

# DYNAMICS OF FINANCIAL DEVELOPMENT IN CO-INTEGRATED ERROR CORRECTION MECHANISM (ECM): EVIDENCE FROM BANGLADESH

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## ABSTRACT

*This paper examines the factors that determine the level of financial development in Bangladesh. Three indicators of financial development are used as dependent variables: broad money, private credit and total bank liability-all percentage of Gross Domestic Product (GDP). Interest rate differential, trade openness, inflation, and exchange rate are included in the regression model as explanatory variables. Dependent and independent variables are found cointegrated and their short run adjustments are also found statistically significant. Among the variables, only interest rate differential is found insignificant. Inflation and exchange rate affect the level of financial development significantly irrespective of indicator selected. Trade openness significantly affects financial development when broad money and private credit indicators are used, but in case of bank liability it is found insignificant. The 1990 paper also examines the impact of financial sector reform program (FSRP) initiated in on financial development. The study finds that FSRP negatively affects financial development. The policy prescriptions that follow from the findings are to maintain inflation at a low level and increase the integration of the economy with rest of the world*

## I. INTRODUCTION

Financial sector of a country plays critical role in the process of economic development by efficiently mobilizing financial resources among the most productive uses. Development of financial sector, by reducing information asymmetry and transaction costs, encourages financial savings and investment. Since investment is critical for economic development, growth impact of financial intermediation

(financial deepening) and development is significant. But this role of financial sector in the development process of a country was overlooked until mid-1970s. According to the early development economists, underdevelopment was caused primarily by market failure. So the policy prescription that follows this view was to impose economic regulation on financial sector in the form of interest rate ceiling (which is often referred to as 'financial repression'), selective credit allocation etc. This view of development

economics came under severe attack with the publication of two seminal works by McKinnon(1973) and Shaw(1973). These two literatures generated a new dimension in the analysis of economic development-financial development relation. They suggested that financial development is an essential ingredient of the process of capital accumulation as reflected in savings and investment ratios and their productivity. This, in turn, contributes to economic growth.

Financial development has also been found instrumental in reducing poverty through its impact on growth. Therefore, study of financial development is of paramount importance for a developing country like Bangladesh. Existing research on financial development in Bangladesh is sparse. Some studies have discussed the issue with reference to financial sector reform, for example, Brownbridge and Gayi (1999); and Choudhury, Moral and Banerjee (2000). The limitations of these studies are that they did not attempt to model financial development, rather simply compare different measures of financial development before and after financial sector reform. Modeling of financial development is important in order to identify the factors that determine its level. It still remains an untapped area of research in the context of Bangladesh. The present study aims to identify the factors that determine the level of financial development in Bangladesh.

## **II. STATEMENT OF THE RESEARCH PROBLEM**

Traditionally economic growth has been analyzed within the macroeconomic framework where there is an obvious link

between investment, savings and national production. Role of capital accumulation has been the most important determining factor of economic growth in all growth models. But no explicit inclusion of financial sector was made in those models. It is assumed that financial intermediation between savers and investors is perfect and costless. Challenges to this assumption assigned crucial role on financial development in development process. It is argued that though financial development does increase the transfer of funds across the economy, it is not costless and several types of leakages can occur between savers and investors. Presence of financial intermediaries helps improve efficiency in the distribution of capital but not at zero costs. When financial development is imperfect and costly, a proportion of savings is lost such that the whole saving is not available for investment. Hence costly and imperfect financial development leads to a direct negative effect on growth process. Thus financial development occupies the central role in channeling savings into investments in economic development process of a country. This role of financial development in economic development has received both theoretical and empirical support, for example, McKinnon (1973); Shaw (1973); King and Levine (1993 a,b,c); Choong, Yusop, Law and Sen (2003); Hondroyiannis, Lolos and Papapetrou (2004).

Another important factor that has provided motivation behind studying financial development is its role in poverty reduction. Poverty is a common problem in all developing countries. Financial sector development can reduce poverty both directly and indirectly. It directly exerts positive impact on poverty reduction by

widening access to financial services for the poor and indirectly through its positive impact on growth. An impressive body of literature has found empirical evidence that financial development reduces poverty (see, for example, Jalilian and Kirkpatric, 2001; Honohan, 2004; Beck, Demirguc-Kunt and Levine, 2004).

Therefore, it is seen that financial development is an important issue for the growth of an economy and in developing economies it is especially important for its poverty-reducing role. These roles of financial development drive home the need to analyze the factors that determine its level. The present study attempts to identify the determinants of financial development in Bangladesh.

