Interest Rate Pass-through and Determinants of Commercial Banks' Loan Pricing Decisions in India: Empirical Evidence from Dynamic Panel Data Model

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Commercial banks' loan pricing decisions can be useful for policy purposes from the perspectives of effective financial intermediation, stability of financial system, economic stability and monetary transmission mechanism. Taking cues from the large literature and using the dynamic panel data methodology and annual data for a sample of 33 banks including public, private and foreign banks over the period 1996-2011, this study provides an empirical reflection on the interest rate channel pass-through and the impact of various bank specific factors, regulatory and supervisory indicators and macroeconomic factors on Indian banks' loan pricing decisions. The empirical analysis brings to the fore some useful applied perspectives and key insights for policy purposes. Firstly, proximate determinants can have differential effects on banks' loan pricing decisions depending upon alternative measures of loan interest rate and spreads. This is a critical finding as it will provide insights to future empirical studies. Secondly, the pass-through from the policy rate to loan interest rates could be limited when commercial banks consider several factors including the policy rate for their loan pricing decisions. Moreover, the problem of pass-through evident from differential impacts of interbank money market rate and the repo rate could relate to the alignment between liquidity and interest rate channels of transmission mechanism. Thirdly, banks' operating efficiency holds the key to softer margins and effective loan pricing decisions in the Indian context. Fourthly, higher capital charge can induce risk aversion and positively affect loan interest rate. Fifthly, the absence of clear statistically significant and positive impact of the asset quality variable, i.e., non-performing loans, suggests that there is a need for strengthening risk pricing culture in the Indian context. Finally, bank size variable, which is often considered for gauging economies of scale effect, does not hold for the Indian context. It is expected that the empirical findings of the paper could be useful for reform and policy purposes.

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Keywords: Banks, depository institutions, panel data, interest rates, net interest income, operating cost, non-interest income

1. Introduction

An understanding of commercial banks' loan pricing decisions assumes importance for policy purposes in various ways. Firstly, the price discovery in the loan market as measured by loan interest rates and their spreads over deposit interest rate and risk free yield on government securities can relate to competitiveness and efficiency of banks in financial intermediation through mobilisation of deposits from saving households and allocation of funds to investors for productive activities. Thus, loan interest rates can be associated with economic growth and macroeconomic stability (Levine, 1997). Secondly, loan interest rates can be associated with banks' loan asset quality and credit risks which have implications for the stability of a bank based financial system. Thirdly, for successful conduct of monetary policy through the interest rate channel by the authorities, it is required that commercial banks should adjust loan interest rates in tandem with policy actions. However, the policy interest rate can constitute only one of the several factors considered by banks in the determination of loan interest rates. Numerous studies have explained the rigidity in banks' lending decisions in response to policy shock (Dhal, 2010). For policy purposes,

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thus, it is necessary to understand which factors are important in influencing banks' loan pricing decisions.

The above perspectives influenced us for studying banks' loan interest rates and their spreads in the Indian context. There are various motivations for studying the Indian context in particular. India is the second largest emerging market economy with a predominantly bank-based financial system. In the wake of balance of payment crisis two decades ago, India adopted reform with a focus on the financial sector. The thrust of reform in the banking sector encompassed operational freedom to banks through liberalization of interest rates and credit allocation, shift to the operating framework of monetary policy with interest rate and liquidity adjustment facility as instruments for monetary management, adoption of prudential regulation and supervision framework in line with international benchmark such as the Basel standard, promoting competition in the banking sector through participation of new private sector banks, development of financial markets through instrument innovation and wider participation of banks and non-banks and institution of modern payment and settlement infrastructure. All these developments are expected to have implications for the loan pricing decisions of the banks. However, loan pricing decisions of banks have come under scrutiny on several occasions. Illustratively, in the wake of recent global crisis in 2008-09, the Reserve Bank of India pursued a softer interest rate policy stance to stimulate the economy by slashing the policy rate by 475 basis points. Banks' response was inadequate with lending rates declining by 100 to 250 basis points. Subsequently, the RBI raised the policy rate 13 times as the inflation condition hardened. This time, banks did not respond adequately in revising deposit and lending rates. Recognising the policy pass-through problem, the Reserve Bank of India set up a committee to review the system of benchmark prime lending rate. Based on the recommendations of the committee, a base rate system was introduced with effect from April 2010. A year later, the RBI set up another committee to look into banks' pricing decisions and credit risk management in the wake of rising non-performing loans and corporate debt restructuring. In this milieu, for policy purposes, it is important to understand the proximate determinants which influence banks' loan pricing decisions. Moreover, studies on the subject are non-existent in the Indian context. In the following, the study is presented in four sections. Section 2 presents the review of literature. Section 3 outlines the methodology and data used in the study. Section 4 presents summary statistics followed by empirical findings. Section 5 concludes the study.

2. The Literature

A large literature exists on the subject of commercial banks' loan pricing decisions, inspired by the seminal works of Klein (1971) and Monti (1972), Ho and Saunders (1981). Klein (1971) and Monti (1972) provide the firm theoretic approach. Their models postulate the banking firm in a static setting where demands and supplies of deposits and loans simultaneously clear both markets. The banking firm framework has been further explored by Zarruk (1989) and Wong (1997). Another important contribution is that by Carbó and Rodríguez (2007). The authors develop the theoretical model by including both traditional and non-traditional activities, with the aim of studying the effect of specialization on bank margins in Europe using a multi-output model. In order to do this, they estimate a dynamic model taking into account the fact that banks need to match the random supply of deposit with the random demand of lending and non-traditional activities.

