Trade Liberalization and Trade Balance
The Case of Bangladesh

M. Zakir Saadullah Khan[*]
M. Ismail Hossain[**]

Abstract

The pace of Bangladesh's trade liberalization is criticized for being too fast and has 'flooded" markets with goods from abroad, particularly from neighboring countries which are hurting Bangladesh's economy and deteriorating its external balance. This paper examines these concerns and investigates the impact of trade liberalization on the trade balance of Bangladesh. Incorporating liberalization indicators, defined as shift dummy variable in the standard trade balance model the paper seeks to answer the question, "Does liberalization improve trade balance of Bangladesh?" Using the time-series data of Bangladesh over period of 1973-2006, the cointegration methodology is applied to estimate an error correction model to find the relationship both in the short-run and in the long-run. The main findings of a single cointegrating equation show a long-run stable relationship between trade balance and the explanatory variables in the model. The results also suggest convergence of the short-run dynamics towards the long-run equilibria and it can be concluded that the trade reforms towards openness has improved the trade balance of Bangladesh.

Key words: Trade balance, liberalization, vector autoregressive.

1. Introduction

Trade liberalization has been one of the major policy reforms discussed in recent days. It is an economic policy reform that has been implemented

[*] M. Zakir Saadullah Khan, Associate Professor, Department of Economics, Comilla University, Bangladesh. Phone +88-02-9336472, +88-01711-970548: E-mail: zskbd@yahoo.com

[**]M. Ismail Hossain Professor, Department of Economics, Jahangirnagar University, Dhaka, Bangladesh

mainly through trade policy reforms. Over the past three decades most developing countries have taken substantial measures to liberalize their trade regime. Nevertheless, the barriers to trade are still significantly high in most of the developing countries. A common concern expressed by developing countries is that trade liberalization may adversely impact their trade balance. Despite the significance of the issue, empirical evidence on the subject remains to be scarce (Win and Zeng, 2008).

Ostry and Rose (1992) using data set of five different countries found no significant impact of the policy variable of liberalization on the trade balance. UNCTAD (1999) studies report a significant negative relationship between trade liberalization and trade balance of 15 developing countries over the period 1970-1995. Using data of 22 developing countries for the period 1976-1998, Santos-Paulino and Thirlwall (2004) found strong evidence of negative influence of trade liberalization on trade balance. In recent studies Win and Zeng (2008) found mixed evidence of impact of liberalization on trade balance using two different data sets of liberalization dates compiled by Li (2004) for 45 countries for the 1970-1995 period and Wacziarg and Welch (2003) cover 77 countries for the period 1970-2001. They found little evidence of negative impact of liberalization on the trade balance using Li (2004) measure of liberalization dates. However, they found some evidence of worsening of trade balance as a result of liberalization using data set of Wacziarg and Welch (2003).

Bangladesh has been liberalizing its trade regime since the early 1980s focusing initially on the removal of quantitative restrictions (QRs). The pace of liberalization has varied over time with massive liberalization taking place in the early 1990s when a more comprehensive trade policy reform program extended its reach to significant removal of QRs, deregulation of import procedure and in reducing the maximum and average tariff rates as well as the number of tariff slabs for all categories of imports. The number of tariff bands was reduced to five (from 0 to maximum 37.5 percent) in 1999-2000 from 18 in 1990-91 ranging from 0 percent to 350 percent. With respect to QRs the trade-related controlled items at HS 4-digit level were also subject to reduction from 6.4 percent in IPO 1991-93 to 2.2 percent in IPO 1997-00. Though there has been a slow down of the movement towards a lower and uniform tariff rate by mid-1990s, the business community, government circles and researchers criticised Bangladesh's trade liberalization for being very swift and for glutting the local markets with imported goods in amounts that damaged the local industries (World Bank, 1999). However, later its liberalization policy was back to its own pace.

Immediate after independence, in 1972, Bangladesh abolished its earlier fixed exchange rate system pegged with the US dollar and switched over its peg to pound sterling which continued uptill 1979. In 1979 the government switched over its currency peg to a basket of six currencies with trade share as weights with these currencies (Chowdhury and Geest, 2004). Since early 1990s, under the structural adjustment reform program, Bangladesh's basket peg included more currencies and by early 2003 it is pegged to 11 currencies. Since June 2003, Bangladesh has switched to a fully floated exchange rate regime and Bangladesh currency became convertible to current account. The movement towards more 'market determined' exchange rate regime perused devaluation of its currency to maintain export competitiveness. The Real Effective Exchange Rate (REER) suggests appreciation of Bangladeshi Taka during 1990s despite nominal depreciation to achieve export growth.

Liberalization of trade regime is generally expected to improve the current account balance and the growth performance of the economy. However, the influence of liberalization of trade regime on trade balance depends on the relative response of exports and imports to the regime change.

This paper investigates whether liberalization of trade regime worsened the trade balance of Bangladesh using time series data of trade with her major trade partners over the period 1973-2006. This is done incorporating the trade liberalization time dummy variable in the standard model of trade balance.

The remainder of this study is organized as follows. Section 2 gives a brief discussion on the theoretical foundation of the trade balance model. Section 3 describes the econometric methodology and data set on which the present study is based. The empirical results of this paper are presented in section 4. Finally, section 5 made the conclusion.

