



A Theoretical and Empirical Analysis of Interest rate pass-through in India with Regulatory Requirements

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Abstract

This study provides a theoretical and empirical analysis of optimal loan pricing by the commercial banks in a regulated environment that could relate to some developing and emerging market economies. Regulatory requirements could impinge on banks' balance sheet and thus, influence their optimal loan pricing response to the policy rate. In such a situation, for an effective transmission mechanism through the interest rate channel, a calibrated approach may be required; changes in the policy rate to be accompanied by changes in the regulatory parameters to achieve desired changes in the banks' lending rate. Theoretical analysis brought to the fore various critical insights. Three major insights are as follows. First, there can be a trade-off between regulation and effectiveness of transmission mechanism and competitiveness of the loan market. Second, theoretically it is possible for banks to engage in subsidisation of loans against investment in risk free government securities. Third, the capital market could be linked to monetary transmission mechanism if banks were subject to a required return on their capital base. These theoretical perspectives have implications for bank regulation and policy purposes.

Key Words: Money, Interest rate, Credit, monetary policy, Firm objective, Micro theory of pricing, mathematical economics, financial economics

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1. Introduction

The world over, central banks are increasingly relying on the interest rate channel for monetary transmission mechanism purpose. For this channel to be effective, it is necessary that interest rates on commercial banks' loans, which have a connect with bank credit, investment and real activity, should move in tandem with the changes in the policy rate. However, it is not uncommon to hear authorities complaining about commercial banks not responding to their policy signals in several countries. More recently during the global crisis, the authorities were pursuing soft

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interest rate policy to fight the world's worst economic recession but commercial banks were showing risk aversion to reset their lending rates. On the other hand, the yield in the short-end of the government securities market was falling in line with the policy easing but the long-term yield was rising. Numerous studies have endeavoured at explaining the rigidity in bank's lending decisions. However, studies focused on the role of regulatory requirements affecting bank's lending decisions, especially in the context of developing and emerging market economies, are rather scarce. Recently, Dhal(2010) made such an attempt. This study extends the analysis of Dhal(2009) to bring to the fore some further perspectives. The study is motivated to engage in a theoretical analysis of optimal loan pricing decisions of commercial banks in an environment of a variety of regulatory requirements. Currently, there is a great deal of discussion going on whether to regulate banks more or less deriving from the lessons of the recent global crisis. In this milieu, theoretical insights of the paper will contribute to the literature and provide crucial insights for policy purposes. The rest of the paper comprises theoretical analysis followed by the conclusion.

2. Theoretical Analysis

Numerous studies have explained the rigidity in banks' lending decisions due to a variety of factors. These include market condition and non-pricing objectives (Pringle, 1974, Hancock, 1986), capital decisions (Pringle,1974, Taggart and Greenbaum, 1978), credit rationing due to information asymmetry and moral hazard problems (Stiglitz and Weiss, 1981, Hannan and Berger 1991, Neumark and Sharpe,1992), product diversification (Hanweck and Ryu, 2005, Allen, 1988, Saunders and Schumacher,2000), relationship banking (Mayer,1988, Sharpe,1990, Boot, et.al.1993, Aoki,1994), bank specific characteristics such as size and ownership (Demrguc-Kunt and Huizinga,1990, Angbazo,1997) and monetary targeting (Thakor, 1996). Some early studies also focused on interest rate regulation and the capital constraints faced by the banks (Mingo and Wolkowitz 1977, Goldberg, 1981, Lam and Chan, 1985). Over the years, the regulatory environment has changed significantly. In developed economies, banks are free to price assets and liabilities due to interest rate deregulation and monetary policy works through the interest rate channel. Developing and emerging market economies have embraced financial reform and freed banks to price their assets and liabilities. At the same time, banks in developing economies have to contend with various quantitative regulatory and prudential norms relating to cash reserve, statutory liquidity, sector specific deployment of credit, risk weighted capital ratio and loan loss provisioning. In this milieu, a mute question arises. In what way these regulatory requirements could affect banks' loan pricing decisions? Deriving from the standard theory of banking firm (Matthews and Thompson, 2005, Santomero, 1984, Slovin and Sushka, 1983, Sealey and Lindley, 1977, Wood,1975, Baltensperger,1980, Mingo and Wolkowitz, 1977, Goldberg,1981, Klein, 1971, Zarruk and Madura, 1992 among others), we demonstrate in the following that the regulatory requirements could impinge on banks' balance sheet and thus, complicate banks' optimal loan pricing decisions.

Let a representative bank has a simplified balance sheet as postulated in the equation (1). Deposits (D) cost interest rate (r_D) and loans (L) and investment (G) fetch interest rate (r_L) and yield (r_G), respectively. The bank maintains reserve balances (R) with the central bank and statutory liquidity (SLR) by investing in government securities (G) as fractions of deposits ' θ ' and ' s ', respectively. The bank complies with prudential norms such as the capital to risk

weighted assets (Loans) ratio (k). Unlike the government securities, loans involve credit risk due to loan defaults at the rate of ‘ δ ’ on its advances and make provisions for default loans, $\omega(\delta L)$; $0 \leq \omega \leq 1$ set by the regulator. The bank treats provisions as a cost item. The bank can borrow from the central bank and the inter-bank market to manage short-term liquidity needs costing the interest rate r_B . Such borrowing could be subject to a limited amount and we assume it proportional to deposit (D). It is assumed that the bank incurs fixed operating costs. The parameters, θ , s , and k satisfy the condition $0 \leq s, k, \theta, b < 1$. The bank’s balance sheet constraint entails that

$$L + G + R = K + D + B \quad (1)$$

2.1 Minimum Regulation

For facilitating comparative analysis, let us begin with a scenario of minimal regulation, i.e., banks are subject two regulatory requirements such as the cash reserve requirement (θ) and prudential capital to risk weight assets (k). Incorporating the regulatory parameters θ and k in equation (1), we have

$$D = \frac{(1 - k)L + G - B}{(1 - \theta)} \quad (2)$$

The objective function of the bank *i.e.*, maximise profit, suppressing fixed operating cost, can be specified as:

$$\text{Max} (\pi) = (1 - \delta)r_L L + r_G G - r_D D - r_B B \quad (3)$$

After incorporating (2) in the objective function (3), the latter solves to a function of L , G , and B :

$$\text{Max} (\pi) = (1 - \delta)r_L L + r_G G - r_D \frac{(1 - k)L + G - B}{(1 - \theta)} - r_B B \quad (4)$$

