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Financial Development and Poverty Reduction Nexus: A Cointegration and Causality Analysis in Bangladesh

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Abstract:

This study investigates the relationship between financial development, economic growth and poverty reduction in Bangladesh using quarter frequency data over the period of 1975-2011. This issue is of importance for developing economics, since the role of financial sector in mobilizing and allocating savings into productive investments. All variables are tested for their order of integration using the ADF and Zivot-Andrews structural break tests. The results show that the variables are integrated at I(1). We then apply a simulation based the ARDL approach to cointegration by incorporating structural breaks stemming in the series for long run relation. Our empirical findings indicated that long run relationship between financial development, economic growth and poverty reduction exists in Bangladesh. The diagnostic tests show that the underlying assumptions of the statistical model are fulfilled. The implication of the empirical findings is explained in the main text.

Keywords: Financial development, economic growth, poverty
JEL Classification: G21, O1, 132

Introduction

The interrelationship between financial development and economic growth is extensive on the theoretical and empirical literature. The similar imperative aspects of the linkage between financial development and poverty reduction cannot be substantially found in the earlier literature. The impact of finance on poverty has been largely inconclusive and unclear from empirical front due to the change in the level of income which results from financial sector reforms, really leads to poverty reduction in developing countries. Poverty reduction strategy will take more importance in compare to the growth model for the developing countries. This is due to the fact that economic progress lead to increase in growth, does not necessarily improve the lives of poor (Todaro, 1997).

For the last couple of decades, Bangladesh has been experiencing a modest reduction in the rate of poverty of around 1.5 percent point a year (IMF, 2005). This improvement is also evident for the distributionally sensitive measures of poverty. Both poverty gap ratio and squared poverty gap ratio declined from 17.2 percent to 12.9 percent and 6.8 percent to 4.6 percent over the period of 1992-2000 (IMF, 2005). This record of poverty reduction since the last decade of the nineteenth century does give some hope of achieving an important target of poverty reduction set by the Millennium Development Goals (MDGs). The poverty reduction strategy (PRS) paper of Bangladesh has also emphasized on the need of resource mobilization efforts that need to be intensified in order to realize the MDGs and PRS goals. However, the resources required for achieving these goals are beyond the capacity of the country both in the short run and immediate long run. Hence, implementation of these programs may be successful with substantial development in the financial sector which will attract resources from external sources. International organizations such as the World Bank, Asian Development Bank (ADB) and IMF have long argued for the development of sound and

efficient financial sectors in Bangladesh in order to attract more foreign resources to overcome poverty (ADB, 2009; IMF, 2010). In 2001, there were more than 1 billion people living in poverty, according to the frugal US\$1 a day poverty measure (Chen and Ravallion, 2004). There are also dramatic differences in poverty among countries, even among developing countries. The poverty situation in Bangladesh is that 41.2 percent of people are lived below poverty line based on the earlier definition of World Bank. However, the actual situation of poverty increased by considering the new definition of poverty provided by World Bank (\$1.25/per day).

Contrary to the orthodox view, it has also been argued that capital market in developing countries suffers from the problem of moral hazard and adverse selection (Stiglitz and Weiss, 1981; Stiglitz, 1998). These market imperfections may lead to an unequal distribution of credit in favor of the rich people (Jalilian and Kirkpatrick, 2005; Shahbaz and Islam, 2011). Hence, financial sector may not serve the purpose of poverty reduction. However, the causal relationship may actually run from poverty reduction to the development in the financial sector since financial intermediaries have more incentive to participate in a market with a smaller group of poor people.

Since its independence in 1971, the internal weakness of the banking sectors resulted in an accumulation of large non-performing loans. Reforms in the financial sectors in Bangladesh started in the early 1980s and gained the pace in the 1990s. The main focus of these reforms was to improve the process of financial intermediation by taking up series of measures related to legal, policy and institutional restructuring. The first phase of reforms in 1980s include denationalization of public banks in 1984, allowing new private banks in 1986, establishment of a National Commission on Money, Banking and Credit to identify problems in the banking

sectors and prescribe policies as remedial measures. In the later phase of reforms, government allowed for market-determined deposits and lending rates. Other measures include introduction of indirect monetary instruments to replace direct credit control, improvement of capital base of commercial banks, and reforms in legal framework of debt recovery (Rahman, 2004). In 1997, ADB approved a program loan of \$80 million that was aimed at enhancing market capacity, and developing a fair, transparent, and efficient capital market (ADB, 2009). The importance of world poverty alleviation cannot be overstated.

The effective utilization of domestic resources is vital for economic growth and poverty reduction through the development of financial sector. The focus of financial sector reforms in Bangladesh which started in the early 1980s and accelerated its pace in the 1990s was to improve the process of financial intermediation by taking up series of legal, policy and institutional restructuring. As evidenced in the real gross domestic product (GDP) which grew at an average rate of 5.8% per annum during 2000–2009 as compared with 5.5% in 1995–2009, these modifications ensured efficient allocation of financial resources promoting higher investments and capital formation. During the first half of 1990s Bangladesh experienced major financial sector reforms which included liberalization 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 liberalization that started in 1997 (IMF, 2000) involved easing restrictions in capital and money market, derivatives, credit operations, direct investments, real estate transactions, personal capital movements, provisions specific to commercial banks and institutional investors.

