Financial Liberalisation and Endogenous Growth: The Case of Bangladesh

by

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Abstract

This paper theoretically and empirically explores the impact of financial liberalisation (FL) in the form of an increase in real interest rates and in financial deepening (the broad money supply as percentage of GDP) on the rate of economic growth in Bangladesh using endogenous growth theory, time series techniques and annual data from 1975-95 . Our theoretical model predicts that FL and an increase in investment in human and physical capital raise economic growth. The overall empirical results support the prediction of our theoretical model, although the coefficient of physical capital is statistically insignificant. Results are robust across methodologies.

Key Words: Financial liberalisation; Human Capital; Endogenous Growth; Bangladesh; Cointegration.

JEL classification: C22; E44; G28; F13; O11; O53.

Financial Liberalisation and Endogenous Growth: The Case of Bangladesh

1. Introduction

This paper examines the impact of financial liberalisation[1] (FL) on the rate of economic growth in a less developed country. In particular, the effects of interest rate deregulation and an increase in financial deepening in LDC such as Bangladesh are analysed using annual data from 1975 to 1995, within an endogenous growth model and time series techniques. It is now acknowledged that the financial sector of a country is crucial to economic development (Levin (1997)). However, the controversy over relative advantages and disadvantages of FL in LDCs is yet to be resolved. The McKinnon-Shaw school argues that FL boosts saving, investment and its efficiency, which in turn enhance economic growth (McKinnon (1973); Shaw (1973); see also Fry (1995) and R. Levine (1997) for surveys); the structuralists and the neo-Keynesians argue that FL is deleterious to growth (Burkett, and A. K. Dutt (1991); Stiglitz and Weiss (1981, 1992); Taylor (1983); Wijnbergen (1983); Siddiki (1999a) for a survey of both types of theories).

There is growing empirical literature examining the impact of FL on the rate of economic growth in LDCs. The general findings of the empirical literature reveal that FL positively affects economic growth rates, which along with real per

[1] FL generally incorporates interest rate deregulation, an increase in branch expansion and in financial deepening (the ratio of money to GDP), an end to preferential credit, less credit to the government sector and more credit to the private sector.

capita income in countries with liberalised financial sectors are higher than in countries with repressed financial sectors (see Fry (1995)).

The dependence of the existing FL and economic growth literature on neoclassical growth theory (NGT) weakens the significance of positive relationships between financial variables and economic growth. This follows from the fact that the presence of diminishing returns to capital as is predicted by NGT dictates that long run growth rates in per capita income will not be enhanced by an increase in the level of saving and investment. This limitation of NGT motivates the emergence of endogenous growth theory (EGT), which predicts that FL positively affects economic growth.

Exploring the impact of FL on economic growth in less developed countries (LDCs) using EGT and time series techniques is rare and the impact is yet to be explored. This paper fills this gap by extending the Pagano (1993) model to incorporate human capital (HC) (see section four). Our extended model predicts that FL also contributes to economic growth by facilitating education and training which enhance the quality of HC, an important growth enhancing factor in EGT.

Bangladesh, which followed repressive financial policies until the mid-eighties (see table 2 in the Appendix), suffered from the negative effects of financial repression with a low level of saving, investment and economic growth. There are few studies which examine the role FL on saving, investment and economic growth in Bangladesh. Ahmed and Ansari (1995) have estimated saving and money demand functions to examine the prediction of the McKinnon-Shaw model in Bangladesh using annual data from 1973-91. The authors found that

financial intermediation and interest rate rises increase saving; the saving-income ratio positively and interest rates negatively affect the demand for money, providing some support for the McKinnon-Shaw model. This study does not analyse the time series properties of the data. Siddiki estimated the money demand function (M2) using time-series techniques and annual data from 1975-95 (Siddiki (1999b). The author found that domestic interest rates positively and foreign interest rates negatively affect the demand for money and hence monetary accumulation.

In our paper, the extended Pagano model is applied to Bangladesh using data from 1975-95. Both the cointegration (Engle and Granger (EG) (1987)) and fully modified least squares methods (FMLS) (Phillips and Hansen (1990)) are used to test the robustness of our results. The FMLS method is intended to correct for the problems of endogeneity and serial correlation that may arise in the EG method.

The rest of the paper is organised as follows: section two explains the financial policies in Bangladesh and their consequences on saving, investment and its efficiency and on the rate of economic growth. The existing literature is reviewed in section three. An endogenous growth model which incorporates financial variables and investment in physical and human capital is developed in section four. To the best of our knowledge, such an analysis has not been attempted before for a LDC. And it provides a strong motivation for writing this paper. Section five reports the econometric results. Section six draws conclusions.

2. Financial Policies in Bangladesh: 1971-1995

Financial policies in Bangladesh can be divided into two regimes: controlled and uncontrolled. The controlled regime was from 1971 to 1986 and the (partially) uncontrolled regime started in 1986. In the first regime, nominal interest rates were controlled and fixed by the Bangladesh Bank, the central bank of Bangladesh. The financial sector was also repressed by: (i) directing credits towards the 'preferential' sectors and (ii) government over-borrowing from this sector.