### **III. OBJECTIVES OF THE STUDY**

The prime objective of this paper is to identify the factors that determine the level of financial development in Bangladesh. In doing so the paper will develop a model of financial development. Therefore the objective of this paper may be specifically stated as under:

1. To develop and estimate an econometric model of financial development in the context of Bangladesh.
2. To examine the long run equilibrium relationship and short run adjustments between financial development and its determinants.
3. To make some suggestions based on the estimation results of the model mentioned above.

Besides, Bangladesh has undergone significant reform measures in its financial sector since 1990. Efficient financial

intermediation is possible only when a well functioning, competitive financial system is present. Without a well functioning financial system efficient financial intermediation is not possible and without efficient financial intermediation society's savings cannot get the right investment. Therefore, reform measures in financial sector are expected to improve the depth of financial intermediation, that is, financial development. This paper will also examine whether financial sector reform measures made any significant contribution to the level financial development in Bangladesh.

### **IV. REVIEW OF RELEVANT LITERATURE**

Although the role of financial development in economic growth and poverty reduction has been subjected to an impressive body of research works, very few studies have investigated the determinants of financial development. Substantial part of research work on financial development centers around causality analysis between financial development and economic growth. Majority of these studies conclude that financial development causes economic growth, which is known as 'supply-leading' hypothesis (McKinnon, 1973; Shaw, 1973; King and Levine, 1993 a,b,c; Choong, Yusop, Law and Sen, 2003; Hondroyiannis, Lolos and Papapetrou, 2004). Some studies conclude to the contrary. According to them economic growth causes financial development, which is dubbed as 'demand-leading' hypothesis. (Garcia and Liu 1999, Berthelemy and Varoudakis, 1996). Chaug and Thai (2004) conclude that a reciprocal relation exists between financial development and growth. The reasoning is that economic growth makes

the development of financial development system profitable. The establishment of an efficient financial system in turn permits faster economic growth. Thus there is a bi-directional cause-effect relationship between financial development and growth.

Some studies have examined the financial development in poverty reduction. For example, Jalilian and Kirkpatrick, (2001); Honohan, (2004); Beck, Demirguc-Kunt and Levine, (2004) note that Financial sector development can reduce poverty both directly and indirectly. It directly exerts positive impact on poverty reduction by widening access to financial services for the poor and indirectly through its positive impact on growth.

Literature on the determinants of financial development is not well documented, especially in case of developing countries like Bangladesh. This aspect has been given very little attention even at the global level. McNulty (2001) examines the determinants of financial intermediation in the transitional economies of central and Eastern Europe. He finds that the system of financial intermediation in the countries of the former Soviet Union is severely underdeveloped, relative to countries at similar stage of development as measured by per capita GNP. The study also finds the rule of law and private property rights as an important determinant of financial intermediation. Herrero et al (2002) finds per capital income as an important determinant of financial development in Latin American countries along with other macroeconomic and institutional aspects. Addison, Chowdhury and Murshed (2002)

study the effect of conflict<sup>1</sup> on financial development in 79 conflict-prone countries and find that conflict has a negative effect on financial development. In examining the behavior of financial intermediation in the southern African custom union countries, namely Botswana, Lesotho, Namibia, South Africa and Swaziland over the period from 1980 to 2000, Aziakpono (2003) finds that income level and exchange rates are most important determinants of financial intermediation. Other variables that are found to have significant impact on financial intermediation include inflation, and interest rate spread. Law and Demetriades (2004) find trade and financial openness as well as institutional quality as important determinants of financial development in developing countries.

Research on financial development in the context of Bangladesh is quite sparse and incomplete. Although two studies (Brownbridge and Gayi, 1999 and Choudhury, Moral and Banerjee, 2000) discuss the impact of financial sector reform program (FSRP) on financial development, it was in very limited form. They simply took the ratio of  $M_2$  to GDP and compare them between pre and post FSRP period. But no research work focused on financial intermediation alone and no attempt has been made to model financial development using econometric methodology. This paper attempts to do this.

## **V. METHODOLOGY**

This section discusses the specification of model of financial development and econometric issues relating to estimation

<sup>1</sup> Addison, Chowdhury and Murshed (2002) define conflict as the use of armed force between two parties, of which at least one is the government of a state, resulting in at least 25 battle-deaths.

of the model. Model formulation is accomplished in two steps: first indicators of financial development are selected and then determinants of financial development are described. Econometric issues that are addressed include unit root, cointegration, error correction and other diagnostic tests relevant to the model.

