The Casual Nexus of Banking Sector Development and Poverty Reduction in Bangladesh

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ABSTRACT: The paper aims to investigate the inter-temporal causal relationship between banking sector development and poverty reduction in Bangladesh from 1976 to 2010. We have applied new methods using modern time series econometrics techniques based on simulations that are robust to the violation of statistical assumptions, especially when the sample size is small, as is the case in this paper. The results reveal that there is a long-term equilibrium relationship between banking sector development and poverty reduction in the case of Bangladesh. Surprisingly, poverty reduction appears to be a long-term forcing variable to the explanation of Bangladesh's banking sector development. There is bidirectional causality between these variables. The diagnostic tests show that the underlying desirable assumptions are fulfilled. Time series data on poverty in many developing countries, particularly in Bangladesh, is scant and inadequate. The empirical results of this study will help policy makers determine whether poverty reduction in Bangladesh is a spur to financial sector development. This implies that, in the long term, Bangladeshi policy makers can influence the reduction of poverty through financial sector development. Although several attempts have been made to investigate the relationship between financial development and growth, this paper is the first of its kind to empirically examine the causal relationship between poverty and the development of the banking sector in Bangladesh.

1. Introduction

There are extensive literatures – both theoretical and empirical – that studied the interrelationship between financial sector development and economic growth in recent years. However, the number of studies focusing on the links between financial development and poverty reduction is quite thin. The impact of finance on poverty has largely been inconclusive at the empirical front particularly with developing countries. It is important to see if financial development really leads to poverty reduction by inducing economic growth. In developing countries are poverty reduction strategies that have been assuming higher importance as opposed to the growth models. As Todaro (1997) pointed out that economic progress leads to an increase in growth but does not necessarily improve the lives of the poorest members of the society.

The importance of world poverty alleviation cannot be overstated. In 2001, more than 1 billion people were living in poverty, as defined by the frugal poverty measure of an income of US$1 a day. There are dramatic differences in poverty between countries; even between developing countries. In Bangladesh, 41.2% of people live below the poverty line. However, according to the latest definition provided by the World Bank (US$1.25 per day) the actual number is even higher.

The development of financial sector through effective utilization of domestic resources is vital for economic growth and poverty reduction. Financial sector reforms began in Bangladesh back in the early 1980s and accelerated the pace in the 1990s. The goal of those reforms was to improve the process of financial intermediation by implementing legal, policy, and institutional restructuring. The changes contributed to the increase in Bangladesh's gross domestic product (GDP), which grew at an average rate of 5.8% per annum from 2000 to 2009, compared to 5.5% from 1995 to 2009. These modifications led to the efficient allocation of financial resources, promoting higher investment and capital formation. During the first half of the 1990s Bangladesh experienced major financial sector reforms which included the 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 involved easing restrictions in capital and money markets, derivatives, credit operations, direct investments, real estate transactions, personal capital movements, provisions specific to commercial banks and institutional investors.

This paper attempts to investigate the financial aspects of poverty alleviation in developing countries, particularly in Bangladesh, and asks whether financial development can actually lead to poverty reduction in Bangladesh. In other words, do the benefits that result from financial sector development in Bangladesh trickle down to the poor?

Our study focuses on Bangladesh as a model for developing countries and excludes developed countries from the sample (unlike Beck et al., 2007) because the nature and the extent of poverty in developing countries are different to that in developed countries. The purpose of this paper is to run an empirical investigation of the direct relationship between financial development and poverty, if there is any, without having the assumption of negative link between income growth and poverty. The novelty of this paper is to allow for asymmetry in potential causal relationship between financial development and poverty reduction in Bangladesh. We use Domestic Credit to private sector as a ratio of Gross Domestic Product (DCP/GDP) as a proxy for financial development and Private Per Capita Consumption as a proxy for poverty reduction.