2. Theoretical Foundation of the Trade Balance Model

There are three approaches to explain the factors determining the trade balance. In the elasticity approach, the exchange rate is the major determinant of the trade balance. According to the absorption approach, an increase in domestic income relative to foreign income would deteriorate the balance of trade as the demand for imports increase. In the monetary approach, devaluation results in excess demand for money due to decrease in real supply of money and this influence the trade balance positively.

A single baseline model of trade balance is derived in this paper that captures the effects of all the factors on trade balance as suggested by the three approaches and employed by some researchers (e.g., Krugman and Baldwin, 1987; Rose and Yellen, 1989; Rose, 1991; and Baharumshah, 2001). The model is derived from foreign (*j*) and domestic *(i*) countries' supply of exports and demand for imports. The demand for foreign goods by country-*i* vary with the relative price of imports and domestic real income

$$M^d_i = M^d_i(RP_{mi} , Y_i) \qquad (1)$$

where M^d_i *is* the domestic demand for imports by country-*i*, RP_{mi} is the relative price of imported goods to locally produced goods, and Y_i is the domestic real income. Let ER_{ji} be the nominal exchange rate[1], defined as the price of domestic currency in terms of foreign currency. The relative price of imported goods can be expressed as:

$$RP_{mi} = \frac{P_{xj}}{ER_{ji}.P_i} = \left(\frac{P_j}{ER_{ji}.P_i}\right)\left(\frac{P_{xj}}{P_j}\right) = (RER_{ij})RP_{xj} \qquad (2)$$

where P_{xj} is the foreign currency price of foreign exports, P_i and P_j are the domestic (country-*i'*s) price indices and foreign (country-*j*'s) price indices of all goods respectively, RER_{ij} is the real exchange rate, defined as $RER_{ij} = [(1/ER_{ji}) (P_j / P_i)]$, so that an increase in ER_{ji} signifies an appreciation of the home currency, and RP_{xj} is the relative price of foreign (*j*'s) exports of foreign produced goods.

---

[1] ER_{ji} is the nominal exchange rate defined as the number of units of foreign currency per unit of domestic currency.

Substituting RP_{mi} from Equation (2) into Equation (1) gives the following equation

$$M^d_i = M^d_i\,(RER_{ij}.RP_{xj}\,,\ Y_i\,) \qquad (3)$$

Similarly, the foreign country's demand for imports depends upon foreign real income Y_j (or real income of the world, Y_w) and domestic relative export prices,

$$M^d_j = M^d_j\,(RP_{xi}\,/\,RER_{ij},\ Y_{j)} \qquad \text{or}$$

$$M^d_w = M^d_w\,(RP_{xi}\,/\,RER_{ij},\ Y_w\,) \qquad (4)$$

Since domestic exports equals foreign (rest of the world) imports and vice versa, therefore,

$$X^s_i = M^d_w\,; \qquad (5)$$

$$X^s_w = M^d_i \qquad (6)$$

Following Haynes and Stone (1982), Bahmani-Oskooee (1991), Brada, Kutan and Su. Zhou (1997) and Shirvani and Wilbratte (1997), the domestic balance of trade of country-*i* (TB_i) can be expressed as the ratio of exports over imports (X_i/M_i), which according to Bahmani-Oskooee (1991) is unit free and can be interpreted as nominal or real trade balance. In addition, the exports - imports ratio allows focus on the specific causes of trade imbalance between a country and its major trading partners. This helps utilize logarithm of the trade balance as the dependent variable in the empirical work,

$$TB_i = X_i/M_i = M^d_w\,/\,M^d_i = M^d_w\,(RP_{xi}\,/\,RER_{ij}\,,\ Y_w\,)\,/\,M^d_i\,(RER_{ij}\,.RP_{xw}\,,\ Y_i\,) \quad (7)$$

The structural equations (1) - (4) are solved along with (5) and (6), and substituted in equation (7). Assuming fixed relative prices[2] or in other words, stationary values of RP_{xi} and RP_{xj}, the resulting reduced-form equation can then be written as:

$$TB_i = TB_i(RER_{ij},\ Y_i,\ Y_w\,) \qquad (8)$$

[2] This is a reasonable assumption for Bangladesh at the aggregate level as the terms of trade moves around 100 for a long time with some deterioration in recent years.

This simple model of trade balance consists of four variables, trade balance (TB_i), real exchange rate (RER_{ij}), real domestic income (Y_i), and real foreign / world income (Y_w). Putting together the three approaches, a model of trade balance affected by the vector of three explanatory variables can be formed. According to the *elasticity approach,* trade balance improves by devaluation, i.e by impacting the relative prices of local and imported goods (expressed in the RER_{ij}). In the *absorption approach,* changing of exchange rate can only influence the trade balance if domestic income increases more proportionately than domestic expenditure (absorption). Thus relative prices expressed by the RER_{ij} and income are the main factors that influence trade balance behaviour. According to the *monetary approach,* exchange rate changes can impact trade balance only temporarily; hence, there may not exist a long-run equilibrium relationship between the trade balance and exchange rates. With respect to income variable, the monetary approach assumes that an increase in income improves the trade balance, assuming that the Keynesian hypothesis of $0<MPC<1$ holds.