While the importance of a sound financial sector in order to eradicate poverty has been long recognized, the empirical relationship between financial sector development and poverty reduction has hardly been investigated. Although in last few decades Bangladesh experienced a modest reduction in poverty and development in the financial sector, research on the relationship between financial sector development and poverty is conspicuously absent for this country. Hence, it raises a number of questions: 1) Is there any relationship between these two variables? 2) Does the causation, if there is any, run from financial development to poverty or poverty to financial development? 3) What precisely was achieved by financial liberalization in Bangladesh? The aim of this paper is to answer these questions by examining the relationship between financial development, economic growth and poverty reduction in Bangladesh. The novelty of this paper is to allow for asymmetry in potential causal relationship between financial development and poverty reduction in Bangladesh—one of the South Asian nations.

This study may have a comprehensive effort on this topic for the economy of Bangladesh and it will give ways contribution to the growth and poverty literature by applying: (i) a comprehensive measure of financial deepening is used; (ii) quarter frequency data is utilized over the period of 1975-2011 avoiding the issue of low number of observations; (iii) Both conventional and structural break unit root test; (iv) The ARDL bounds testing approach to cointegration for long run relationship between the variables in the presence of structural breaks. (v) OLS and ECM for long run and short run impacts (vi) The VECM Granger causality approach for causal relationship and (vii) Innovative Accounting Approach (IAA) to test the robustness of causality analysis.

The rest of the paper is organized as the following. Section-II outlines the literature review pertinent to the Bangladesh. The data and the underlying methodology are clarified in section-III. Empirical findings are presented in section-IV and section-V presents conclusion and policy implications.

II. Literature review

Empirical evidence on the interaction between financial development and poverty reduction has not been fully explored due to the mixed and inconclusive findings. Some of the earlier studies have shown that financial development can contribute to poverty reduction in a number of ways (Odhiambo, 2009). First, financial development can improve the opportunities for the poor to access formal finance by addressing the causes of financial market failures such as information asymmetry and the high fixed cost of lending to small borrowers (Stiglitz, 1998; Jalilian and Kirkpatrick, 2001). Second, financial development enables the poor to draw down accumulated savings or to borrow money to start micro-enterprises, which eventually leads to wider access to financial services, generates more employment and higher incomes and thereby reduces poverty (Department for International Development (DFID), 2004). Third, financial development may trickle down to the poor through its influence on economic growth. This is because of the implied positive relationship between financial development and economic growth. The trickle-down theory has been widely supported by studies such as Ravallion and Datt, (2002); Mellor, (1999); Dollar and Kraay, (2002); Fan et al. (2000) and World Bank, (1995) and among others.

Some of the researchers have attempted to deal with the empirical findings on the inter-temporal causal relationship between financial development and poverty reduction has been largely inconclusive and mixed. Some of the studies that have attempted to examine the

relationship between financial development and poverty reduction such as Odhiambo, (2009); Julilian and Kirkpatrick, (2002, 2005); Jeanneney and Kpodar, (2005, 2008); Quartey, (2005); Honohan, (2004); Banerjee and Newman, (1993); Clarke et al. (2002); Stiglitz, (2000); Arestis and Caner, (2005, 2009); Dollar and Kraay, (2002); Honohan, (2004); Beck et al. (2007); Honohan and Beck, (2007) and among others.

Financial development has an indirect impact on the living standards of the poor through its support of economic growth (World Bank, 2001). Clark et al. (2002) opined that there is a negative relationship between financial development and income inequality rather than an inverted u-shaped relationship but Greenwood and Jovanovich, (1990) noted inverted-U shape relationship between financial development and income inequality. Recently, Odhiambo, (2009) examined the causal relationship between finance, growth and poverty reduction in South Africa, using a tri-variate causality model. He reported that both financial development and economic growth Granger cause poverty reduction in South Africa where as Quartey, (2005), in examining the relationship between financial development, savings mobilisation and poverty reduction in Ghana, finds that although financial development does not Granger-cause savings mobilisation in Ghana, it induces poverty reduction. Jalilian and Kirkpatrick, (2001) tested the relationship between financial development and poverty through the growth channel. They concluded that one unit change in financial development leads to a 0.4% change in the growth rate of the incomes of the poor, assuming that there are no direct effects. Furthermore, they found that financial development contributes to poverty reduction through a growth-enhancing effect up to a certain threshold level of economic development.

Some studies have also examined the inverse association between financial development and poverty (Honohan, 2004). He found that a 10-percentage point increase in the ratio of private

credit to GDP should reduce poverty ratios by 2.5-3 percentage points. Beck et al. (2004), while using data on 52 developing and developed countries to assess the relationship between financial development and income distribution, reported that the income of the poorest 20 per cent of the population grows faster than the average GDP per capita in countries with higher financial development. Arestis and Caner, (2005) disclosed that the growth channel is not the only channel through which financial development can affect poverty, but that there are two further channels, namely the financial crises channel and the access to credit and financial services channel. Even more recently, Arestis and Caner, (2009) suggested a further channel—the income share of labour channel.

Similarly, Honohan and Beck, (2007) suggested that financial depth is indeed conducive to poverty reduction, so that deep financial system also seems to have a lower incidence of poverty than others at the same level of national income. A more recent study by Jeanneney and Kpodar, (2008) is concerned with standard financial liberalization is directly effective in reducing poverty, as is the more indirect effect via economic growth. Financial development promotes financial instability; moreover the poor do not benefit from the greater availability of credit. This implies that the benefits outweigh the cost for the poor, although no real explanation is provided.