### **Model Specification**

#### **Indicators of Financial Development**

Financial development measures the development of financial sector of an economy. In other words, it measures the volume of financial intermediation by financial intermediaries in an economy. Although there are different types of financial intermediaries, such as Insurance companies, financial system of Bangladesh is mainly bank-based. For this reason bank-related financial development indicators are used in this study. Some of the most commonly used measures of financial development are

- i. Money as a percentage of GDP
- ii. Bank Deposit Liabilities as a percentage of GDP
- iii. Domestic Credit as a percentage of GDP
- iv. Private credit as percentage of GDP

#### **(i) Money as a percentage of GDP**

**(MGDP):** The most commonly used measure of FI is the share of some broad measure of money stock, usually M2, in the nominal income, i.e. nominal GDP (King and Levine, 1993a, 1993b; Wood, 1993; Murinde and Eng, 1994; Lyons and Murinde, 1994; Agung and Ford 1998). The measure shows the real size of a growing economy in which money provides valuable payment and saving service. The narrow money stock (M1) best reflects the payment service while

the broad money stock (M2) reflects the saving and precautionary functions. Narrow money balance should rise with economic transactions but broad money should rise at a faster pace if financial deepening is occurring (Lynch, 1996). As noted by Wood (1993) an increase in the share of M2 in GDP reflects a higher degree of division of labor and specialization in both real and financial sector.

Though commonly used these measures and especially the use of narrow money aggregate have a number of limitations that may make them poor indicator of financial development. Aziakpono (2003) noted that the use of narrow money as a percentage of income (GDP) as a proxy for financial development could be criticized on the ground that a high level of monetization is most likely the result of financial underdevelopment, while a low level of monetization is the result of a high degree of financial sophistication which allows individual to economize on their money holding. Lynch (1996) noted that monetary aggregate might be misleading, since they may indicate monetization rather than financial sophistication. Bearing in mind some of these limitations, De Gregorio and Guidotti (1995) suggest the use of a less liquid monetary aggregate (M2 or M3) as a proxy for financial intermediation. In the present study, broad money (M2) as a percentage of GDP (MGDP) is used as the proxy for financial development.

#### **(ii) Bank Deposit Liabilities as a percentage of GDP (BLGDP):**

This provides an alternative to MGDP especially when dealing with developing economies. This is because in developing countries a large component of broad money is in the

form of currency held outside the banking system. Therefore a rising share of M2 in GDP may reflect the more extensive use of currency than an increase in the volume of bank deposit. Therefore, bank deposit liabilities which excludes currency outside the banking system from the broad money may provide a better measure of financial development. Despite its improvement over M2, this measure has been criticized on the ground that it may not accurately gauge the effectiveness of the financial sector in ameliorating information asymmetries and easing transactions costs (Levine et al, 2000). However under the assumption that the size of financial intermediary sector is positively correlated with the provision and quality of financial services, many researcher have used this measure of financial development (Goldsmith, 1969; King and Levine, 1993a; and McKinnon 1973). In the present study sum of demand and time deposit is used to denote total bank deposit liabilities.

**(iii) Domestic Credit as a Percentage of GDP(DCGDP):** This proxy for financial development represents domestic assets of the banking sector. This is the major item on the asset side of the consolidated balance sheet of the financial sector. It tries to capture the uses of deposits with the financial sector. It is expected to increase in response to improved price signals represented primarily by the establishment of positive real interest rate.

**(iv) Private Credit as a percentage of GDP:** This is closely related to DCGDP. It provides a more direct measure of financial development than DCGDP. It isolates credit issued to the private sector from credit issued to government agencies and public enterprises. It also excludes credit issued

by central bank (Levine et al, 2000). The underlying assumption is that credit extended to the private sector generates increases in investment and productivity to a much larger extent than do credit to the public sector. It is also argued that loans to the private sector are given under more stringent conditions and that the improved quality of investment emanating from financial intermediaries' evaluation of project viability is more significant for private sector credits (Levine and Zervos, 1998; Levine, 1998). In general this measure of financial development is preferred to DCGDP and for this reason DCGDP is not used in this study.

Considering the practical importance, three measures of financial development discussed above (excluding DCGDP) are used in this study as dependent variable.