Ho and Saunders (1981) developed a dealership model in which banks were assumed to be risk-averse utility maximizing intermediaries for collecting deposits and granting loans over a single-period. Transaction uncertainty arising due to the asymmetry between the supply of deposits and demand for loans and market power were considered two significant factors driving interest margins. Ho and Saunders (1981) also empirically estimated the model for the U.S. banks, using a two-step approach. In the first step, a regression model explained bank interest margin in terms of bank-specific factors such as implicit interest rate, opportunity cost of reserves, default premium, operating costs, and capital-asset ratio. The constant term of this regression represented an estimate of the 'pure spread' component for the banks, i.e. the portion of the margin that cannot be explained

by bank-specific characteristics. In the second stage, they estimated a regression of pure spread against variables reflecting macroeconomic factors. The inclusion of a constant term in second step aimed at capturing factors that are neither bank-specific nor macroeconomic in nature but attributable to market structure and risk aversion.

The dealership model was further extended and modified by McShane and Sharpe (1985), Allen (1988) and Angbazo (1997). McShane and Sharpe (1985) considered interest uncertainty from loan and deposit returns to money market rates. Allen (1988) extended the model for various types of loans with interdependent demands. Angbazo (1997) introduced credit and interest rate risk and interaction between the two into the theoretical model. The dealership model has been criticised on the grounds that it failed to recognize the bank as a firm having a certain production function associated with provision of the intermediation services (Lerner, 1981). The presence of cost inefficiencies associated with the production process across banks can have a distortionary effect on the margin. Thus, Maudos and Fernández de Guevara (2004) made an interesting contribution while expanding the theoretical model by considering the importance of operating costs, market power (Lerner index) and providing a detailed description of the link between riskiness and the margin. Their model specifically differentiated between market risk and credit risk, as well as their interaction as separate factors affecting the margin. The model was then estimated empirically for the main European banking sectors in the period 1992-2000. The opportunity cost variable (OC) is approximated, by the yield on Government securities investment. This variable is included in the profitability equation to reflect the substitution effect among different bank assets, and more specifically to capture the impact of changing remuneration conditions of substitutable assets for the traditional loans granted by banks (the assets for which banks are price-takers). The expected effect of this variable on bank net margin is unknown (Wong, 1997) and depends on the position (net lender or borrower) of the bank in the money market (Angbazo, 1997).

Deriving from theoretical models, empirical studies have applied various types of econometric models including ordinary least square, pooled least square (Demirguc-Kunt and Huizinga 1999, Angbazo 1997), fixed effect and random effect panel regression (Naceur and Goaied 2004, Maudos and Guevara 2003, Maudos and Solisc 2009, Hamadi and Awdeh 2012, Afanasieff *et.al.,* 2002) and dynamic panel data technique (Liebeg and Schwaiger 2007, Hossain, 2010). Studies have argued that while fixed effect or random effect panel regression models suffer from short-panel bias, other regression models may not be appropriate to capture some unobserved characteristics of firms, such as managerial risk aversion, revealed preferences, governance structure etc. Ignoring unobserved firm-level heterogeneity imposes incorrect assumption of zero correlation, leading to biased and inefficient estimates. One of the ways to handle the problem is to capture persistency in spreads and a dynamic panel regression model, therefore, is useful in this regard. Moreover, it appears that more country-specific and cross-country analysis can contribute to increased understanding of the determinants of interest spreads and margins. To deal with this variation, some empirical studies apply a two-stage approach that isolates impacts of various imperfections not taken into account in the theoretical model before modelling the remaining 'pure spread' as a function of the theoretically motivated factors (Saunders and Schumacher, 2000). Consequently, empirics across the globe have taken different factors and approaches and have reached varied conclusions with respect to the determinants of loan pricing. This is because empirical studies usually cover banks located across countries with different institutional and economic characteristics, thus complicating the comparison with respect to the effects of various factors across countries. For instance, there is great variation in factors such as implicit and explicit taxation (level of statutory reserve requirements), managerial efficiency, bank capitalization, and market competition across developed and developing countries. According to Zarruk and Madura (1992), the required ratio of capital-to-deposits is assumed to be an increasing function of the amounts of domestic and foreign loans, respectively, held by the bank at the beginning of the period.

Broadly, the factors concerning the loan pricing can be summarized under four broad categories: (i) bank specific factors (ii) institutional, policy and regulatory factors (iii) market

structure, and (iv) macroeconomic factors. Bank specific factors such as bank size, capitalization, liquidity, managerial efficiency, operating expenses, loan quality, deposit growth, interest rate risk, credit risk, ownership, non-interest incomes, and risk aversion are identified by multiple studies as the important determinants of interest margins. Regulatory and institutional factors subsume determinants such as implicit and explicit taxation (reserve requirements), central bank discount rate, and inter-bank rate. The market structure focuses on the competition in the banking sector (market power), bank concentration, and financial sector liberalization. Market concentration ratio or Lerner Index is often used to capture monopolistic competition in the sector. Finally, the macroeconomic view focuses on inflation rate, GDP growth, exchange rate, interest rate policies, gross national savings, and investment and capital formation as factors driving interest spreads and margins in the banking system.

Studies provide mixed perspectives on the impact of these variables on loan pricing. Illustratively, Leibeg and Schwaiger (2007) in a study of Austria and Hossain (2010) for Bangladesh found the negative influence of bank size on interest rate margins. On the contrary, Demirguc-kunt *et.al.,* (2004) in a cross-country study showed high net interest margins tend to be positively associated with market share of banks. Similarly, Berger and Humphrey (1997), and Altunbas *et.al.,* (2001) found economies of scale for larger banks whereas Vennet (1998) and Pallage (1991) found economies of scale for small banks or diseconomies for larger banks.

