

1. Introduction

Current literature advocates for open capital markets with greater capital flow to facilitate higher growth and greater capability of smoothing the risks of financial instabilities and crises (Borensztein et al., 1998; Grossman and Helpman, 1991; Obstfeld, 1998). Particularly developing countries, characterized with low income traps, with lower levels of capital per worker, are putting huge emphasis on drawing an international pool of financial capital. Net foreign capital inflow enables countries with higher net foreign resource inflows, augments private savings, transfers knowledge through foreign direct investment and strengthens the absorptive capacity of domestic financial markets through portfolio investment and foreign bank lending (Bosworth et al., 1999). However, at the same time domestic financial market liberalization creates added risks that are not present in the economy through various channels, specially, the changes in exchange rates, productivity, world interest rate, risk attitude of international investors etc. It has become a burning issue in the wake of on going global financial crisis pushing many developed countries in liquidity problems. Stiglitz rightly has pointed out that rapid liberalization of financial and capital market is in the core of recent financial and economic crisis. Focus is now again on the returns on investments in the perspective that the extent by which expanded resources for investment is facilitating growth should be examined. Many Asian countries had gone through a stage of economic takeoff with large capital inflows, which was hailed as the “Asian miracle” in the early 1990s, and then suddenly faced capital flight and the turmoil of the “Asian crisis” in the late 1990s (Corsetti, Pesenti, and Roubini, 1998; Radelet and Sachs, 1998; Furman and Stiglitz, 1998). Hence, it is an utmost requirement to know the benefits of free capital flow in any economy and there is enough scope for government policies like exchange rate manipulation, government guarantee, capital control etc. to achieve the high capital equilibrium controlling the return and risk factors.

Established theories in trade always argue for openness, both in goods and capital markets, at least for long run wealth impact. Openness drives specialization in the production of products for which countries have comparative advantages, promotes

competition, increases transfer of knowledge and enhances productivity even in firm level. But it also narrows opportunities to many other prospective industries of a country, adds vulnerability to local markets due to foreign shocks and leads to increased dependency of a country for foreign goods. Although wide supports are there for an overall positive impact of openness (Frankel and Romer, 1999), critiques are also available (Rodríguez and Rodrik, 2001). The neoclassical growth models (Ramsey, 1926; Cass, 1965) lack a match to real world time series of growth rates, interest rates and savings even after lot of adjustments (Barro and Sala-i-Martin, 1995; Barro, Mankiw, and Sala-i-Martin, 1995). Specially, as revealed in Klenow and Rodríguez-Clare (1997), the dynamics of capital accumulation cannot explain important elements of the process of economic growth. Post Keynesian economists have explored the demand side constraints of growth. While the neoclassical growth model argues that growth is determined by the factors of production and technical change, the post Keynesian growth model has emphasized on the growth of demand and has argued that it is limited by the deficits in current account balance (Thirlwall, 1979; Thirlwall and Hussain, 1982; Mc Gregor and Swales, 1985, 1986, 1991; Thirlwall, 1986). The expenditure of a country cannot grow faster than income growth and external deficits are offset by the reductions in income growth since there is a limit in capital inflows. The basis of the model used in this study is the Thirlwall and Hussain (1982) model, which was first introduced by Thirlwall (1979). The basic assumption of Thirlwall and Hussains model is that balance of payments is the main constraint of economic growth. Thus our model mainly focuses on the demand side constraints of growth and examines the impact of trade and capital flows on the growth of a developing economy like Bangladesh that has adopted openness as a strategy growth and development. The rest of the paper is organized as follows. Section 2 gives a brief overview of Bangladesh economy, section 3 explains the methodology and econometric technique used to investigate the theoretical model. Results and findings are analyzed in section 4. Section 5 draws the conclusion.