The study attempts to answer one critical question. Does financial development lead to poverty reduction in Bangladesh? The paper is organized in the following manner: Section 2 outlines a review of literature pertinent to Bangladesh; data and the underlying methodology are clarified in Section 3; empirical findings are presented in Section 4; while the last section offers concluding remarks.

2. Literature Review

Empirical evidence on the interaction between financial development and poverty reduction has been inconclusive due to mixed findings. Some earlier studies have shown that financial development can contribute to poverty reduction in a number of ways (eg; Odhiambo, 2009). First, financial development can improve 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 (Stiglitze, 1998; Jalilian and Kirkpatrick, 2001). Second, financial sector 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; higher employment and higher incomes; and thereby reduces poverty (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 among others.

Some studies have attempted to test empirically the inter-temporal causal relationship between financial development and poverty reduction but the findings have been largely inconclusive. Those studies include Odhiambo (2009), Jeanneney and Kpodar (2005), Jeanneney and Kpodar (2008),

Quartey (2005), Honohan (2004), Banerjee and Newman (1993), Clarke et al. (2002), Stiglitz (2000), Arestis and Caner (2005), Arestis and Caner (2009), Dollar and Kraay (2002), Honohan (2004), Beck et al., (2007) and Honohan and Beck (2007), among others.

Financial development supports economic growth and so has an indirect impact on the living standards of the poor. Clark et al. (2002) support that there is a negative relationship between financial sector development and income inequality rather than an inverted u-shaped relationship. Odhiambo (2009) examines the causal relationship between finance, growth and poverty reduction in South Africa using a tri-variate causality model and finds that both financial development and economic growth Granger cause poverty reduction. Quartey (2005) examines the relationship between financial development, savings mobilization, and poverty reduction in Ghana, and finds that although financial sector development does not Granger-cause savings mobilization in Ghana, it induces poverty reduction. Jalilian and Kirkpatrick (2001) test econometrically the relationship between financial development and poverty through the growth channel. They conclude that a one-unit change in financial development leads to a 0.4% change in the growth rate of the incomes of the poor. The same authors, Jalilian and Kirkpatrick (2005), while examining the causal relationship between financial development and poverty reduction in developing countries, find that financial sector 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 sector development and headcount poverty (Honohan 2004). According to these studies, a 10-percentage point increase in the ratio of private credit to GDP should reduce poverty rations 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, find that the income of the poorest 20% of the population grows faster than the average GDP per capita in countries with higher financial development. Arestis and Caner (2005) report 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) suggest a further channel – the income share of labor channel.

In a related study, Honohan and Beck (2007) suggest that financial depth is indeed conducive to poverty reduction, so that deep financial systems also seem 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 being 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. Ultimately, though, the authors argue that the benefits outweigh the cost for the poor, although no real explanation is provided.

3. Data Sources and Methodology

We collected the annual time series data on poverty reduction and financial sector development in Bangladesh from the World Development Indicators (WDI) published by the World Bank (WB 2011) and from the annual national budgets published by the Government of Bangladesh (GOB 2010-2011). The time series data on poverty in many developing countries, particularly in Bangladesh, are scant and inadequate. For this reason, this study uses per capita consumption as a proxy for poverty reduction[1]. The log of the series gives us the 'LPOV' variable in this work. The ratio of bank claims on the private sector to GDP (LDCP) indicates the importance of the role played by the financial sector in the economy[2].

Our objective is to examine the long-term relationship between banking sector development and poverty reduction in an ARDL bounds testing approach to cointegration. The studies that sequentially developed this approach include Pesaran and Pesaran (1997), Pesaran and Shin (1999), and Pesaran et al. (2001). There are a number of comparative advantages to the ARDL method, which makes it more useful than others. First, with a small sample size, as is the case with ours, this method is more efficient than other techniques. Second, the Johansen cointegration technique requires larger

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[1] See also Odhiambo (2009), Woolard and Leibbrandt (1999), and Ravallion (1992) for details.
[2] See also Levine et al., (2000) and Odhiambo (2007) for details.