#### **Determinants of Financial Development**

Two approaches are commonly used in analyzing the determinants of financial intermediation, namely (i) Institutional/ structural approach and (ii) Macroeconomic approach. The institutional approach focuses on such factors as capital adequacy ratio, minimum reserve requirements, non-performing loans, property rights, legal environments, accounting standards, transparency and taxation issues, concentration ratio and inside information problems. On the other hand macroeconomic approach focuses on such factors as income growth, interest rate measures, inflation, exchange rate etc. (Garcia and Liu, 1999). Though both institutional and macroeconomic approaches are important for analyzing financial intermediation, accurate data relating to institutional approach are difficult to obtain in developing countries like Bangladesh. For example

data on property rights, legal environment, accounting standards, transparency and specially, inside information are not available in desired form and accuracy. For this reason the present research study follows macroeconomic approach in analyzing financial intermediation in Bangladesh. Following macroeconomic variables are considered in as the determining factors of financial intermediation.

**(i) Economic growth:** A large and growing body of literature have demonstrated the strong link between financial sector and economic growth over the last two decades. But opinion differs on the direction of causality. Because high rate of economic growth is positively associated with a higher rate of financial intermediation, it does not follow that high financial development is the cause and economic growth is the effect. There are four school of thoughts on this issue:

**a. Financial development and economic growth are not causally related:** According to this view observed correlation between financial development and economic growth is merely the result of a historical accident. As economies grow, so do their financial sectors, where each is influenced by separate external factors. While modern economic growth is governed by real factors, the financial development is rooted in the history of financial institutions. This view is supported by Graff (2001).

**b. Financial development causes economic growth:** According to this view effective financial development accelerate economic growth. Financial sector transfers resources from low-growth sectors to modern high growth sectors and thereby accelerate economic growth by promoting and

stimulating entrepreneurial responses in those high-growth sectors. Provided that there is no real impediment to economic development, sophisticated financial system can generate high and sustained rates of economic growth. This is known as *Supply side Hypothesis* as resources required for economic growth are supplied though financial system. McKinnon (1973), Shaw (1973) and King and Levine (1993a, 1993b, 1993c) support this view.

**c. Financial development follows economic growth:** This school of thought views the demand for financial services as dependent upon the growth of real output. Thus the creation of modern financial institutions and financial services are the responses to the demand for these services by investors and savers in the real economy. The financial system adapts itself to the financial needs of the real sector and fits in with its autonomous development playing a relatively passive role in economic growth process (Garcia and Liu 1999; Berthelemy and Varoudakis 1996).

**d. Relationship between financial development and economic growth is reciprocal:** According to this view economic growth makes the financial development system profitable. The establishment of efficient financial system in turn permits faster economic growth. By specializing in fund pooling, risk diversification, liquidity management, and project evaluation and monitoring, the financial system improves the efficiency of capital allocation and increases the productive capacity of the real sector (Aziakpono, 2003).

However, a casual study by Hassan (2005) shows that the relationship between economic growth and financial development

supports the *Supply Side Hypothesis*, that is, financial development causes economic growth in Bangladesh. For this reason economic growth has not been included as an independent variable in the proposed model.

**(ii) Interest Rate Differential:** Interest rate differential or interest rate spread, as measured by the difference between lending and borrowing rate, is a measure of competitive financial system. In a competitive system the spread represents the cost of financial development and is good measure of efficiency in the banking sector as it describes the transaction costs in the sector (Graff 2001). A competitive banking sector facilitates financial development, so there exists a negative relationship between financial development and interest rate differential that is, higher spread means less competitive banking sector and less financial development and the vice versa.

**(iii) Exchange Rate:** Bangladesh followed fixed exchange rate policy until it moved into flexible exchange rate regime in 2003. From time to time Bangladesh taka has been devalued against dollar. Inclusion of nominal exchange rate in the model is based on the premise that devaluation of currency has important influence on real sector. There is an impressive body of literature that shows that devaluation lowers both aggregate demand and supply and thus the level of output (Agenor and Montiel 1996; Kamas 1992; Lizondo and Montiel 1989). Devaluation lowers aggregate demand through different channels. For example it raises price level and creates a negative real balance effect (Bruno 1979; Gylfason and Schmid 1983; Gylfason and Radetzki 1985; Hanson 1983), it also raises nominal

interest rate and lowers investment (Bruno 1979; van Wijnbergen 1986). Devaluation also lowers output through a number of channels, for example it increases the cost of imported input (Bruno 1979; Gylfason and Schmid 1983; Gylfason and Radetzki 1985; Hanson 1983), it increases the cost of working capital because of reduction in working capital (Bruno 1979; van Wijnbergen 1986) and it increases wages due to indexation to goods prices (Edwards 1986; Gylfason and Risager 1984; Hanson 1983; van Wijnbergen 1986).