High interest margins and profitability tend to be associated with banks that hold relatively high amount of bank capital. This is consistent with the fact that banks with higher capital ratios tend have lower cost of funding due to lower prospective bankruptcy costs. Besides, banks with higher equity capitals need to borrow less in order to support a given level of assets (Demirguc-Kunt and Huizinga, 1999, Naceur and Goaied, 2003). However, Hamadi and Awdeh (2012) in their study of Lebanon banks found that capitalization is negatively correlated with net interest margins for domestic banks.

With regards to quality of management, Estrada *et.al.,* (2006) argue that interest margin is positively affected by inefficiency. Similar studies by Hamadi and Awdeh (2012), Maudos and Guevara (2003), and Maudos and Solisc (2009) postulate that efficiency/quality of management is negatively correlated with net interest margin.

The ownership of banks matter too. Peria and Mody (2004) in their study of Latin America showed that foreign banks were able to charge lower spreads relative to domestic banks implying that international ownership of banks has a significant impact on bank spreads. In contrast, Demirgue-Kunt and Huizinga (1998) argued that the technological edge of foreign banks was strong enough to overcome any informational disadvantages in developing countries. Thus, foreign banks were found to realize higher interest margins and profitability than domestic counterparts.

Credit risk shows both negative and positive impact. Liebeg and Schwaiger (2007), Williams (2007), and Hamadi and Awdeh (2012) provided evidence of a negative impact of credit risk on the interest margin. On the contrary, Maudos and Guevara (2003), and Maudos and Solisc (2009) showed a positive sign for credit risk as well as interest rate risk.

Other bank-specific factors also explain a part of the intra-country variations in bank interest margins. Hamadi and Awedh (2012) concluded with liquidity negatively correlated with net interest margins for domestic banks. However, Doliente (2003) in his study of Southeast Asia held a divergent view, while showing margins to be partially explained by liquid assets.

Coming to operating cost, risk aversion and loan quality, Liebeg and Schwaiger (2006), Maudos and Guevara (2003), Maudos and Solisc (2009), Doliente (2003), Mannasoo (2012) and Hossain (2010) in their respective studies show a positive impact of either one or all of these variables on interest margin. Implicit taxes include reserve and liquidity requirements whose opportunity cost tend to be higher as they are remunerated at less than market rates. Thus, they reduce interest margins and profits, especially in developing countries. Hossain (2010) too reasons that liquidity reserve requirement key determinant of persistently high interest margins. In contrast, explicit taxes translate into higher interest margins. Studies suggest that corporate tax is fully passed on to

customers in poor as well as rich countries. This is aligned with the common notion that bank stock investors need to receive a net of company tax returns that is independent of the company tax (Demirguc-Kunt and Huizingia, 1999).

On the impact of competition, most of the empirical studies on banking structure generally produce ambiguous results. Studies like Liebeg and Schwaiger (2007), Maudos and Guevara (2003), and Maudosa and Solisc (2006) demonstrated that competition in banking sector positively affected interest margin. Chirwa and Mlachila (2004) found that interest rate spreads in Malawi increased significantly after implementation of financial liberalization reforms partially due to high monopoly power within the industry which effectively stifled competition. They concluded that high interest rate spreads in developing countries will persist if financial sector reforms do not alter the structure of banking system. Estrada *et.al.,* (2006) and Mannasoo (2012) provided evidence in support to this argument and concluded with market power as a key determinant of interest margin. Mendoza (1997) identified the low level of competition in the Belizean banking system as a primary reason for a higher interest spreads than in Barbados, a country with similar exchange rate regime and high reserve requirement.

As regards to concentration, margins have been found to be positively related to the degree of market concentration (Saunders and Schumacher 2000, Maudos and Guevara 2004, Angbanzo 1997, McShane and Sharpe 1985, Williams 2007, Berger and Hannan 1998, Hannan and Berger 1991, Neumark and Sharpe, 1992). Others disagree. Hamadi and Awdeh (2012) report a negative and significant correlation between concentration and margin. Smirlock (1985) and Graddy and Kyle (1979) also find that interest rate spreads are narrower in concentrated banking systems, while Keeley and Zimmerman (1985) report more mixed results. Nevertheless, Berger *et.al.,* (1998) find that the best performing banks are generally not located in highly concentrated markets.

The empirical evidence regarding the impact of financial liberalization on spreads is also debated. Barajas *et.al.,* (2000) note the role of financial liberalization in improving market competition in Colombia that resulted in lower interest margins and better financial intermediation. Honohan (1999), Fuentes and Basch (1997), and Denizer (1999) also provide supporting evidence. However, Chirwa and Mlachila (2004) find the opposite scenarios. The contrasting evidence can be attributed to the degree of financial reforms, regulatory framework in place, institutional strength and other country-specific factors. Dabla-Norris and Floerkemeier (2007) found that foreign banks over all do not contribute to lower spreads and margins in the case of Armenia. However, their origin matters for banking efficiency. While presence of foreign banks from developed countries is associated with lower spreads, the presence of foreign banks from developing countries is associated with higher spreads in Armenia.

There is also a consensus among studies that macroeconomic factors can play important role in influencing banks' behaviour. Afanasieff *et.al.,* (2002) in their study of Brazil found macroeconomic variables most relevant elements. Birchwood (2004) explicitly examined the impact of macroeconomic influences on nominal and real interest spreads in the Caribbean region and concluded that inter-region differences may be due to economic cycles and inflation. Liebeg and Schwaiger (2006) and Hamadi and Awdeh (2012) hold contrasting views as they argue for positive and negative correlation of GDP growth with net interest margin, respectively. According to Bencivenga (2009), the introduction of intermediaries shifts the composition of savings toward capital, causing intermediation to growth promoting. In addition, intermediaries generally reduce socially unnecessary capital liquidation, again tending to promote growth. Studies have also found inflation condition associated with higher interest margins as it entails higher transaction costs (Demirguc-Kunt and Huizingia, 1999).