samples for the results to be valid (Ghatak and Siddiki, 2001). Third, the simplicity of the ARDL bounds testing method is appealing. Fourth, as opposed to other multivariate cointegration techniques, the ARDL bounds testing method allows the cointegration relationship to be estimated by the OLS method once the lag order of the model is identified. Johansen's technique requires that the variables be integrated of the same order. And finally, the ARDL approach does not require the pretesting variables for unit roots – it is applicable irrespective of whether the regressors in the model are purely *I(0)*, purely *I(1)*, or mutually cointegrated.- The long-term relationship can be estimated in the following forms:

$$LPOV_t = \alpha_1 + \beta_1 LDCP_t + \varepsilon_{1t} \qquad (1)$$

$$LDCP_t = \alpha_2 + \beta_2 LPOV_t + \varepsilon_{2t} \qquad (2)$$

where $LPOV_t$ denotes poverty reduction, α_1 and α_2 are intercepts, β_1 and β_2 are coefficients on LDCP and poverty reduction respectively, and finally ε_1 and ε_2 are error terms.

The ARDL model used in this study can be expressed as follows:

Domestic Credit to the Private Sector (LDCP) and Poverty Reduction (LPOV)

$$\Delta LPOV_t = c_1 + \delta_1 trend + \pi_1 LPOV_{t-1} + \pi_2 LDCP_{t-1} + \sum_{i=1}^{p} \theta_i \Delta LPOV_{t-i} + \sum_{i=1}^{p} \phi_i \Delta LDCP_{t-i} + u_{1t} \qquad (3)$$

$$\Delta LDCP_t = c_2 + \delta_2 trend + \pi_1 LDCP_{t-1} + \pi_2 LPOV_{t-1} + \sum_{i=1}^{p} \theta_i \Delta LDCP_{t-i} + \sum_{i=1}^{p} \phi_i \Delta LPOV_{t-i} + u_{2t} \qquad (4)$$

Here Δ denotes the first difference operator. c_1 and c_2 are constants, δ_1 and δ_2 are coefficients on the trend term, and π_1 and π_2 are the coefficients on the lagged levels of the dependent and independent variables respectively. θ_i and ϕ_i are the coefficients on the lagged dependent and independent variables respectively. u_1 and u_2 denote the error terms. p signifies the maximum lag length, which is decided by the user. The researcher usually depends on literature and convention to determine the maximum lag length. Following Pesaran et al. (2001), two separate statistics are employed to 'bounds test' for the existence of a long-term relationship: an *F*-test for the joint significance of the coefficients of the lagged levels in equations (3) and (4) (so that $H_0: \pi_1 = \pi_2 = 0$).It should be mentioned that we have produced the critical values (CVs) of the *F-value* in order to account for the fact that we have a relatively small sample size. The critical value bounds are computed by stochastic simulations using 20,000 replications. With 35 observations in our sample, we report 95% critical bounds from stochastic simulations using 20,000 replications (see Table 1). In the bounds testing procedure, the null hypothesis of no cointegration among the variables in equations (3)-(4) is tested against the alternative hypothesis. If the computed test statistic exceeds the upper critical bounds value, then the H0 hypothesis is rejected. Once the long-term relationships have been identified, then the next step is to examine the short-term and long-term Granger-causality between the two proxies of financial development and poverty reduction, using the following models (Odhiambo, 2009a; Narayan and Smyth, 2008): Domestic Credit to the Private Sector (LDCP) and Poverty Reduction (LPOV) represented in the following equation.

$$\Delta LPOV_t = c_1 + \delta_1 trend + \sum_{i=1}^{p} \theta_i \Delta LPOV_{t-i} + \sum_{i=1}^{p} \phi_i \Delta lDCP_{t-i} + ECM_{t-1} + u_{1t} \qquad (5)$$

$$\Delta LDCP_t = c_2 + \delta_2 trend + \sum_{i=1}^{p} \theta_i \Delta LDCP_{t-i} + \sum_{i=1}^{p} \phi_i \Delta LPOV_{t-i} + ECM_{t-1} + u_{2t} \qquad (6)$$