On the other hand arguments have also been placed in favor of devaluation. World Bank and IMF has a strong faith in devaluation as an instrument for both expanding output and reducing trade deficit in developing countries (Hossain 2000). According to *The Australian Dependent Economy Model* of devaluation developed by Trevor Swan (1960) and W. Salter (1959), devaluation expands output by both inducing an efficient allocation of resources from non-tradable sector to tradable sector and changing the composition of private spending between domestic and foreign goods and services (Agenor and Montiel 1996). Starting from a situation of sub-optimal allocation of resources, any shift of resources from the non-tradable to tradable sector would be productive enhancing (Hossain 2000). The reason is that the tradable sector remains under international competitive pressure, and this leads to the introduction of productive enhancing technology, management practices and skilled labor in the production process (Sachs and Larrain 1993). The World Bank and IMF are also optimistic that devaluation is effective in improving the trade balance position of a developing country by increasing export and lowering imports.



The impact on the real sector of an economy of exchange rate devaluation, as explained by different studies mentioned above, will be reversed when currency is revalued, i.e. when the number of domestic currency per foreign currency is reduced. Therefore, the impact of exchange rate on financial development is not clear *a priori*. It might have positive or negative relationship with exchange rate.

**(iv) Inflation:** In general inflation is considered as a measure of macroeconomic stability/ volatility. Theoretically macroeconomic volatility will have negative impact on financial development. Savers have low incentive to save as they expect a fall in the value of their wealth with rising inflation. On the other hand borrowers tend to demand more credit since they expect to pay less in real terms in future. However, banks in an attempt to cover the cost of inflation while providing additional financial development will tend to increase lending interest rate, which in turn reduces demand for credit. Several empirical studies have confirmed this prediction by obtaining a significant negative relationship between inflation and financial development (For example Garcia and Liu 1999 and Rother 2001).

There are different measures of inflation, such as Consumer Price Index (CPI), Producers Price Index (PPI), GDP deflator etc. CPI or PPI consider some selected item in constructing price indexes. Only GDP deflator takes into account prices of all goods and services in an economy. For this reason percentage change in GDP deflator is used as a measure of inflation.

**(v) Trade Openness:** Ginebri, Petrioli and Sabani (2001) find trade openness to have significant positive effect on financial development. Theoretically trade openness should have indirect effect on financial development through its effect on growth, but Ginebri, Petrioli and Sabani (2001), while working on Italian and Spanish data, find that trade fosters financial development even when growth is kept constant. Thus trade openness evolves as an important determinant of financial development. Due to various liberalization measures undertaken, Bangladesh economy is experiencing growing trade openness. So, this study includes the trade openness variable assuming a positive relationship with financial development.

Trade openness of a country represents its policy stances with regard to its foreign trade, such as export subsidy, lowering import tariff, removing ban on imported items etc. The ultimate result of all these policy variables are increased export and import. For these reasons total volume of export and import, expressed as a percentage of GDP, is used as an indicator of trade openness.

Based on the above discussion a model of financial development may be specified as under:

$$FD_t = \beta_1 + \beta_2 IRD_t + \beta_3 EXRT_t + \beta_4 INFL_t + \beta_5 XM_t + \mu_t$$

$$(\beta_2, \beta_4 < 0; \beta_3 > 0; \beta_5 > 0; \text{or}, < 0)$$

where, FD is different indicators of financial development, IRD is interest rate differential, i.e. difference between lending and borrowing rate, EXRT is exchange rate, INFL is inflation and XM is trade openness (the sum of total export and import as % of GDP).

Besides, the impact of financial sector reform measures introduced in 1990 will also be examined by introducing a financial sector reform dummy in the regression model as under:

$$FD_t = \beta_1 + \beta_2 IRD_t + \beta_3 EXRT_t + \beta_4 INFL_t + \beta_5 XM_t + \beta_6 FSRP + \mu_t$$

$$(\beta_2, \beta_4 < 0; \beta_5 > 0; \beta_3 > 0; \text{or}, < 0; \beta_6 > 0)$$

### Econometric Issues

Standard econometric issues that are addressed in this section are unit root test, co-integration and Error Correction Model (ECM).