Bidirectional causality between financial development and poverty reduction does not mean that poverty reduction is influenced by financial development (Beck et al. 2007; Shahbaz and Islam, 2011). The distribution of income is enhanced in order to implementation of the easy access to financial resources (Shahbaz, 2009b; Shahbaz and Islam, 2011). This implies that financial development eradicates the credit constraints on the poor segment of population to increase their productivity and efficiency of their productive assets which in return, reduces

poverty (Inoue and Hamori, 2012). Working with the annual data for Pakistan, Shahbaz, (2009b) investigate the impact of financial development and financial instability on poverty reduction by applying the autoregressive distributed lag model (ARDL) for long run relationship between the variables by controlling economic growth, inflation, agricultural growth, manufacturing and trade openness. The results indicated that all the variables are cointegrated for long run relationship and also found that financial development is negatively related with poverty while financial instability increases poverty. In addition, Agriculture growth, manufacturing and trade openness seem to reduce poverty reduction in Pakistan. Using the similar method, Ellahi, (2011) investigated the relationship between financial development and poverty reduction by incorporating economic growth as potential variable affecting both financial development and poverty in case of Pakistan. The results indicated that cointegration is found between financial development, economic growth and poverty reduction. Financial development, investment and poverty reduction Granger cause economic growth confirmed by the VECM Granger causality approach. Recently, Shahbaz, (2012b) investigated causality between financial deepening, economic growth and poverty reduction in case of Pakistan using quarter frequency over the period of 17972-2011. The results are sensitive with use poverty indicator as well as estimation techniques to be applied for analysis.

Apart from that; Odhiambo, (2010a) found that financial development Granger causes domestic savings and hence poverty reduction in Kenya. Further, feedback effect exists between domestic savings and poverty reduction. Using the similar approach, working with the annual data from 1969-2006, Odhiambo, (2010b) investigated intertemporal causality between financial development and poverty in case of Zambia. The causality analysis reported that financial development is Granger caused by poverty reduction once M_2 as share of GDP

is used an indicator of financial development while unidirectional causality runs from financial development (proxied by domestic credit to private sector as share of GDP) to poverty reduction. This implies that causality results matter with the measure of financial development. Applying similar cointegration approach for India, Pradhan, (2010) confirms the long run relationship and the Granger causality test opines that poverty reduction Granger causes economic growth and vice versa. Financial development Granger causes poverty reduction but financial development is Granger caused by economic growth.

Applying the VECM approach for Turkish economy, Kar et al. (2011) followed Odhiambo, (2009) to detect the direction of causal relationship between financial development, economic growth and poverty reduction. Their empirical evidence confirmed the validity of the supply-side hypothesis. Using annual Chinese data from 1978-2008, Ho and Odhiambo, (2011) explored the relationship between financial development and poverty reduction. They claimed that in long run, poverty reduction Granger causes financial development and feedback effect exists between financial development and poverty reduction in short run. According to the Perez-Moreno, (2011) analyzed the causal relationship between financial development and poverty reduction using the data of 35 developing economies. He found unidirectional causality running from financial development to poverty reduction but reverse is not valid.

Recently, working with the annual data for Bangladesh, Uddin et al. (2012) examined causal the relations between financial development and poverty reduction using data over the period of 1976-2010 by applying the ARDL bounds testing approach to cointegration and the VECM Granger causality for long run and causality relationships respectively. Their results reported cointegration between the variables and feedback effect between financial development and poverty reduction. In case of African countries, Fowowe and Abidoye, (2012) investigated the

impact of financial development, inflation and trade openness on poverty reduction and their findings claimed that financial development does not seem to reduce poverty but poverty is reduced by trade openness and low inflation. Khan et al. (2012) reinvestigated the impact of financial development on poverty reduction by using several indicators of financial development such as broad money supply (M_2), domestic credit to the private sector and domestic money bank assets etc. They applied the ARDL bounds testing approach to cointegration for long run relationship between the variables and error correction method (ECM) is used to examine short run dynamics impact of financial development on poverty. Their results are sensitive with use of methodology and proxy of financial development but overall results found that financial development reduces poverty.

The empirical evidence of above studies may be biased due to ignoring the structural break stemming in the macroeconomic series of an economy. This generates more ambiguity in articulating a comprehensive economic and financial policy to reduce poverty due to having little knowledge about economic happenings in case of Bangladesh. We find that above studies used weak proxies such narrow money supply (M_1), broad money supply (M_2), domestic money bank assets and domestic credit to private sector which can not capture the phenomenon of financial development. To over this issue, we have used structural break unit root test accommodating an unknown structural break stemming in the series and new financial deepening index. This study is a humble request to fill gap in existing literature for said issue in case of Bangladesh.

III. Estimation Strategy and Data Collection

The aim of this present study is to investigate the causality between financial deepening, economic growth and poverty reduction in case of Bangladesh using quarter frequency data

over the period of 1975Q1-2011Q4. This study may have a comprehensive effort on this topic for the economy of Bangladesh and it will several ways contribution to the growth and poverty literature by applying: (i) a comprehensive measure of financial deepening is used; (ii) quarter frequency data is utilized over the period of 1975-2011 avoiding the issue of low number of observations; (iii) both conventional and structural break unit root test; (iv) the ARDL bounds testing approach to cointegration for long run relationship between the variables in the presence of structural breaks. (v) OLS and ECM for long run and short run impacts (vi) The direction of causality is tested by using the VECM Granger causality approach and (vii) Innovative Accounting Approach (IAA) to test the robustness of causality analysis.