From the first order conditions with respect to L , G , and B we can derive

$$r_L = \left(\frac{1}{e_L^*}\right) \left(\frac{1}{\delta^*}\right) \left(\frac{1 - k}{1 - \theta}\right) r_D \quad (5)$$

$$r_G = \left(\frac{1}{e_G^*}\right) \left(\frac{1 - k}{1 - \theta}\right) r_D \quad (6)$$

$$r_B = \left(\frac{1}{e_B^*}\right) \left(\frac{1 - k}{1 - \theta}\right) r_D \quad (7)$$

From equations (5) to (7), we find that lending rate, borrowing rate and the yield all have a common factor, i.e., deposit rate and specific elasticity parameter. The lending rate has an additional loan default parameter. The key question now is how should the lending rate respond to the policy rate? From the above equations it is evident that the lending rate can be linked to the policy rate in three ways through the linkage of the latter with the deposit rate, government yield and the borrowing rate. First, suppose, we have the deposit rate equation as follows:

$$r_D = a_D + \mu_D r_P \quad (8)$$

From equation (5), the marginal response of the lending rate to the policy rate, using equation (8), can be derived as

$$\frac{\partial r_L}{\partial r_P} = \frac{\partial r_L}{\partial r_D} \frac{\partial r_D}{\partial r_P} = \left(\frac{1}{e_L^*}\right) \left(\frac{1}{\delta^*}\right) \left(\frac{1-k}{1-\theta}\right) \mu_D \quad (9)$$

Second, let the government securities yield be linked to the policy rate as

$$r_G = a_G + \mu_G r_P \quad (10)$$

and the marginal response of the lending rate to the policy rate, using equations (5), (6) and (10), can be derived as

$$\frac{\partial r_L}{\partial r_P} = \left(\frac{1}{e_L^*}\right) \left(\frac{1}{\delta^*}\right) e_G^* \mu_G \quad (11)$$

Third, let the policy rate sets a floor to the borrowing rate, $r_B = r_P$ and therefore, we can derive the marginal response of the lending rate to the policy rate as

$$\frac{\partial r_L}{\partial r_P} = \left(\frac{1}{e_L^*}\right) \left(\frac{1}{\delta^*}\right) e_B^* \quad (12)$$

Thus, the marginal the response of the lending rate to the policy rate can be derived differently. It could be similar under conditions that (i) $(1-k) = (1-\theta)$, implying that the capital to risk weighted assets ratio is similar to cash reserve requirement, (ii) $\mu_D = \mu_G = 1$, marginal responses of deposit rate and the bond yield to the policy rate are unity, and (iii) $e_G^* = e_B^*$, government securities and borrowing segments have similar interest elasticity.

2.2 Comprehensive Regulation

Now let us consider a scenario of comprehensive regulation comprising cash reserve, statutory liquidity, borrowing constraint, prudential capital and loan loss provisioning requirements. The balance sheet equation can be reformulated as

$$D = \frac{(1-k)L}{(1+b-s-\theta)} \quad (13)$$

After incorporating (13) and the regulatory parameters and the borrowing constraint in the objective function (3), the latter solves to a function of L:

$$\text{Max } (\pi) = (1-\delta)r_L L - (r_D + br_B - sr_G) \frac{(1-k)L}{(1+b-s-\theta)} - \mu\delta L \quad (14)$$

From the firm order condition with respect to L for the equation (14), the lending rate will be determined as:

$$r_L = \left(\frac{1}{\left(1-\frac{1}{e}\right)(1-\delta)}\right) \left[(1-k) \left(\frac{r_D + br_B - sr_G}{1+b-s-\theta}\right) + \mu\delta\right] \quad (15)$$

In equation (15), the terms $(1-k)$, $(1-\delta)$ and $(1+b-s-\theta)$ terms are positive but less than unity. For optimal solution to the lending rate (r_L), loan demand should be downward sloping and the interest elasticity of loans (e) should be greater

than unity in line with the second order condition. The second order condition entails that $\frac{d^2\pi}{dL^2} < 0$. This will be satisfied if $(1 - \delta) \frac{dr_L}{dL} \left(1 - \frac{1}{e}\right) < 0$, for a downward slopping loan demand function, i.e., $\frac{dr_L}{dL} < 0$ and interest elasticity of loan demand $e > 1$. However, for the lending rate to be positive the term $(r_D + br_B - sr_G)$ should be positive. If this term is negative, then the term $(\mu\delta)$ relating to provisioning requirement of loans should outweigh the term relating to $(r_D + br_B - sr_G)$. Otherwise, we can relax the assumption of fixed operating cost to bring in the term marginal cost of loans to make the lending rate positive. This assumption about operating cost will not affect theoretical insights. Illustratively, let this assumption is relaxed by postulating that operating costs as a linear function of the bank's core business activities defined as the sum of loans, investments and deposits; $C = a + c(L + G + D)$. The cost function can be simplified to a function of L such as $C = a + c \left[1 + \frac{(1+s)(1-k)}{1+b-s-\theta}\right] L$ using the balance sheet constraint and thus, the lending rate equation will have another term marginal cost, $c \frac{(1+s)(1-k)}{1+b-s-\theta}$ in the right side. Since the marginal cost is not dependent on the policy rate, the $\frac{dr_L}{dr_p}$ will not be affected.

However, the assumption of marginal operating cost will not affect the marginal response of lending rate to the policy rate, which is our main concern. For our purpose, the linkage between the r_L and the policy interest rate (r_p) can be established by linking the later to the deposit interest rate and government securities yield as in equations (8) and (10) and also assuming $r_B = r_p$ as follows:

$$\frac{\partial r_L}{\partial r_p} = \left(\frac{1}{1 - \frac{1}{e}}\right) \left(\frac{1}{1 - \delta}\right) \left(\frac{1 - k}{1 + b - s - \theta}\right) (\mu_D + b - s\mu_G) \quad (16)$$

In the equation (16), $(1-k)$, $(1-\delta)$ and $(1+b-s-\theta)$ terms are positive but less than unity. Thus, for $\frac{\partial r_L}{\partial r_p} > 0$, the terms $(\mu_D + b - s\mu_G)$ and the loan demand condition reflected in the interest elasticity of loan (e) will play a crucial role. Several interesting insights arise from the equations (15) and (16).