**A. Unit Root Test:** Empirical works based on time series data assumes that the underlying time series is stationary. 'A time series is said to be stationary if its mean, variance and auto-covariance (at various lags) remain the same no matter at what time we measure them' (Gujarati, 1995). If the underlying series is not stationary, least square methods and classical inferences made from these series are generally not valid (Carigwell and Samaroo, 1997). Two widely used statistical tests that are available for identifying stationary property of time series data are Dickey-Fuller (1979, 1981), hereafter DF test and Phillips-Perron (1988), hereafter PP test. For any time series  $Y_t$ , Augmented Dickey-Fuller (ADF) test requires estimation of a regression of the following form:

$$\Delta Y_t = \beta_1 + \beta_2 t + \delta Y_{t-1} + \alpha_i \sum_{i=1}^m \Delta Y_{t-i} + \varepsilon_t$$

Where;  $t$  is the time or trend variable and  $m$  is number of lagged differenced term needed to achieve white noise residuals. When  $m=0$  the ADF collapses to the DF test. The test statistics test the null hypothesis that  $\delta=0$ ,

that is  $Y_t$  is non-stationary against the alternative hypothesis that  $\delta < 0$ , that is,  $Y_t$  is stationary. The  $t$  statistic on  $\delta$  is known as  $\tau$  (tau) statistic and follows what is known as Dickey-Fuller distribution (see Dickey and Fuller, 1979).

### B. Co-integration:

Engle and Granger (1987) suggest that a vector of non-stationary time series, which may be stationary only after differencing, may have stationary linear combination without differencing and then the variables are said to have cointegrated relationship. If the variables are non-stationary and not co-integrated, the estimation result of regression model gives rise to what is called 'spurious regression'. In that case one may obtain a very high  $R^2$ , although there is no meaningful relationship between the variables. To ascertain cointegrating relationship between two variables, say,  $Y_t$  and  $X_t$  residuals from regression model  $Y_t = \beta_1 + \beta_2 X_t + \mu_t$  are subjected to DF test as under:  $\hat{\mu}_t = \delta \hat{\mu}_{t-1} + \nu_t$

A significant  $t$  statistic indicates that dependent and independent variables are cointegrated.

### C. Error Correction Mechanism (ECM):

Another important result of co-integration analysis is Error Correction Mechanism (ECM), first used by Sargan (1984) and latter popularized by Engle and Granger (1987) which deals with modeling short-run dynamics of long-run equilibrium relationship. Despite co-integrated or having long-run equilibrium relationship between a set of variables, in the short-run there may be disequilibrium. ECM corrects for that

disequilibrium. The ECM presentation of relationship of the two variables,  $X_t$  and  $Y_t$ , takes the following form:

$$\Delta Y_t = \beta_1 + \beta_2 \Delta X_t + \beta_3 \hat{\mu}_{t-1} + \varepsilon_t$$

Where  $\hat{\mu}_{t-1}$ , the one period lagged value of the residual from regression  $Y_t = \beta_1 + \beta_2 X_t + \mu_t$  measures the discrepancy between actual and long run or equilibrium value of  $Y_t$  that is corrected each period.

### Data Sources

Data used in this paper covers the period from 1974-2003. All data, except interest rate differential, are taken from International Financial Statistics (IFS)-2006 (on-line version), a publication of International Monetary Fund (IMF). Annual data are used due to unavailability of data at lower than annual frequency. GDP data after 2003 are not reported in IFS-2006, that is why study period covers from 1973 to 2003. Interest rate differential data are taken from various issues of Economic Trend, a publication of Bangladesh Bank, central bank of Bangladesh. Interest rate differential is calculated as the difference between weighted average interest rate on loan and deposit.

## VI. EMPIRICAL ANALYSIS

This section presents results of empirical data analyses. Stationarity of time series data is examined first using ADF, which is reported in Table-1.

From Table-1 it is seen that all variables, except inflation contain unit root at level but

**Table-1: Unit Root Test Result**

Variables	Test statistic	
	Level	First Difference
MGDP	-0.817728	*-4.357782
BLGDP	-0.621091	*-4.089378
DCGDP	-1.404444	*-4.213850
PCGDP	-1.049465	*-3.304622
IRD	-3.318885	*-4.482508
EXRT	0.614121	*-3.719815
INFL	*-5.355922	---
XM	-0.745333	*-4.507285

\* indicates significant at 1% level.

stationary at first difference, that is, they are I(0). The natural extension of this finding is to examine whether different indicator of financial development and its determinants are cointegrated. Engle and Granger (1987) cointegration technique is applied for this purpose and the results re reported in Table-2.