Although the existence of a long-term relationship between [LDCP, LPOV] suggests that there must be Granger-causality in at least one direction, it does not indicate the direction of temporal causality between the variables. It should, however, be noted that even though the error-correction term has been incorporated in the equations (5) and(6), only equations where the null hypothesis of no cointegration is rejected will be estimated with an error-correction term (Narayan and Smyth, 2006; Morley, 2006; Odhiambo, 2009a). The sign of the error correction (EC) coefficient must be negative

and significant to ensure convergence of the dynamics to the long-term equilibrium. The value of the EC coefficient, which signifies the speed of convergence to the equilibrium process, usually ranges between negative 1 and zero: negative 1 signifies perfect and instantaneous convergence, while zero means no convergence after a shock in the process.

4. The Estimation Results

In this section we present the estimation results for cointegration tests between financial development and poverty reduction, and find that they are sensitive to the choice of the proxy used for measuring financial development. The estimation results for the cointegration are presented in Table 1 and before we estimate equation (3) and equation (4), we need to decide on two things: first, the lag length of the first-order differenced variables in these equations, and second, the inclusion of the trend term in the same equations. Suffice to say, these two factors affect the value of the *F*-statistic. In the literature on ARDL estimations, most studies working with annual data chose a lag length of 2 or 3 worked with a dataset of 47 developing countries, including Bangladesh. They used the lag length of 3 in their ARDL estimations. We decided to use 3 as the maximum lag length in our study as well. It should be mentioned that we have produced the critical values (CVs) of the *F*- in order to account for the fact that we have a relatively small sample size. The critical value bounds are computed by stochastic simulations using 20,000 replications. With 35 observations in our sample, we report 95% critical bounds (Table 1) from stochastic simulations using 20,000 replications. The test results are clear and robust. The long-term relationship is clearly confirmed by *F* statistics as long as LPOV acts as the forcing variable. But the possibility of the same relationship is discarded when LDCP comes into play as the forcing variable.

Table 1. Bounds F-test for Cointegration with Poverty and Remittance

Model	LHS Variable	Forcing variable	F-statistic	95% Critical Bounds		90% Critical Bounds		Cointegration
				I(0)	I(1)	I(0)	I(1)	
A(Equation:1)	ΔLPOV	LDCP	3.714	7.250	8.020	5.936	6.738	Absent
A(Equation:2)	ΔLDCP	LPOV	11.908**	7.250	8.020	5.936	6.738	Present

Notes:
1. If the statistic lies between the bounds, the test is inconclusive.
2. If it is above the upper bound, the null hypothesis of no level effect is rejected.
3. If it is below the lower bound, the null hypothesis of no level effect can't be rejected.
4. The critical value bounds are computed by stochastic simulations using 20000 replications.
5. *, ** Rejects the null of no cointegration at 5% and 10% level of significance. Δ denotes the first order difference operator.

Based on the results in Table 1, we need to proceed only with the ARDL model having poverty on the LHS (see Pesaran et al., 2001:304). Now we need to determine the ARDL model with optimal lags before estimating long-term coefficients on regressors and the EC term. Most studies have used either the SBC or the AIC to select their models. Pesaran and Shin (1999) insist on using SBC for the sake of parsimony. For our purpose, we prefer SBC to AIC, though we present the estimations from both criteria to make our results more general and robust.

Table 2. Long Run Coefficient of ARDL Models

Model	Dependent Variable	Model	Constant	Trend	LPOV
SBC	LDCP	ARDL(1,1)	2.0749 [.29943]	.059771*** [0.001]	-.027659 [1.3142]

Notes:
1. Schwarz Bayesian Criterion (SBC) is the selection criteria for the autoregressive Distributive Lag (ARDL) models.
2. Standard errors are shown in parentheses under each coefficient.
3. *, ** and *** indicate that the coefficient are at the 10%,5% and 1% levels, respectively.