The current exchange rate regime of Bangladesh is based on adjustable basket peg system with Real Effective Exchange Rate (*REER*) as the target variable. It is witnessed that the real effective exchange rate measured on the current par value deviates substantially from the targeted *REER*; and corrective measures are initiated by changing the nominal exchange rate. Therefore, it makes more sense to use the *REER* than *RER* in the empirical model to measure exchange rate, following the work of Rose and Yellen (1989), Rose (1991), Rincón (1998) and Bahmani-Oskooee (2001).

3. The Econometric Model and Data

The standard trade balance model of equation (8) regarded trade balance of a country (TB_i) as depending on the real effective exchange rate (*REER*) and the level of domestic (Y_i) and foreign incomes/world incomes (Y_w). In investigating the effect of trade liberalization on the trade balance, the paper incorporates liberalization indicator in the model in addition to these factors. There are no specific criteria that measure the level of trade liberalization in a country. Direct measures of trade liberalization are the policy variables; tariff and non-tariff barriers, but they involve problems when evaluating time-series across countries. Use of the outcome variables like the trade-GDP ratio, import penetration or export orientation ratio as a measure of trade liberalization in a cross country or time-series context has also been criticized. Therefore liberalization indicator in this study has been defined as a time dummy variable (*LIB*) that takes the value of zero (0) before the year of liberalization and 1 afterward[3]. Therefore, the empirical model becomes:

$$TB_i = TB_i(REER\ ,\ Y_i\ ,\ Y_w\ ,\ LIB) \qquad (9)$$

The equation of trade balance based on function (9) is expressed in log-linear form for estimation. For the long-run analysis *LIB* is considered exogenous and is taken as a shift dummy variable. According to the standard time-series model the disturbance term (u_i) is assumed to be white-noise process. Adding time subscripts (t) the estimating equation of trade balance becomes:

$$ln(TB_i)_t = \alpha_0 + \beta_1 ln(REER)_t + \beta_2 ln(Y_i)_t + \beta_3\ ln(Y_w)_t + \beta_4\ (LIB)_t + u_{it} \qquad (10)$$

Equation (10) outlines the long-run relation among endogenous variables of the trade balance, which has been estimated taking *LIB* as exogenous. The short-run dynamics has been incorporated by specifying equation (10) in an error-correction modelling format including the exogenous variable.

The variables in the model bear theoretically expected relationship with the trade balance. According to the elasticity approach, devaluation improves the trade balance through a change in the relative prices of locally produced and imported goods, the sign of the co-efficient of *REER* (β_1) is expected to be positive if the Marshall-Lerner condition holds. Whereas, according to the absorption approach exchange rate changes can only impact the trade balance if the induced increase in income outweighs the increase in domestic expenditure or in other words absorption (Rincón, 1998).

The coefficient (β_2) is expected to be negative (positive) in the absorption (monetary) approach. Income effect is one of the effects of devaluation under

[3] Trade liberalization is an ongoing process and hence the term post-trade liberalization is avoided.

the absorption approach. An increase in domestic income and a change in the terms of trade results in this effect and increases absorption (consumption and investment) and then imports, deteriorating the trade balance. According to monetary approach, "if…[an] economy is growing over time …. It will ceteris paribus run a …[trade balance] surplus". (Hallwood and MacDonald, 1994). This is because of the implicit assumption that income growth raises expenditure by less than output, therefore improving the trade balance. The variable Y_w is viewed as the foreign demand for domestic (Bangladesh) exports, and thus the coefficient β_3 is usually expected to be positive. It is expected that trade balance of a country improves in the trade liberalization regime and hence the sign of the coefficient of the shift dummy variable *LIB,* β_4 be positive.

3.1 Data

The data used to estimate the model consist of annual observations for Bangladesh for the period 1973-2006. After allowing for lags the sample period for estimation of the model is 1977-2006. The data employed in this paper are obtained from World Development Indicators of World Bank, International Financial Statistics and Direction of Trade Statistics of International Monetary Fund.

Since data on measuring the initial dates of trade liberalization, in various countries, is not available therefore most empirical work is restricted to individual country based analysis. This study has set trade liberalization date and the time dummy series for Bangladesh based on Wacziarg and Welch (2003), which defines the liberalization data as the date after which all the Sachs and Warner (SW)[4] openness criteria are met without any interruption.

[4] Sachs and Warner (1995) constructed a dummy variable for openness based on five individual dummies for five specific trade-related policies - (1) Average tariff rates of 40% of more; (2) Non tariff barriers covering 40% or more of trade; (3) A black market exchange rate that is depreciated by 20% or more relative to the official exchange rate, on average, during the 1970s or 1980s; (4) A state monopoly on major exports; (5) A socialist economic system. A country is classified as closed if it displayed at least one of the above characteristics.