The conventional unit root tests are ADF by Dickey and Fuller (1979, 1981), PP by Philips and Perron (1988), KPSS by Kwiatkowski et al. (1992), DF-GLS by Elliott et al. (1996) and Ng-Perron by Ng-Perron (2001) have been widely used in the macroeconomics dynamics and finance. However, the classical unit root tests are not reliable in the presence structural break in the series. In order to make the more consistent and reliable in the stationary properties of the data, Zivot and Andrews, (1992) unit root test accommodate single structural break point in the level. Zivot-Andrews, (1992) model the structural break in the series can be tested in the following form:

$$\Delta x_t = a + ax_{t-1} + bt + cDU_t + \sum_{j=1}^k d_j \Delta x_{t-j} + \mu_t \quad (1)$$

$$\Delta x_t = b + bx_{t-1} + ct + bDT_t + \sum_{j=1}^k d_j \Delta x_{t-j} + \mu_t \quad (2)$$

$$\Delta x_t = c + cx_{t-1} + ct + dDU_t + dDT_t + \sum_{j=1}^k d_j \Delta x_{t-j} + \mu_t \quad (3)$$

where DU_t denotes dummy variable and gives the mean shift incurred at each point while DT_t denotes trend shift variable.

$$DU_t = \begin{cases} 1 & \text{if } t > TB \\ 0 & \text{if } t < TB \end{cases} \text{ and } DT_t = \begin{cases} t - TB & \text{if } t > TB \\ 0 & \text{if } t < TB \end{cases}$$

The null hypothesis of the Zivot-Andrews, (1992) unit root break date is $c = 0$ which indicates that series is non-stationary or integrated of order one with a drift not having information about structural break stemming in the series while $c < 0$ hypothesis implies that the variable is found to be trend-stationary with one unknown time break. Then, this unit root test selects that time break which decreases one-sided t-statistic to test $\hat{c}(= c - 1) = 1$. According to this procedure, it is necessary to consider a region where end points of sample period are excluded. In addition, Zivot-Andrews suggested the trimming regions i.e. (0.15T, 0.85T) are followed.

Since conventional method to cointegration have certain shortcoming in the presence of break in the macroeconomics dynamics. In order to remove this remedy, we have incorporated the structural break autoregressive distributed lag model or the ARDL bounds testing approach to cointegration in the presence of structural break in the series. The ARDL bounds testing approach to cointegration has comparative advantage in compare to the other approaches. This approach is flexible in the order of integration order whether variables are found to be stationary at I(1) or I(0) or I(1) / I(0). According to the small sample size, Monte Carlo investigation confirms that this approach performs better than other conventional approach (Pesaran and Shin, 1999). Moreover, a dynamic unrestricted error correction model (UECM) integrates the short run dynamics with the long run equilibrium can be derived from the

ARDL bounds testing through a simple linear transformation. The empirical formulation of the ARDL bounds testing approach to cointegration is given below:

$$\begin{aligned} \Delta \ln P_t = & \alpha_1 + \alpha_T T + \alpha_{DUM} DUM + \alpha_p \ln P_{t-1} + \alpha_F \ln F_{t-1} + \alpha_Y \ln Y_{t-1} + \sum_{i=1}^p \alpha_i \Delta \ln P_{t-i} \\ & + \sum_{j=0}^q \alpha_j \Delta \ln F_{t-j} + \sum_{k=0}^r \alpha_k \Delta \ln Y_{t-k} + \mu_t \end{aligned} \quad (4)$$

$$\begin{aligned} \Delta \ln F_t = & \alpha_1 + \alpha_T T + \alpha_{DUM} DUM + \alpha_p \ln P_{t-1} + \alpha_F \ln F_{t-1} + \alpha_Y \ln Y_{t-1} + \sum_{i=1}^p \beta_i \Delta \ln F_{t-i} \\ & + \sum_{j=0}^q \beta_j \Delta \ln P_{t-j} + \sum_{k=0}^r \beta_k \Delta \ln Y_{t-k} + \mu_t \end{aligned} \quad (5)$$

$$\begin{aligned} \Delta \ln Y_t = & \alpha_1 + \alpha_T T + \alpha_{DUM} DUM + \alpha_p \ln P_{t-1} + \alpha_F \ln F_{t-1} + \alpha_Y \ln Y_{t-1} + \sum_{i=1}^p \beta_i \Delta \ln Y_{t-i} \\ & + \sum_{j=0}^q \beta_j \Delta \ln P_{t-j} + \sum_{k=0}^r \beta_k \Delta \ln F_{t-k} + \mu_t \end{aligned} \quad (6)$$

Where, $\ln P_t$, $\ln F_t$ and $\ln Y_t$ indicates natural log of poverty proxies by private household consumption per capita, natural log of financial deepening index and real GDP per capita. Δ is for difference operator, μ_s denotes residual terms, and DUM denotes dummy variable to capture the structural breaks arising in the series¹. F-statistics are computed to compare with upper and lower critical bounds generated by Pesaran et al. (2001) to test for existence of cointegration. The null hypothesis to examine the existence of long run relationship between the variables is $H_0 : \alpha_p = \alpha_F = \alpha_Y = 0$ against alternate hypothesis ($H_a : \alpha_p \neq \alpha_F \neq \alpha_Y \neq 0$) of cointegration for equation (4-6).