First, let parameters θ , s , k and δ and μ_D and μ_G ensure the second, third and fourth terms in (16) to be positive. However, for a positive $\frac{\partial r_L}{\partial r_p}$, the parameter 'e' should exceed unity. Otherwise, a negative $\frac{\partial r_L}{\partial r_p}$ can occur due to inelastic loan demand, i.e., $0 < e < 1$. Interestingly, for $e = 1$, the $\frac{\partial r_L}{\partial r_p}$ will be indeterminate and for, $e = 0$, $\frac{\partial r_L}{\partial r_p}$ will be zero. Perfect interest elasticity of loans $e = \infty$ will lead to a positive $\frac{\partial r_L}{\partial r_p}$ when the $(\mu_D + b - s\mu_G) > 0$. Here an interesting insight arises. The marginal response of the lending rate to the policy rate in a perfectly competitive market ($e = \infty$) will be lower than the case of a less than perfectly competitive loan market ($1 < e < \infty$). In other words, interest rate channel

could be more effective in an imperfect loan market in terms of a more pronounced response of the lending rate to the policy rate than perfectly competitive loan market.

Second, consider the case with no borrowing ($b=0$) and $e>1$. The sign of $\frac{\partial r_L}{\partial r_P}$ in equation (16) will depend upon $(\mu_D - s\mu_G)$. One scenario could be $\mu_D = \mu_G=1$; the perfect adjustment of r_D and r_G in tandem with r_P . Then, changes in r_P can bring about a positive $\frac{\partial r_L}{\partial r_P}$. The magnitude of $\frac{\partial r_L}{\partial r_P}$ will depend upon the regulatory parameters, θ , s , k , δ and loan elasticity (e). Alternatively, under imperfect financial market conditions, the r_G could adjust sluggishly than the r_D , *i.e.*, $\mu_G < \mu_D$ so that a positive $\frac{\partial r_L}{\partial r_P}$ occurs. If $\mu_G > \mu_D$, there may not be a positive $\frac{\partial r_L}{\partial r_P}$. If $\mu_G > 1$, then the SLR parameter (s) could be adjusted to a lower level to ensure that $(\mu_D - s\mu_G)$ is positive. Otherwise, banks may engage in cross-subsidisation in terms of reducing r_L and raising the r_G . Another critical situation may arise when $\mu_G = 1$. In this scenario, μ_D , the marginal response of the deposit rate to the policy rate, should be greater than 's' for $\frac{\partial r_L}{\partial r_P}$ to be greater than zero.

Third, from the equation (15), the sign of marginal response of r_L to the provisioning requirement (μ) will also depend upon the parameter 'e':

$$\frac{\partial r_L}{\partial \mu} = \left(\frac{1}{1 - \frac{1}{e}} \right) \left(\frac{\delta}{1 - \delta} \right) \quad (17)$$

Since δ will be non-zero positive, $\frac{\partial r_L}{\partial \mu}$ will be non-zero only when $e>1$. However, the provisioning requirement (μ), *ceteris paribus*, can affect the level of lending rate but not the marginal response of lending rate to the policy rate, $\frac{\partial r_L}{\partial r_P}$.

Fourth, a critical insight is that an increase (decrease) in 'k' will induce a similar adjustment in the lending rate, provided we have $0 < e < 1$ or a negative $(r_D + br_B - sr_G)$ since from the equation (15) we will have

$$\frac{\partial r_L}{\partial k} = \left(\frac{1}{1 - \frac{1}{e}} \right) \left(\frac{1}{1 - \delta} \right) \left(\frac{-(r_D + br_B - sr_G)}{1 + b - s - \theta} \right) \quad (18)$$

However, for $0 < e < 1$, the second order condition of optimisation will not be satisfied. Other wise, for $e>1$ to satisfy the second order condition of optimality, $\frac{\partial r_L}{\partial k} > 0$ provided we have $(r_D + br_B - sr_G) < 0$. Assuming no borrowing ($b=0$), this condition will entail that $(r_D - sr_G) < 0$, which could be a very difficult situation in practice. Thus, the spread

between the deposit rate and yield on investment, *ceteris paribus*, could play a critical role in determining the impact of prudential regulation on banks' optimal lending rate decisions.

Fifth, we can simplify the lending rate equation (15) as

$$r_L = \frac{\gamma(c - sr_G)}{(g - s)} + \alpha \quad (19)$$

and derive the marginal response of the lending rate to changes in 's' as

$$\frac{\partial r_L}{\partial s} = \frac{\gamma(c - gr_G)}{(g - s)^2} \quad (20)$$

The sign of $\frac{\partial r_L}{\partial s}$ will depend upon γ and $(c - gr_G)$; γ can be positive if $e > 1$, and the sign of $(c - gr_G)$ will depend upon the responses of deposit and borrowing interest rates to the policy rate.

2.3 Unrestricted Borrowing

Now let us assume that commercial banks may not face the borrowing constraint. In the absence of borrowing constraint, the balance sheet constraint faced by the bank could be expressed as

$$\frac{(1-k)L-B}{1-s-\theta} = D \quad (21)$$

and the objective function could be expressed as a function of L and B:

$$\text{Max } (\pi) = (1 - \delta)r_L L - (r_D - sr_G) \left(\frac{(1-k)L - B}{1-s-\theta} \right) - r_B B - \mu \delta L \quad (22)$$

From the equation (22), the two first order conditions respect to L and B can be solved for the lending rate r_L

$$r_L = \left(\frac{1}{\left(1 - \frac{1}{e}\right)(1 - \delta)} \right) \left[(1 - k) \left(\frac{r_D - sr_G}{1-s-\theta} \right) + \mu \delta \right] \quad (23)$$

and the borrowing interest rate r_B , equal to central bank's policy rate r_P , as

$$r_B = r_P = \left(\frac{r_D - sr_G}{1-s-\theta} \right) \quad (24)$$

From equations (23) and (24), we can have

$$r_L = \left(\frac{1}{\left(1 - \frac{1}{e}\right)(1 - \delta)} \right) \left[(1 - k)r_P + \mu \delta \right] \quad (25)$$

and the marginal response of r_L with respect to r_P as

$$\frac{\partial r_L}{\partial r_P} = \frac{1 - k}{\left(1 - \frac{1}{e}\right)(1 - \delta)} \quad (26)$$

It may be noted here that for deriving $\frac{\partial r_L}{\partial r_P}$ from the equation (26), we do not require the adjustment of deposit rate and the yield on investment as postulated in the equations (8) and (10). Thus, the changes in the lending rate could be determined in terms of three parameters, the interest elasticity of loans (e), the loan default rate (δ) and the capital requirement (k). Furthermore, since $(1-\delta)$ and $(1-k)$ will be positive, we will have $\frac{\partial r_L}{\partial r_P} > 0$, for $e > 1$. For perfect interest elasticity of loans, $e = \infty$, we will have

$$\frac{\partial r_L}{\partial r_P} = \frac{(1 - k)}{(1 - \delta)} \quad (27)$$

and $\frac{\partial r_P}{\partial r_L} = 1$, provided $\delta = k$. Otherwise, as long as δ is higher than k , the r_L will have to increase at a faster rate than the r_P . Interestingly, from equation (27) we can also infer that a higher marginal response of the lending rate with respect to the changes in the policy rate will entail lower capital requirement and/or higher loan default. Moreover, if we allow the borrowing to be interest elastic, then we will have

$$\frac{\partial r_L}{\partial r_P} = \frac{\left(1 - \frac{1}{e_b}\right)(1 - k)}{\left(1 - \frac{1}{e}\right)(1 - \delta)} \quad (28)$$

In the equation (28), $\frac{\partial r_L}{\partial r_P}$ will be positive for $e > 1$ and $e_b > 1$. Otherwise, alternative scenarios will emerge for different values of these parameters. Interestingly, for similar loan and borrowing elasticity parameters, we may not require perfect loan market to have the lending rate response to policy rate from equation (28) to be equivalent to equation (27).