4. The Empirical Analysis

A common procedure adopted by most studies is to first examine the time-series properties of the data. It starts with the test of stationarity of variables of the model equation (10), using unit root test procedures. The purpose of knowing whether a variable has a unit root i.e it is nonstationary is that, under the alternative hypothesis of stationarity, variables display mean reversion characteristics and finite variance, shocks are transitory and the autocorrelations die out as the number of lags increase. The standard ADF (Augmented Dickey-Fuller) test has been used to perform the unit root test in all the series of the model to examine their *order of integration.* The ADF test includes both a constant and a linear trend in the regression, since it is a more general specification. The test has employed automatic lag length selection using a Schwarz Information Criterion (SIC) and a maximum lag length of 3. Schwarz Information Criterion (SIC) is considered to be more appropriate because of small numbers of observations in the study (34 observations). Table-1 and Table-2 report the test statistics for the model without and with a time trend and intercept in level and in first differences respectively.

The estimated statistics for the included variables at level is not greater than the ADF test statistics. In other words, the null hypothesis of unit root cannot be rejected at 5% significance level for the variables of interest at level. Also to test whether more than one unit root exist in the variables, the unit root tests at first difference is carried out. The results of Table-2 show that the unit root hypothesis is rejected at the first differences for all variables.

Table 1
ADF Statistics for Testing for Unit Roots in Level

Variables	t-ADF (with trend and intercept)	P- value
$\ln(TB_i)$	-3.130	0.1167
ln(REER)	-3.446	0.625
$\ln(Y_i)$	-0.039	0.995
$\ln(Y_w)$	-2.159	0.495

Table 2
ADF Statistics for Testing for Unit Roots in First Differences

Variables	t-ADF (with trend and intercept)	P- value
Δ ln(TB_i)	-10.867***	0.000
Δ ln(REER)	-6.574***	0.000
Δ ln(Y_i)	-8.616***	0.000
Δ ln(Y_w)	-5.245***	0.001

*, ** and *** denote rejection of the unit root hypothesis at the 10%, 5% and 1% level of significance.

This result from *Unit-root tests indicate* the presence of non-stationarity at levels and stationarity at first difference, that all the four series are integrated of degree one, *I (1).* The residuals are also found stationary at maximum 3 period time lag (Table-3). On the basis of these results the econometric method is carried out assuming that all series show nonstationary behaviour and follow *I(1)* process.

Table 3
ADF Statistics for Testing for Unit Roots of Residuals

Variables	t-ADF (with trend and intercept)	P- value
Res(lnTB)	-5.741***	0.0003
Res(lnREER)	-6.958***	0.000
Res (lnY)	-5.101***	0.0023
Res(lnY_w)	-3.798***	0.0413

*, ** and *** denote rejection of the unit root hypothesis at the 10%, 5% and 1% level of significance.

4.1 Trade Balance of Bangladesh in the Long-run

As the variables in the model are found non-stationary, the traditional methods cannot be used to estimate the model. In this case, to infer the long-run relationship among the variables, some form of co-integration analysis is required. The cointegration between variables reveals the existence of the stable long-run (equilibrium) relationship. To test for cointegration among the variables, Johansen Maximum Likelihood procedure has been applied to a vector autoregressive (VAR) version. It may be noted that this particular method is regarded as superior to the regression-based Engle and Granger procedure in testing cointegration among macroeconomic variables. The results are presented in Annex 2.

Trace statistics reject the null hypothesis of no cointegration at 1% level, indicating that there exists a single cointegrating relationship among the variables of equation (10). Bottom part of the table shows the most significant co-integrating vector normalized on trade balance.

The parameter estimates representing the cointegration between the trade balance and the endogenous factors in the model, is specified as:

$$ln(TB_i) + 5.190\ ln(REER) - 1.099\ ln(Y_i) - 0.430\ ln(Y_w) - 5.216 = 0 \quad \text{or,}$$

$$ln(TB_i) = 5.216 - 5.190\ ln(REER) + 1.099\ ln(Y_i) + 0.430\ ln(Y_w) \qquad (11)$$

4.2 The Error Correction Model (ECM)

With the existence of cointegration established, equation (10) is re-parameterised as an error correction model (ECM) to estimate a model for improved forecasting, including the effects of exogenous variables. The cointegrating equations are generally interpreted as the long run equilibrium relationships characterizing the data, with the error correction equations representing short-run adjustment towards such equilibria. Direct inference about the long-run and short-run relationship can also be made from the error correction model. Since there is a single cointegrating equation, the Vector Autoregressive (VAR) needs to include an error correction term involving levels of the series, and this term appears on the right-hand side of each of the VAR equations, which otherwise will be in first differences. Table-4 reports the error correction model for the trade balance including the liberalization time dummy *LIB* to capture the effects of liberalization on trade balance of Bangladesh. The Eviews output is presented in Annex 3.

Table 4
The Error Correction Model: Modelling Δ ln(TB) by OLS

Variable	Coefficient	t- Statistic
$\Delta \ln(TB_{t-1})$	-0.549596	-3.57704***
$\Delta \ln(TB_{t-2})$	-0.526252	-2.71325***
$\Delta \ln(TB_{t-3})$	-0.421598	-3.07775***
$\Delta \ln(REER_{t-1})$	0.900999	2.51000**
$\Delta \ln(REER_{t-2})$	1.415604	2.72607**
$\Delta \ln(REER_{t-3})$	-0.082518	-0.24167
$\Delta \ln(Y_{t-1})$	-2.758424	-1.65721*
$\Delta \ln(Y_{t-2})$	2.076619	1.46321
$\Delta \ln(Y_{t-3})$	0.479658	0.47557
$\Delta \ln(Y_{w\,t-1})$	0.289770	1.36421*
$\Delta \ln(Y_{w\,t-2})$	0.374257	1.79109**
$\Delta \ln(Y_{w\,t-3})$	-0.412224	-2.03684*
LIB	0.162713	3.37326**
Error-Correction term	-0.567372	-5.42340**

*, **, *** denotes rejection of the hypothesis of no relationship at the 10%, 5% and 1% level respectively.