The aim of the repressive interest rate policies was to reduce the costs of investment and to increase the rate of economic growth as well as to reduce government budgetary constrains. The government budget deficits were around 7-9% during 1971-95 (see table 2 in Appendix for all of the figures reported in this section). The high rate of inflation with administratively determined lower levels of nominal interest rates caused real interest rates to be negative until 1985. On the other hand, real interest rates from 1986-onwards have been positive. Similarly, until 1985, the ratio of foreign to domestic interest rates was greater than one, implying lower domestic rates relative to foreign ones. The opposite has been true since 1986. In addition, the extent of financial repression is reflected in (the high average rate of) UM premiums (Fry (1997)), measured as the difference between official and unofficial rates as a per cent age of unofficial one, which were about 49% during 1974-95 in Bangladesh. These premiums are measured as the differences between unofficial and official exchange rates as a percentage of unofficial ones.

These restricted financial policies in Bangladesh reduces financial saving. It is also reflected in the low level of investment or saving to GDP ratios and in real

GDP growth rates. The investment to GDP ratio remained 10-14% during 1974-95. The average ratio of domestic saving to GDP for the same periods was three percent of GDP and reached to less than seven percent in 1994/95. Similarly, the efficiency of investment as indicated by incremental output-capital ratios is very low implying a mis-allocation of scarce resources. The real GDP growth rates have been less than four per cent during this period despite the fact that average per capita income during 1974-95 was only US$ 161 (it reached to US$ 247 in 1994/95). Thus, Bangladesh has been associated with high levels of financial repression as well as high UM premiums and with low levels of saving, investment and real GDP growth.

3. Financial Liberalisation and Economic Growth: A Review

The financial system of a country is crucial to development and the controversy over relative advantages and disadvantages of FL in LDCs is yet to be resolved. The McKinnon-Shaw school favours FL and argues that financial repression in the form of ceilings on interest rates which causes real rates to be negative distorts the economy in the following way (Fry (1995, 1997)): a low level of interest rates:

(i) encourages individuals to increase present consumption and reduce saving for future consumption below the socially optimal level;

(ii) causes both an under supply of loanable funds and credit rationing;

(iii) generates investment in low-yielding projects or in inflation hedges rather than in the accumulation of financial savings, causing investment to be constrained by

savings and the choice of capital-intensive but less productive projects due to the low costs of funds;

(iv) the financing of low risk (and therefore low yield) projects since the financial institutions (FIs) are barred from charging the high risk premia associated with high return projects.

In addition, a low level of lending rates causes under-investment in the collection of information about projects or borrowers. The government can further distort the financial market by offering relatively high interest rates on government bonds in order to borrow money from financial institutions; this government borrowing crowds out private borrowing or investment (Schreft and Smith (1997)).

Contrary to the McKinnon-Shaw School, structuralists argue that low levels of real interest rates and credit towards priority sectors would increase investment and economic growth (Stiglitz and Weiss (1981, 1992)). They also suggest raising government expenditure in order to increase effective demand, investment and economic growth where seigniorage or inflation tax is an 'easy' source of government revenues.

Interest rate deregulation increases saving on the one hand and reduces effective demand and profits on the other (Burkett and Dutt (1991); Gibson and Tsakalotos (1994) see for a survey). The negative impact often dominates the positive one due to a pessimistic view regarding future profits, which worsens the negative impact, causing a decline in saving, investment and economic growth. In addition, an increase in interest rates: (i) causes a real exchange rate appreciation and exerts a negative impact on the tradable sector by making exports more expensive; (ii) incurs losses to a bank when it is lending long-term and borrowing

on a short-term basis; and (iii) raises government budgetary strains since in LDCs a significant proportion of deficits are financed by bank loans. Moreover, a reduction in reserve requirements and a relief from buying government bonds reduces tax revenues.

The neo-Keynesians also argue that a low level of real interest rates may be because of: (i) a low level of demand for investment caused by depressed expectations and high levels of uncertainty about the future; (ii) cash holding or liquidity preference or the accumulation of savings to make large purchases when access to credit markets is limited. Consequently, saving takes place even when interest rates are negative and any initiative to increase real interest rates generates an over supply of funds and damage the stability of the financial sectors (Beckerman (1988)).

Structuralists also argue that financial institutions maximising expected profits usually charge interest rates lower than the equilibrium rates and decline to supply funds to borrowers who are willing pay equilibrium rates. Thus, contrary to the prediction of the McKinnon and Shaw school, credit rationing prevails even in the absence of ceilings on interest rates. In addition, information and monitoring are public goods which are very important for the financial markets and undersupplied by competitive markets (Stiglitz (1994)). FL also reduces the supply of loans by inducing people to transfer their deposits from the unorganised money (or curb) markets (UMMs) rather than from inflation hedges to formal FIs (Taylor (1983) and Wijnbergen (1983)). Unlike to UMMs, formal FIs in LDCs are

not user friendly and cannot lend on a one for one basis due to reserve requirements.