2.4 Role of Asset Market

Theoretical analysis can be complicated further by postulating that the bank will engage in financial intermediation while satisfying the shareholder with a required return (r_k) on their capital ($K = kL$). The objective function without the borrowing constraint scenario will be

$$\text{Max } (V) = (1 - \delta)r_L L - (r_D - sr_G) \left(\frac{(1-k)L - B}{1-s-\theta} \right) - r_B B - \mu\delta L - r_k kL \quad (29)$$

for which the two first order conditions with respect to L and B solve for

$$r_B = \frac{r_D - sr_G}{1 - s - \theta} \quad (30)$$

$$r_L = \left(\frac{1}{1 - \frac{1}{e}} \right) \left(\frac{1}{1 - \delta} \right) [(1 - k)r_B + \mu\delta + r_k k] \quad (31)$$

Some interesting insights emerge if we set $r_B = r_P$ and allow the bank to adopt the capital asset price model, i.e. the return on capital (r_k) as a function of risk free rate (r_G) and the market risk premium (r_m):

$$r_k = r_G + \beta(r_m - r_G) \quad (32)$$

and using further equation (32), derive from equation (31)

$$\frac{\partial r_L}{\partial r_P} = \left[\left(\frac{1}{(1 - \delta)(1 - \frac{1}{e})} \right) (1 - k) \right] + \left[\left(\frac{1}{(1 - \delta)(1 - \frac{1}{e})} \right) (1 - \beta)\mu_G k \right] \quad (33)$$

In equation (33), the first term will be positive for $e > 1$. However, the second term will be positive for $\beta < 1$ and negative for $\beta > 1$. For the scenario $\beta > 1$, the first term should outweigh the second term for $\frac{\partial r_L}{\partial r_P}$ to be positive. A notable thing here is that the capital market can play a role in the transmission mechanism when banks are listed in the stock market.

3. Empirical Analysis

In our empirical analysis we have considered banks' loan pricing decisions in terms of the dependent variables bank lending interest rate (BLR). The models estimated, after incorporating the competitiveness index (Boone measure ARPD) are as follows.

$$BLR_{i,t} = \alpha BLR_{i,t-1} + \theta mp_t + \gamma ARPD_t + \beta ARPD_t * mp_t + CoF_{it} + \sum \alpha_k X_{i,t} + \eta_i + e_{i,t} \quad (34)$$

where, $i = 1 \dots n, k = 1 \dots m, t = 1 \dots T$, CoF is the cost of fund and X is the vector of control variables and bank specific characteristics viz., bank size, CRAR, loan maturity, managerial inefficiency, product diversification, return on equity, bank liquidity and asset quality. Finally, η_i is a bank-specific effect.

3.1 Sample and variables

The empirical analysis based on the dependent variable interest rate spread (IRS) rests on the assumption of a complete adjustment of loan interest rate ($r_{L,t}^1, r_{L,t}^2$ and $r_{L,t}^3$) with respect to deposit interest rate ($r_{D,t}^1, r_{D,t}^2$ and $r_{D,t}^3$) and the spread is attributable to host of other factors. In the second instance, we relax this assumption and thus, study the loan interest rate as the dependent variable as a function of various explanatory variables including the deposit

interest rate. In this context, it is useful to take note of a caveat here. In the real world, commercial banks' loan portfolio could comprise numerous borrowers with different loan interest rates, reflecting upon different characteristics of borrowers. A similar argument could hold for depositors. Accordingly, empirical research has to rely on a derived measure of loan and deposit interest rates based on banks' balance sheet data. We have experimented with three measures of loan interest rates based on annual balance sheet data for total interest income $R_{L,t}$ generated from loans and advances and the outstanding loans 'L' as shown below:

$$r_{L,t}^1 = \frac{R_{L,t}}{L_t} \quad (35)$$

$$r_{L,t}^2 = \frac{R_{L,t}}{L_{t-1}} \quad (36)$$

$$r_{L,t}^3 = \frac{R_{L,t} + R_{L,t-1}}{L_t + L_{t-1}} \quad (37)$$

The first measure BLR1 ($r_{L,t}^1$) could account for effective loan interest rate. The second measure BLR2 ($r_{L,t}^2$) recognises that the interest income earned in the current period relates to loans extended in the beginning of the year (previous year). The third measure BLR3 ($r_{L,t}^3$) recognises stock-flow (SF) concept, i.e., banks could not only earn interest income from loans extended in the previous period but also current period. In the same manner, we derived deposit interest rates ($r_{D,t}^1, r_{D,t}^2$ and $r_{D,t}^3$). As regards the explanatory variables, we have used monetary policy (mp) and regulatory variable prudential capital to risk weighted assets ratio (CRAR) consistent with India's monetary policy and banking sector regulation frameworks. For bank specific variables, we have indicators of bank size (SIZE) defined in terms of ratio of a bank's total assets to the banking industry aggregate measure; liquidity ratio, i.e., liquid assets less liquid liabilities to total assets ratio; operating cost to assets ratio as an indicator of managerial inefficiency; asset quality measured by gross non-performing loans to total loans ratio; earnings and profitability in terms of return on equity (ROE); product diversification represented by non-interest income to total asset ratio; and loan maturity defined as the share of term loans in total loans. For macro variables, we have used real GDP growth rate and inflation rate from the wholesale price index. Our sample consists of 33 banks comprising 27 public, three private and three foreign banks, which together account for the bulk of commercial banking system in India with three-fourth share in total deposits, credit, investment and other indicators. The majority of the sample comprises the public sector banks. We are not able to control for the ownership variable here due to the low number of bank sampling units under private and foreign sector bank groups.

