

Bangladeshi Lending-Deposit Rate Spread: An Econometric Analysis

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Asymmetric adjustments in the Bangladeshi lending-deposit rate spread are documented. The deposit rates adjust faster when the spread is widening than when it is narrowing. These findings seem to support the customer reaction hypothesis as articulated by Stiglitz and Weiss (1981). A plausible interpretation of the asymmetries is that they are likely due to the efforts to maximize the personal gains of bank management. Strong political will would be needed to establish a more competitive and efficient banking sector that would be conducive for economic progress in Bangladesh.

Field of Research: Financial Economics, Econometrics.

1. Introduction

Commercial banks are an integral part in any national monetary policy transmission mechanism. Thompson (2006) theorizes that banks set their lending rates as some markup or premium over their deposit rates. If the financial market perceives the premium to be too high or low, it will discipline banks to adjust back to some equilibrium spread. Ausubel (1991), Neumark and Sharpe (1992), Calem and Mester (1995), Dueker (2000), and Thompson (2006), have documented the asymmetric adjustment in the US lending rates. There are three main theoretical explanations for commercial bank interest rate asymmetries in the literature: Neumark and Sharpe (1992) argue that when market interest rates fluctuate in either direction, banks in more concentrated markets adjust deposit rates and lending rates at different speeds that allow them to extract more surpluses from the consumers. Rosen (2002) and Calem and Mester (1995) theorize, based on the characteristics of the consumers, that the greater the proportion of unsophisticated consumers relative to sophisticated consumers in the market together with the potential search and switching costs give banks greater ability to adjust interest rates to their advantage.

However, Stiglitz and Weiss (1981) argue that banks operating in the high rate environment may fear a negative reaction from customers in response to lending rate

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increases. Thus, the presence of asymmetric information may create an adverse selection problem in lending markets because the higher interest rates tend to attract riskier borrowers. The expected costs to the banks of not raising the lending rates, when their marginal cost of fund increases, will be offset by the benefit from not encouraging the higher risk customers to borrow. Therefore, the adjustment of lending rates upward is slow when the deposit rates increase.

Pervasive corruption in Bangladesh is a form of agency problem in which bank management tries to maximize the amount of its personal gains (bribery) has been documented in the literature, (Ahmed, et al., 2006, Ali 2005, Mian , et al. 2005, and Mujeri, et al. 2008). This study investigates whether the empirical findings on the behavior of the commercial banks are attributable to market forces or the impact of various non-market factors? In other words, whether the observed empirical results are misleading? For instance, when the findings seem to support the customer reaction hypothesis as articulated by Stiglitz and Weiss (1981), is it possible that this is in fact the effort to maximize personal gains by corrupt bank management facing a very elastic loan demand in the high interest rate environment.

Thompson's analysis (2006) is applied to the Bangladeshi economy to investigate the following questions. First, are asymmetries present in the lending-deposit rate spread in the banking industry? Second, if asymmetries are present, how do the Bangladeshi lending rate and deposit rate respond to such asymmetries? Third, is there any different interpretation of the estimation results of a model developed for a market economy using data from a poor developing economy such as Bangladesh. The remainder of the paper is organized as follow: Section 2 describes the Bangladeshi banking sector; Section 3 summarizes the data, methodology, and empirical results; Section 4 offers an alternative interpretation of the empirical results and some policy recommendations; and Section 4 provides the concluding remarks.

2. The Bangladeshi Banking Sector

Since the independence of the country on December 16th, 1971 until December 1989, the Bangladeshi financial sector was controlled under the strict directives of government and the Bangladesh Bank (the central bank). Most commercial banks up to that time were owned and operated by the government under the then prevailing nationalization program. Some reforms began to be introduced since the decade of the 1990's and the most recent decade witnessed some major policy shifts such as deregulation of interest rates by the Bangladesh Bank and privatization of some state owned commercial banks. Most recently, Bangladesh Bank under the newly elected Bangladeshi government (inaugurated in January 2009), has been aggressively persuading banks to lower their average lending rate from 13.43 to 10.00 percent. Naturally, this persuaded downward adjustment in lending rate would be followed by the downward adjustment in the deposit rate for the banks to maintain a decent real return (Dewan 2009).

Historically, bank management in Bangladesh did not properly assessed risks. Additionally, as the consequences of extensive government interventions in the form of

licenses and permits as well as directives, the ownership of private institutions and controls of public institutions are given to a few politically well-connected individuals. These inevitably resulted in monopoly and oligopoly behavior either implicitly or explicitly, a symptom of crony capitalism. These phenomena would invariably result in higher lending rates, lower deposit rates and hence higher lending-deposit rate spread in the banking industry.

