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Liberalisation and Growth in Bangladesh: An Empirical Investigation

by

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I. INTRODUCTION

Economic liberalisation entails either trade liberalisation or financial and capital account liberalisation or both. Starting from the mid-1980s, Bangladesh gradually introduced various liberalisation measures. The process was initiated by liberalising its international trade, which consisted permitting the exporters of nontraditional items to convert some of their export earnings at higher exchange rate in the secondary market, reduction of the tariff level and tariff dispersion, simplification and rationalisation of the tariff structure, and deregulation of the import process as well as export incentives such as Export Performance Licensing, Export Performance Benefit Scheme, Special Bonded Warehouse Scheme, Backto-Back L/C System, Export Credit Guarantee Scheme, Export Promotion Fund, bank loans, and "tax holiday." The financial sector reforms in Bangladesh which began during the first half of the 1990s include liberalisation of interest rates, improvement of monetary policy, abolishing priority sector lending, strengthening central bank supervision, regulating banks, improving debt recovery and broadening capital market development. Capital account liberalisation in Bangladesh started in 1997 (International Monetary Fund 2000). It includes easing restrictions in capital and money market, derivatives, credit operations, direct

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investments, real estate transactions, personal capital movements, provisions specific to commercial banks and institutional investors.

Empirical evidence on the effects of economic liberalisation on growth has been mixed. Several studies including those of Krueger (1978), Romer (1989) and Sachs and Warner (1995) provided strong evidence of an "indirect" effect of trade liberalisation on growth. A few studies including those of Dollar and Kraay (2004) and Salinas and Aksoy (2006) established a "direct" link (unidirectional causality) between export and growth. Many other studies, however, failed to establish any unidirectional link between export and economic growth. These include Hsiao (1987), Ahmed and Harnhirun (1995) and Islam (1998). On the other hand, a few studies including those of Greenaway, Morgan and Wright (1998), Srinivasan (2001) and Bolaky and Freund (2004) suggest that trade liberalisation may have negative impact on economic growth.

A number of studies have investigated the relationship between financial and capital account liberalisation and economic growth. Quinn (1997), Bekaert, Harvey and Lundblad (2001), Edison *et al.* (2002a), Hermes and Lensink (2005) and Nazmi (2005) found positive link between financial and capital account liberalisation and growth. On the other hand, a few studies found little evidence supporting any link between financial and capital account liberalisation and economic growth. These include Warman and Thirlwall (1994), Rodrik (1998) and Edison *et al.* (2002b). Several other studies including those of Kraay (1998), Klein and Olivei (2000), Reisen and Soto (2001) and Khalid (2004) reported mixed findings on the linkage between financial and capital account liberalisation and economic growth.

There have been some studies focusing on the effects of liberalisation on economic growth in Bangladesh. Rashid (2000) using participatory research method found positive impact of trade liberalisation on manufacturing growth in Bangladesh. Ahmed (2001) used Lucas' "human capital model of endogenous growth" to study impact of trade liberalisation on industrial growth in Bangladesh through cointegration analysis and error correction model. He used ratio of investment to GDP, ratio of exports to GDP, customs duty collection rate, and secondary enrolment ratio as exogenous variables. He found positive effects of trade liberalisation on growth. Habib (2002) using cointegration analysis and error correction model tested whether Bangladesh's external financial openness and economic growth could be linked. He modeled economic growth as a function of long-term domestic investment (function of gross domestic savings, broad money, and private sector credit) and productivity. He found that external financial openness has a positive impact on growth through financial deepening and long-term investment. However, he could not find any evidence suggesting external

financial liberalisation contributes to Bangladesh's economic growth through productivity improvement. Mamun and Nath (2004) using cointegration analysis, error correction model and Granger causality test investigated the link between exports and economic growth in Bangladesh. They used exports of goods and services to capture the effects of exports (trade openness) and found unidirectional causality from exports to growth.