3.2 Descriptive Statistics

Our data set is the annual accounts of 33 commercial banks over the period 1996 to 2011. The data source is RBI published 'Statistical Tables Relating to Banks in India. Table 1 and Table 2 provide descriptive statistics for bank specific and dependent variables.

Table 1: Descriptive Statistics

Year	Loan Maturity	Product Diversification	Managerial Inefficiency	Return on Equity	Liquidity	Size
1996	29.5(13.3)	1.4(0.6)	3.2(0.9)	19(23.9)	9.6(56.8)	3.0(4.7)
1997	33.0(15.3)	1.4(0.6)	2.9(0.5)	13.7(8.1)	0.5(7.6)	3.0(4.6)
1998	34.5(15.2)	1.5(0.7)	2.7(0.5)	14.9(7.2)	1.4(6.4)	3.0(4.6)
1999	35.4(12.4)	1.3(0.6)	2.7(0.5)	14.2(7.0)	-0.2(9.4)	3.0(4.7)
2000	36.1(13.1)	1.4(0.5)	2.5(0.5)	14.6(6.7)	-1.5(12.4)	3.0(4.6)
2001	36.4(11.6)	1.4(0.5)	2.7(0.5)	13.1(7.7)	-3.6(18.5)	3.0(4.8)
2002	40.3(13.1)	1.7(0.6)	2.4(0.5)	15.3(7.2)	-8.9(26.6)	3.0(4.4)
2003	43.5(12.7)	1.9(0.5)	2.4(0.4)	19.3(7.5)	-3.5(11.8)	3.0(4.3)
2004	48.1(10.7)	2.0(0.5)	2.3(0.5)	22.2(6.1)	-3.4(13.3)	3.0(4.0)
2005	53.0(11.1)	1.5(0.5)	2.2(0.6)	15.9(6.2)	-15.1(49.5)	3.0(3.8)
2006	55.3(10.9)	1.1(0.5)	2.1(0.4)	13.8(5.4)	-16.8(26.5)	3.0(3.6)
2007	58.0(11)	1.1(0.5)	1.9(0.4)	15.8(4.1)	-13.8(15.8)	3.0(3.4)
2008	57.5(11.6)	1.3(0.6)	1.7(0.5)	16.2(4.8)	-11.2(10.4)	3.0(3.5)
2009	58.2(12.4)	1.3(0.7)	1.6(0.4)	16.2(4.7)	-12.2(10.3)	3.1(3.6)
2010	57.7(12.5)	1.2(0.5)	1.6(0.4)	16.0(4.9)	-12.0(10.9)	3.1(3.5)
2011	56.5(12.1)	1.0(0.4)	1.7(0.4)	15.1(3.9)	-15.5(12.7)	3.2(3.4)

Note: Standard deviation in parenthesis

Table 2: Descriptive Statistics

Year	IRS1	IRS2	IRS3	BLR1	BLR2	BLR3
1996	5.5(1.7)	9.1(7.7)	5.1(1.1)	12.4(2.3)	17.3(9.1)	11.8(1.2)
1997	6.6(1.5)	4.2(15.2)	6.1(1.3)	14.0(2.0)	17.0(6.9)	13.3(1.8)
1998	5.1(1.4)	5.9(2.1)	5.8(1.3)	12.1(1.4)	14.7(2.1)	13(1.5)
1999	4.5(1.1)	5.0(1.5)	4.7(1.1)	11.7(1.4)	14.0(1.9)	11.9(1.3)
2000	3.8(0.9)	5.2(1.8)	4.1(0.9)	10.9(1.0)	13.7(1.8)	11.2(1.1)
2001	3.8(1.1)	5.0(1.7)	3.8(1.0)	10.7(1.0)	13.0(1.3)	10.8(0.9)
2002	3.1(1.4)	4.4(1.8)	3.3(1.3)	9.6(1.6)	12.1(1.6)	10.0(1.5)
2003	3.5(1.1)	4.1(0.9)	3.3(0.9)	9.4(0.9)	11.0(1.3)	9.5(0.9)
2004	3.4(1.0)	4.2(1.2)	3.5(1.0)	8.2(0.9)	9.8(1.1)	8.8(0.9)
2005	3.2(0.9)	5.3(3.9)	3.3(0.9)	7.3(0.8)	10.1(3.6)	7.7(0.9)
2006	3.3(1.0)	4.8(1.0)	3.2(0.9)	7.3(0.5)	9.6(0.7)	7.3(0.5)
2007	3.5(0.9)	4.9(1.2)	3.4(0.9)	8.0(0.6)	10.5(0.8)	7.7(0.5)
2008	3.5(1.2)	4.5(1.6)	3.5(1.1)	9.0(0.8)	11.2(1.1)	8.5(0.7)
2009	4.1(1.6)	4.9(1.8)	3.8(1.4)	9.8(1.3)	11.9(1.5)	9.4(1.0)
2010	3.8(1.4)	4.3(1.2)	3.9(1.5)	8.9(0.9)	10.3(0.8)	9.3(1.1)
2011	3.9(0.8)	5.0(0.9)	3.9(1.1)	8.6(0.7)	10.5(0.8)	8.7(0.7)

Note: Standard deviation in parenthesis

Table 1 shows an improvement in managerial efficiency of banks in terms of operating cost to income ratio. However, the return on equity variable showed greater cross-section variability than loan interest rate spreads. The non-interest income ratio, reflecting product diversification, showed an increasing trend during 1996-2007 and some moderation thereafter. The size variable exhibited steady trend during the sample period, reflecting banks' ability to maintain their competitiveness in financial intermediation. Banks, however, showed substantial variation in terms of net liquidity ratio than loan and deposit interest rates. Loan maturity showed an increasing trend during the sample period. Loan interest rate and their spreads over deposit interest rates showed some moderation during 2002-2007 as compared with the late 1990s (Table 2). For the more recent period from 2008, loan spreads have shown some firming up as compared with the first half of the 2000s but they remain lower than the late 1990s. This trend also was observed in terms of cross-section variability (standard deviation) of loan interest rates and spreads. Deposit interest rates more or less showed lower variability than loan interest rates during the late 1990s, except the year 1997.

3.3 Results

Empirical findings on alternative measures of loan interest rate and its spread are presented in Tables 3 and 4. The results give interesting insights about the determinants of banks loan pricing decisions. Comparing the maximum likelihood value of all the three interest rate specifications, we found that the third specification has the highest value, then the next highest is for first specification and the least value is for the second specification in the static framework of panel regression. So we can conclude that the third specification is the better proxy which could be used to measure the lending rate.