A host of empirical studies have been carried out and the general findings of them support the McKinnon and Shaw hypothesis, i.e. more liberalised financial regimes are associated with faster economic growth (see Levin (197); Fry (1995); Siddiki (1999a); Ghatak (1997)). However, most of the studies are based on NGT. This dependence on NGT weakens the significance of positive relationships between financial variables and economic growth, since the presence of diminishing returns to capital as predicted by NGT dictates that long run growth rates in per capita income will not be enhanced by an increase in the level of saving and investment. This type of limitation of NGT motivates the emergence of endogenous growth theory (EGT), which predicts that FL (King and Levine (1993)) along with investment in physical (Romer (1986)) and human capital (Lucas (1988)) enhance economic growth.

Using EGT, King and Levine predict that FIs increase the productivity of investment and contribute economic growth by: efficiently evaluating projects and selecting the most promising ones; pooling household savings and mobilising them to finance more promising projects and sharing and diversifying risks associated with innovations. FIs also contribute to the productivity of investment and economic growth by reducing cash holding and liquid, i.e. unproductive, investment to meet agents' future liquidity demand (Bencivenga and Smith (1991)). In an another study, using cross-section data for 80 countries over the period 1960-1989 and EGT, King and Levine (1993) show a significant positive relationship between various financial indicators and real per capita income.

Roubini and Sala-i-Martin (1992) have also empirically shows that financial repression causes high rates of inflation and a reduction in the productivity of capital which in turn reduces economic growth rates.

4. The Theoretical Model

In this section, we extend the Pagano (1993) model to incorporate HC since FL increases the quality of HC by financing education to financially constrained households (Gregorio (1996)). EGT predicts that HC is one of the main engines of economic growth - a common feature in LDCs. The Pagano model predicts that FL increases: (i) saving and investment; (ii) the proportion of saving that goes to investment and (iii) the efficiency of investment by improving competitiveness, availability of information regarding the investment projects. Using an AK version of endogenous growth model, Pagano postulates that these above three factors in turn increase the rate of economic growth. Our extended model predicts that there is an additional efficiency gain caused by the accumulation of HC resulting from FL. To explain our model, assume that aggregate output is a linear function of the

$$Y_t = A K_t$$

aggregate capital stock:

where Y_t is aggregate output, K_t is the aggregate capital stock and t is time. This production function represents a competitive economy with the presence of externality or spillover effects. Each firm faces constant returns to scale, but the

economy as whole shows increasing returns to scale with respect to K_t. Suppose the population is stationary and the economy produces a single good which can be consumed or invested. Assuming the rate of depreciation of investment is zero and

$$I_t = K_{t+1} - K_t$$

$$\_ K_{t+1} = I_t + K_t$$

gross investment is:

This is a one-sector economy with no government and external sectors. Assume that FIs channel a proportion φ of saving, S_t, to investment, I_t, i.e. the proportion (1 - φ) of saving that is lost in the process of intermediation. Therefore, the capital

$$\phi S_t = I_t$$

market equilibrium condition is:

Using equations (4.1) and (4.2), the growth rate at time t+1 can be written as

$$g_{t+1} = \frac{Y_{t+1} - Y_t}{Y_t} = \frac{A K_{t+1} - A K_t}{A KSUBt} = \frac{K_{t+1} - K_t}{K_t} = \frac{K_{t+1}}{K_t} - 1$$

$$\_ g_{t+1} = \frac{I_t + K_t}{K_t} - 1 = \frac{I_t}{K_t} = \frac{A I_t}{A K_t}$$

follows:

where g_{t+1} is the growth rate of income at time t+1. Define the steady state as $K_t = K_{t+1} = K$; $Y_t = Y_{t+1} = Y$; $g_t = g_{t+1} = g$. Substituting equation (4.3) into equation (4.4) the steady state growth rate (g) can be written as follows:

$$g = A\frac{I}{Y} = A\phi s$$

$$\ln g = \ln A + \ln \phi + \ln s$$

where s is S/Y. Taking the logarithms of equation (4.5), we can write:

Equation 4.6 distinguishes three channels: φ, s and 'A', through which FL could influence economic growth. The transmission mechanisms are explained below.

4.1 Funnelling Saving to Investment

FIs collect private savings and direct them into investment. FIs cannot generally transform all savings into investment since transaction costs and profits absorb some of the funds. A proportion (1 - φ) of saving remains out of investment. FL in the form of the expansion of bank branches and a reduction in reserve requirements boosts competition among FIs, which reduces their commissions and fees, the difference between lending and borrowing rates and hence there is a rise

$$\ln \phi_t = \phi_0 + \phi_1 \ln FD_{\phi t} + u_{\phi t}$$

in φ. The structural equation for φ can be written as follows:

where $FD_{\varphi t}$ represents a vector of government financial policies which help or hinder financial development and competition. The signs of the vector of parameters φ_1 are positive when policies reduce reserve requirements, restrictions on new banks or branches and hence boost the financial markets, vice versa.