To summarize, the above discussion suggests that determinants and impacts of bank loan interest rate and margins vary considerably. Multiple factors wholly or partially can contribute to high interest rates and spreads in a less developed financial system. Generally, interest rate and spreads are fairly higher in developing countries than developed countries and a close examination across the empirical literature, therefore, reveals that large spreads occur in developing countries

mainly due to a mix of factors explained above (Barajas *et.al*. 1999, Brock and Rojas-Suarez, 2000, Chirwa and Machila, 2004, Beck and Hesse, 2009).

3. Methodology

In the literature, most studies have used panel data methodology for analysing commercial banks' loan pricing decisions. According to the literature, panel data is useful for identifying and measuring the effects that are simply not detectable in pure cross-section or pure time-series data. Panel data model is used to deal with the problem of heterogeneity. In addition, it can also be used to investigate the dynamic of change due to external factors which may affect dependent variables. Basically, panel data methodology comprises static and dynamic models. Static models again can be differentiated in terms of group effects, time effects and both time and group effects. These effects are either fixed effect or random effect. A fixed effect model assumes differences in intercepts across groups or time periods, whereas a random effect model explores differences in error variances. Static panel data models are based on a key assumption, i.e., the absence of correlation between the error components with the explanatory variables. However, these models may cause the emergence of endogeneity problem so that when the model is estimated with fixed-effect and random-effect the estimator will produce biased and inconsistent coefficients (Verbeek, 2008). In this context, Arellano and Bond (1991) proposed an approach known as the Generalized Methods of Moments (GMM). This method helps to provide a more useful framework for comparison and assessment and a simple alternative to other estimators, especially the maximum likelihood estimator. It is from this perspective that we have used the dynamic panel data methodology.

According to the literature, theoretical arguments in favour of using dynamic panel data model for analysing loan pricing decisions of banks derive from asymmetric information and adverse selection perspective (Nickell, 1985, Scholnick, 1991,Winker, 1999, Lago-González and Salas-Fumás 2005). According to these studies, asymmetric information can lead to a sluggish adjustment process to the long-run equilibrium, implying for some delay in the response of market interest rates to changes in the policy rate depending upon bank characteristics. Specifically, we are thinking of a setup in which in the short run, banks solve an inter-temporal problem characterized by a cost of adjusting too slowly to this long-run equilibrium and a cost of moving too fast. This latter cost is due to adverse selection and moral hazard problems in the banking industry. For instance, if a bank increases the lending rate in response to an increase in the money market rate, the bank's adjustment to its new long-term equilibrium may involve attracting debtors that have a lower repayment probability, thereby lowering the bank's profits. At the same time, moral hazard arises because a higher interest rate gives debtors incentives to invest in riskier projects, which would also decrease the bank's profits. Moreover, the dynamic panel model can tackle risk persistence and endogeneity of bank-specific controls (Beck and Levine, 2004, Salas and Saurina,2002, Athanasoglou et.al. 2009 and Merkl and Stolz, 2009).

The main feature of a dynamic panel data specification is the inclusion of a lagged dependent variable in the set of explanatory variables:

$$y_{i,t} = \alpha y_{i,t-1} + \beta(L)X_{i,t} + \eta_i + \varepsilon_{i,t}, |\alpha| < 1, i = 1,\dots,N, t = 1,\dots,T \quad (1)$$

where the subscripts i and t denote the cross sectional and time dimension of the panel sample respectively, $y_{i,t}$ is the lending rate, $\beta(L)$ is the lag polynomial vector, X_{it} *is (*$1 \times k$*)* vector of explanatory variables other than $y_{i,t-1}$, η_i is the unobserved individual (bank specific) effects and $\varepsilon_{i,t}$ are the error terms.

As the lagged dependent variable $y_{i,t-1}$ is inherently correlated with the bank specific effects η_i, OLS estimation method will produce biased and inconsistent parameter estimates. Equation (1) can be consistently estimated by utilizing the Generalized Method of Moments (GMM) as proposed by Arellano and Bond (1991), Arellano and Bover (1995) and Blundell and Bond (1998). The GMM estimation of Arellano and Bond (1991) is based on the first difference transformation of equation (1) and the subsequent elimination of bank-specific effects:

$$\Delta y_{i,t} = \alpha \Delta y_{i,t-1} + \beta(L)\Delta X_{i,t} + \Delta\varepsilon_{i,t}, \; i = 1,\ldots,N, t = 1,\ldots,T \quad (2)$$

where Δ is the first difference operator. In equation (2), the lagged dependent variable Δy_{it-1} is, by construction, correlated with the error term $\Delta\varepsilon_{it}$ imposing a bias in the estimation of the model. Nonetheless, y_{it-2}, which is expected to be correlated with Δy_{it-1} and not correlated with $\Delta\varepsilon_{it}$ for t = 3,...,T , can be used as an instrument in the estimation of (2), given that ε_{it} are not serially correlated. This suggests that lags of order two and more of the dependent variable satisfy the following moment conditions:

$$E[y_{i,t-s}\Delta\varepsilon_{i,t}] = 0 \; for \; t = 3,\ldots,T \; and \; s \geq 2 \quad (3)$$

A second source of bias stems from the possible endogeneity of the explanatory variables and the resultant correlation with the error term. In the case of *strictly exogenous* variables, all past and future values of the explanatory variable are uncorrelated with the error term, implying the following moment conditions:

$$E[X_{i,t-s}\Delta\varepsilon_{i,t}] = 0, \; t = 3,\ldots,T \; and \; for \; all \; s. \quad (4)$$