Table 3: Determinants of Interest rate spread(IRS)

Variables	IRS1			IRS2			IRS3		
	Coef.	Std. Err.	z	Coef.	Std. Err.	z	Coef.	Std. Err.	z
Interest Rate spread									
IRS(t-1)	0.192***	0.035	5.500	0.030***	0.010	-3.110	0.483***	0.018	26.480
Policy Rate(mp)	0.330***	0.018	18.760	0.426***	0.012	34.170	0.256***	0.011	24.330
Competitiveness Index(ARPD)	-	0.076	-9.590	-0.141**	0.059	-2.400	0.626***	0.034	18.690
mp*ARPD	-	-	-	-	-	-	-	-	-
	0.504***	0.049	10.210	0.807***	0.086	-9.380	0.555***	0.028	19.200
Loan Maturity	-	-	-	-	-	-	-	-	-
	0.018**	0.007	2.420	0.033***	0.004	-7.790	0.007***	0.002	2.850
Managerial Inefficiency	0.373***	0.059	6.310	0.731***	0.113	6.450	0.189***	0.045	4.230
Product diversification	-	-	-	-	-	-	-	-	-
	0.292***	0.074	-3.970	-0.100	0.065	-1.530	0.320***	0.072	-4.450
Return on equity	0.017***	0.005	3.370	0.009	0.005	1.580	0.003	0.003	0.950
size	-	-	-	-	-	-	-	-	-
	-0.176	0.110	-1.600	0.192***	0.057	-3.360	0.150***	0.051	-2.940
Bank liquidity	-	-	-	-	-	-	-	-	-
	0.006***	0.002	2.770	0.064***	0.001	58.970	0.007***	0.001	4.580

Table Continued

Asset quality	0.003	0.013	0.240	0.112***	0.008	14.230	0.005	0.006	0.920
CRAR	0.002	0.021	0.100	0.076***	0.012	6.500	0.008	0.012	0.730
GDP growth	0.040***	0.015	2.690	0.024**	0.011	2.090	0.053***	0.006	8.590
Inflation	0.184***	0.013	14.190	0.168***	0.009	18.310	0.128***	0.007	18.410
Intercept	0.933***	0.077	12.090	0.370	0.624	0.590	0.821***	0.063	12.870

Note: ***, ** and * indicate the level significance at the 1%, 5% and 10%, respectively.

Table 4: Determinants of Bank Lending Rate (BLR)

Variables	BLR1			BLR2			BLR3		
	Coef.	Std. Err.	z	Coef.	Std. Err.	z	Coef.	Std. Err.	z
Bank Lending Rate									
BLR(t-1)	0.083***	0.028	2.960	0.046**	0.020	2.270	0.243***	0.021	11.740
Policy Rate(mp)	0.266***	0.023	11.350	0.350***	0.018	19.510	0.310***	0.013	23.500
Competitiveness Index(ARPD)	-			-0.048	0.122	-0.400	0.223***	0.050	-4.490
mp*ARPD	-			-			-		
Cost of deposit funds	0.618***	0.109	-5.650	-0.576**	0.196	-2.940	0.644***	0.090	-7.200
Return on investment	1.238***	0.025	49.830	0.898***	0.041	21.870	1.029***	0.023	44.560
Loan Maturity	-			-			-		
Managerial Inefficiency	0.376***	0.027	13.860	0.082**	0.026	3.150	0.346***	0.030	11.560
Product diversification	0.018***	0.007	2.650	-0.017**	0.007	-2.500	0.008*	0.004	1.690
Return on equity	1.026***	0.164	6.250	0.507**	0.203	2.500	0.625***	0.069	9.030
size	-			-			-		
Bank liquidity	-0.185**	0.074	-2.500	0.192	0.136	1.410	0.224***	0.033	-6.790
Asset quality	0.015**	0.005	3.250	0.005	0.008	0.670	0.001	0.003	0.210
CRAR	-			-			-		
GDP growth	0.218***	0.045	-4.800	0.153***	0.043	3.600	-0.112	0.085	-1.320
Inflation	0.007***	0.002	3.610	0.055***	0.003	16.360	0.009***	0.001	7.260
Intercept	0.059***	0.012	5.030	0.092***	0.015	-5.950	0.008	0.005	1.550
	0.050***	0.016	3.100	0.047***	0.014	3.290	0.051***	0.012	4.260
	0.116***	0.016	7.390	0.027**	0.013	2.010	0.077***	0.009	8.230
	0.162***	0.017	9.690	0.157**	0.015	10.600	0.086***	0.009	9.120
	1.629**	0.667	2.440	2.463***	0.979	2.520	0.774*	0.424	1.820

Note: ***, ** and * indicate the level significance at the 1%, 5% and 10% , respectively.

First, regarding the interest rate pass-through or the impact of policy rate on loan interest rate, the policy rate has a statistically significant positive effect on loan interest rates but the magnitude of impact, as measured by the size of the coefficient of policy rate, is quite moderate. This suggests an imperfect monetary transmission mechanism and the rigidity in loan pricing decisions of banks due to various factors as explained by the other control variables. Apart