3. Data and Methodology

This study utilizes monthly data from the International Financial Statistics over the period 1997:2 to 2010:2 focusing mostly on the post-reform period. The lending rate and the deposit rate are respectively denoted by LR_t and DR_t . As Figure 1 reveals, the deposit rates were fairly stable while the lending rates gradually increased from the beginning of the sample period to early 2004, thus gradually increasing the spread. However, deposit rate was also raised from mid-2004 to early 2005, narrowing the lending-deposit rate spread. The reduction in nonperforming loans to bank net assets from 30.74% in 1999 to 9.15% at the end of December, 2005 also contributes to narrowing lending-deposit rate spread (Mian 2005). However, beginning in 2006, both inflation rate and nonperforming loans started to rise, precipitating the upward movements in both lending and deposit rates. They then leveled off until early 2009.

As mentioned before, the Bangladesh Bank, under the new Bangladeshi government inaugurated in January 2009, has been aggressively persuading banks to lower their average lending rate. Consequently, both the lending and deposit rates experienced a huge drop in mid-2009 (Dewan 2009). The descriptive statistics reveal that the lending rate sample mean is 15.10 percent, ranging from 13.00 to 17.50 percent while the corresponding figures for the deposit rate are respectively 8.42, 6.43 and 10.57.

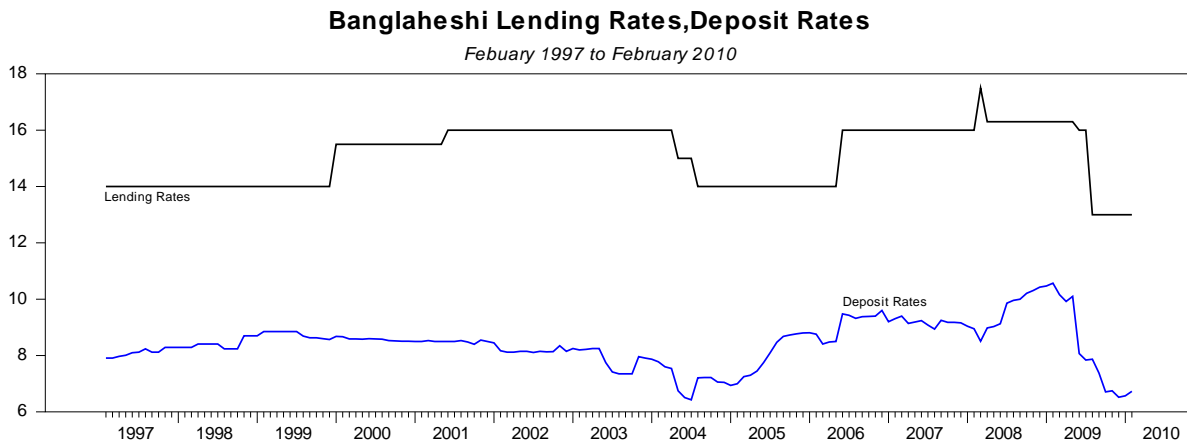


Figure 1

This study estimated the threshold autoregressive (TAR) model developed by Enders and Siklos (2001) to examine the Bangladeshi lending-deposit rate spread. The threshold autoregressive model allows the degree of autoregressive decay to depend

on the state of the lending-deposit rate spread, (i.e. “deepness” of cycles). The estimated TAR model empirically reveal if the spread tends to revert back to the long run position faster when the spread is above or below the threshold. Therefore, TAR model indicate whether troughs or peaks persist more when shocks pushes the spread out of it long term path. In this model’s specification, the null hypothesis that the lending-deposit rate spread contains a unit root can be expressed as $\rho_1 = \rho_2 = 0$, while the hypothesis that the spread is stationary with symmetric adjustments can be stated as $\rho_1 = \rho_2$.