The assumption of strict exogeneity is restrictive and invalid in the presence of reverse causality i.e. when $E[X_{is}\varepsilon_{it}] \neq 0$ for $t < s$. For a set of *weakly exogenous* or *predetermined* explanatory variables, only current and lagged values of X_{it} are valid instruments and the following moment conditions can be used:

$$E[X_{i,t-s}\Delta\varepsilon_{i,t}] = 0, \; t = 3,\ldots,T \; and \; for \; s \geq 2. \quad (5)$$

For the equations (1)-(5), orthogonality restrictions form the underpinnings of the one-step GMM estimation which produces, under the assumption of independent and homoscedastic residuals (both cross-sectionally and over time), consistent parameter estimates. Arellano and Bond (1991) propose another variant of the GMM estimator, namely the two-step estimator, which utilizes the estimated residuals in order to construct a consistent variance covariance matrix of the moment conditions. Although the two-step estimator is asymptotically more efficient than the one-step estimator and relaxes the assumption of homoscedasticity, the efficiency gains are not that important even in the case of heteroscedastic errors (Arellano and Bond,1991, Blundel and Bond,1998 and Blundell et.al.2000). This result is further supported by the empirical findings of Judson and Owen (1999), which performed Monte Carlo experiments for a variety of cross sectional and time series dimensions and showed that the one-step estimator outperforms the two-step estimator. Moreover, the two-step estimator imposes a downward (upward) bias in standard errors (t-statistics) due to its dependence on estimated values (as it uses the estimated residuals from the one-step estimator), which may lead to unreliable asymptotic statistical inference (Bond, 2002, Bond and Windmeijeir, 2002, Windmeijer, 2005). This issue should be taken into account, especially in the case of data samples with relatively small cross section dimension (Arellano and Bond, 1991 and Blundell and Bond, 1998).

As noted above, the validity of instruments used in the moment conditions and the assumption of serial independence of residuals are crucial for the consistency of the GMM estimates. We test the overall validity of the instruments using the Sargan specification test proposed by Arellano and Bond (1991), Arellano and Bover (1995) and Blundel and Bond (1998). Under the null hypothesis of valid moment conditions, the Sargan test statistic is asymptotically distributed as chi-square. Furthermore, the fundamental assumption that the errors, ε_{it}, are serially uncorrelated can be assessed by testing the hypothesis that the differenced errors $\Delta\varepsilon_{it}$ are not second order auto-correlated. As noted by Roodman (2009), the system GMM can generate moment conditions prolifically. Too many instruments in the system GMM can over fit endogenous variable while weakening the Hansen test of the instruments' joint validity. Therefore, in order to deal with the instruments proliferation, researchers often follow limited number of instruments by using only certain lags instead of all available lags for instruments. We have used the one-step system GMM estimation. However, for robustness checking, the two-step estimation in the system GMM was also considered.

4. Empirical Analysis

For our empirical analysis, we have considered alternative measures of banks' loan pricing decisions in terms of dependent variables pertaining to loan interest rate and the spread of loan interest rate over deposit interest rate. From an applied perspective, the empirical analysis based on loan interest rate spread as the dependent variable rests on the assumption of a complete adjustment of loan interest rate with respect to deposit interest rate 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 deposit interest rate. Accordingly, empirical research works have to rely on derived measures of loan and deposit interest rates based on banks' balance sheet data. In our empirical exercise, we have experimented with three measures of loan interest rates based on annual balance sheet data for total interest income generated from loans and advances and the outstanding loans 'L' as shown below:

$$LRT1 = \frac{R_{L,t}}{L_t} \tag{8}$$

$$LRT2 = \frac{R_{L,t}}{L_{t-1}} \tag{9}$$

$$LRT3 = \frac{R_{L,t}+R_{L,t-1}}{L_t+L_{t-1}} \tag{10}$$

The first measure (LRT1) could account for effective loan interest rate. The second measure (LRT2) 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 (LRT3) recognises stock-flow 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 also derived deposit interest rates and the yield on government securities in order to derive corresponding loan interest spread variables.

As regards the explanatory variables, we have used policy and regulatory variables pertaining to cash reserve requirement (CRR), statutory liquidity requirement (SLR) and prudential capital to risk weighted assets ratio (CRAR) consistent with the India's monetary policy and banking sector regulation frameworks. For bank specific variables, we have indicators of bank size (SIZE) defined as the ratio of a bank's total assets to the banking industry aggregate measure, liquidity ratio (LQDR), i.e., liquid assets less liquid liabilities to total assets ratio, non-interest rate operating cost to assets ratio as an indicator of managerial efficiency (OEAR), asset quality (GNPAR) measured by gross non-performing loans to total loans ratio, earnings and profitability in terms of return on equity (ROE), product diversification (NRYR) represented by non-interest income to total asset ratio, and loan maturity (LMAT) as the share of term loans in total loans. For macro variables, we have used real GDP growth rate (GY) and inflation rate (INF) for the wholesale price index. Our sample comprises 33 banks comprising 27 public, three private and three foreign banks, which together account for the bulk of commercial banking system in India by way of three-fourth share in total deposits, credit, investment and other indicators.