from rigidity in loan markets, the low pass-through of policy rate could be attributable to central bank's liquidity management and monetary policy communication and transparency (Poirson, 2009). Second, the interest rate pass-through depends significantly on the competitiveness index. The impact of competition on interest rate pass-through for IRS specifications varies from 0.51-0.81 whereas for BLR it ranges 0.58-0.64. Both of these are negative and highly significant. The short term interest rate pass-through for one standard deviation competitiveness index shock ranges from 22 to 31 per cent for IRS specification and 21 to 36 per cent for BLR specification. The long run (dynamic) pass-through coefficient could be calculated using ($\frac{\theta + \beta * ARPD_t}{1 - \alpha}$) formula. The long run interest rate pass-through under IRS varies from 8 to 16 per cent whereas under BLR pass-through varies from 8 to 60 per cent for the mean ARPD level 0.385. The interest rate pass-through is lower in the case of IRS as compare to the BLR. The BLR model explains that the cost of fund is fully recovered while pricing the loan. A positive policy shock lead to increase in the cost of fund and hence the lower spread. The spread depends on the difference between the lending rate and the cost of fund and not only between lending rate and the deposit rate. Further the coefficient of the competitiveness index is higher in the IRS specifications (1 and 3) as compared to BLR (1 and 3). This indicates that there is possibility of two way competition. The one could be in the deposit market and another in the loan market. This leads to lower pass-through in IRS whereas higher in the BLR pass-through. Additionally, the lag effect (persistence) is higher in the IRS specification which could lead to lower pass-through. Third, banks recover the cost of deposit funds from borrowers and earn a positive spread. This is captured by the intercept term in Table 3. The intercept terms varies between 0.37 to 0.93 percentage points. Alternatively, the pass-through of cost of funds is reflected in the coefficient of deposit interest rate in the loan interest rate equations in Table 4. Here, the coefficient varies from 0.90 to 1.2 under the different scenarios mentioned in Section 3. The second specification of the interest spread is not significant for the intercept term whereas the coefficient for BLR1 is significant and positive. Fourth, the capital to risk adjusted assets ratio (CRAR) has a statistically significant positive effect on loan pricing. An interesting aspect of CRAR impact is that it is higher under BLR1 and BLR3 specifications. The positive impact of CRAR on loan pricing is consistent with various other studies. According to Saunders and Schumacher (2000), banks hold capital to insulate themselves against both expected and unexpected credit risk, and therefore, it reflects banks' risk aversion. Specifically, while capital requirements constitute the minimum level, banks often endogenously choose to hold more capital against unexpected credit losses or market discipline may induce them to hold more capital (Flannery and Rangan, 2004). However, holding equity capital is a more expensive funding source than debt (because of tax and dilution of control reasons). Thus, banks that have a relatively high capital ratio for regulatory or credit reasons can be expected to seek to cover some of the increase in the average cost of capital by operating with higher loan interest rate and its spread over deposit interest rate. Berger (1995) finds that there is no relationship between ROE and capital during normal times, which may reflect the fact that the smaller competitive advantage of capital during normal times may be offset entirely by the negative mechanical effect of higher capital on ROE. Gambacorta and Mistrulli (2004) suggested that bank capital is a potentially critical factor affecting banks' behaviour, particularly in times of financial stress and showed that bank capital affects lending even when regulatory constraints are not binding and that shocks to bank

profits, such as loan defaults, can have a persistent impact on lending. Another viewpoint is that since capital is considered to be the most expensive form of liabilities, holding capital above the regulatory minimum is a credible signal of creditworthiness on the part of the bank (Claeys and Vennet, 2003) and thus, it is expected to have positive influence on banks' loan interest rates. Fifth, a positive relationship, *a priori*, is expected between asset quality variable and bank loan interest rate, reflecting the notion that banks tend to push the cost of nonperforming loans to customers. Moreover, a neoclassical finance theory perspective entails that higher credit risk is expected to be associated with higher return in terms of loan interest rate. A contrarian perspective entails that banks are likely to follow softer loan interest rate policy in order to avoid more loan defaults. But our results show that the effect is not consistent in loan pricing or in the determination of spread. Asset quality of loans and advances as reflected in gross non-performing loans ratio is statistically significant and positive in IRS1/BLR1 and IRS3/BLR3, the two specifications of loan interest spread and bank lending rate but has a negative impact in the second specification under both the spread and lending rate measures. The negative impact of asset quality on loan interest rate spread could reflect regulatory features that strengthen the contrarian perspective. Sixth, managerial efficiency which is measured by non-interest operating expenses to average assets ratio, captures expenses in processing loans and the servicing of deposits. In addition, some portion of operating cost may arise on account of non-funded activities with regard to a variety of banking transaction services. Thus, two scenarios are possible. One, banks may recoup some or all of such costs by factoring them into loan pricing. Two, banks may recover a portion of such costs from non-funded activities by way of other non-interest income, thereby, charging only a fraction of operating cost to loan interest rate to borrowers. As per the analysis, we found that a positive effect of managerial inefficiency, i.e., higher operating cost ratio on loan interest rates and their spread over deposit interest rates. From the Tables 3 and 4, we can see that the operating cost put on average 50 to 100 percentage point weights on the loan pricing which is positive and highly significant. This is a critical finding because such effects persist in the presence of non-interest income variable, characterising product diversification. Seventh, a stable and sustainable banking system entails that banks should earn sufficient profit to satisfy shareholders while keeping credit and liquidity risks under tolerable levels. The return on equity (ROE) measures the rate of return on the money invested by common stock owners and retained earnings by the bank. It demonstrates a bank's ability to generate profits for shareholders' equity (also known as net assets or assets minus liabilities). In other words, ROE shows how well a bank uses investment funds to generate growth. Interest income is clearly a function of the yield curve and credit spreads posited under the stress scenario, but what the net impact of rising or falling rates are on bank profitability remains ambiguous, perhaps in part because of interest rate hedging strategies (English 2002). Bikker and Hu (2002), found that provisioning for credit losses rises when the cycle falls, but less so when net income of banks is relatively high, which reduces procyclicality. As expected it is positive in all the specifications but is significant under first specification (IRS1/BLR1). From the Table 3 and 4, we see that the coefficient varied from 0.1 per cent to 1.5 per cent under different scenarios viz. current loan interest rate, lagged loan interest rate spread and stock-flow measure of loan interest rate. Eighth, the role of liquidity is found to be very important in loan pricing behaviour of banks. As the liquidity ratio increases, liquidity risks increase, implying a higher margin set by banks. Our results show a positive and significant differential impact of banks' liquidity with

regard to differential measure of loan interest rates. However, banks with more liquid assets are expected to find it easier to fund loans on the margin, so there may be a negative sign for this variable. Under the second specification we have a negative and significant impact of liquidity on loan pricing. Product diversification measured by the non-interest income variable has a significant negative coefficient in all our panel data estimations suggesting possible cross-subsidization of traditional lending activities. However, Stiroh and Rumble (2006) have shown that diversification gains are frequently offset by the costs of increased exposure to volatile activities. The results in Tables 3 and 4 shows that the coefficient of non-interest income (the income share of commission and fee income) are negative and significant. Our results are consistent with the hypothesis that banks decrease their lending rate when they are more reliant on fee generating products. The coefficient ranges from 18percent to 22percent depending on the lending rate structure chosen for the analysis. Under the case of interest rate spread, the coefficient ranges from 10percent to 32percent, which is significant under all the three specification. The role of loan maturity in loan pricing derives from the terms of lending and management of asset-liability mismatches (Ranjan and Dhal 2003). In the Indian context, the introduction of maturity-based pricing reflects bank's continuous commitment to safeguard its financial strength based on sound banking principles, while striving to provide resources for development lending at the lowest and most stable funding costs and on the most reasonable terms. Brock and Franken (2002), found matched maturity spreads are conceptually similar to bid-ask spreads in securities markets, an idea that was originally put forward by Ho and Saunders (1981). In contrast, the long spread captures the premium that banks charge for bearing duration risk. The brokerage function and term transformation functions of banks are blurred in the Net Interest Margins (NIMs) and Average Spreads, since all interest income and expenses are aggregated to create implicit returns on assets and liabilities. Nevertheless, the NIM and the Average Spread are important because aggregation highlights the overall profitability of bank management across different loan and deposit activities, as well as the role of noninterest income activities. According to Segura and Suarez (2012) banks' incentive is not to set debt maturities as short as savers might *ceteris paribus* prefer, however, it comes from the fact that there are events (called systemic liquidity crises) in which their normal financing channels fail and they have to turn to more expensive sources of funds. In this context, we find that the coefficients are positive and significant in first and third specifications of the model. The coefficient of the maturity ranges from 0.1 per cent to 2 per cent, which indicates that in Indian banking system, there is no evidence of discount to the customers to keep a long term relationship and hence, pricing is done accordingly. Lastly, on the bank specific variables, bank size is normally important in the loan price decision of banks. According to the literature, larger banks are expected to have greater market power and better access to government safety net subsidies relative to smaller banks. Relatively smaller banks may be at a competitive disadvantage in attracting the business of larger loan customers. Accordingly, bank size is expected to influence bank's lending activities differentially. However, our results show differential negative effects of bank size on different measures of loan interest rate and its spread over corresponding deposit interest rate. The theoretical model predicts a positive relationship between the size of operations and margins, since for a given value of credit and market risk, larger operations are expected to be connected to a higher potential loss. On the other hand, economies of scale suggest that banks that provide more loans should benefit from their size and have lower margins. Therefore, we do not have particular prior information

