On Self-correction of Trade Deficit of Bangladesh

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Abstract

The paper investigates the long-run behaviour of trade deficit and the possibility of its self-correction in Bangladesh using data for the years 1973 to 2005. This is done by examining co-integration between exports and imports and by studying compliance of the international budget constraint. It is found that exports and imports are cointegrated, which implies that there is an adjustment towards self-correction of deficit. However, it is also found that Bangladesh is not able to satisfy the international budget constraint when the whole period is considered, but could satisfy it till the year 1996, that is, for the period 1973-1996. Therefore, Bangladesh had no risk of experiencing sustained external imbalances till 1996 but faced such problem later on as it became evident that the international budget constraint could not be satisfied after 1996, and the short-run imbalances are likely to prevail in the long-run.

1. Introduction

This paper takes up the issue of trade deficit in Bangladesh and the possibility of its self-correction in the long-run. This is done by examining cointegration between exports and imports of Bangladesh and compliance of the international budget constraint. Trade deficit is a matter of great concern but is not unique to the economy of Bangladesh. Most developing countries have faced this problem and there is increasing evidence of developed countries facing this problem as

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well, particularly as a result of trade liberalization. So, an empirical look at this issue may clarify our understanding.

Empirical and econometric study of trade deficit has been going on for about two decades. Some more well-known and recent studies include the works of Husted (1992), Cox and Ruffin (1998), Brockway (2001), Leachman and Francis (2002), Chinn (2003), Irandoust and Ericsson (2004), Wijeweera (2005) and Ehrhart and Llorca (2007). Husted (1992) analysed U.S. trade balance of goods and services in order to identify the long-run tendency of the U.S. current account balance and concluded that there had been a structural shift resulting in a long-run tendency for a deficit in the current account balance. He tested the international budget constraint for analyzing the dynamics of trade. Chinn (2003) used the Johansen procedure to determine whether a long-run relationship existed between the U.S. trade flows. He estimated two separate equations for imports and exports while controlling relevant macroeconomic variables. Irandoust and Ericsson (2004) undertook a multi-country analysis using exports and imports to examine whether cointegration relationship existed between the two trade components. They employed the Johansen and Juselius cointegration techniques and concluded that trade flows were cointegrated for Germany, Sweden, and U.S.A., but not for other countries. Wijeweera (2005) investigated the long-run behaviour of trade deficit for Australia and found that there was no risk of sustained external imbalance. Sustainability of external deficit of seven South-Mediterranean countries was studied by Ehrhart and Llorca (2007). They found that exports and imports were cointegrated, which implied that external deficits in these countries were sustainable in the long run. To our knowledge, there has not been any study of this nature for Bangladesh and we attempt to fill this gap through this small work.

2. Trade Deficit in Bangladesh

Bangladesh had trade deficit since its independence in1971. It stood at U.S.$311.06 million in 1973. This rose to U.S.$969.12 million in 1978. By 1983, the deficit increased to U.S.$1500.72 million. Five years later in 1988, the deficit stood at U.S.$1765.56 million. In 1993, the deficit fell a little to U.S.$1704.16 million. By 1998, the deficit increased substantially to U.S.$2369.31 million. By the end of 2005, which is the last year of the period covered by this study, the deficit rose to U.S.$4536.94 million. This is shown in Figure 1.

Although exports from Bangladesh increased steadily, rising from U.S.$384.70 million in 1973 to U.S.$8734.22 million in 2005, imports also rose heavily from U.S.$695.76 million in 1973 to U.S.$13271.16 million in 2005 causing the deficit