2. Overview: Bangladesh Economy

Table (1) portrays Bangladesh economy's performance over the last three decades and this table considers variables related to this study. GDP growth rate of the on average of the last three decades shows a continuous increasing trend. A notable performance of manufacturing based industrial sector, strong performance of the crop sector and a very high level of public investment contributed to this strong economic growth. In spite of the global financial crisis, GDP growth rate for the last four years (2006-2010) on average is 6% implying that negative external shock could not have adverse impact on Bangladesh's economic growth. Export showed a remarkable performance over the 3 decades of time period. RMG based manufacturing sector mainly contributes to his high export growth performance. Bangladesh economy registered a high growth of 41.5 % in 2010-11 against only 4.1% growth in 2009-10 (CPD, 2011). This figure shows a very sharp turnaround in export sector after having an adverse experience of global crisis in export sector in Bangladesh. Foreign direct investment did not cross even 1 % of GDP till the date. However, this share is increasing. Capital inflows figure shows a continuous positive inflow into Bangladesh economy, while this amount is much higher in the last decade compared to previous two decades.

Table (1): Key Macro Indicators: Bangladesh Economy

Macro Indicators	1981-90	1991-2000	2001-10
GDP Growth (Annual %)	3.73	4.80	5.82
Export Growth (Annual %)	7.79	12.31	9.44
Foreign Direct Inv (% of GDP)	0.00	0.18	0.80
Capital Inflows/Flight (Mill. USD)	172	147	1264

Source: WDI online 2011

3. Methodology

A. Theoretical Model

A large amount of literature focus only on the supply side determinants of growth and the demand side constraints are overlooked. Growth literature on Bangladesh also investigates the supply side constraints and not paying much attention on the demand

side constraints. Examining Thirlwall law in determining growth constraints of Bangladesh could fill in the gap of the existing literatures. Following the application of Thirlwall and Hussain's (1982) model by Atesoglu (1993-94) to Canadian economy, balance of- payments-constrained growth model specifications are as follows:

$$(1) x_t = aw + b(p - pf) \text{ Where, } a > 0, b < 0$$

$$(2) m_t = cy_t + d(pf - p) \text{ Where, } c > 0, d < 0$$

$$(3) \alpha(p + x) + \beta k = pf + m$$

Equation (1) is export function, equation (2) is import function and equation (3) is balance of payments equilibrium condition. In these models, x is growth in real exports, w is growth in real world income, p is growth in domestic price, pf is the growth in foreign price expressed in domestic currency, m is the growth in imports, y is the real income growth, k is the nominal capital inflows, α is ratio of nominal exports to nominal imports and β is ratio of nominal capital inflows to nominal imports. Solving equations (1) through (3) and substituting world growth income from export demand function we obtain:

$$(4) y_t = \frac{1}{\{c(\alpha x + \beta(k - p)) + (1 + d)(p - pf)\}}$$

Equation (4) clearly shows that growth in income is determined by the growth in real exports (x), growth in real capital flows ($k - p$), and growth in relative prices ($p - pf$). For simplicity if we assume that relative prices are constant ($p - pf = 0$), exports equals imports ($\alpha = 0$) and no capital inflows (β), then the growth in income is solely determined by the growth in real exports and the inverse of the income elasticity of imports. In notation:

$$(5) y_t = \frac{x_t}{c}$$

This is known as Thirlwall's law implying that in long run growth of an economy is determined by the rate of growth of exports and income elasticity of imports. For the empirical purpose, we will assume variables other than exports growth, growth of real

capital flows assumed to be constant. Though our model followed that of Atesoglu (1993-94), our model considers all types of capital flows (i.e. both official and private), where Atesoglu considered only current account balance as the determinants of capital flows. The empirical model to be tested in this study can be written as in 6(b):

$$(6a) \quad y_t = \delta_0 + \delta_1 x_t + \delta_2 (k_t - p_{dt}) + \delta_3 (p_{dt} - p_{ft}) + \varepsilon_t$$

$$(6b) \quad y_t = \delta_0 + \delta_1 x_t + \delta_2 cf_t + \varepsilon_t$$

The expected sign of export is positive ($\delta_1 > 0$), theoretically, the higher long-term export is likely to enhance the economic growth. Real capital flows (δ_2) could be positive, negative or equal to zero. When capital flows to capital scarce country, theoretically it increases economic growth since marginal productivity of capital is higher. In equation (6b), y_t is real income growth (GDP growth), x_t is real export growth, cf_t is capital flows growth. Relative prices remain invariant in the strict version of the Thirlwall model. This is why relative prices are dropped and we add capital flows as variable of interest in addition to export growth. It should be noted that existing literature does not include all types of capital flows while measuring impact of capital flows on growth. Some study used private capital flows while other used official capital flows and investigated the determinants of growth. Unlike other studies, this study used the method of measuring capital flows according to World Bank (1985) and Erbe (1985). This method includes all types of capital flows (for more details, see World Bank, 1985 and Erbe, 1995).