The estimated equation of the model in error correction form for the trade balance is:

$$\begin{aligned}
\Delta\, ln(TB_t) = &- 0.550\Delta ln(TB_{t-1}) - 0.526\Delta\, ln(TB_{t-2}) - 0.422\Delta\, ln(TB_{t-3}) \\
&\quad (-3.577) \qquad (-2.7133) \qquad (-3.0778) \\
&+0.901\Delta ln\,(REER_{t-1}) + 1.416\Delta\, ln(REER_{t-2}) - 0.083\, ln(REER_{t-3}) \\
&\quad (2.510) \qquad (2.726) \qquad (-0.242) \\
&-2.758\Delta ln(Y_{t-1}) + 2.077\Delta\, ln(Y_{t-2}) - 0.480\Delta\, ln(Y_{t-3}) \\
&\quad (-1.657) \qquad (1.463) \qquad (0.476) \\
&+0.493\Delta ln\,(Y_{w\,t1}) + 0.546\Delta\, ln(Y_{w\,t-2}) - 0.348\Delta\, ln(Y_{w\,t-3}) \\
&\quad (1.364) \qquad (1.791) \qquad (-2.037) \\
&-0.163\, LIB - 0.567\, [\, ln(TB_t) + 5.190\, ln(REER_t) - 1.10\, ln(Y_t) \\
&\quad (-3.373) \qquad (-5.423) \qquad (7.126) \qquad (-3.714) \\
&-0.430\, ln(Y_{wt}) - 5.216\,] \\
&\quad (-2.334) \qquad\qquad (12)
\end{aligned}$$

In equation (12) values in parentheses represent the *t*-statistics for the respective coefficients. The coefficients of the *REER* at 1-period and 2-period time lag are significantly positive and at 3-period lag it gets negative but is insignificant. This indicates a deterioration of the trade balance immediate after a drop in real effective exchange rate (*REER*) which shows an improvement of the trade balance at 3 period lag. This is consistent with the *J*-curve phenomena revealing the existence of *J*-curve in case of Bangladesh, though not significant in the later phases of development.

With respect to the domestic income variable Y_i the trade balance of Bangladesh deteriorates with the rise in domestic income in 1-period time lag. It means income rise has immediate adverse effect on trade balance of Bangladesh which is consistent with the absorption approach; the increased income increases the demand for importables, putting pressure on her trade balance. Later the rise in income expands domestic supply of exports more than rise in imports and a positive effect results on the trade balance.

The effect of changes in world income (trade partners' income) $Y_{w,}$ on the trade balance of Bangladesh is positive in the beginning, though not significant in period-1 and significantly negative from the period-3. This implies that Bangladesh's export to trade partners increase immediately after the increase in their income, which is consistent with the idea of the absorption approach and later it reverses.

The key finding from the short-run dynamics above is that of a negative and statistically significant speed of adjustment coefficient (the error correction term). It implies the speed of adjustment of variation in trade balance $\Delta\ ln(TB_i)$, towards the single long-run cointegrating relationship differs from zero. Thus, the short-run trade balance disequilibrium is adjusted at the rate of 57% per annum.

4.3 An Extension of the Long-run Relationship

Solving equation (12) the long-run relationship between the variables in the model can be written as (while all the Δs equal zero at equilibrium):

$$ln(TB_i) = 2.959 - 5.190\ ln(REER) + 1.099\ ln(Y_i) + 0.430\ ln(Y_w) + 0.163\ LIB$$

$$\qquad (-7.126) \qquad (3.714) \qquad (2.334) \qquad (3.373) \qquad (13)$$

Here trade liberalization dummy (*LIB)* enters the equation as an exogenous variable. The equation reveals that the estimated coefficient of real effective exchange rate (*REER*) has a negative sign with a high level of significance. Accordingly a drop in the real effective exchange rate of Bangladesh or real devaluation leads to an improvement in the (real) trade balance. It indicates that one percent increase in the real exchange rate (that is, devaluation), keeping other variables constant leads to an average 5.19 percent increase in the trade balance expressed in the form of the ratio of export over import. That is, the sum of the elasticities of demand for exports and imports exceed one (in absolute value) and thus improves the trade balance of Bangladesh. This result is consistent with the elasticity approach and thus *Marshall-Lerner condition* seems to hold in the case of Bangladesh in the long-run.

Furthermore, the estimated positive coefficient of Bangladesh's real income variable imply consistency with the monetary view and is statistically significant, denoting significant positive effect of the change in national income on the change of her trade balance in the long run. The value of the coefficient of income variable indicates that the trade balance is more income elastic ($\varepsilon_y = 1.10$). This implies that in the long-run with the increase in income, Bangladesh comparatively consumes more of her domestic goods relative to imported goods, improving her trade balance. The significant positive value of rest of the world income (Y_w) implies that increase in Bangladesh's trading partners' income improves her trade balance in the long-run which is consistent with the absorption view, as the partners are importing more from Bangladesh with the increase in their income.