¹ The structural breaks are based on Zivot-Andrews (1992)

According to the Pesaran et al. (2001) critical bounds, the condition is that if the value of the F-statistic is more than upper critical bound (UCB) there is cointegration relations between the variables. Secondly, if computed F-statistic does not exceed lower critical bound (LCB) then the variables are not cointegrated. Finally, if computed F-statistic falls between lower and upper critical bounds then decision regarding cointegration between the variables is inconclusive. The sample size of this paper is adequate in the context of Bangladesh where the independence of Bangladesh is 1971. Based on the 160 observation, the critical bounds generated by Pesaran et al. (2001) may be preferable in this paper compare to the critical value provided in the literature Narayan, (2005). The direction of causality addressed in this paper in the following form;

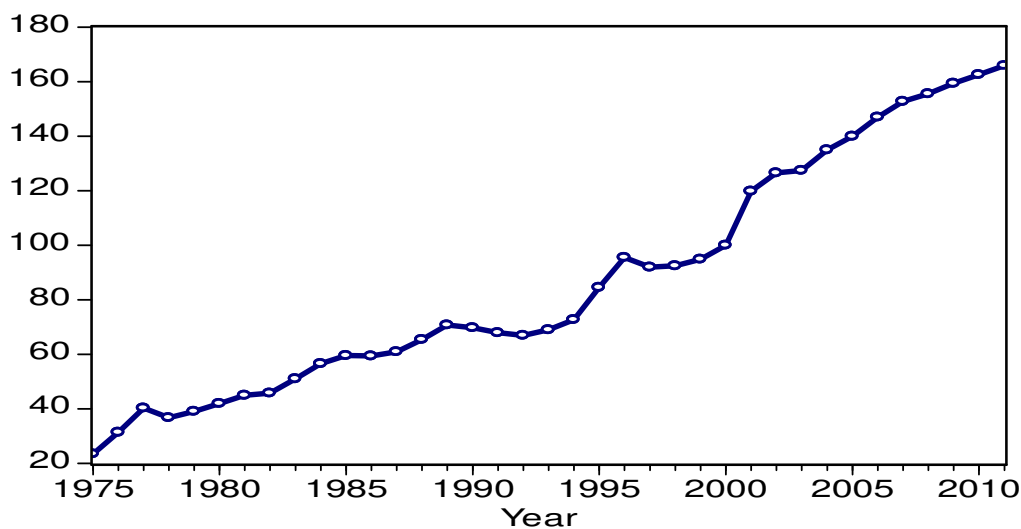
$$(1-L) \begin{bmatrix} \ln P_t \\ \ln F_t \\ \ln Y_t \end{bmatrix} = \begin{bmatrix} a_1 \\ a_2 \\ a_3 \end{bmatrix} + \sum_{i=1}^p (1-L) \begin{bmatrix} b_{1i} b_{12i} b_{13i} \\ b_{2i} b_{22i} b_{23i} \\ b_{3i} b_{32i} b_{33i} \end{bmatrix} \times \begin{bmatrix} \ln P_{t-1} \\ \ln F_{t-1} \\ \ln Y_{t-1} \end{bmatrix} + \begin{bmatrix} \alpha \\ \beta \\ \delta \end{bmatrix} ECT_{t-1} + \begin{bmatrix} \varepsilon_{1t} \\ \varepsilon_{2t} \\ \varepsilon_{3t} \end{bmatrix} \quad (7)$$

Where $(1-L)$ denotes the difference operator and ECT_{t-1} denotes the lagged residual term generated from long run relationship $\varepsilon_{1t}, \varepsilon_{2t}$ and ε_{3t} are error terms assumed to be normally distributed with mean zero and finite covariance matrix. The long run causality is indicated by the significance of t-statistic connecting to the coefficient of error correction term (ECT_{t-1}) and statistical significance of F-statistic in first differences of the variables shows the evidence of short run causality between variables. Additionally, joint long-and-short runs causal relationship can be estimated by joint significance of both ECT_{t-1} and the estimate of lagged independent variables. For instance, $b_{12,i} \neq 0 \forall_i$ shows that financial development

Granger-causes poverty reduction and causality is running from poverty reduction to financial development indicated by $b_{21,i} \neq 0 \forall_i$. The same hypothesis can be drawn for other variables.

The study covers the time period of 1975-2011. The on real GDP and private household consumption expenditures data has been obtained from world development indicators (CD-ROM, 2012). The population series is used to convert all series into per capita. We have used quarter-weight method to transform annual frequency into quarter frequency to avoid the problem of low frequency of observations following (Shahbaz, 2012a). The data for financial development index has been borrowed from Hye and Islam, (2012)².

Figure-1: Financial Development Index in Bangladesh



IV. The Estimation Results

Table-1 reports the empirical results of the ADF tests for intercept and trend. Our findings indicate the stationarity properties of the all the variables. The empirical evidence reported in Table-1 shows that poverty, financial development and economic growth are found to be non-

² They have generated comprehensive index of financial development in case of Bangladesh using. They used M = Liquid liabilities (M3) as % of GDP, DCP = Domestic credit provided by banks (% of GDP); DC = Domestic credit to private sector (% of GDP); M2/M1 = Money plus quasi money divided by money; and Market capitalization of listed companies (% of GDP) as sub-measures of financial development to generate financial development applying principle component method. For further details see (Hye and Islam, 2012).

stationary at level. The variables are found to be stationary at 1st difference i.e. integrated of order one I(1).