Figure 1: Trade Deficit in Bangladesh over the period 1972-2005 (in Million US$)
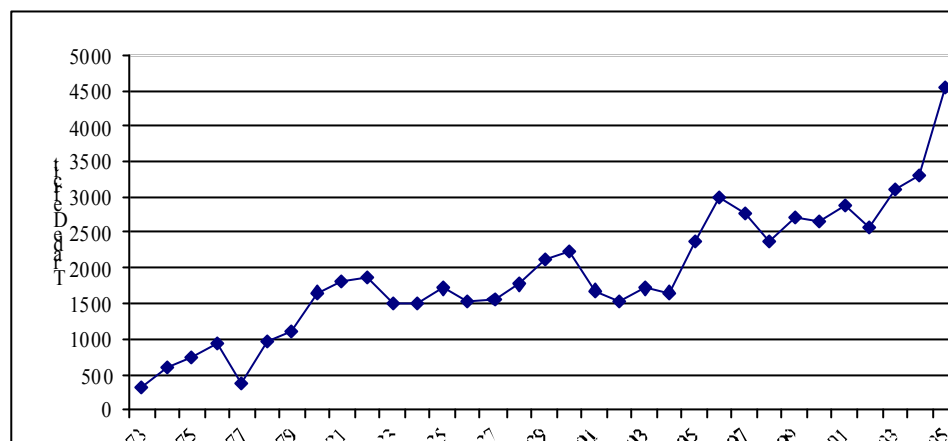
to widen. We usually hear much about growing export earnings of Bangladesh, which is true, but the rise in import spending which was even greater than that of exports is not noticed that much. This has important implications, which we shall see below.

3.   Theoretical Framework

Econometric analysis of self-correction of trade deficit consists in investigating whether the country satisfies its intertemporal external constraint. In other words, empirical studies about this issue are based on the intertemporal approach to current account. Husted (1992) provides a simple small economy framework in which a representative household is able to borrow and lend freely in international financial markets at a given world rate of interest. This representative agent faces the following current period budget constraint:

$$C_0 = Y_0 + B_0 - I_0 - (1 + r_0)B_{-1} \tag{1}$$

where C_0, Y_0, B_0 and I_0 represent current consumption, output, international borrowing and investment; r_0 is the one-period world interest rate; and $(1+ r_0)$ B-$_1$ is the initial debt of the representative agent, corresponding to the country's external debt.

Equation (1) must hold for every time period. Iterating (1) forward yields the economy's intertemporal budget constraint (Husted, 1992):

$$B_0 = \sum_{t=1}^{\infty} \delta_t TB_t + \lim_{n \to \infty} \delta_n B_n \tag{2}$$

where $TB_t = X_t - M_t = Y_t - C_t - I_t$ represents the trade balance in period t, X_t equals exports, M_t is the imports, $\delta_t = \prod_{s=1} \beta_s$ where $\beta_s = 1/(1+r_s)$ and δ_t is the discount factor.

A necessary and sufficient condition for external sustainability is that as $n \to \infty$ the discounted value of the external debt converges asymptotically to zero. This transversality condition can be expressed as

$$\lim_{n \to \infty} \delta_n B_n = 0 \tag{3}$$

Equation (3) implies that a country cannot borrow (lend) indefinitely in global capital markets to finance its trade account deficit (surplus). If this transversality condition holds, then the amount a country borrows (lends) in international financial markets equals the present-value of its future trade surplus (deficits).

In order to derive a testable equation, we need to rewrite equation (1). Assuming that the world interest rate is stationary with unconditional mean r, equation (1) can be rewritten as follows.

$$Z_t + (1+r)B_{t-1} = X_t + B_t \tag{4}$$

where $Z_t = M_t + (r_t - r)B_{t-1}$.

Following Husted (1992), solving (4) forward yields

$$M_t + r_t B_{t-1} = X_t + \sum_{i=0}^{\infty} \lambda^{j-1} \left[\Delta X_{t+j} - \Delta Z_{t+j} \right] + \lim_{j \to \infty} \lambda^{t+j} B_{t+j} \tag{5}$$

where $\lambda = 1/(1+r)$ and Δ is the first-difference operator. By subtracting X_t from both sides of equation (5), we obtain the following relationship:

$$M_t^* - X_t = \sum_{j=0}^{\infty} \lambda^{j-1} \left[\Delta X_{t+j} - \Delta Z_{t+j} \right] + \lim_{j \to \infty} \lambda^{t+j} B_{t+j} \tag{6}$$

where $M_t^* = M_t + r_t B_{t-1}$ represents spending on imports as well as interest payments (receipts) on net foreign debt (assets). Further, assuming the limit term that appears in equation (6) is equal to zero (i.e. the transversality condition holds), we finally get

$$M_t^* - X_t = \sum_{j=0}^{\infty} \lambda^{j-1} \left[\Delta X_{t+j} - \Delta Z_{t+j} \right] \tag{7}$$