regarding the expected sign of this coefficient. The coefficients of size range from 11% to 22% under the bank lending rate whereas it ranges from 15% to 19% under the interest spread. In the Indian context only the State Bank of India has a bigger size (22%) and rests are within the range of 1 to 5 per cent. So the loan pricing power may not be working due the competition in the loan market in India. Macroeconomic factors such as growth and inflation are expected to influence the loan market from demand as well as supply sides. From a theoretical standpoint, there is a positive relationship between economic activity and banks' spreads. As the economy expands, the demand for loans increases and this in turn can lead to higher lending rates, which can serve to widen spreads. This in turn can exert upward pressure on lending rates and in turn, banks' spread. Bikker and Hu (2002), emphasis on the bank profitability and business cycle relationship and found that profit appears to move up and down with the business cycle, allowing for accumulation of capital in boom periods. Provisioning for credit losses rise when the cycle falls, but less so when net income of banks is relatively high, which reduces procyclicality. Economic activity is proxied by the growth rate of real gross domestic product. Within Indian context, the expected sign is positive. The coefficient ranges from 9 to 19 per cent depending on various measures of spreads and lending rates. This is consistently positive and significant. On the other hand, inflation is included because if inflation shocks are not passed on equally in terms of magnitude as well as speed to deposit and lending rate, then the spread would change. As expected the impact of inflation on interest spread is positive and significant.

4. Conclusion

This paper endeavoured at providing a theoretical analysis of optimal loan pricing by the commercial banks in an environment of regulatory requirements. The paper demonstrated that regulatory parameters impinging on the banks' balance sheet could influence optimal lending rate response to the policy rate. A key finding was that the policy rate alone cannot bring about the desired changes in the banks' lending rates. Several other factors such as the interest elasticity of loans, the deposit interest rate, government securities' yield, loan defaults and regulatory and prudential norms such as capital requirement and provisioning could play an important role. Theoretically, it could be possible for the banks to subsidise loans and adjust loan interest rate in the opposite direction to the policy rate under certain conditions. From policy perspective, the paper also demonstrated that in line with optimal problem faced by the banks, the alignment of the policy rate with the lending rate could be determined by parameters such as the interest elasticity of loan, the loan default risk, the prudential capital requirement, and the response of yield on government securities to the policy rate. Additionally, for a stock exchange listed bank, the parameter 'beta' measuring the response of bank stock return to the market risk could also affect lending rate response to the policy rate. According to the literature, the interest elasticity of loans could depend upon the competitiveness of credit market and macroeconomic developments. Default risk could depend upon macroeconomic conditions and the institutional mechanism for debt resolution. Thus, we conclude that a calibrated approach for monetary transmission mechanism may be required, i.e., changes in the policy rate could be accompanied by appropriate and adequate regulatory and prudential parameters to achieve desired changes in the banks' lending rates. Theoretical analysis brought to the fore various critical insights. Three major insights are as follows. First, there can be a trade-off between regulation and effectiveness of transmission mechanism

and competitiveness of the loan market. Second, theoretically it is possible for banks to banks to engage in subsidisation of loans against investment in risk free government securities. Third, the capital market could be linked to monetary transmission mechanism if banks were subject to a required return on their capital base. At a time when a great deal of discussion is going on whether to regulate banks more than ever before, theoretical insights of the paper will contribute to this discourse. As regards the limitations of this study, this paper confined to standard comparative static analysis. Such a simplistic framework could be justified when commercial banks, especially, in developing economies, may not be well versed with complicated balance sheet management. Nevertheless, for future research, the analysis of banks' behaviour in terms of dynamic optimisation, alternative risk pricing, financial innovations and endogenous default risk approaches incorporating regulatory requirements may provide further insights for policy purposes. We investigated the commercial banks' loan pricing decisions which could be influenced by host of factors, using dynamic panel data methodology and annual accounts data of 33 commercial banks over the period 1996 to 2011. The determinants of loan interest rate and spreads were classified into (i) regulatory and policy variables such as banks prudential regulatory variables, repo rate (ii) bank specific variables pertaining to capital adequacy, asset quality, managerial efficiency, earnings, liquidity, bank size, loan maturity, cost of funds, competition and (iii) macro variables including the rate of growth of GDP and WPI inflation rate. Our main finding is that bank spreads are positively impacted by the policy indicators. At the same time, loan interest rate is influenced by various market structure, bank specific and macro factors. More competition reduces transmission by reducing the loan rate but a positive policy shock increases the cost of fund and reduces the spread. The interaction between policy rate and the competition in the banking sector had a negative and highly significant coefficient, which is the impact of competition on interest rate pass-through. Regarding the bank specific variables, loan interest rates and their spreads showed statistically significant positive relationship with operating cost, profitability and capital adequacy, loan maturity, asset quality, bank size and liquidity indicators. Macro variables such as GDP growth and inflation rate showed positive impact on loan interest rates. Reform has had mixed effects, while managerial inefficiency raises rates and spreads and product diversification reduces both. Costs of deposits are passed on to loan rates. Regulatory requirements raise loan rates and spreads. These findings highlight the roles of operating efficiency, risk aversion, asset-liability management, and credit risk management in commercial banks loan pricing decisions.

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