**Table-2: Co-integration Test**

Indicator of financial development used in regression	Estimation result (Figures (in parentheses are <i>t</i> ratios)
MGDP	$\hat{\mu}_t = -0.48774\hat{\mu}_{t-1}$ (-2.880)
BLGDP	$\hat{\mu}_t = -0.47061\hat{\mu}_{t-1}$ (-2.823)
PCGDP	$\hat{\mu}_t = -0.42700\hat{\mu}_{t-1}$ (-2.754)

Results reported in Table-2 ensure that different measures of financial development and its determinants are co-integrated as the *t* ratios of all regressions are highly significant. We next examine the short run dynamics of this long run equilibrium relation, which is done by ECM. The ECM

representation of financial development models for different indicators of financial development are reported in Table-3.

financial development. Trade openness exerts significant impact on two indicators of financial development: MGDP and

**Table-3: Error Correction Mechanism (ECM) Result**

	Constant	$\Delta IRD$	$\Delta EXRT$	$\Delta INFL$	$\Delta XM$	$\hat{u}_{t-1}$
$\Delta MGDP$	0.32731 (0.5146)	0.22447 (0.6289)	0.19337 (0.6764)	-0.20191 (-1.660)	0.56190* (6.623)	-0.33268*** (-1.913)
$\Delta BLGDP$	0.38858 (0.7353)	0.11386 (0.3839)	0.15319 (0.6458)	-0.16802 (-1.661)	0.45212* (3.505)	-0.32352*** (-1.997)
$\Delta PCGDP$	0.77041 (1.681)	-0.23118 (-0.8878)	-0.05909 (-0.2851)	-0.14807 (-1.708)	0.37476* (3.391)	-0.27989*** (-2.004)

\* and \*\*\* Indicates significant at 1% and 10% level respectively.

First row of Table-3 represents independent variables and first column represents different indicators of financial development. It is seen that the equilibrating errors in all specification (except DCGDP) are statistically significant. In MGDP regression about 0.33 of the discrepancy between actual and long-run value of MGDP is eliminated each year. Similarly, in case of BLGDP and PCGDP regression magnitude of these corrections are 0.32 and 0.28 respectively.

Next we examine the impact of financial sector reform program (FSRP) introduced in 1990 on financial development. A dummy variable is used for this purpose that takes a value of '0' for the period 1975-1990 and '1' for the period 1991-2003. Table-4 reports estimation results of regression equations.

Estimation results reported in Table-4 shows that all variables, except FSRP, have expected sign. In all specifications of regression models, except DCGDP, exchange rate (EXRT) and inflation (INFL) are found to have significant impact on

PCGDP. However, interest rate differential is not found to be a statistically significant determinant of financial development, except DCGDP. The most notable result is found in case of FSRP. The estimation results show that after financial sector reform program undertaken, financial development has been deteriorated.

Each models performs well in terms of their power to explain the behavior of different indicators of financial development as indicated by  $R^2$  and adjusted  $R^2$ . Along with these high  $R^2$  values majority of the 't' ratios in each model is significant, which is contrary to the multicollinearity symptom. Variance Inflation Factor (VIF), reported in right most column in Table-4 signifies that there is no high multi-collinear relationship among independent variables, as none of the VIFs exceed 10<sup>1</sup>. NRM (*Jraque-Bera* normality test) statistic shows that the residuals of all regressions are normally distributed.

<sup>1</sup> Gujarati (1995: 339) notes that as a rule of thumb, if the VIF of a variable exceeds 10, that variable is said to be highly collinear.

**Table-4: Estimation Results of Regression Models**

	MGDP	BLGDP	PCGDP	VIF
Constant	9.0271*** (1.966)	6.2498 (1.580)	-1.0160 (-0.2624)	
IRD	-0.27865 (-0.4630)	-0.22073 (-0.4257)	-0.50983 (-1.005)	1.2
EXRT	0.50521* (5.644)	0.52170* (6.765)	0.55987* (7.418)	9.2
INFL	-0.35654*** (-1.781)	-0.31538*** (-1.829)	-0.32254*** (-1.911)	1.0
XM	0.30819** (2.114)	0.19592 (1.560)	0.27326** (2.223)	5.0
FSRP	-6.3985* (-3.841)	-5.9554* (-4.150)	-5.8305* (-4.151)	
$R^2$	0.9134	0.9283	0.9484	
$\bar{R}^2$	0.8946	0.9127	0.9371	
$NRM [x^2(2)]$	2.8006 (0.246)	3.0965 (0.213)	1.4137 (0.493)	

1. Figures in parentheses are respective 't' values.

2. \*, \*\* & \*\*\* indicate significant at 1%, 5% and 10% level.