B. Econometric Model: ARDL Bound Testing Approach

Following Pesaran et al. (2001), the generalized vector autoregression models of order p, VAR (p), is as follows:

$$(7) \quad z_t = \alpha + \sum_{i=1}^p \beta_i z_{t-i} + \varepsilon_t$$

Where, z_t is the vector of both dependent variable (y), here y is growth rate, and vector matrix of explanatory variables (x), i.e. capital flows growth, export growth. The vector error correction model follows equation (7) is as follows:

$$(8) \Delta z_t = \alpha + \delta t + \phi z_{t-1} + \sum_{i=1}^{p-1} \lambda_i \Delta y_{t-i} + \sum_{i=1}^{p-1} \theta_i \Delta x_{t-i} + \varepsilon_t$$

On the basis of equation (8) to estimate the bound test procedure conditional ARDL vector error correction model of equation (6b) takes following transformation.

$$(9) \Delta y_t = \alpha + \sum_{j=1}^n \beta_j \Delta x_{t-j} + \sum_{j=1}^n \theta_j \Delta cf_{t-j} + \sum_{j=1}^n \delta_j y_{t-1} + \delta_2 x_{t-1} + \delta_3 cf_{t-1} + \varepsilon_t$$

To trace the presence of cointegration by restricting all lagged level variables equal to zero. Thus null hypothesis of no cointegration is: $\delta_1 = \delta_2 = \delta_3 = 0$ by the mean of F test with an asymptotic non-standard distribution. If computed F statistics is greater than the upper level band, then reject null and the presence of cointegration. If the F statistics lies below the lower critical band, there is no cointegration. If the F statistics fall within the band, the inference is inclusive. When long run relationship is defined by equation (9), then short run dynamics is to be checked by estimating an error correction model. This is specified as follows:

$$(10) \Delta y_t = \alpha + \sum_{j=1}^n \beta_j \Delta x_{t-j} + \sum_{j=1}^n \theta_j \Delta cf_{t-j} + \vartheta ec_{t-1} + \varepsilon_t$$

Here β_j θ_j are the short run dynamic coefficients and the model convergence to equilibrium and ϑ is speed of adjustment. Negative significant value of ϑ is expected for the short run equilibrium.

4. Estimation Result and Analysis

4.1 Unit Root Test: Checking the stationarity of the variables included in the empirical model suggests that the model qualifies for the ARDL, since variables are I(0) and I(1).

Table (1): Unit Root Test: ADF (No drift, No trend)

Variables	Level	1 st Differenced	Integration Order I(d)
GDP growth	-2.38	-9.04**	I(1)
Capital flows growth	-3.14**	-7.12***	I(0)
Export growth	-3.10**	-6.19***	I(0)

Note: **, *** indicates the significance levels at 5% and 1% respectively. The critical values are based on McKinnon (1991) using STATA 11.

4.2 Long Run Relationship

Equation (9) is estimated for Bangladesh economy using the data over the period of 31 years (1978-2010). Before testing the long run relationship among the variables it is important to decide on the order of the lag of the ARDL. Based on information criteria (Akaike, Schwartz Bayesian criterion) the ARDL process takes two lags for GDP growth and zero lag for export and capital flows.

Table (2) shows the bound test result for the existence of long run relationship. The F statistics estimated is above the 5% critical bounds computed by Pesaran et al (2001), thus implying that null hypothesis can be rejected. In other words, there exist a long run relationship among the variables estimated.

