreign goods also increase import demand for raw materials which, are used as intermediate goods of export industries in the similar fashion making trade balance insensitive following a depreciation of Bangladesh currency. All these findings imply that depreciation of Bangladesh currency is effective to make the Bangladeshi product competitive in the world market (i.e. growth in exports) in the long run and short run as well. The impact on the trade balance is although insensitive initially become significant after 5th period and remain significant after that.

This study does not find any significant effect of REER either on the trade balance or exports and imports. This is may be because in Bangladesh real effective exchange rate has been calculated for the policy makers to gauge the competitiveness of Bangladeshi goods compared with the major trading countries of Bangladesh. This data is not publicly available. To examine the competitiveness of Bangladeshi products REER based exchange rate is compared with Taka per dollar nominal exchange rate. The difference between two exchange rates gives an idea to the authorities with respect to competitiveness. For this reason, a policy implications of this study is a real exchange rate has highly significant and positive impact on export, negative impact on imports and improves trade deficits in Bangladesh.

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Appendix

Diagnostic Test for Exports

R^2	0.77
F-stat	7.88

Autocorrelation LM Test

VEC Residual Serial Correlation LM Tests

H0: no serial correlation at lag order h

Lags	LM-Stat	Prob
1	15.86805	0.4622
2	20.76905	0.1876
3	22.76666	0.1201
4	21.07457	0.1757
5	18.77651	0.2804
6	15.56711	0.4836
7	13.06100	0.6683
8	22.12717	0.1391
9	11.24717	0.7940
10	15.26685	0.5052

Probs from chi-square with 16 df.

VEC Residual Normality Tests

Orthogonalization: Cholesky (Lutkepohl)

H0: residuals are multivariate normal

Component	Skewness	Chi-sq	df	Prob.
1	-0.090658	0.143832	1	0.7045
2	0.197744	0.684295	1	0.4081
3	0.327992	1.882633	1	0.1700
4	-0.258417	1.168638	1	0.2797
Joint		3.879398	4	0.4226

VEC Residual Heteroskedasticity Tests: No Cross Terms (only levels and squares)
Date: 08/15/14 Time: 03:03
Sample: 2003:06 2014:06
Included observations: 105

Joint test:

Chi-sq	df	Prob.
740.0384	74	0.4927

Individual components:

Dependent	R-squared	F(74,30)	Prob.	Chi-sq(74)	Prob.
res1*res1	0.602597	0.614732	0.9529	63.27270	0.8086
res2*res2	0.672791	0.833573	0.7396	70.64301	0.5891
res3*res3	0.751636	1.226900	0.2705	78.92182	0.3262
res4*res4	0.786591	1.494254	0.1107	82.59200	0.2312
res2*res1	0.683463	0.875347	0.6844	71.76362	0.5520
res3*res1	0.703158	0.960324	0.5696	73.83163	0.4836
res3*res2	0.630669	0.692271	0.8975	66.22028	0.7284
res4*res1	0.687572	0.892190	0.6616	72.19503	0.5377
res4*res2	0.689503	0.900259	0.6507	72.39777	0.5310
res4*res3	0.733328	1.114832	0.3793	76.99940	0.3829

Co-integrating terms and determinants of Δ LN_R_EX$_t$

The Export Behavior

ECT(**LN_R_EX**)$_{t-1}$	-0.44(-5.39)
$\Delta LN\_IPI\_EX_{t-1}$	-0.25 (-2.35)
$\Delta LN\_IPI\_TP_{t-3}$	2.87 (1.83)
Δ LN_IPI_BD$_{t-1}$	-1.55(-1.86)
Δ LN_IPI_BD$_{t-2}$	-1.90(-2.26)
Δ LN_R_IM$_{t-1}$	-0.76(-3.78)
$\Delta LN\_R\_IM_{t-2}$	-0.43(-2.33)
Constant	0.06(3.31)
R^2	0.57
S.E	0.12
F-Statistics	7.79

Cointegration test for Imports

Unrestricted Cointegration Rank Test

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	5 Percent Critical Value	1 Percent Critical Value
None **	0.250511	60.13902	47.21	54.46
At most 1	0.133644	28.13065	29.68	35.65
At most 2	0.104136	12.20663	15.41	20.04
At most 3	3.54E-06	0.000393	3.76	6.65

*(**) denotes rejection of the hypothesis at the 5%(1%) level
Trace test indicates 1 cointegrating equation(s) at both 5% and 1% levels

Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	5 Percent Critical Value	1 Percent Critical Value
None *	0.250511	32.00837	27.07	32.24
At most 1	0.133644	15.92401	20.97	25.52
At most 2	0.104136	12.20624	14.07	18.63
At most 3	3.54E-06	0.000393	3.76	6.65

*(**) denotes rejection of the hypothesis at the 5%(1%) level
Max-eigenvalue test indicates 1 cointegrating equation(s) at the 5% level
Max-eigenvalue test indicates no cointegration at the 1% level

Vector Error Correction Model (VECM): Imports

$$\Delta lnIM_t = 0.85\Delta lnRER_{t-1} + 1.51\Delta lnY_{t-1} + 1.29\Delta lnY^*{}_{t-1} - 0.43EC_{t-1} + 0.01$$
$$(2.38) \qquad (4.49) \qquad (4.23) \qquad (-2.97) \quad (0.64)$$

The above dynamic estimate suggests that the real exchange rate depreciation has significant and positive effect on imports in the short-run implying that if the real exchange rate depreciates that will increase imports in the short run. This result is consistent with the results derived from impulse response functions. The VECM results also indicate that domestic real output has significant and positive impacts on imports in the short-run implying that if the domestic real output increase following export demand that will increase imports. The coefficient of output of major trading partners is significant and appeared with the expected positive sign implying that if real output of major trading partner increases that will increase imports in Bangladesh. The coefficient of ECt-1 is negative and significant, which implies that the model converges. The speed of adjustment is high -0.43 implies that these variables will adjust quickly to get back to the equilibrium.