4.2 Improving the Allocation of Investment

The FIs play their second role in improving the efficiency of funds by channelling them towards more productive projects and by promoting education and training. FIs increase the efficiency of investment in the following ways: firstly, FIs provide information on more productive investment opportunities ((Bencivenga and Smith (1991))). Secondly, FIs help in channelling funds towards more risky but productive projects by risk sharing and portfolio diversification (Paul (1992)). Thirdly, FIs also help in channelling funds towards long run and productive projects and reduce premature liquidation by fulfilling unexpected future liquidity demands (Diamond and Dybvig (1983)). Finally, FIs can facilitates education and training of financially constrained young agents by providing study loans. Hence,

$$\ln A = A_0 + A_1 \ln \left(\frac{\Delta Y}{\Delta K}\right) + A_2 \ln HC + u, \; with \; A_1, A_2 > 0$$

the second behavioural equation can be written as follows:

where Δ is the difference operator, $\Delta Y/\Delta K$ is the ratio of incremental output (GDP) to capital (IOCR) and HC is human capital. FL improves the efficiency of investment, which is reflected in the IOCR. FL also increases the quality of HC. Both effects together increase 'A'.

4.3 Effects on the Rate of Saving

As predicted by the McKinnon and Shaw hypothesis, FL in the form of an increase in real deposit rates to assure a positive real rate of return influences people to

invest their saving in financial assets instead of investing in inflation hedges. Thus, FL increases private saving, i.e. bank deposits, which in turn increase credit, investment and economic growth. The behavioural equation for the saving ratio

$$\ln s = S_0 + S_1 \ln DR_{st} + u_t, \; with \; S_1 > 0$$

can be written as follows:

where DR_{st} represents deposit rates. Substituting equations (4.7), (4.8) and (4.9),

$$\ln g = \alpha_0 + \alpha_1 \ln \left(\frac{\Delta Y}{\Delta K}\right) + \alpha_2 \ln HC + \alpha_3 \ln FD + \alpha_4 DR + u;$$

$$\alpha_1 > 0, \alpha_2 > 0, \alpha_3 > 0, \alpha_4 > 0,$$

we obtain the following reduced form equation:

where u is an identically and independently distributed error term, with other variables as defined above. Equation 4.10 predicts that economic growth is positively affected by the capital-output ratios, human capital, interest/deposit rates and a policy vector which boosts or deters financial deepening.

5. The Empirical Model

$$y = \alpha_0 + \alpha_1 INV + \alpha_2 HC + \alpha_3 FD + \alpha_2 DR + u;$$

$$\alpha_1 > 0, \alpha_2 > 0, \alpha_3 > 0, \alpha_4 > 0,$$

The empirical counterpart of equation 4.10 can be written as follows:

where y is real per capita income with the GDP deflator (base 1990) used as a deflator; INV is the incremental output to capital ratio proxied by the ratio of GDP to investment. HC is human capital, measured by secondary school enrollment as a share of the total population (data for the total school age population are not available); FD is financial deepening measured by the broad money supply as a percentage of GDP; DR is real weighted deposit rates measured by weighted deposit rates minus the rate of inflation which is estimated from the consumer price index (base 1990) of middle income people in Dhaka. The sources of data are explained in the Appendix. All variables except DR are in natural logarithms. We have also proxied INV by the ratio of the incremental output to capital. This change does not alter the overall results (available on request). Sample periods with annual data: 1975-95.

We first apply the EG method. The augmented Dicky Fuller (ADF) test results in table 1 included in the Appendix show that all variables are I(1), i.e. the levels are non-stationary, while the first differences are stationary at a 5% level of significance. *Microfit 4.0* is used for all statistical analysis in this paper (Pesaran and Pesaran (1997)). In the next step, in tests for cointegration, is to establish a static long-run relationship among the variables. The results of the cointegrating

$$y = 7.85^{**} + 0.011\ INV + 0.334\ HC^{**} + 0.162\ FD^{**} + 0.000918\ DR^{**}$$
$$(139.53)\quad (0.58)\quad (12.25)\quad (10.50)\quad (2.91)$$

regression estimated by OLS over the periods 1975-95 are as follows:

$\underline{R}^2$ = 0.99, DW = 1.79, S.E. of regression 0.012382, RSS = 0.0024529, SBC = 57.6687, ADF = -6.1541 (with two lags) (5% critical value = -5.19), AR1-F(1,

15) = 0.081378[0.779], AR1-λ^2(1) = 0.11331[0.735], RESET-F(1,15) = 0.002928[0.958], RESET-λ^2(1) = 0.0040994[0.949], NOR-λ^2(2) = 0.77[0.77686], H-λ^2(1) = 3.1642[0.075], H-F(1, 19) = 3.3708[0.083], ARCH-λ^2(1) = 0.7654[0.395], ARCH- λ^2(2) = 2.1143[0.347].