4.1 Descriptive Statistics

Descriptive statistics for the variables used in our study are provided in the Annex. We derive interesting insights from the trends in banks' indicators when different phases of economic growth are considered: second half of the 1990s (1996-2000), 2001-2003 when growth moderated, 2004-08 when growth rate witnessed a significant jump and 2009-11, the period of global crisis when growth slowed down. During 1996-2000, the loan interest on average was almost equivalent to the policy

rate. During 2000-2003 and 2004-2008, the loan interest rate exceeded the policy rate by 1 to 2 percentage points. During 2009-11, loan interest rate exceeded the policy rate by 3 percentage points. Moreover, when the policy rate declined by 4 percentage points in response to growth slowdown in 2001-2003, loan interest rate declined by only 2 percentage points. During 2004-08, the loan interest rate softened by 2 percentage points in tandem with the policy stance. However, during 2009-11, loan interest and the policy rate moved in the opposite direction; the former firmed up by about a percentage point as opposed to the latter's softening in equivalent terms. Overall, loan interest spread over deposit interest rate remained less volatile during 2000-11 reflecting the impact of various parameters of asset-liability management and performance. Deposit interest rates more or less showed lower variability than loan interest rates during the late 1990s. However, unlike the loan and deposit interest rates, the yield on investment in government securities and their spread over deposit interest rates showed some stability in terms of cross-section variation during 1996 to 2011. Stylised facts show 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 1997-2007 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. The empirical analysis in the following provides evidence of how various bank specific indicators and policy variable could have influenced banks' loan pricing decisions.

4.2 Empirical Findings

The empirical findings are presented in Tables 1 to 6 pertaining to alternative measures of loan interest rate and its spread over deposit interest rate. Across the tables, empirical findings are presented for two scenarios when the policy rate is measured by interbank money market rate and the repo rate. The findings bring to the fore some common perspectives and various interesting insights about the determinants of banks loan pricing decisions in the Indian context. The common perspective is that in the absence of observed loan interest rates and its spread over deposit interest rate, derived measures of these indicators from banks' balance sheet data could provide differential association with proximate determinants of banks' loan pricing decisions. The specific findings with regard to various determinants of loan pricing are briefly discussed below.

Cost of Deposit Funds

Banks exist for intermediation role in terms of mobilising deposits for lending and investment purposes. In this context, viable banking entails that banks must recover the cost of deposit funds from borrowers and earn a positive spread. In our empirical findings, this could be attributable to the intercept term in Tables 1 to 3. We find the intercept term varying between 1 to 2.4 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 (Table 4 to 6). Here, the coefficient varies from 0.28 to closer to unity under different scenarios as mentioned in section 3.

Capital Requirement

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 when the policy rate is represented by the repo rate rather than the call money rate. The positive impact of CRAR on loan pricing is consistent with risk aversion and credit worthiness, costly capital, minimising unexpected credit losses and market discipline perspectives (Saunders and Schumacher, 2000, Flannery and Rangan, 2004, Gambacorta and Mistrulli, 2004, Claeys and Vennet, 2003). 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.

Asset Quality and Credit risk

A positive relationship, *a priori*, is expected between asset quality variable and bank loan interest, 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 loan defaults. Our results show that asset quality of loans and advances as reflected in gross non-performing loans ratio has statistically significant negative on two measures of loan interest spread but positive impact on two measures of loan interest rates. This result could be attributable to two scenarios. Firstly, the negative impact of asset quality on loan interest rate spread could imply for banks' ability to mobilise deposits at lower cost. Two, banks in India may be under-provisioning in order to avoid defaults on account of higher loan interest cost.

Table 1
Determinants of Loan Interest Rate Spread (IRS1) over Deposit Interest rate

Variables	Call rate	Repo Rate
IRS1(L1)	0.005	-0.021
IRS1(L2)	0.079**	0.047**
Policy Rate	0.120**	0.257 **
Yield Spread1	0.034	0.038
Loan Maturity (LMAT)	-0.028**	-0.021 **
Managerial Efficiency (OEAR)	1.062**	0.740 **
Product diversification (NRYR)	-0.379**	0.016
Return on Equity (ROE)	0.030**	0.010
Size(L1)	-0.139 **	-0.158 **
Bank Liquidity (LQDR)	-0.059 **	-0.061 **
Asset Quality (GNPAR)	-0.074 **	-0.097 **
Capital/Risk aversion (CRAR)	0.026 **	0.035 **
GDP growth (GY)	-0.002	-0.037 **
Inflation (INF)	0.054**	0.088 **
Intercept	2.422 **	1.830 **
Wald Statistics	28264.330	13158.790
Sargan statistics	27.510	25.770
N	414	414

Notes: ** and * indicate the level significance at the 5% and 10%, respectively. L1 and L2 are lag1 and lag2 respectively.

Managerial and Operating Efficiency

Managerial efficiency, measured by non-interest operating expenses to average assets ratio, implies for expensive services owing to funded activities such as loans and investment. At the same time, 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 arise here. One, banks may recoup some or all of such costs by factoring into loan pricing. Two, banks may recover a portion of such costs from non-funded activities by way of other non-interest income, thereby, leaving a fraction of operating cost to loan interest rate charged to borrowers. We found statistically significant positive effect of managerial inefficiency, i.e., higher operating cost ratio on loan interest rates and their spread over deposit interest rates. From the Table 2 to 7, we can see that every percentage point increase in the operating cost ratio can push up loan interest on average by 50 to 100 basis points. This is a critical finding when we consider the concerns of the authorities over Indian banks' net interest margin higher than some of the emerging market economies mainly due to relatively high operating cost (Subbarao, 2011).

Table 2
Determinants of Loan Interest Rate Spread (IRS2) over Deposit Interest rate

Variables	Call rate	Repo Rate
Spread2(L1)	0.107*	-0.004
Spread2(L2)	0.079**	0.039**
Policy Rate	0.039**	0.207**
Yield Spread2	0.182**	0.145**
Loan Maturity (LMAT)	-0.023**	-0.023**
Managerial Efficiency (OEAR)	0.592**	0.547**
Product diversification (NRYR)	-0.094	0.161
Return on Equity (ROE)	0.015*	0.007
Size(t-1)	-0.136**	-0.120*
Bank Liquidity (LQDR)	-0.053**	-0.054**
Asset Quality (GNPAR)	-0.046**	-0.082**
Risk aversion (CRAR)	0.014	0.034**
GDP growth (GY)	0.156**	0.105**
Inflation (INF)	0.056**	0.078**
Intercept	1.400**	1.057**
Wald Statistics	12664.020	87956.860
Sargan statistics	21.320	27.140
N	414	414

Notes: ** and * indicate the level significance at the 5% and 10%, respectively. L1 and L2 are lag1 and lag2 respectively.