Table (2): Bound Test for existence of cointegration

F statistics	5% significance critical values (No intercept, No trend)	
	I(0)	I(1)
6.30	2.45	3.63

Table (3): Estimates of Long run Coefficients: ARDL (2,0,0)

Dependent variables: GDP growth

	Coefficients	Std. Error	T-ratio	P-values
Constant	1.83	0.75	2.42	0.02
Capital flows growth	00	0.001	1.76	0.08
Export growth	0.07	0.02	3.22	0.00
GDP Growth (-1)	0.44	0.14	3.12	0.00
R2 =0.41	F statistics=6.44			

Long run estimates of the coefficients (Table 3) suggest that in the long run, capital flows have positive significant impact on growth but the magnitude is zero. This finding aligns with the expected result since the share of capital flows is still very small in amount. On the other hand, export growth has highly statistically significant impact on growth. Lag GDP gives a strong stimulus to current GDP growth rate. This result gives us a clear-cut evidence of the export led growth strategies of Bangladesh economy. These results support and justify the outward looking policies and structural adjustment policies started in the eighties and more financial liberalization in the early nineties of Bangladesh economy.

4.4 Short Run Dynamics

The presence of cointegration of our model suggests that we can use error correction model (ECM) to identify short run dynamics among the variables. Estimation result (Table 4) of high $R^2 = 0.59$ suggest that such error correction model fits the data reasonably well. Lagged GDP growth has strong significant impact on current GDP growth, which confirms the long run relationship. Capital flows are found to have a positive impact but not significant on growth. Exports have a strong contemporaneous impact on GDP growth. This implies that GDP growth is highly positively influenced by that year's export growth in case of Bangladesh. This finding supports the evidence of the Thirlwall Law. Higher export demand are like to be associated with higher growth in Bangladesh. More importantly, error correction coefficient (ecm_1) has the expected negative sign and is highly significant. This implies a very high speed of adjustment to equilibrium after a shock. More specifically, approximately 1.16 % of the disequilibrium from the previous year shock converges back to the long run equilibrium in current year.

Table (4): Short run Dynamics: ARDL(2,2,2)Dependent Variable: $\Delta(\text{GDP Growth})$

	Coefficients	Std. Error	T-ratio	P-values
Constant	0.05	0.19	0.28	0.78
Δ GDP growth (-1)	0.66	0.25	2.56	0.01
Δ Capital flows growth	0.00	0.00	0.78	0.44
Δ Capital flows growth (-1)	0.00	0.00	-1.05	0.30
Δ Export growth	0.06	0.02	-2.10	0.02
Δ Export growth (-1)	-0.04	0.02	-2.10	0.05
Ecm ($_1$)	-1.16	0.32	-3.62	0.00
R ² =0.59	F statistics=5.90			

4.5 Stability

The stability of the above long run and short relationships is required to check. For this purpose, one needs to test for parameter stability. The methodology used here is based on the cumulative sum (CUSUM) and the cumulative sum of squares (CUSUMSQ). This test is first proposed by Brown *et al.* (1975), which is advantageous over the Chow test since we do not need to know whether there is any structural break. The CUSUM test uses the cumulative sum of recursive residuals based on the first n observations and is updated recursively and plotted against break point. The CUSUMSQ test uses the squared recursive residuals and follows the same procedure. The figure shows that at 5 % critical level we can not reject the null hypothesis implying that all coefficients are stable in CUSUM, however, CUSUMSQ suggests that there were structural breaks during the period of late eighties and early nineties. This finding correctly implies the structural change of Bangladesh economy. During that periods, Bangladesh economy switched from inward looking to outward looking policy, and also initiated policies to liberalize financial markets.

5. Conclusion

This study has cross-examined Thirlwall Law and employed the bound testing (ARDL) approach to cointegration to examine the long run and short run relationships between capital flows, export, and economic growth in case of Bangladesh economy. The bound test suggests that the variables of interest are bound together in the long run. The error correction approach also confirms the existence of the long run relationships. The error correction term implies a faster adjustment to equilibrium after any shock in the economy. These facts together yield a strong evidence in of Thirlwall law and GDP growth in Bangladesh is demand determined by the balance of payment position. Capital flows appear to have long run impact on growth. This might implies that project based external financing have positive impact on growth but it takes time. The policy implication of findings for long-term growth policy is straightforward. Policy measures and institutional arrangements that lead to higher export growth and capital flows in appropriate sectors are likely to enhance the economic growth of Bangladesh.

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