The limitations of above studies are that they focused on the effects of economic liberalisation in Bangladesh from *separate* policy reforms points of view, either trade liberalisation or financial liberalisation, and thus were unable to capture the effects of reforms comprehensively. Attempts are yet to be made to assess the effects of economic liberalisation in Bangladesh by taking into account trade and financial liberalisation (both internal and external) at the same time. By combining trade, financial and capital account liberalisation, this study, which covers economic liberalisation in a broader context, would fill the gap in existing literature on impact of economic reform programmes in Bangladesh. It is hypothesised that trade liberalisation and financial and capital account liberalisation led to higher economic growth in Bangladesh, and in order to verify this hypothesis we analyse the quarterly data for a period of 29 years that include 14 pre-reform years (1974-1987) and 15 post-reform years (1988-2002). For analysing the data, we use the latest available computer software of cointegration and error correction methods.

This paper is organised as follows: After an introduction to the subject matter that includes a brief review of the literature in section I, the methodological issues are explained in section II. The results are covered in section III. Finally, conclusions are stated in section IV; it also discusses policy implications and limitations of analysis.

II. METHODOLOGICAL ISSUES

Following broadly the approach adopted in Lucas (1988), we specify the economic growth function for Bangladesh as follows:

$$Y = f(K, L, H, OI) \tag{1}$$

Where, Y is output, K is physical capital, L is labour, H is human capital, and OI is openness indicator. We consider three types of openness indicators trade liberalisation, financial liberalisation and capital account liberalisation. We use Sachs and Warner index (D) as trade openness indicator, real interest rate (R) as financial reform indicator, and net capital inflows as share of GDP (CAPFLOWY) as capital market openness indicator.¹ For capital(K), we use ratio of investment to GDP(IY). For labour(L), we use labour force as share of population(LFORCE). Following Mankiw, Romer and Weil (1992), the effective workforce of Lucas (H) is proxied by the variable EDU, which measures percentage of the working-age population that is in secondary school. Thus, our growth function becomes

 $\ln PCY_t = \alpha_0 + \alpha_1 IY_t + \alpha_2 LFORCE_t + \alpha_3 EDU_t + \alpha_4 D_t + \alpha_5 R_t + \alpha_6 CAPFLOWY_t + u_t$ (2) Where,

PCY	=	per capita GDP
IY	=	gross investment as share of GDP
LFORCE	=	labour force as share of population
EDU	=	human capital investment in terms of schooling (secondary
		enrolment ratio)
D	=	trade openness indicator- 0 for 1974-1991 and 1 for
		1992-2002
R	=	real rate of interest (financial openness indicator)
CAPFLOWY	=	net capital inflows as share of GDP (capital account openness
		indicator)
Exposted sign	$\cdot \alpha$	(x, y) = (

Expected sign: $\alpha_1 > 0$; $\alpha_2 > 0$; $\alpha_3 > 0$; $\alpha_4 > 0$; $\alpha_5 > 0$ or $\alpha_5 < 0$; $\alpha_6 > 0$.

The error correction (EC) term lagged one period, which integrates shortterm dynamics in the long-run growth function is shown below through error correction model (ECM):

¹ The Sachs-Warner openness indicator either has a value of 1 or 0. The value of 1 indicates an open economy. A value of 0 indicates a closed economy according to any one of the following criteria: the average tariff rate exceeds 40 per cent; non-tariff barriers cover more than 40 per cent of imports; the country has a socialist economy or a state export monopoly; or the black market premium on the exchange rate exceeded 20 per cent during the 1970s and 1980s. We relaxed the black market premium criterion as prescribed by Sachs and Warner (1995) in light of the date of trade liberalisation in Bangladesh, i.e. mid-1980s. High black market premium does not necessarily represent repressive trade regime given that other criteria of openness are fulfilled. For instance, in June 1974, the government established the Wage Earners' Scheme (WES) through the development of a legal secondary exchange market. This attracted more wage remittances from overseas while permitting higher premiums on the secondary market exchange rates. The black market premium gradually declined to zero because of the unification of the dual exchange rates in 1992.