Given the right-hand side variables from equation (7) are first-difference stationary implies that the left-hand side of equation (7) must be stationary in

order to satisfy the present-value external constraint. Thus, M_t^* and X_t must be examined for stationarity. If M_t^* and X_t are I(1), then they must be cointegrated, so that the left-hand side of equation (7), i.e. the current account deficit, is stationary. Thus, a test for sustainability of the external debt would check for the cointegration of these two variables M_t^* and X_t if they are I(1). This cointegration regression would take the following form:

$$X_t = a + bM_t^* + u_t \tag{8}$$

Formally, if and are I(1), the null hypothesis is that   and   are cointegrated and that . If the null hypothesis is not rejected, then the external debt is said to be sustainable (Ehrhart and Llorca, 2007). This model enables researchers to consider both trade deficit and external debt in an integrated way but in this paper we only focus on trade deficit.

4.   Cointegration and Trade Deficit

Researchers opine that cointegration between exports and imports is indicative of long-run convergence of the two items. To study such a cointegration, two methods are available. The first one is that of Engle and Granger (1987), which examines stationarity of the residual term and hence is regarded as a residual based approach. The second method is due to Johansen (1991), which is based on the full information maximum likelihood method. In this paper, we use the Johansen method to test for cointegration. Gonzalo (1994) provided Monte Carlo evidence that Johansen method performed better than others according to different criteria.

We first consider a VAR model given by

$$Z_t = \delta + \Pi_1 Z_{t-1} + ... + \Pi_k Z_{t-k} + \varepsilon_t \qquad \text{t = 1,2,…,T} \tag{9}$$

The corresponding VECM can be written as:

$$\Delta Z_t = \delta + \Gamma_1 \Delta Z_{t-1} + ... + \Gamma_{k-1} \Delta Z_{t-k+1} + \Pi \Delta Z_{t-1} + \varepsilon_t \tag{10}$$

where $Z_t = \begin{bmatrix} X_t & M_t \end{bmatrix}$ $\Gamma_i = -\boldsymbol{1} + \Pi_1 + ... + \Pi_i$ $i = \boldsymbol{1},...,k$ denotes the first difference operator, δ is the intercept term and ε_t is white noise.

An examination of the P matrix enables us to detect existence of cointegrating relations among the Z_t variables. The most interesting case is 0< rank (P)= r < p. This implies that there are r cointegrating relations among the element of Z_t , and there are $p \times r$ matrices α and β such that $\Pi = \alpha\beta'$. Here a is α matrix of error correction parameter and β is interpreted as α matrix of cointegrating

vectors, with the property that $\beta' Z_t$ is stationary, even though Z_t itself is nonstationary.

5.   Empirical Results

We present the results in two parts. The first part, given in section 5.1, deals with cointegration between exports and imports while the second part, reported in section 5.2, contains estimates of the international budget constraint. Data were obtained from the World Tables and various issues of Bangladesh Economic Review. Both exports and imports are expressed in terms of U.S.$ millions.

5.1 Cointegration between Exports and Imports

First, we test for unit root of exports and imports applying the augmented Dickey-Fuller (ADF) test. Results are given in Table 1. It is found that both exports and imports suffer from the unit root problem. We then take the first difference of these two variables and test for nonstationarity. It is found that the problem of nonstationarity vanished after taking first difference, which means that exports and imports are integrated of order 1. We then test for cointegration of exports and imports applying the Johansen method. Results are given in Table 2. It is found that exports and imports are cointegrated, which means that there is a long-relationship between the two. This implies that trade deficit will be self-correcting.

In order to determine the stability properties of the trade account, we estimate the international budget constraint as given in equation (8).