Enders and Siklos (2001) extended the symmetric Engle-Granger (1987) methodology to test for long-run relationships between two time series allowing for asymmetry. As demonstrated by Enders-Siklos (2001), the first step is to estimate the following long-run relationship between the Bangladeshi lending rate and deposit rate using ordinary least squares.

$$LR_t = \beta_0 + \beta_1 DR_t + \varepsilon_t \quad (1)$$

where LR_t and DR_t denote the lending rate and the deposit rate, respectively. The saved residuals, ε_t from the estimation of equation (1), denoted by $\hat{\varepsilon}_t$, are then used to estimate the following TAR model:

$$\Delta \hat{\varepsilon}_t = I_t \rho_1 \hat{\varepsilon}_{t-1} + (1 - I_t) \rho_2 \hat{\varepsilon}_{t-1} + \sum_{i=1}^p \alpha_i \Delta \hat{\varepsilon}_{t-i} + \hat{u}_t \quad (2)$$

where $\hat{u}_t \sim i.i.d.(0, \sigma^2)$, and the lagged values of $\Delta \hat{\varepsilon}_t$ are meant to yield uncorrelated residuals. As defined by Enders and Granger (1998), the Heaviside indicator function for the model is given as:

$$I_t = \begin{cases} 1 & \text{if } \hat{\varepsilon}_{t-1} \geq \tau \\ 0 & \text{if } \hat{\varepsilon}_{t-1} < \tau \end{cases} \quad (3)$$

The threshold value, τ , is endogenously determined using the Chan (1993) procedure which obtains τ by minimizing the sum of squared residuals after sorting the estimated residuals in an ascending order, and eliminating 15 percent of the largest and smallest values.

3. Empirical Results

The overall empirical results in Table 1 indicates that the estimation results are devoid of serial correlation and have good predicting power as evidenced by the Ljung-Box statistics and the overall *F-statistics*, respectively. With the calculated statistic $\Phi_\mu = 9.1492$, the null hypothesis of a unit root ($\rho_1 = \rho_2 = 0$) is rejected at the 1 percent significance level (i.e. the spread is stationary). Given the partial test statistic $F = 16.5895$, the null hypothesis of symmetry, $\rho_1 = \rho_2$, is rejected at any conventional

significance level. Thus, the empirical results indicate that adjustments around the threshold value of the Bangladeshi lending-deposit rate spread are asymmetric. In fact, the point estimates suggest that the spread tends to decay at the rate of $|\rho_1| = 0.8137$ for $\hat{\varepsilon}_{t-1}$ above the threshold, $\tau = 0.5230$, and at the rate of $|\rho_2| = 0.0208$ for $\hat{\varepsilon}_{t-1}$ below the threshold. Moreover, while ρ_1 is statistically significant at 1 percent level, ρ_2 is not significant at any conventional level. Furthermore, As shown by Petrucelli and Woolford (1984), the necessary and sufficient condition for the basis to be stationary is: $\rho_1 < 0$, $\rho_2 < 0$ and $(1 + \rho_1)(1 + \rho_2) < 1$; thus, the estimates of ρ_1 and ρ_2 satisfy the stationary (convergence) conditions. With regard to the stationarity of the basis, Ewing, et al. (2006, p.14) pointed out that this simple finding is consistent with the two underlying series that comprise the basis being co-integrated in the *conventional, linear combination sense*.

Table 1: Unit Root and Tests of Asymmetry, 1997:02 to 2010:02

ρ_1	ρ_2	τ	$H_0 : \rho_1 = \rho_2 = 0$	$H_0 : \rho_1 = \rho_2$	aic
-0.8137*	-0.0208	0.5230	$\Phi_{..} = 9.1492^*$	$F = 16.5895^*$	775.2462
$Q_{LB(8)} = 5.182[0.7380]$			$\ln L = -61.6931$	$F_{(4,150)} = 6.5523^*$	

Notes: The null hypothesis of a unit root, $H_0 : \rho_1 = \rho_2 = 0$, uses the critical values from Enders and Siklos (2001, p. 170, Table 1 for four lagged changes and $n = 100$). "*" indicates 1 percent level of significance. The null hypothesis of symmetry, $H_0 : \rho_1 = \rho_2$, uses the standard F distribution. τ is the threshold value determined via the Chan (1993) method. $Q_{LB(8)}$ denotes the Ljung-Box Q-statistic with 8 lags.

Given $|\rho_1| > |\rho_2|$, the Bangladeshi lending-deposit rate spread adjust to the threshold value faster when an economic shock causes the deposit rates to fall relative to the lending rates, widening the spread, than when the deposit rates move in the opposite direction, narrowing the spread. These findings seem to support the position articulated by the consumer reaction hypothesis articulated by Stiglitz and Weiss (1981).