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$$\Delta \ln PCY_{t} = \gamma_{0} + \sum_{i=1}^{n} \gamma_{1i} \Delta \ln PCY_{t-i} + \sum_{i=0}^{n} \gamma_{2i} \Delta IY_{t-i} + \sum_{i=0}^{n} \gamma_{3i} \Delta LFORC_{t-i} + \sum_{i=0}^{n} \gamma_{4i} \Delta EDU_{t-i}$$
$$+ \sum_{i=0}^{n} \gamma_{5i} \Delta D_{t-i} + \sum_{i=0}^{n} \gamma_{6i} \Delta R_{t-i} + \sum_{i=0}^{n} \gamma_{7i} \Delta CAPFLOW_{t-i} + \gamma_{8}EC_{t-1} + \varepsilon_{t}$$

Where, EC_{t-1} is error correction term lagged one period.

We use seasonally adjusted quarterly data for the period 1974Q1-2002Q2 and all variables are expressed in real terms. The variables are defined in Appendix A while the modeling strategy is discussed in Appendix B.

III. RESULTS

Appendix C depicts results of the unit root tests in our model. As all variables in the model, except LFORCE, are found to be I(1), we take first difference of the I(2) variable LFORCE, and conduct Johansen-Juselius cointegration analysis.

We specify the relevant order of lags p=3 of the VAR model (implies a lag length of 2 in VEC model) before conducting cointegration tests. Given the nature of the data, which is quarterly, p=2 rather seems to be a reasonable choice as we can capture effects of events that occurred up to two quarters back. However, our findings suggest presence of serial correlation when we use p=2. Results of the Johansen-Juselius cointegration analysis using p=3 have been shown in Table I.

TABLE I JOHANSEN-JUSELIUS MAXIMUM LIKELIHOOD COINTEGRATION TESTS

	Trace Test		Maximum Eigenvalue Test		
Null	Alternative	Test	Null	Alternative	Test
Hypothesis	Hypothesis	Statistic	Hypothesis	Hypothesis	Statistic
r = 0	r > 0	149.29*	r = 0	r = 1	52.95*
$r \leq 1$	r > 1	96.34*	r = 1	r = 2	32.55
$r \leq 2$	r > 2	63.78	r = 2	r = 3	30.00

Note: i. r refers to number of cointegrating equations.

ii. The test has been conducted assuming linear deterministic trend.

iii. * denotes rejection of null hypothesis of no cointegration at 5 per cent significance level. MacKinnon-Haug-Michelis (1999) p-values have been used for this purpose.

At 5 per cent significance level, the trace test indicates 2 cointegrating equations while the maximum eigenvalue test indicates 1 cointegrating equation among the variables. This is also the case at 10 per cent significance level. As the maximum eigenvalue test is usually preferred for trying to pin down the number of cointegrating vectors (Enders 2004), we conclude that there is 1 cointegrating

equation among the variables based on this test. When normalised for a unit coefficient on *LNPCY*, the cointegrating regression of economic growth in Bangladesh can be given as follows (standard errors in parentheses):²

 $LNPCY = 3.83 + 0.02IY + 0.07\Delta LFORCE + 0.004EDU + 0.04D - 0.002R - 0.10CAPFLOWY$ (4)

(0.002) (0.07) (0.001) (0.02) (0.0004) (0.08)

In the estimated model above, none of the coefficients of explanatory variables of economic growth is found to be greater than unity, indicating low responsiveness of economic growth to changes in these variables.