3. For  $NRM [x^2(2)]$  figures in parentheses are p-values.

## VII. FINDINGS OF THE STUDY

This paper examines the determinants of financial development in Bangladesh. A model of financial development is developed and estimated. Findings from the empirical analyses of estimation results of financial development models may be summarized as under:

1. In general all models performed quite well in terms of their explanatory power as indicated by the adjusted  $R^2$ . With regard to variables only interest rate differential is found to be insignificant and has sign contrary to expectation in all specifications. This result indicates that deposits and advances are not interest sensitive. For that reason, measures

of financial development does not have statistically significant expected relationship with interest rate differential. Another factor is also noteworthy in this respect. Interest rate on deposit and advances are not determined by market forces in Bangladesh. The behavior of commercial banks in the determination of interest rates on deposits and advances indicates that banks as a group fix their interest rates at a uniform level with minor deviations among the group of banks (Khan, 2001). Had interest rates been determined by market forces, financial development would have shown clear and predictable relationship with interest rate differential.

2. Inflation has statistically significant negative impact on all measures of financial development as expected. This

implies that increased macroeconomic instability reduces the volume of financial development. It has also negative impact on economic growth. From Granger-causality tests it is found that financial development Granger causes economic growth. Therefore, inflation exerts its negative impact on economic growth indirectly through financial development.

3. Positive and statistically significant impact of exchange rate on all measures of financial development supports the view that devaluation expands output by both inducing an efficient allocation of resources from non-tradable sector to tradable sector and changing the composition of private spending between domestic and foreign goods and services (Agenor and Montiel 1996). This positive impact on output of devaluation is channeled through financial development.
4. Trade openness has statistically significant positive impact on private credit as a percentage of GDP. This is because increased imports and exports necessitate increased amount of credit in these sectors. Private credit is needed to finance importation of capital machinery and raw materials for production at home. On the other side, exporting firms also need credit to facilitate production required to meet increased export demand. For this reason trade openness has positive impact on financial development as measured by the private credit as a percentage of GDP. Trade openness also contributed to the increased volume of broad money.
5. Coefficients of financial sector reform indicate that the volume of financial

sector reform has been decreased in the post-reform period as compared to the pre-reform period. Tests of effectiveness of financial development also indicate that no improvement has been recorded in the effectiveness of financial development during the post reform period. Even the effectiveness has been deteriorated when measured by the ratio of reserve money to total deposit during the post reform period. The reform measures were taken to enhance the efficiency of the financial system, mainly banking sector, by smoothing its intermediative function. But that objective has not been fulfilled. This failure of financial sector reform measures to enhance financial development may be assigned to the stringent regulation imposed on banking institutions with regard to classification, provisioning, capital adequacy etc. on one hand and lack of effective legal support to recover bad debts on the other hand. As banks do not have effective authority to recover their bad debts, they became reluctant to extend credit because of their concerns regarding financial discipline (Choudhury, Moral and Banarjee, 2000).

## **VIII. CONCLUSIONS AND RECOMMENDATIONS**

This paper attempts to identify the determinants of financial development in Bangladesh. The issue is of paramount importance for the role of financial development in accelerating growth and reducing poverty as evidenced in several empirical studies. In modeling financial development interest rate differential, inflation, nominal exchange

rate and trade openness are selected as independent variables. Broad money, total bank liabilities and private credit, all as percentage of GDP, are used as indicators of financial development. All variable, except inflation, are found non-stationary at level but stationary at first difference. Inflation is found stationary at level. Different indicators of financial development and explanatory variables are found cointegrated as per Engle-Granger cointegration test. Short-run dynamics of this long-run relationship is also found significant and substantial amount of correction of the discrepancy between actual and long-run value of financial development is corrected each year.

Exchange rate, inflation, and trade openness are found to be significant determinants of financial development. Only interest rate differential is found insignificant among the explanatory variables. The study also examines the impact of financial sector reform on financial development. The result was contrary to the expectation. Coefficient of financial sector reform is negative and statistically significant. Based on these empirical analyses, a couple of recommendations are in order as follows;

- (a) government should take measures to ensure macroeconomic stability by reducing inflation,

- (b) measures to be undertaken to increase the degree of economic integration with world economy,
- (c) government should not intervene in the foreign exchange market to keep the exchange rate below the equilibrium level etc.

This paper attempts to identify some factors that are important in explaining the behavior of financial development in Bangladesh. It also opens up the door to future research in some potential areas relating to financial development as follows:

- (a) Bangladesh is one of the poorest countries in the world. So, the role of financial development in poverty reduction may be a prospective field of future research,
- (b) Political regime has important bearings on economic performance of a country. True democratization of political system in Bangladesh is started in 1991. Therefore, effect of political regime on financial development, through its effect on economic performance, can be subject matter of future research.

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