The sign of the estimated coefficient of trade liberalization dummy variable *LIB* is assigned to capture the differences in trade balance of Bangladesh between pre and post-liberalization period. It is evident that the coefficient of *LIB* is positive and statistically significant; suggesting that the liberalization period has been associated with an improvement of the trade balance of Bangladesh.

5. Conclusion

Investigating the impact of trade regime change is important in formulating trade policies and other related policies. The empirical results of this study provide some useful insights of the trade balance of Bangladesh and the effects of trade liberalization on her trade balance. Taking account of important economic determinants of the trade balance in a standard trade balance model, this study adds trade liberalization time dummy variable in investigating the change in trade regime on the trade balance of Bangladesh. The model is estimated using standard time series econometric techniques, the vector autoregressive (VAR) method after testing the stationarity of the data series and cointegration among variables of the model. The estimated results show that the trade balance of Bangladesh improved in the post-liberalization period, supporting Bangladesh government's trade policies toward openness. In the long-run, the Marshall-Lerner condition holds in case of Bangladesh suggesting stable impact of devaluation on her trade balance. Significance of the error correction term shows that the short-run disequilibrium of the trade balance is corrected at a reasonable rate and there is an existence of J-curve in case of Bangladesh.

References

Baharumshah, A.Z. (2001). The Effect of Exchange Rate on Bilateral Trade Balanace: New Evidence from Malaysia and Thailand. *Asian Economic Journal, 15* (3), 291-311.

Bhamani-Oskooee, M. (1991). Is There a Long-Run Relation Between the Trade Balance and the Real Effective Exchange Rate of LDCs? *Economic Letters, 36,* 403-407.

Bhamani-Oskooee, M. (2001). Nominal and Real Effective Exchange Rates of Middle Eastern Countries and Their Trade Performance. *Applied Economics, 33,*103-111.

Brada, J.C., Kutan, A.M., and Su.Zhou. (1997). The Exchange Rate and the Balance of Trade: The Turkish Experience. *Journal of Development Studies, 33* (5), 675-692.

Chowdhury, O.H., and William, V.G. (2004). *Economic Reform and Trade Performance in South Asia.* Dhaka: BIDS-UPL.

Hallwood, C.P., and MacDonald, R. (1994). *International Money and Finance (2^{nd} ed.).* USA: Blackwell.

Haynes, S.E., and Stone, J.A. (1982). Impact of the Terms of Trade on the U.S. Trade Balance: A Re-examination. *The Review of Economics and Statistics, 64,* 702-706.

International Monetary Fund. (1980-2005). *International Monetary Fund's Direction of Trade Statistics (DOT).* Retrieved n.d. from www.imfstatistics.org/DOT.

International Monetary Fund. (1980-2006). *IMF's International Financial Statistics (IFS), Yearbook 1980-2006.* Washington: IMF.

International Monetary Fund. (2006). *International Financial Statistics (IFS)* (CD-ROM 2006). Washington: IMF

Krugman, P.R., and Baldwin, R.E. (1987). The Persistence of the U.S. Trade Deficit. *Brookings Papers on Economic Activity, 1,* 1-43.

Li, X. (2004).Trade Liberalization and Real Exchange Rate Movement. *IMF Staff Papers, 51,* 553–584.

Ostry, J., and Rose, A. (1992). An Empirical Evaluation of the Macroeconomic Effects of Tariffs. *Journal of International Money and Finance, 11,* 63-79.

Pacheco-López, P. (2003).*The Impact of Trade Liberalisation on the Trade Balance, the Balance of Payments and Economic Growth: The Case of Mexico*. Fifth Annual Conference, European Trade Study Group, Madrid, Spain.

Rincón, C.H. (1998). Testing the Short-run and Long-run Exchange Rate Effects on Trade Balance: The Case of Colombia. *Banco de la Republica de Colombia, 120*.

Rose, A.K. (1991). The Role of Exchange Rates in a Popular Model of International Trade: Does the 'Marshall-Lerner' Condition Hold? *Journal of International Economics, 30,* 301-316.

Rose, A.K., and Yellen, J.L. (1989). Is There a J-curve? *Journal of Monetary Economics, 24,* 53- 68

Sachs, J. D., and Andrew, W. (1995). Economic Reform and the Process of Global Integration. *Brookings Papers on Economic Activity, 1995* (1), 118.

Santos-Paulino, A.U. (2002). Trade Liberalization and Export Performance in Selective Developing Countries*. Journal of Development Studies, 30,* 959-974.

Santos-Paulino, A., and Thirlwall, A.P. (2004). The Impact of Trade Liberalization on Exports, Imports and the Balance of Payments of Developing Countries. *The Economic Journal, 114,* 50-74

Shirvani, H., and Wilbratte, B. (1997).The Relationship between the Real Exchange Rate and the Trade Balance: An Empirical Reassessment. *International Economics Journal, 11*(1), 30-50.