The coefficient estimates of the variables IY, EDU, D and R in the equilibrium relation are significant at 5 per cent level and have the expected signs. The coefficient estimate of the variable $\Delta LFORCE$ in the equilibrium relation is insignificant at 5 per cent level with expected sign. The coefficient estimate of the variable CAPFLOWY in the equilibrium relation is insignificant at 5 per cent level with unexpected sign. Thus, physical capital (investment-GDP ratio), human capital investment (secondary enrolment ratio), trade openness (dummy variable) and internal financial liberalisation (real interest rate) are found to be the main determinants of economic growth.

We estimate the error correction model in order to determine the dynamic behaviour of economic growth, results of which are displayed in Table II.

In the above estimated model, investment (lagged one quarter), real interest rate (lagged one and two quarters), and capital flows (lagged one quarter) have been found important (significant) determinants of economic growth of Bangladesh in the short-run.

The estimated coefficient of the error term (-0.07) has been found statistically significant at 10 per cent level with appropriate (negative) sign.³ This suggests that the system corrects its previous period's disequilibrium by 7 per cent a quarter. Diagnostic tests using correlogram of the residuals indicate presence of no serial correlation at 5 per cent significance level. Diagnostic test results for the dependent variable have been shown in Table III.

² The standard errors for the cointegrating vector are computed following Boswijk (1995).

³ Though the estimated coefficient of the error term has not been found statistically significant at 5 percent level, it is found to be statistically significant at 10 per cent level.

Regressors	Dependent Variable: ΔLNPCY		
	Parameter Estimates	T-Ratios (absolute value)	
Intercept	0.0004	0.22	
Δ LNPCY (-1)	- 0.02	0.12	
Δ LNPCY (-2)	0.12	0.89	
ΔIY (-1)	0.02	1.93**	
ΔIY (-2)	0.003	0.33	
$\Delta\Delta$ LFORCE (-1)	-0.03	0.47	
$\Delta\Delta$ LFORCE (-2)	0.03	0.47	
ΔEDU (-1)	-0.0007	0.60	
ΔEDU (-2)	0.0008	0.68	
$\Delta R(-1)$	0.0004	2.74*	
ΔR (-2)	0.0003	2.48*	
$\Delta CAPFLOWY$ (-1)	-0.09	1.72**	
$\Delta CAPFLOWY$ (-2)	0.04	0.68	
EC (-1)	-0.07	1.90**	

TABLE II ESTIMATED ERROR CORRECTION MODEL

Note: i. While reporting results, lagged values of ΔD have been ignored. ii. * and ** denote significant at 5 and 10 per cent levels, respectively.

(DEPENDENT VARIABLE: ECONOMIC GROWTH) Q-Statistics P-Values Lags 0.907 0.0137 1 2 0.0567 0.972 3 0.2302 0.973 4 0.2580 0.992 5 0.997 0.3529 6 0.4881 0.998 7 0.8817 0.997 8 0.9939 0.998

TABLE III

DIAGNOSTIC TEST OF THE RESIDUAL

IV. CONCLUSION

In this paper, we have examined the effects of economic liberalisation on economic growth in Bangladesh by means of cointegration and error correction methods using quarterly data for a period of 29 years. Our study found coefficient of the trade liberalisation policy variable to be positive and significant, implying positive impact of trade liberalisation on Bangladesh's economic growth. This finding is supported by other studies, such as Rashid (2000), Ahmed (2001) and Mamun and Nath (2004). Second, we found coefficient of the financial liberalisation policy variable to be negative and significant, implying that financial liberalisation has had negative effects on Bangladesh's economic growth. This seemingly surprising result could at least partly be explained by the lack of physical infrastructure and unfriendly business environment. Third, the coefficient of capital account liberalisation policy variable was found to be insignificant, implying that this policy was largely ineffective in propelling the country's economic growth. Our finding on capital account liberalisation is partially supported by Habib (2002), which found positive impact of external financial liberalisation on growth through financial deepening and long-term investment, but no impact of external financial liberalisation through productivity improvement. Difference in our findings could be due to difference in models and coverage of the study. We included all three measures of liberalisation-trade, financial and capital account liberalisation policy variables-in our model, whereas Habib (2002) only took capital account liberalisation into account. The reasons for the failure of capital account reform could be attributed to weak supply responses following from the lack of credibility of announced reforms and the structural factors that hindered the implementation of such measures.