Throughout our analysis, t-statistics are reported in the parentheses, ** and * represent 1% and 5% significance levels, respectively[2]. All the values are statistically insignificant implying no evidence of mis-specification. Thus the model (equation 5.2) passes all diagnostic tests. The variables are cointegrated at the 5% level as the estimated ADF statistics are lower than the critical value. However, the coefficient of INV is statistically insignificant in the both long- and the short-

$$y = 7.88^{**} + 0.331\ HC^{**} + 0.161\ FD^{**} + 0.000815\ DR^{**}$$
$$(258.195)\quad (12.60)\qquad (10.70)\qquad (3.19)$$

run (see below). Excluding INV, we re-estimated the model as follows:

$\underline{R}^2$ = 0.99, DW = 1.81, S.E. of regression 0.01236, RSS = 0.0025038, SBC = 58.9752, ADF = -5.8155 (with two lags) (5% critical value = -4.7635), AR1-F(1, 16) = 0.056836[0.815], AR1-λ^2(1) = 0.074[0.785], RESET-F(1,16) =

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[2] AR1-F and AR2-λ (2) are the F and chi square tests, respectively, for first order residual joint autocorrelation; RESET-F and RESET-λ^2 are the F and chi square tests for mis-specified functional form; NOR-λ^2(2) is the chi square statistic for testing normality; H-λ^2(1) and H-F are the chi square and F statistics, respectively, for testing heteroscedasticity; ARCH-λ^2(1) and ARCH-λ^2(2) are the first and second order tests for autoregressive conditional heteroscedasticity; probability values are reported in the square brackets.

0.025[0.877], RESET-$\lambda^2(1)$ = 0.03[0.858], NOR-$\lambda^2(2)$ = 1.075[0.584], H-$\lambda^2(1)$ = 3.79[0.052], H-F(1, 19) = 4.18[0.055], ARCH- $\lambda^2(1)$ = 0.70142[0.402], ARCH-$\lambda^2(2)$ = 0.553[0.468].

The re-estimated model (equation (5.3)) passes all diagnostic tests. In addition, we carried out tests on the stability of the model. Both of the CUSUM test and the CUSUM of squares test (figures 1 and 2 in Appendix) suggest that the model is stable over the sample period. We also carried out the predictive failure test (Chow's second test) which gives F_{1979} (16, 1) = 3.1606[0.418] where F_{1979} (., .) is the F statistics of the Chow's second test of predictive failures assuming 1979 due the second oil price shock as a break point. The test statistics reject the null hypothesis of structural breaks in 1979. Moreover, actual and fitted values of real per capita income generally move together; residuals of the model are generally within Two Standard Error Bands (figures 3 and 4 in the Appendix). Therefore, it is apparent that the overall fit of the model is very good.

Having found a stable cointegrated relationship, an error correction (EC) model is constructed to confirm the cointegrated relationship and to examine the short-run dynamics of the model as suggested by the Granger representation theorem (GRT) (Engle and Granger (1987)). The GRT states that there should be an EC mechanism when variables are cointegrated and conversely, that EC mechanisms generate a cointegrated series. The GRT also states that the EC model explains the dynamics of the model where variables in first difference represent short-run dynamics and the first lag of level variables, i.e. the EC term, represents long-run dynamics.

In the EC model, we try to incorporate the first difference of INV as an independent variable in order to examine whether investment has a short-run impact, even though it does not have any significant impact in the long-run. The coefficients of the first difference of INV and FD are statistically insignificant and they are excluded from the EC model (results are available on request). Thus, the

$$\Delta y = \underset{(5.14)}{0.01^{*}} + \underset{(5.1)}{0.18}\,\Delta HC^{**} + \underset{(9.14)}{0.0013}\,\Delta DR^{**} - \underset{(-4.65)}{0.92}\,ECM^{**}_{t-1}$$

preferred and the most parsimonious estimated EC model is as follows:

$\underline{R}^2$ = 0.835, DW = 2.53, S.E. of regression 0.0094557, RSS = 0.0014306, SBC = 61.084, AR1-F(1, 15) = 2.76[0.117], AR1-λ^2(1) = 3.11[0.07], RESET-F(1,15) = 0.0003[0.986], RESET-λ^2(1) = 0.0004[0.945], NOR-λ^2(2) = 1.01[0.603], H-λ^2(1) = 0.95[0.329], H-F(1, 18) = 0.9[0.355].

The EC model (equation 5.4) passes all diagnostic and the coefficient of the EC term is negative and significant, supporting cointegrating relationship as suggested by the GRT.

Given the size of the sample, we also apply fully modified least squares (FMLS) method in order to examine the robustness of our EG results. The FMLS method corrects for any the problems of endogeneity or serial correlation which may be experienced by the EG method. The FMLS method is appropriate for estimation and inference when there exists a single cointegrating relation among I(1) variables, which is in fact the case here, as suggested by both our theoretical model and EG results. The FMLS method with sample periods from 1976-95,

assuming at least one of the regressors has a drift and Parzen weights with two

$$y = 7.91^{**} - 0.08\ INV^{**} + 0.34\ HC^{**} + 0.16\ FD^{**} + 0.001\ DR^{**}$$
$$(188.68)\quad (-0.58)\quad (16.05)\quad (13.10)\quad (5.18)$$

lags, is used. The estimated model is as follows[3]:

INV is statistically insignificant, hence the re-estimated model excluding INV is as

$$y = 7.88^{**} + 0.33\ HC^{**} + 0.16\ FD^{**} + 0.001\ DR^{**}$$
$$(329.46)\quad (15.89)\quad (13.76)\quad (5.82)$$

follows:

The Explanation of the Empirical Results

The overall results support the predictions of our theoretical model, except the result for the impact of INV, that financial policies and government investment in human capital affect the rate of economic growth. More precisely, we observe that there is a cointegrated relationship among real per capita income (y), financial deepening (FD), real interest rates (DR) and human capital (HC) with y as a dependent variable. Our results show that HC, FD and DR have positive and statistically significant effects on y while the impact of the ratio of incremental output to capital (INV) is statistically insignificant. These results are robust across the both EG and FMLS methods.