The long-term coefficients of the selected ARDL models are presented in Table 2. Although the SBC selects an ARDL (1,1) model specification, the coefficients on poverty are about -2.76% and are insignificant, suggesting a long-term response of poverty to LDCP in a negative direction. The coefficient on trend is positive and significant at the 1% level.

Table 3. Error Correction Representation for the Selected ARDL Models

Dependent Variable	Causal flow	F-statistics	t-test on ECM	R^2
Model A Poverty reduction (LPOV) and Domestic Credit to the private sector (LDCP)				
Poverty reduction (POV)	LDCP → LPOV	3.324* [0.077]		
Domestic Credit to the private sector (DC)	LPOV → LDCP	3.466* [0.072]	-0.280*** [0.003]	0.62
Note: ***, ** and * are 1%, 5% and 10% level of significance.				

The results from the error correction model are presented in Table 3 and provide the error correction that is representative of the selected ARDL (1,1) models. Error Correction Model (ECM) estimation shows Δ LDCP(t) as the dependent variable, however, the short-term effects on poverty of banking sector development are significant at the 1% level based on the SBC criteria. However, the most important term in Table 3 is the sign and value of the coefficient on the EC term. The negative sign on the EC term confirms the expected convergence process in the long-term dynamics of poverty and banking sector development. Twenty-eight percent of the last year's disequilibria are corrected in the current year, suggesting a good speed of adjustment in the relationship process following a shock. There is bidirectional causality between poverty reduction and the development of the banking sector.

Table 4. Diagnostic Tests

	F-version		LM-version	
	Statistics	P- Value	Statistics	P- Value
A: Serial Correlation	F(1, 29)=1.167	0.289	$\chi 2$ (1)=1.354	0.245
B: Functional Form	F(1, 29)= 0.572	0.455	$\chi 2$ (1)=0.677	0.411
C: Normality	N/A		$\chi 2$ (2)=4.424	0.109

Notes:
1. Standard errors are shown in parentheses under each coefficient.
2. *, ** and *** indicate that the coefficient are at the 10%,5% and 1% levels, respectively.

Table 4 presents diagnostic tests associated with the estimations in Tables 3 and 2. Our exercise carries out four diagnostic tests: the Lagrange multiplier test of residual serial correlation, the normality test based on a test of skewness and kurtosis of residuals, and the Ramsey Regression Equation Specification Error Test (RESET), using the square of the fitted values (see Pesaran and Pesaran, 1997 for details of these tests). The diagnostic tests suggest that the estimations of the long-term coefficients and the ECM are free from serial correlation, functional form and non-normality at the 5% level. The diagnostic tests show that the underlying desirable assumptions are fulfilled.

5. Concluding Remarks

The paper aims to investigate the inter-temporal causal relationship between banking sector development and poverty reduction in Bangladesh during the period 1976-2010. We applied newly developed methods based on simulations that are robust to the violation of statistical assumptions, especially when the sample size is small as is the case in this paper. The paper is set in Bangladesh and uses modern time series econometrics techniques. The results reveal that there is a long-term

equilibrium relationship between banking sector development and poverty reduction in the case of Bangladesh. Surprisingly, poverty reduction appears to be a long-term forcing variable to the explanation of Bangladesh' banking sector development. There is bidirectional causality between these variables. The diagnostic tests show that the underlying desirable assumptions are fulfilled. The empirical results of this study will help policymakers to determine whether poverty reduction in Bangladesh is a spur to financial sector development. This finding implies that Bangladeshi policymakers can influence the reduction of poverty by encouraging financial sector development in the long run. Developing financial sectors will provide better and more access to institutional credits to the people in poverty. Putting an organized and effective loan recovery system in place could potentially encourage micro credits which the 'poors' could use as a stepping stone to get out of the shackle of poverty. 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.

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