Like most other empirical studies, our study suffers from several inherent limitations pertaining to data and selected methodology. First, the time horizon for assessing the impact of reform programmes is only 29 years (1974-2002); for capital account liberalisation it is 6 years (1997-2002); this data series is not long enough for precise impact assessment as effects of the reform programmes are likely to be spread over longer time periods. Second, due to data unavailability, we converted annual data for some variables to quarterly data using univariate approach. This might not reflect the true status of the economy, and thus introduce certain bias in our empirical findings. Third, our selected methodology of cointegration analysis and error correction models though are considered excellent tools for studying the relationships between economic reform programmes and growth, they cannot establish causality and directions between reforms and growth. Finally, our study covers only trade liberalisation, internal financial liberalisation and external financial liberalisation (capital account liberalisation) programmes.

The results are therefore not conclusive enough as we did not take into account other types of policy changes such as agricultural policy reform, fiscal policy reform, and public enterprise reform (privatisation) that took place in Bangladesh simultaneously.

In conclusion, our findings suggest that trade liberalisation has had significant positive impacts on economic growth, while the effects of financial liberalisation were rather negative. Also, we found effects of capital account liberalisation to be insignificant. It is quite clear that a poor country such as Bangladesh would not be able to benefit substantially from a comprehensive set of liberalisation measures unless the preconditions such as basic infrastructure and good governance are in place.

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APPENDICES

Appendix A: Definitions of Variables and Data Sources

PCY: Per capita GDP at 1995 prices has been derived by dividing real GDP at 1995 by population. Quarterly real GDP at 1995 prices has been derived from yearly data following Chow-Lin procedure using quarterly data on trade and money supply (M1).

IY: Gross investment as share of GDP.

LFORCE: Labour force as share of population.

EDU: Secondary enrolment ratio (in percentage) derived by dividing number of students in secondary school by population of 10-14 age-group.

D: A trade openness indicator with values 0 for 1974-1991 and 1 for 1992-2002.

R: Nominal interest rate (deposit rate, 3-6 months) has been adjusted with inflation (GDP deflator, %) to derive real rate of interest(R).

CAPFLOWY: Net capital inflows (foreign direct investment, BoP, 1995 prices) as share of GDP at 1995 prices.

Annual data for gross fixed investment and net capital inflows at 1995 prices have been converted into quarterly using SAS/ETS programme.

Data sources include various international compilations such as, UN Statistical Yearbooks by the United Nations, International Financial Statistics by the International Monetary Fund (IMF), EIU Country Data by the Economist Intelligence Unit (EIU), World Development Indicators by the World Bank, and ADB Key Indicators by the Asian Development Bank (ADB), and Bangladesh publications such as Statistical Yearbook of Bangladesh by Bangladesh Bureau of Statistics, and Bangladesh Economic Surveys by the Government of Bangladesh.

Appendix B: Modeling Strategy

The modeling strategy follows a three-step procedure:

- (i) determine the order of integration of the variables using Augmented Dickey-Fuller (ADF, 1981) and Phillips-Perron (1988) unit root tests. In case of contradictory findings, use Kwiatkowski-Phillips-Schmidt-Shin (KPSS, 1992) test of unit root.
- (ii) if the variables are found to be integrated of *same* order, apply the Johansen-Juselius (1990, 1992, 1994) maximum likelihood method of cointegration to determine the number of cointegrating vectors. On the other hand, if the variables are found to be integrated of *different* order, make them integrated of same order through differencing before determining the number of cointegrating vectors. We will apply trace test and maximum eigenvalue test of cointegration. If the tests give contradictory results, we would stick to the results based on maximum eigenvalue test, which is usually preferred for trying to p+in down the number of cointegrating vectors (Enders, 2004; page 354).
- (iii) if the variables are found to be cointegrated, estimate error correction model using standard methods and diagnostic tests. We will include the I(0) variables (which have been omitted in cointegration tests) while estimating vector error correction models.