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3 These results are robust across various weight structures, i.e. Parzen, Bartlett and Tuckey weights, and lag structures. We are using Parzen weights as suggested by Pesaran and Pesaran (1997)

The overall results reveal the highest positive real per capita income elasticity with respect to investment in HC. These results support the prediction of EGT which suggests that the improvement of the quality of working population is very important in the development process. Importantly, investment in education increases knowledge which in turn has effects on other sectors. Note also that R & D, innovation, specialisation and high technology projects require skilled manpower and these are unachievable in the absence of investment in HC.

We also observe that the impact of INV on y is statistically insignificant. This result is not unexpected since it is widely accepted that the quality of both government and private physical investment in Bangladesh is very low because of prevalent corruption and bureaucratic red tape associated with both government investment and loans for private sector investment (Ahmed *et al.* (1991); Hossain and Rashid, (1997)). There is, for example, a very common practice in Bangladesh of grasping depositors' money from banks using bribes, personal influences and political pressures, making 'false' investment and then declaring the business as 'sick'. The essence of the result on investment is that the quality in addition to the quantity of investment is important in order to increase economic growth.

Our results also show that FD has a statistically significant and positive impact on y, which is consistent with our theoretical model that an increase in FD raises the supply or the availability of funds which in turn increases investment and economic growth. However, the magnitude of this effect is not very high. The low effectiveness of FD and the statistically insignificant impact of INV highlight the inefficiency of the government sector and the poor management of credit that

goes to the private sector ((Ahmed *et al.* (1991); Hossain and Rashid, (1997)). In the case of Bangladesh, until the early 1990s, a significant proportion of credit was taken by the government to finance budget deficits. Credit to the private sector was confined to some selective borrowers who were politically and socially very influential. Thus, low FD implies that the banking sector serves only the government and influential borrowers and hence, productive potential borrowers were left with no credit. On the other hand, an increase in FD implies that FIs have more ability to lend potential borrowers.

The empirical results also support the prediction that DR positively affect y. The main policy consideration of the McKinnon and Shaw hypothesis is to increase DR to a positive level to encourage financial saving. A real positive or market clearing DR encourages borrowers to undertake only those projects which have returns above market clearing interest rates. Market clearing interest rates also reduce inefficiency associated with directed loans towards preferential sectors. Our results support these views. However, the magnitude of the coefficient of real rates is very low which is consistent with other findings on developing countries (Ghatak (1995)). This low interest elasticity is mainly due to the low level of y in Bangladesh. Since most of the earnings of people are spent on basic needs, people are left with very little money to save. The very small but significant coefficient of DR implies that DR liberalisation alone is unlikely to be able to expedite economic growth in Bangladesh.

Note that the impact of FD on y is much higher than that of DR. An increase in FD is tantamount to a rise in the capacity for financial intermediation. On the other hand, an increase in DR indicates a rise in the costs of borrowing.

Thus, our results support the view that the availability of credit rather than their opportunity costs is the more important determinant of y in a LDC like Bangladesh.

To sum up, our long-run results show that HC, FD and DR have statistically significant and positive impact on y, though the magnitude of the impact of DR is small. On the other hand, the impact of INV is statistically insignificant, implying that quality of investment is also important to increase y.

Finally, the coefficients of ΔHC and ΔDR in our EC model are statistically significant and positive, implying that short-run dynamics of these variables are also effective (equation 5.4). That is, y rises in the short-run in response to increases in HC and DR. In the short-run, INV and FD does not have any statistically significant impact on y. The short-run insignificant impact of FD may be due to the fact that there is a time delay in the transfer of available funds from the financial system to investment.

6. Conclusions

In this paper, we have developed an endogenous growth model including the ratio of incremental output to capital (INV), investment in human capital (HC), financial deepening (FD) and real interest rates (DR). This model predicts that economic growth mainly is generated from three factors: the proportion of saving channelled to investment (φ); (ii) the marginal productivity of capital (A) and (iii) the ratios of saving GDP (s). Financial liberalisation (FL) in the form of interest rate deregulation and an increase in FIs or financial deepening influences economic growth by raising φ, A and s.

Our model predicts that a rise in real interest rates raises the returns on financial saving and encourages people to divert funds from non-financial to financial assets, i.e. an increase in s. An increase in FIs also raises competition and reduces investment leakage and thus a rise in φ. FIs increase the efficiency of investment by: (a) collecting information on investment opportunities; (b) providing the scope of risk sharing through portfolio diversification; (c) promoting training and education.