The presence of asymmetric adjustments in the Bangladeshi lending-deposit rate spread necessitates the estimation of an TAR VEC model to further investigate the short-run and long-run dynamics with respect to the lending rate (LR_t) and the deposit rate (DR_t).

$$\Delta LR_t = \alpha_0 + \rho_1 I_t \hat{\varepsilon}_{t-1} + \rho_2 (1 - I_t) \hat{\varepsilon}_{t-1} + A_{11}(L) \Delta LR_{t-i} + A_{12}(L) \Delta DR_{t-i} + u_{1t} \quad (4)$$

$$\Delta DR_t = \tilde{\alpha}_0 + \tilde{\rho}_1 I_t \hat{\varepsilon}_{t-1} + \tilde{\rho}_2 (1 - I_t) \hat{\varepsilon}_{t-1} + A_{21}(L) \Delta LR_{t-i} + A_{22}(L) \Delta DR_{t-i} + u_{2t} \quad (5)$$

where $u_{1,2t} \sim i.i.d.(0, \sigma^2)$ and I_t is set in accordance with equation (3).

As pointed out by Thompson (2006, p. 327-328) the above specified TAR VEC model differs from the conventional error-correction models by allowing asymmetric adjustments toward the long-run equilibrium. Also, the asymmetric error correctional model replaces the single symmetric error correction term with two error correction terms. Thus, in addition to estimating the long run equilibrium relationship and asymmetric adjustment, the model also allow for tests of short run dynamic between changes in lending rate and deposit rate. This in turn reveals the nature of their Granger causality.

The estimation results are reported in Table 2. In the summary of the estimation results, $A_{ij}(L)$ represents the first-order polynomials in the lag operator L . The F_{ij} represents the calculated partial F -statistics with the p-value in squared brackets testing the null hypothesis that all coefficients of A_{ij} are equal to zero. The t -statistics are reported with “***” indicating the 5 percent significant levels. $Q_{LB(8)}$ is the Ljung-Box statistics and its significance is in squared brackets, testing for the first eight of the residual autocorrelations to be jointly equal to zero. $\ln L$ is the log likelihood. The overall F -statistic with “*” indicates the significance level of 1 percent.

Overall empirical results suggest that the estimated equations (4) and (5) are absent of serial correlation and have good predicting power as evidenced by the Ljung-Box statistics and the overall F -statistics, respectively. As to the short-run dynamic adjustment, the calculated partial F -statistics in equations (4) and (5) indicate bi-directional Granger-causality between Bangladeshi lending and deposit rates. These results imply that the Bangladeshi lending rate and deposit rate adjustments affected each other’s movements, i.e., there is evidence of Granger bidirectional causality.

Table 2: Asymmetric Error Correction Model, TAR, 1997:02 to 2010:02

$$\begin{aligned} \Delta LR_t = & 0.02060 - 0.1155 I_t \hat{\varepsilon}_{t-1} - 0.06898(1 - I_t) \hat{\varepsilon}_{t-1} + A_{11}(L) \Delta LR_{t-i} + A_{12}(L) \Delta DR_{t-i} + u_{1t} \\ & 0.5257 \quad -2.0259^{**} \quad -1.3860 \quad F_{11}=5.2230[0.0239] \quad F_{21}=21.9269[0.000] \\ & Q_{LB(8)} = 1.184[0.9968] \quad \ln L = -46.36076 \quad F_{(4,135)} = 46.36076^* \end{aligned}$$

$$\begin{aligned} \Delta DR_t = & -0.02912 + 0.01946 I_t \hat{\varepsilon}_{t-1} - 0.05558(1 - I_t) \hat{\varepsilon}_{t-1} + A_{21}(L) \Delta LR_{t-i} + A_{22}(L) \Delta DR_{t-i} + u_{2t} \\ & -0.9687 \quad 0.4535 \quad -1.4679 \quad F_{21}=8.3958[0.004] \quad F_{22}=14.0205[0.000] \\ & Q_{LB(8)} = 13.554[0.0942] \quad \ln L = -9.46781 \quad F_{(4,137)} = 5.2413^* \end{aligned}$$

In addition to revealing the short run dynamic Granger-causality, the asymmetric error correction model also captures the long run adjustments of the lending and deposit rates. $|\rho_1| > |\rho_2|$ in equation (4) indicate that the lending rate adjusts to the long-run equilibrium faster when the shock widens than when it narrows the lending-deposit rate spread. However, while ρ_1 is statistically significant at 5 percent, ρ_2 is not significant at any conventional level. Economically, this result suggests that the Bangladeshi lending rate does not respond to contractionary monetary policy in the long run. With regard to

the deposit rate, the estimation results for equation (5) show that $|\tilde{\rho}_2| > |\tilde{\rho}_1|$, and only $\tilde{\rho}_2$ is only marginally significant. These findings suggest that the deposit rate marginally responds to the contractionary monetary policy, narrowing the lending-deposit rate spread in the long run.