Appendix C: Unit Root Tests

In order to analyse time-series properties of the data, we conduct Augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) tests at both level and first difference for all variables in the model. We use quarterly data for the period 1974Q1-2002Q2. Results of the unit root tests have been shown in Table A.1.

Augmented Dickey-Fuller Phillips-Perron Variables Level/ Conclusion (PP) First (ADF) Test Statistic Difference Test Statistic With Without With Without Trend Trend Trend Trend Level 1.91(1)-1.04(1)2.35 -0.92 LNPCY First -12.61*(0) -13.06*(0)-12.53* I(1) Difference 13.59* Level -0.42(4)-2.09(6)0.29 -2.31 IY First -6.67*(3)-6.63*(3)-6.34* -6.30* I(1)Difference Level -1.51 (1) -1.89(1)0.54 -0.87 LFORCE First -1.77(0) -1.59(0) -1.79 -1.70I(2) Difference Level -0.12(1) 0.16 -0.88-1.17(1)EDU First -5.90*(0)-5.90* -6.08* -6.07* (0) I(1) Difference -3.05* Level -1.82(8)-2.43(8)-3.10 I(0) or I(1)R -20.20*(7)First -19.34* (7) -16.24* Inconclusive Difference 19.60* Level -1.77(2) -1.91(2)-1.76 -1.78 -2.39** First $-12.36^{**}(1)$ -12.23*(1)-2.33 I(1) CAPFLOWY Difference

TABLE A.1 UNIT ROOT TESTS FOR STATIONARITY

iii. Conclusion about the order of integration of a particular variable is based on the test that did not include the trend in the test equation. Test statistics "with trend" have been shown for the purpose of reporting only.

- iv. * denotes significant at 5 per cent level. Mackinnon (1998) one-sided p-values have been used for this purpose.
- v. ** denotes significant at 5 per cent level without intercept and the trend. Mackinnon (1998) one-sided p-values have been used for this purpose.

Note: i. In ADF tests, optimum lag lengths, shown in parentheses in the test statistic column, have been determined using Schwartz Bayesian Criterion (SBC).

ii. In PP tests, Bartlett kernel (default) spectral estimation method and Newey-West bandwidth (automatic selection) have been used.

The ADF and PP tests give contradictory results about R at both 5 and 10 per cent significance levels. In order to resolve this issue, we use the KPSS test as third unit root test. The results of the KPSS test are given in Table A.2.

Variables	Level / First	Kwiatkowski-Ph	Conclusion	
	Difference	(KPSS) Test Statistic		
		Without	With	
		Trend	Trend	
	Level	0.61*	0.13	
R	First Difference	0.27	0.21*	I(1)

 TABLE A.2

 UNIT ROOT TESTS FOR STATIONARITY (KPSS TEST)

Note: i. In KPSS tests, the null hypothesis is that the variable is stationary, which is exactly opposite in ADF and PP tests.

- ii. Bartlett kernel (default) spectral estimation method and Newey-West bandwidth (automatic selection) have been used in the test.
- iii. Conclusion about the order of integration of a particular variable is based on the test that did not include the trend in the test equation. Test statistics "with trend" have been shown for the purpose of reporting only.
- iv. * denotes significant at 5 per cent level. Kwiatkowski-Phillips-Schmidt-Shin (1992, Table 1) asymptotic critical values have been used for this purpose.

The KPSS tests suggest that R is integrated of order one. This substantiates our findings based on the ADF test. Thus, we can conclude that R is I(1) variable.