This model has been applied to Bangladesh using annual data from 1975-95, cointegration analysis and the fully modified least squares (FMLS) method. The results are robust across both methodologies. Our results reveal that there is multivariate cointegrated relationship among y, HC, FD and DR where y is the dependent variable, supporting the view that FD, DR and HC are important factors in boosting economic growth.

The results reveal that HC is the one of the most important factors for increasing the growth of y. These results highlight the fact that development in

Bangladesh crucially depends on investment in education. The impact of INV on y is statistically insignificant. The insignificant impact of INV is not unexpected due to prevalent corruption associated with both government investment and the allocation of credit for private investment.

We also observe that FD has a significant positive impact on the growth of y, which is in accord with our theoretical model. FL reduces direct lending and borrowing and increases FD and the availability of funds. FIs also channel funds towards efficient projects. Thus, an increase in FD increases the supply of investment towards relatively more productive sectors and hence, generates the growth of y. In addition, a rise in DR increases the supply of loanable funds as people are encouraged to hold financial assets instead of investing in inflation hedges and thus a rise in economic growth.

However, the magnitude of the coefficient of DR is very low because of very low level of y and distortions in the financial sector. The very small but significant coefficient of DR also implies that the deregulation of interest rates alone are unlikely to be able to expedite economic growth in Bangladesh. The greater impact of FD than of DR implies that the availability rather than the opportunity costs (DR) of funds is more important in stimulating economic growth in Bangladesh.

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Appendix: Table 1: Augmented Dicky-Fuller Test for Unit Roots

Variables	Levels	No. of lags	First Differences	No. of lags
y	1.4323	1	-9.7959	0
INV	-2.89	1	-4.73	0
HC	0.12796	0	-3.8683	1
FD	-1.0736	2	-6.4469	1
DR	-0.54218	2	-15.9289	1

The maximum number of lags for levels is chosen as two and for first difference as one. The number of lags based on the Schwartz Bayesian Criterion appears to be sufficient to secure the lack of autocorrelation in error terms. *Microfit 4.0* is used for computation.

Table 2: Some Macroeconomic Indicators in Bangladesh

Average	GY	SGDP	IGDP	INV	PCI	P	GBSB	I	DR
1974-80	3.8[a]	1.47	10.64	2.01	117	19.3	17.02	1.15	-11
1981-85	3.59	1.62	14.06	0.98	140	10.68	5.38	1.11	0
1986-90	4.11	3.01	12.72	0.88	185	9.98	2.3	0.74	0.67
1991-95	4.15	6.42	13.99	0.64	221	4.69	4.69	0.97	
1974-95	3.9	3	12.64	1.21	161	12.24	6.92	0.95	-3.1

GY - real GDP growth rate, GDP deflator (base 1990) is used as a deflator; SGDP- domestic savings (= domestically financed investment) as a % of GDP; IGDP - gross investment as a % of GDP; INV - incremental output capital ratio; PCI - per capita income in US Dollar; P- rate of inflation; GBSB - growth of total branches of schedule banks; I - the ratio of foreign (Euro dollar rates) to domestic (Bank Rates) interest rates; DR - real bank (discount) rates, nominal bank rates minus P;

Table 2: continued

Average	FD	FGDP	BGDP	MGDP	XGDP	OPEN	UPRIM1	UPRIM
1974-80	15	1.46	7.57	12.25	4.81	17.05	45.33	89.94
1981-85	21.24	1.64	8.97	16.27	5.95	22.22	38.14	68.32
1986-90	27.62	1.94	7.54	14.21	6.12	20.33	68.65	222 (198[d])
1991-95	33.2	2.01	7.48	14.74	9.11	23.86	43.1 (30.26[c])	95.25 (44.62[c])
1974-95	23.4	1.64	7.86	14.17	6.34	20.52	48.5	116.25

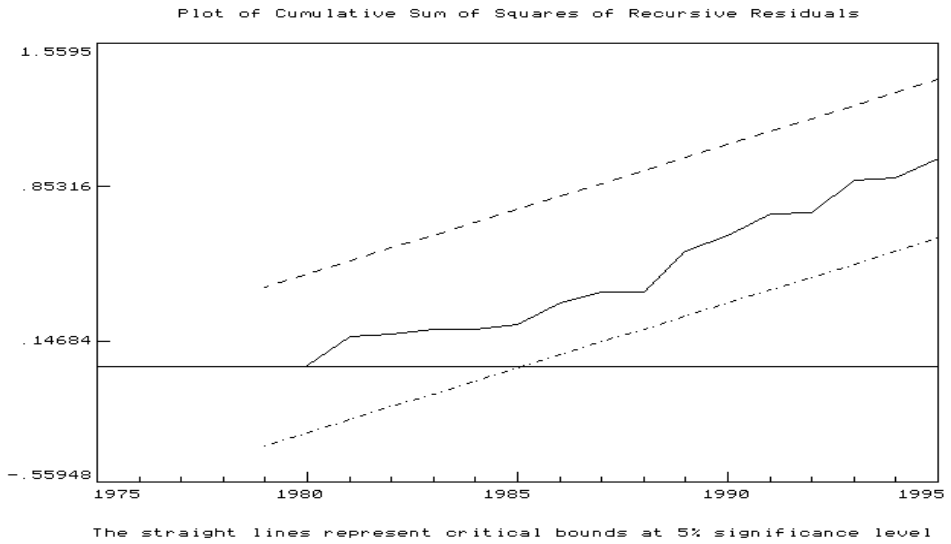
FD - M2 as a % GDP; FGDP - the share of the financial sector in GDP; BGDP - government budget deficits as a % of GDP; MGDP - imports (c & f) as a share of GDP; XGDP - exports (f.o.b) as a % of GDP; OPEN - trade, exports (f. o. b) plus imports (c & f), as a % of GDP; UMPRIM - the differences between unofficial and official exchange rates as a % of official exchange rates; UMPRIM1 - the differences between unofficial and official exchange rates as a % of unofficial exchange rates; a - 1975-1980 average; b - 1975-1995 average; c - 1993-95 average; d - 1985-92 average.