Table 1 : Results of Unit Root Test

	Levels		First difference	
	Trend and intercept	Intercept	Trend and intercept	Intercept
Exports	-3.3261	-2.2429	-5.7658	-5.6592
Imports	-1.8992	-1.2601	-3.5526	-3.1773

Note: Critical values for levels with an intercept but not a trend is -2.9665 and critical values with an intercept and a trend is -3.5731. Critical values for first differences with an intercept but not a trend is -2.9706 and with intercept and linear trend -3.5796. The test examines the null hypothesis of nonstationarity.

The results of the cointegration tests are reported in Table 2. The lag length is found to be one. Both Eigenvalue and trace tests are conducted, which generate similar results.

Table 2: Cointegration between Exports and Imports

Hypothesis		Maximal Eigenvalue test			Trace Test		
Null	Alternative	Statistic	95% C.V.	90% C. V.	Statistic	95% C. V.	90% C.V.
r = 0	r = 1	42.2246	11.0300	9.2800	42.6303	12.3600	10.2500
r<= 1	r = 2	.40570	4.1600	3.0400	.40570	4.1600	3.0400

In Table 2, it can be seen from the maximum Eigenvalue test for with and without trend that estimated test statistics is less than the critical value for r = 0. This means that the hypothesis of no cointegration is rejected. To find the number of cointegrating vectors we see that for r < 1, the estimated test statistics is less than the critical value, which means that there is only one cointegrating vector. Similar results are noticed for the trace test with and without a trend. The findings imply that external deficits are sustainable in the long run.

5.2. Compliance of the International Budget Constraint

We estimated the international budget constraint for the period 1973-2005 given in equation (8). This is presented below.

$$\text{Ln } X = -2.8258 + 1.2584 \text{ ln } M \qquad\qquad\qquad (11)$$
$$\phantom{\text{Ln } X = }(-7.4197) \quad (27.0933)$$
$$R2 = 0.96$$

Estimate of b is equal to 1.2584, which upon statistical testing, is found to be different from one (greater than one). This means that if the whole period of our study (1973 -2005) is considered then Bangladesh does not fulfill the international budget constraint. Non-fulfillment of the international budget constraint is a disturbing result from the viewpoint of trade deficit.

We did some exercises considering different periods separately and found that till 1996, that is, for the period 1973 - 1996, Bangladesh satisfied the international budget constraint. The international budget constraint estimate for 1973-1996 is given below.

$$\text{Ln } X = -2.0363 + 1.1536 \text{ ln } M \qquad\qquad\qquad (12)$$
$$\phantom{\text{Ln } X = }(-3.2923) \quad (14.6052)$$
$$R2 = 0.906$$

Here, the coefficient of imports (M), upon proper testing, is found to be significantly not different from one. This implies that the budget constraint is satisfied. But when the subsequent years (1997 - 2005) were included, that is, for the full period of our study, the budget constraint could not be satisfied. This could be due to the fact that the gap between exports and imports became too great after 1996 causing the noncompliance of the international budget constraint. That the trade deficit widened after 1996 is evident from the fact that while trade deficit per year was U.S.$1509.81 million during the period 1973-1996, it was significantly greater at U.S.$2982.31 million per year for the period 1997-2005.

6.   Conclusions

It is now well perceived by researchers that cointegration between exports and imports and compliance of the international budget constraint are both needed to be assured of long-run convergence of exports and imports.

This paper shows through cointegration of exports and imports that a long run stability is evident and there are forces working towards a self-correction of trade deficit, but noncompliance of the international budget constraint raises serious concern about the possibility of long-run sustainability (self-correction) of trade deficit. Our result that Bangladesh fulfilled the international budget constraint for the period 1973 - 1996 but failed to do so when the subsequent years (1997 -2005) are considered seems to indicate that the great widening of exports and imports after 1996 is to be held responsible for this.

Compliance of the international budget constraint should be checked regularly by researchers and policy makers. Whenever there are signs of its noncompliance, corrective measures for reducing trade deficit should be taken. In the case of Bangladesh, it appears that 1997 was the year that called for initiation of such measures. Since, after 1996, trade deficit increased further, measures in terms of exports augmentation and imports reduction should have been taken up then and continued subsequently.

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