4. An Alternate Interpretation of the Empirical Findings, and Policy Implications

As the aforementioned interest rate spread is not only high in comparison to International standard but also in terms neighboring countries such as Sri Lanka, India and Pakistan. As pointed out by Mujeri and Islam (2008), in real terms, the deposit rate is low (1.2 percent in 2007) so that the scope of lowering lending-deposit rate spread through reducing the deposit rate is likely to be counterproductive.

Additionally, *the findings of this study suggest new predicaments for the authorities.* At first glance, the above results seem to support the consumer reaction hypothesis as articulated by Stiglitz and Weiss (1981). It is important first to note that the consumer reaction hypothesis is hypothesized in the high interest rate environment in the context of an advanced market economy and to understand the rationale for banks to behave as such in such an environment. Interest rate is the price of using financial capital or funds, and microeconomic theory demonstrates that in the relatively high price range, the demand for the underlying product is more elastic. Therefore, in the relatively high lending rate environment such as the case of Bangladesh, the demand for loans is likely to be relatively more elastic.

Customarily, originating loans would generate some non-interest incomes besides the interest incomes for lending institutions. However, in a corrupted environment, there may be some “other benefits” for both the originating institutions and possibly their management as well. Naturally, it is easier to ask for and the borrowers are more likely to agree to providing “other benefits” in the declining lending rate environment than when the rate is rising. Certainly, a decline in deposit rate widens the spread, which allows lending institutions to originate loans at *lower lending rate and still maintain the old spread*. This coupled with the high elasticity of demand precipitate a significant increase in demand for loans which in turn will create opportunities for lending institutions and their management to generate lucrative “other benefits” and hence the observed quicker responses.

Asymmetrically, in the rising rate environment, the new loans must be generated at higher lending rate and the possibly negative attendant impacts on “other benefits” do not provide attractive opportunities for lending institutions and their management, and hence the observed slower responses. As aforementioned, Bangladeshi banking industry is operating in the high rate, corrupted environment, when deposit rate changes causing changes in the spread, lending institutions must weigh the marginal non-interest benefits to both the originating institutions and their management against marginal loss in interest income in originating new loans at the new lending rate to restore the spread to the threshold. This benefit maximizing process in the face of high

elasticity of demand for loans precipitated by high rate environment would be a very plausible explanation of the empirical findings of the above pattern of the asymmetric adjustment process in the Bangladeshi banking industry.

The above discussion on asymmetric adjustment of the lending-deposit rate spread may help explaining the bi-directional Granger-causality findings in the estimation of the asymmetric error correction model. More specifically, when a shock widens the spread, management of lending institutions would try to increase the loan originations to maximize non-interest income and “other benefits” while maintaining the old spread. Facing high elastic demand for loans, precipitated by high rate environment, the management may achieve this objective by lowering the lending rate moderately – just enough-- to attract the number of new loans and to raise the deposit rate to acquire funds to finance these new originated loans at moderately lower lending rate. This phenomenon is consistent with empirical findings of asymmetric adjustments of the lending rate and lending-deposit rate spreads and the Granger-bidirectional causality.

Clearly, the root causes of the Bangladeshi banking sector problem are the lack of market economy disciplines. *Excessive government intervention and political connections*, management corruptions, inefficiency and ineffectiveness are part of a vicious circle that inhibits economic development, industrialization, and social progresses in poor and developing countries in general and in Bangladesh in particular. These problems cannot be corrected without the infrastructure of the more effective market economy. In this environment, strong political will would be needed to establish a more competitive and efficient banking sector that would be conducive for economic progress.

5. Concluding Remarks

The findings of asymmetric adjustment behaviors of the lending rate, the deposit rate and their spread are the contributions of this study to the literature on the Bangladeshi banking industry. Another contribution is an articulation that even though the *asymmetries in the lending deposit rate spread sees to support the consumer reaction hypothesis; however, they are more likely due to the effort of the bank management to maximize the size of its bribery*. These findings may assist the Bangladesh Bank in designing its counter-cyclical monetary policy more effectively over different phases of business cycles.

As to the short-run and long-run dynamics of the Bangladeshi lending and deposit rates, the estimations of the asymmetric error-correction model reveal that the lending rate and the deposit rate affect the movement of each other. The results further suggest that the lending rate adjusts to the long-run equilibrium faster when a shock narrows than when it widens the basis. However, the results seem to indicate that the deposit rate only responds when the basis is widening but not when it is narrowing.

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