Table 3
Determinants of Loan Interest Rate Spread (IRS3) over Deposit Interest rate

Variables	Call rate	Repo Rate
IRS3(L1)	0.860**	0.836**
IRS3(L2)	-0.327**	-0.325**
Policy Rate	0.019*	-0.110**
Yield Spread3	-0.093**	0.051**
Loan Maturity (LMAT)	-0.002	-0.001
Managerial Efficiency (OEAR)	0.283**	0.242**
Product diversification (NRYR)	0.181**	0.181**
Return on Equity (ROE)	0.004**	0.003
Size(t-1)	0.019	0.005
Bank Liquidity (LQDR)	0.004**	0.004*
Asset Quality (GNPAR)	0.004	0.001
Risk aversion (CRAR)	0.029**	0.029**
GDP growth (GY)	0.060**	0.045**
Inflation (INF)	0.003	0.014**
Intercept	0.180	0.199
Wald Statistics	8007.390	9643.520
Sargan statistics	27.990	25.910
N	414	414

Notes: ** and * indicate the level significance at the 5% and 10%, respectively. L1 and L2 are lag1 and lag2 respectively.

Earnings and Profitability

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, we found statistically significant positive association between banks' loan pricing decisions and profitability. From the Table 2 to 7, we see that the coefficient varied from 0.3 per cent to 2.5 per cent under different scenarios relating to current, one period lag and stock-flow measures of loan interest rate.

Table 4
Determinants of Loan Interest Rate (LRT1)

Variables	Call rate	Repo Rate
LRT1(L1)	0.310**	0.266**
LRT1(L2)	-0.012	-0.038
Policy Rate	0.109**	0.099**
Yield (RYG1)	-0.291**	-0.252**
Cost of Deposit (DRT1)	0.573**	0.679**
Loan Maturity (LMAT)	0.006**	0.004
Managerial Efficiency (OEAR)	0.819**	0.736**
Product diversification (NRYR)	-0.010	0.030
Return on Equity (ROE)	0.014**	0.010**
Size(t-1)	0.128	0.001
Bank Liquidity (LQDR)	0.008**	0.005**
Asset Quality (GNPAR)	0.013	0.012
Risk aversion (CRAR)	0.034**	0.032**
GDP growth (GY)	0.060**	0.052**
Inflation (INF)	0.031**	0.072**
Intercept	-0.296	0.071
Wald Statistics	18665.770	16539.510
Sargan statistics	23.050	24.710
N	414	414

Notes: ** and * indicate the level significance at the 5% and 10%, respectively. L1 and L2 are lag1 and lag2 respectively.

Liquidity Effect

Banks with more liquid assets are expected to find it easier to fund loans on the margin, so we expect a negative sign for this variable. However, our results show differential impact of banks' net liquidity with regard to differential measure of loan interest rate and their spreads over deposit rates.

Financial Innovation and Product Diversification

Financial innovation and 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. Our results in Tables 2 to 7 suggest that the coefficient of non-interest income (the income share of commission and fee income) can be positive or negative under different measures of loan interest rate and spreads. Thus, it cannot be confirmed that banks are passing on the benefits of diversification to borrowers in the Indian context.

Table 5
Determinants of Loan Interest Rate (LRT2)

Variables	Call rate	Repo Rate
LRT2(L1)	0.134**	0.130**
LRT2(L2)	0.034**	0.025**
Policy Rate	-0.016	0.114**
Yield (RYG2)	0.199**	0.196**
Cost of Deposit (DRT2)	0.971**	0.932**
Loan Maturity (LMAT)	-0.018**	-0.020**
Managerial Efficiency (OEAR)	0.648**	0.468**
Product diversification (NRYR)	-0.163	-0.011
Return on Equity (ROE)	0.022**	0.013*
Size(t-1)	-0.095	-0.101
Bank Liquidity (LQDR)	-0.053**	-0.053**
Asset Quality (GNPAR)	-0.043**	-0.069**
Risk aversion (CRAR)	0.016	0.019
GDP growth (GY)	0.225**	0.163**
Inflation (INF)	0.056**	0.070**
Intercept	-0.136	0.211
Wald Statistics	8417.580	13261.310
Sargan statistics	22.850	24.270
N	414	414

Notes: ** and * indicate the level significance at the 5% and 10%, respectively. L1 and L2 are lag1 and lag2 respectively.

Table 6
Determinants of Loan Interest Rate (LRT3)

Variables	Call rate	Repo Rate
LRT3(L1)	0.827**	0.686**
LRT3(L2)	-0.356 **	-0.342 **
Policy Rate	0.202 **	0.132**
Yield (RYG3)	-0.224**	-0.118**
Cost of Deposit (DRT3)	0.278 **	0.525 **
Loan Maturity (LMAT)	-0.003	-0.005**
Managerial Efficiency (OEAR)	0.465**	0.392
Product diversification (NRYR)	0.143 **	0.160**
Return on Equity (ROE)	0.005**	0.003 **
Size(t-1)	0.131*	0.079
Bank Liquidity (LQDR)	0.006 **	0.005 **
Asset Quality (GNPAR)	-0.008	-0.005
Risk aversion (CRAR)	0.020 **	0.035 **
GDP growth (GY)	0.019**	0.046 **
Inflation (INF)	-0.055 **	0.007**
Intercept	1.207 **	0.705**
Wald Statistics	161510.500	170273.820
Sargan statistics	23.500	28.660
N	414	414

Notes: ** and * indicate the level significance at the 5% and 10%, respectively. L1 and L2 are lag1 and lag2 respectively.