Table-1: Unit Root Analysis

Variable	ADF Test at Level		ADF Test at 1 st Difference	
	T. statistic	Prob. value	T. statistic	Prob. value
$\ln Y_t$	0.7556 (4)	0.9976	-6.5970 (4)*	0.0000
$\ln P_t$	-1.2442 (4)	0.8969	-5.9180 (4)*	0.0000
$\ln F_t$	-1.9677 (9)	0.6187	-6.3304 (3)*	0.0000
Note: * indicates significant at 1% level. Lag length of variables is shown in small parentheses.				

In general, classical unit root tests are not reliable in the presence of structural break (Baum, 2004). This limitation of classical unit root tests (ADF) has been covered by applying Zivot-Andrews, (1992) structural break unit root test. Zivot-Andrews contain information about one structural break in the series. The results for Zivot and Andrew, (1992) unit root test are presented in Table-2. This empirical evidence indicates that the series have unit root problem at level but financial development, poverty and economic growth are stationary at 1st difference. This shows that variables have unique order of integration in order to apply the ARDL bounds testing approach to cointegration for long relationship between the variables.

Table-2: Zivot-Andrews Structural Break Unit Root Test

Variable	Level Results			1 st Difference Results		
	T-statistic	TB	Decision	T-statistic	TB	Decision
$\ln Y_t$	-2.840 (1)	1990Q2	Unit Exists	-9.732(3)*	1979Q4	Stationary
$\ln F_t$	-3.747 (2)	1989Q2	Unit Exists	-7.235 (3)*	1979Q4	Stationary
$\ln P_t$	-2.039()	2000Q3	Unit Exists	-12.398*	1979 Q4	Stationary

Note: * represents significant at 1% level of significance. Lag order is shown in parenthesis.

In order to apply the ARDL bounds testing approach, it is important to identify an appropriate lag to calculate the F-statistics. The ARDL model is sensitive with the lag order. In addition optimum lag order would be helpful in reliable and consistent result in the analysis. In this paper, we choose the AIC (Akaike information criterion) for investigate the long run relations among the variables. This AIC provides more better and consistent results as compared other lag length criterion (Lütkepohl, 2006). The results reported in second column of Table-3 reveal that we are not consider taking the lag length more than 6 in our sample.

Table-3 presents the ARDL bounds testing approach to cointegration. In this paper, Pesaran et al. (2001) critical bounds are used to take decision whether cointegration exists or not. The result reported in table-3 suggests that F-statistics are greater than upper critical bounds at 1% when poverty and financial development are used as predicted variables. This finding shows that there is long run relationship between financial development, poverty and economic growth over the study period of 1975Q1-2011Q4 in case of Bangladesh.

Table-3: The Results of ARDL Cointegration Test

Bounds Testing to Cointegration				Diagnostic tests		
Estimated Models	Optimal lag length	F-statistics	Break Year	χ_{HETERO}	χ_{ARCH}^2	χ_{SERIAL}^2
$F_Y(Y/F, P)$	6, 6, 5	2.235	1990Q2	1.9552	0.6046	0.8578
$F_F(F/Y, P)$	6, 5, 5	4.676*	1989Q2	0.9622	0.6885	0.6029
$F_P(P/Y, F)$	6, 6, 6	4.768*	2000Q3	1.3569	0.9903	2.2182
Significant level	Critical values (T= 148)					
	Lower bounds $I(0)$	Upper bounds $I(1)$				
1 per cent level	3.15	4.43				
5 per cent level	2.45	3.61				
10 per cent level	2.12	3.23				
Note: * represents significant at 1 per cent at level.						

In order to apply the VECM Granger causality approach to detect direction of causal relationship between financial deepening, economic growth and poverty reduction, it is necessary to the order of integration of all the variables is unique. According to the procedure of the application of VECM, Granger, (1969) pointed out that once the variables are cointegrated for long run relationship with same level of stationarity then the VECM Granger causality is most appropriate. The VECM Granger causality analysis results are presented in Table-4. The findings of the in long run results indicate that the feedback effect exists between financial deepening and poverty reduction. In addition, economic growth Granger causes financial development and poverty reduction. This shows that unidirectional causality running from economic growth to financial development corroborates the demand-side hypothesis in Bangladesh. According to the short run results, bidirectional causality is found between financial development and poverty reduction in Bangladesh. Financial development

and economic growth Granger cause each other. Bidirectional causality is also found between economic growth and poverty reduction. The significance of joint long-and-short runs also corroborates our long run and short run analysis.