Data Sources

(A) Interest rates, official exchange rates, exports and imports from Bangladesh Bank (various years) *Economic Trends*; (B) saving, investment, consumer price index for middle income government employees in Dhaka city, population, government budget deficits from Bangladesh Bureau of Statistics (various years) *Statistical Yearbook of Bangladesh;* (C) GDP, GDP deflator, money supply from IMF (various years) *International Financial Statistical Yearbook*; (D) unofficial exchange rates from Cowitt (various years) *World/Picks Currency Yearbook.*

Figure 1

Figure 2


Plot of Cumulative Sum of Squares of Recursive Residuals
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.14684
-.55948
1975
1980
1985
1990
1995
The straight lines represent critical bounds at 5% significance level

Figure 3

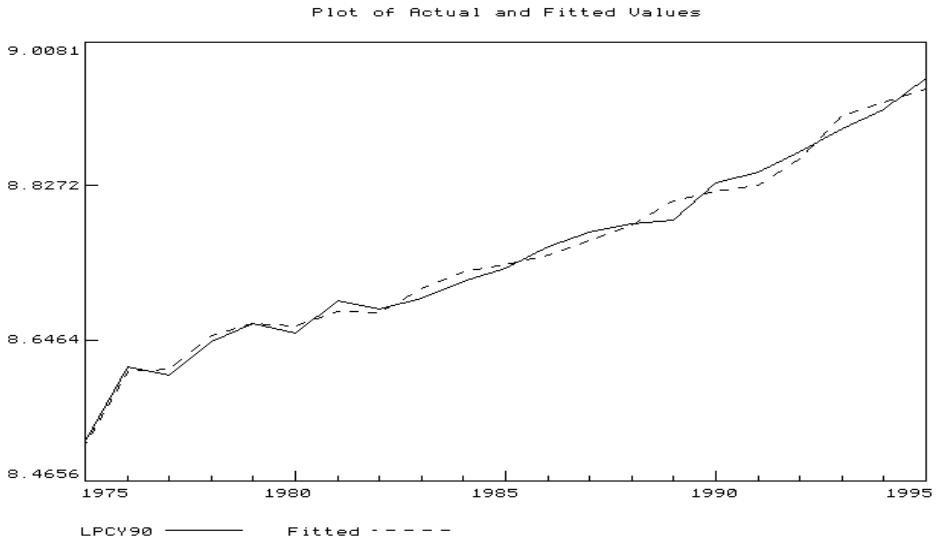
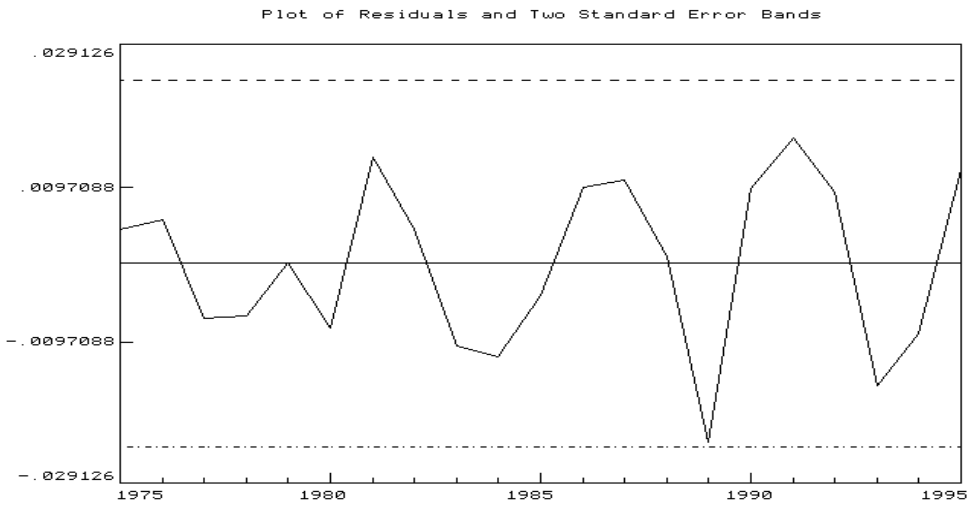


Figure 4


Plot of Residuals and Two Standard Error Bands
.029126
.0097088
-.0097088
-.029126
1975
1980
1985
1990
1995