United Nations Conference on Trade and Development. (1999). *Trade and Development Report*. Geneva: UNCTAD.

Wacziarg, R., and Welch, K.H. (2003). *Trade Liberalization and Growth: New Evidence* (Working Paper No. 10152). NBER Working Paper Series.

World Bank. (1999). Bangladesh *Trade Liberalization- Its Pace and Impacts* (Report No. 19591-BD). World Bank, Washington D.C.

World Bank. (2007). *World Development Indicators (WDI) 2007* (CD-ROM 2007). World Bank, Washington D.C.

World Bank website: *www.econ.worldbank.org/External/Topics/Trade*

Wu, Y., and Li, Z. (2008). *The Impact of Trade Liberalization on the Trade Balance in Developing Countries* (WP/08/14). IMF Working Paper: International Monetary Fund.

Annex 1: Sources, definitions and construction of model variables

Trade Balance (TB)

Trade Balance of Bangladesh is obtained by taking the logarithm of the nominal exports-imports ratio. Annual data series for both nominal exports and nominal imports for the period 1973 to 2006 are available from World Development Indicator *(WDI)* CD-Rom. The exports-imports ratio, following Haynes and Stone (1982), and Bahmani-Oskooee (1991), proxies for the trade balance. The ratio makes the data unit free and can be interpreted as nominal or real trade balance for the empirical model.

Real Effective Exchange Rate Index (REER)

Real Effective Exchange Rate for Bangladesh for the period 1973-2005 is calculated following the four steps method of Bahmani-Oskooee (1995). First, bilateral nominal exchange rates (*NER*) of Bangladesh (denoted by *'i')*, with its trading partner country, *j* are obtained by dividing Bangladesh-US $ exchange rate by respective trading partner currency-US $ exchange which are available from the IMF's *International Financial Statistics* (IFS) CD-Rom. Thus the bilateral exchange rates are:

$$NER_{ij} = NER_{i\$} / NER_{j\$}$$

Where, NER_{ij} stands for bilateral nominal exchange rate of Bangladesh with the trading partner *j*, $NER_{i\$}$ for Bangladesh's exchange rate with dollar and $NER_{j\$}$ for the trading partners' exchange rate with dollar.

The second step involves calculating the bilateral real exchange rates. This is based on the following equation:

$$RER_{ij} = NER_{ij} \ (CIP_j / CIP_i)$$

where CIP_j stands for the Consumer Price Index in country *j* (trading partner), CIP_i for country *i* (Bangladesh). It needs to convert the bilateral exchange rate into index form with a common base year. We take the base of 1996 = 100. Data for CIPs are collected from the IMF's *International*

Financial Statistics (IFS) Yearbooks and from *Bangladesh Bank* website (www.bangladesh-bank.org), and then we processed some figures to convert it to 1996 base index.

The third step involves the calculation of the trade shares (Exports plus Imports) for each of the selected trading partner countries and the transformation of those shares into normalized weights. The share of each country in Bangladesh's total trade is calculated as a percentage. Country- specific annual data for Bangladesh's trade flows during 1973-2006 are drawn from various issues of IMF's *Direction of Trade Statistics.* For this purpose trade with major 15 trading partners are considered which together represents about 70 percent of Bangladesh's total trade flows for the period. However, the trade shares of individual countries with Bangladesh changed significantly over this period. Once the trade shares have been calculated, they are transformed into normalized weights (α_{ij}) by dividing each country's trade shares by the sum of the trade shares of the combined such that the sum of all normalized trade shares equals one. We use such data set for each five-year period calculated by Hossain (2001).

Finally, *REER* is estimated according to the following formula:

$$REER = \sum \alpha_{ij} \; RER_{ij}$$

Bangladesh's Income (Y_i)

Real GDP is used as income of Bangladesh data is obtained from the World Development Indicator *(WDI)* CD-Rom.

World Income Index (Y_w)

World income index refers to the real incomes of all Bangladesh's importers expressed as an index with 2000= 100. Following Bahmani-Oskooee (1986), it is calculated as:

$$Y_w = \sum w_{ij} \, RGDP_j$$

where w_{ij} is the normalized weight of market j in Bangladesh's exports. Relevant data are obtained from various issues of IMF's Direction of Trade Statistics. We consider major

15 importers from Bangladesh, which together constitutes almost 55%-55% of Bangladesh exports, and calculate their import shares to Bangladesh exports during the study period. $RGDP_j$ refers to economy j's annual real gross domestic product.