Table-4: The VECM Granger Causality Analysis

Dependent Variable	Direction of Causality						
	Short Run			Long Run	Joint Long-and-Short Run Causality		
	$\Delta \ln P_{t-1}$	$\Delta \ln F_{t-1}$	$\Delta \ln Y_{t-1}$	ECT_{t-1}	$\Delta \ln P_{t-1}, ECT_{t-1}$	$\Delta \ln F_{t-1}, ECT_{t-1}$	$\Delta \ln Y_{t-1}, ECT_{t-1}$
$\Delta \ln P_t$	....	43.9387* [0.0000]	45.0350* [0.0000]	-0.0929* [-4.0467]	....	35.9966* [0.0000]	40.8163* [0.000]
$\Delta \ln F_t$	49.9727* [0.0000]	....	2.7064*** [0.0703]	-0.0257* [-2.8440]	35.5360* [0.0000]	....	4.06500* [0.0084]
$\Delta \ln Y_t$	51.9367* [0.0000]	3.0145** [0.0523]	....	....	....	....	....

Note: *, ** and *** show significance at 1, 5 and 10 per cent levels respectively.

The VECM Granger causality approach detects direction of causal relations within the given sample period. The shortcoming of this approach is that it's unable to forecasts a comprehensive economic policy to reduce poverty in the country. In order to overcome this issue, we have applied the innovative accounting approach (IAA) is a combination of variance decomposition method (VDM) impulse response function (IRF) to examine direction of causal relationship between financial deepening, economic growth and poverty reduction. This approach is more suitable to forecast the behavior and to show the relative strength of variables. The findings of the IAA would be helpful to policy makers in designing comprehensive economic and financial policy to reduce poverty and sustain economic growth

for long run. The findings of the long run result show the relative strength of causality results ahead the sample period (Shan, 2005; Shahbaz, 2012). This approach also provides the magnitude of the feedback from one variable to other variable. Additionally, the VDM helps in determining the response of the dependent actor due to shocks occurring in independent actors.

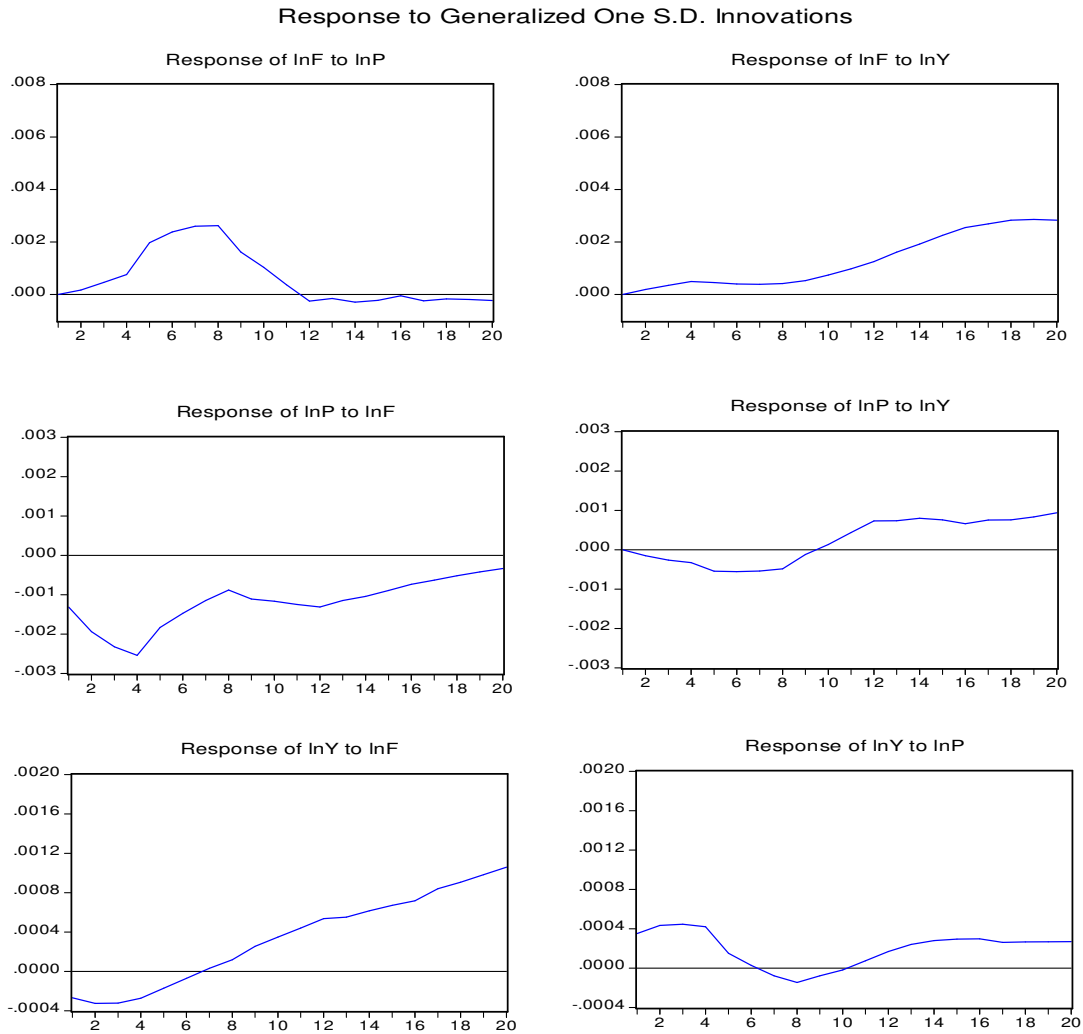
Table-5: The Variance Decomposition Analysis

Horizon	Variance Decomposition of $\ln F_t$			Variance Decomposition of $\ln P_t$			Variance Decomposition of $\ln Y_t$		
	$\ln F_t$	$\ln P_t$	$\ln Y_t$	$\ln F_t$	$\ln P_t$	$\ln Y_t$	$\ln F_t$	$\ln P_t$	$\ln Y_t$
1	100.000	0.0000	0.0000	12.5057	87.4942	0.0000	0.8742	0.0727	99.0529
5	94.5745	2.4520	2.9734	6.6425	92.8796	0.4777	7.8372	0.7156	91.4468
10	82.7619	8.1099	9.1280	3.7412	95.2019	1.0568	9.6837	9.7572	80.5590
11	80.6721	10.9102	8.4175	3.5121	95.1551	1.3327	11.0599	10.5182	78.4220
12	78.2811	14.1271	7.5917	3.2807	94.6348	2.0844	13.0624	10.7360	76.2014
13	76.7762	16.2145	7.0092	3.0547	94.1347	2.8104	13.7659	11.1649	75.0691
14	75.3800	18.0612	6.5587	2.8415	93.5678	3.5906	14.3573	11.5426	74.0999
15	74.2688	19.4625	6.2686	2.6469	93.0718	4.2812	14.6282	11.9903	73.3814
16	73.4188	20.4410	6.1401	2.4736	92.7027	4.8236	14.6098	12.5597	72.8304
17	72.1862	21.7698	6.0438	2.3226	92.1915	5.4858	14.8725	13.2184	71.9089
18	70.9714	23.0359	5.9926	2.1969	91.6376	6.1653	15.0670	13.9194	71.0135
19	69.5933	24.4510	5.9556	2.1050	90.9639	6.9310	15.3439	14.6621	69.9939
20	68.0278	26.0583	5.9137	2.0574	90.1266	7.8159	15.7458	15.4216	68.8326

The results of VDM are reported in Table-5. The results suggest that the contribution of poverty in financial development is 26.05% and economic growth explains financial development by 5.91%. A 68.02% portion of financial development is explained by own innovative shocks (or other factors could not be captured in the model). The shocks stemming in financial development contributes in poverty reduction by 2.05%. The contribution of economic growth in poverty reduction is 7.81% and rest is 90.12% contributed by the innovative shocks stemming in poverty reduction. Financial development and poverty reduction explain economic growth by 15.42% and 15.42% respectively. The innovative shock stems in economic growth explains itself by 68.83%. Overall our results indicate that poverty reduction leads financial development. Financial development and economic growth does not contribute to lower poverty. Financial development and poverty reduction Granger cause economic growth but relation is weak.

The impulse response function is alternative of variance decomposition method shows how long and to what extent dependent variable reacts to shock stemming in independent variables. The results indicate that the response in financial development due to forecast error stemming in poverty reduction initially rises, goes to peak and then starts to decline after 11th time horizon. This presents the phenomenon of inverted-U response of financial development due to poverty reduction. The contribution of economic growth to financial development is positive and goes upwards till 20th time horizon. The response of poverty is negative due to forecast error in financial development. Economic growth reduces poverty till 10th time horizon then it increases poverty. Financial development lowers economic growth initially then after 7th time horizon it adds in economic growth. Economic growth shows mixed impact of poverty reduction. Till 6th time horizon economic growth and economic growth starts to increase after 10th time horizon.

Figure-1: Impulse Response Function



V. Conclusions and Policy Implications

This study explored the relationship between financial development, economic growth and poverty reduction in case of Bangladesh. The quarter frequency was used over the period of 1975-2011. The order of integration of the variables was investigated by applying structural break unit root test. The long run relationship between the variables was examined by applying the ARDL bounds testing while using dummy to accommodate structural break stemming in the series. Our results confirm that variables are cointegrated for long run relationship between the variables.

The causality reveals that financial development and economic growth does not seem to contribute in poverty reduction. Poverty reduction leads financial development. The findings are consistent with earlier studies (Uddin et al. 2012). Our findings suggest that Bangladeshi policymakers can influence the reduction of poverty by encouraging financial sector development. Sound financial sectors will promote better and more access to institutional credits availability to the people, who are living in poverty. According to the most cited source of evidence by David Hulme and Paul Mosley (1996) findings of the studies are provocative: poor households do not benefit from microfinance; it is only non-poor borrowers (with incomes above poverty lines) who can do well with microfinance and enjoy sizable positive impacts. In order to implementation of the organized and effective loan recovery system in place could potentially encourage micro credits which the 'poor' could use as a stepping stone to get out of the shackle of poverty. The number of population living under poverty line is still increasing. The number of population living below the poverty line has increased from 51.6 million in 1991-92 to 56 million in 2005 with an annual average rate of 0.314 percent at national level (Rahman, 2011).

Economic growth is weakly accelerated by financial development and poverty reduction. On the other hand, taking poverty reducing measures would put the economy on a higher growth path which will facilitate further reform in developing the financial sector. The rising economic growth rate of the 1990s has had a positive impact on poverty reduction. But the increased growth and declining poverty has not brought about a more equitable distribution of income. In fact, the distribution of income has become more unequal over time with the rich getting richer and the poor getting poorer (GOB and UNDP, 2011). The government may adopt a new policy asking all commercial banks to provide a certain percentage of loans to the

SMEs that will help for reducing poverty through creating employment opportunities in the country. Financial sector reform attached with the bank Portfolio of each bank must be compulsorily earmarked for financing SMEs in Bangladesh.

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