Annex 2: Johansen Co-integration Test

Sample (adjusted): 1977 2006
Included observations: 30 after adjustments
Trend assumption: Linear deterministic trend
Series: LN_TB LN_Y LN_YW LN_REER
Exogenous series: LIB
Lags interval (in first differences): 1 to 3

Unrestricted Cointegration Rank Test (Trace)

Hypothesized		Trace	0.05	
No. of CE(s)	Eigenvalue	Statistic	Critical Value	Prob.**
None *	0.883340	90.90025	47.85613	0.0000
At most 1	0.503956	26.44553	29.79707	0.1159
At most 2	0.160677	5.412790	15.49471	0.7635
At most 3	0.005253	0.157993	3.841466	0.6910

Trace test indicates 1 cointegrating eqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

Annex 3: Vector Error Correction Estimates

Sample (adjusted): 1977-2006
Included observations: 30 after adjustments
Standard errors in ( ) & t-statistics in [ ]

Cointegrating Eq:	Eq1
LN_TB(-1)	1.000000
LN_Y(-1)	-1.098732 (0.29586) [-3.71368]
LN_YW(-1)	-0.430384 (0.18440) [-2.33400]
LN_REER(-1)	5.190405 (0.72834) [7.12638]
C	-5.215725

Error Correction:	D(LN_TB)	D(LN_Y)	D(LN_YW)	D(LN_REER)
CointEq1	-0.567372 (0.10462) [-5.42340]	-0.012818 (0.01784) [-0.71848]	0.100441 (0.11263) [0.89177]	-0.086415 (0.04417) [-1.95633]
D(LN_TB(-1))	-0.549596 (0.15365) [-3.57704]	0.000480 (0.02620) [0.01832]	0.019748 (0.16542) [0.11938]	0.120317 (0.06487) [1.85463]
D(LN_TB(-2))	-0.526252 (0.19396) [-2.71325]	-0.020376 (0.03308) [-0.61601]	-0.292740 (0.20882) [-1.40190]	-0.017263 (0.08189) [-0.21079]

Error Correction:	D(LN_TB)	D(LN_Y)	D(LN_YW)	D(LN_REER)
D(LN_TB(-3))	-0.421598	-0.023157	-0.336503	-0.003495
	(0.13698)	(0.02336)	(0.14748)	(0.05784)
	[-3.07775]	[-0.99128]	[-2.28172]	[-0.06042]
D(LN_Y(-1))	-2.758424	-0.084703	-1.757949	-0.680071
	(1.66450)	(0.28386)	(1.79203)	(0.70280)
	[-1.65721]	[-0.29840]	[-0.98098]	[-0.96765]
D(LN_Y(-2))	2.076619	-0.156040	0.841447	1.277889
	(1.41922)	(0.24203)	(1.52795)	(0.59924)
	[1.46321]	[-0.64472]	[0.55070]	[2.13253]
D(LN_Y(-3))	0.479658	-0.110123	-1.555434	-0.160918
	(1.00861)	(0.17200)	(1.08588)	(0.42587)
	[0.47557]	[-0.64024]	[-1.43241]	[-0.37786]
D(LN_YW(-1))	0.289770	0.003674	0.008769	0.084716
	(0.21241)	(0.03622)	(0.22868)	(0.08969)
	[1.36421]	[0.10142]	[0.03834]	[0.94459]
D(LN_YW(-2))	0.374257	-0.016884	0.355312	-0.149998
	(0.20896)	(0.03563)	(0.22496)	(0.08823)
	[1.79109]	[-0.47380]	[1.57941]	[-1.70013]
D(LN_YW(-3))	-0.412224	0.039935	-0.026366	-0.125592
	(0.20238)	(0.03451)	(0.21789)	(0.08545)
	[-2.03684]	[1.15708]	[-0.12101]	[-1.46972]
D(LN_REER(-1))	0.900999	0.177346	-0.455017	0.227017
	(0.35896)	(0.06122)	(0.38647)	(0.15157)
	[2.51000]	[2.89705]	[-1.17738]	[1.49782]
D(LN_REER(-2))	1.415604	0.044848	-0.023716	0.171851
	(0.51928)	(0.08856)	(0.55907)	(0.21926)
	[2.72607]	[0.50643]	[-0.04242]	[0.78378]

Error Correction:	D(LN_TB)	D(LN_Y)	D(LN_YW)	D(LN_REER)
D(LN_REER(-3))	-0.082518	0.055069	-0.609512	-0.152279
	(0.34144)	(0.05823)	(0.36760)	(0.14417)
	[-0.24167]	[0.94575]	[-1.65808]	[-1.05627]
C	-0.070661	0.045402	0.183344	-0.021202
	(0.10078)	(0.01719)	(0.10851)	(0.04255)
	[-0.70111]	[2.64160]	[1.68972]	[-0.49823]
LIB	0.162713	0.015588	-0.025953	0.022443
	(0.04824)	(0.00823)	(0.05193)	(0.02037)
	[3.37326]	[1.89499]	[-0.49975]	[1.10193]
R-squared	0.913830	0.827854	0.642690	0.621520
Adj. R-squared	0.833404	0.667185	0.309201	0.268273
Sum sq. resids	0.118564	0.003448	0.137428	0.021138
S.E. equation	0.088906	0.015162	0.095718	0.037539
F-statistic	11.36240	5.152538	1.927169	1.759447
Log likelihood	40.43429	93.49868	38.21958	66.30038
Akaike AIC	-1.695620	-5.233245	-1.547972	-3.420025
Schwarz SC	-0.995021	-4.532647	-0.847373	-2.719427
Mean dependent	0.032706	0.046574	0.034206	0.011293
S.D. dependent	0.217821	0.026281	0.115164	0.043884

Determinant residual covariance (d of adj.)	8.00E-12
Determinant residual covariance	5.00E-13
Log likelihood	254.5859
Akaike information criterion	-12.70572
Schwarz criterion	-9.716503