Bank Size

According to the literature, larger banks are expected to have greater market power, scale efficiency 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 positive and negative effects of bank size on different measures of loan interest rate and its spread over corresponding deposit interest rate.

Loan Maturity

The role of loan maturity in loan pricing derives from the terms of lending and asset-liability management perspectives (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 that the 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. Liquidity consideration comes from the fact that there are events (called systemic liquidity crises) in which normal financing channels fail and banks turn to more expensive sources of funds. In this context, we find that the maturity variable has negative and significant coefficients in most of the model setups. The coefficient of the maturity ranges from 0.1 per cent to 3 per cent, which indicates that in Indian banking system, there is an evidence of discount to the customers to keep a long term relationship and hence, pricing is done accordingly.

Macroeconomic factors

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. Bikker and Hu (2002) emphasised on the bank profitability and business cycle relationship and found that profit appear 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. In the Indian context, the expected sign is positive. The coefficient ranges from 0.19 to 0.22 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.

Policy Rate

*Finally, t*he empirical analysis brings to the fore two crucial perspectives pertaining to the interest rate pass-through or the impact of policy rate on loan interest rate and its spread over deposit interest rate. Firstly, policy rate could have statistically significant positive impact on loan interest rates but the magnitude of impact, as measured by the size of the coefficient of policy rate, could be quite moderate. This reflects on the limited pass-through of monetary transmission

mechanism and the rigidity in loan pricing decisions of banks due to various factors as explained by explanatory variables discussed in the above. Secondly, the impact of policy rate depends on two alternative measures of policy rate, the interbank call money rate and the repo rate. We find the impact of repo rate higher than the call rate, which captures the policy stance pertaining to both liquidity and interest rate. Apart from rigidity in the loan market, the pass-through problem could be attributable to a central bank's liquidity management offsetting the interest rate stance and monetary policy communication and transparency issues (Poirson, 2009).

5. Conclusion

In this study, we investigated how commercial banks' loan pricing decisions could be influenced by host of factors, using dynamic panel data methodology and annual accounts data of 33 commercial banks over the period 1997 to 2011. The determinants of loan interest rate and spreads were classified into (i) regulatory and policy variables such the cash reserve requirement, statutory liquidity requirement, (ii) bank specific variables pertaining to capital adequacy, asset quality, managerial efficiency, earnings, liquidity, bank size, loan maturity, cost of funds, and opportunity cost of loans and (iii) macro variables including the rate of growth of GDP and wholesale price inflation rate.

Our study found banks loan interest rate and its spread over deposit interest rate positively, albeit, moderately impacted by the short-term policy interest rate. The empirical findings highlight the roles of operating efficiency, risk aversion owing to capital adequacy, economies of scale owing to bank size, asset-liability management (loan maturity) and credit risk management in commercial banks' loan pricing decisions. A couple of critical and interesting perspectives emerge from this study. Firstly, proximate determinants can have differential effects on loan pricing decisions of banks depending upon alternative measures of loan interest rate and spreads. Secondly, the pass-through from the policy rate to loan interest rates could be limited when commercial banks consider several factors including the policy rate for their loan pricing decisions. Moreover, the problem of pass-through evident from differential impacts of interbank money market rate and the repo rate could relate to the alignment between liquidity and interest rate channels of transmission mechanism in the Indian context. Thirdly, banks' operating efficiency holds the key to effective loan pricing decisions in the Indian context. Fourthly, higher capital charge can induce risk aversion and positively affect loan interest rate. Fifthly, the absence of clear statistically significant and positive impact of the asset quality variable, i.e., non-performing loans, on loan interest rate and its spread, suggests that there is a need for strengthening risk pricing culture in the Indian context. Finally, bank size variable, which is often considered for gauging economies of scale effect, does not hold for the Indian context. From policy and regulation perspective, these findings along with the evidence of moderate pass-through from the policy rate to loan pricing decisions of banks suggests that there is a need for strengthening the price discovery in the loan market by way of further reform in the banking sector with focus on operating efficiency, capital adequacy, scale economies and risk pricing culture. We recognise that further research could be useful in this area when empirical analysis incorporate refined measures of loan interest rate and spreads, risk pricing perspectives, sophisticated modelling techniques and high frequency data, as annual data subject to auditing often get influenced by year-end balance sheet management.

Annex

Descriptive Statistics (cross-section data)

Year	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Loan Interest Rate Spread (IRS1)																
Mean	5.5	6.6	5.1	4.5	3.8	3.8	3.1	3.5	3.4	3.2	3.3	3.5	3.5	4.1	3.8	3.9
SD	1.7	1.5	1.4	1.1	0.9	1.1	1.4	1.1	1.0	0.9	1.0	0.9	1.2	1.6	1.4	0.8
Loan Interest Rate Spread (IRS2)																
Mean	9.1	4.2	5.9	5.0	5.2	5.0	4.4	4.1	4.2	5.3	4.8	4.9	4.5	4.9	4.3	5.0
SD	7.7	15.2	2.1	1.5	1.8	1.7	1.8	0.9	1.2	3.9	1.0	1.2	1.6	1.8	1.2	0.9
Loan Interest Rate Spread (IRS3)																
Mean	5.1	6.1	5.8	4.7	4.1	3.8	3.3	3.3	3.5	3.3	3.2	3.4	3.5	3.8	3.9	3.9
SD	1.1	1.3	1.3	1.1	0.9	1.0	1.3	0.9	1.0	0.9	0.9	0.9	1.1	1.4	1.5	1.1
Loan Interest Rate (LRT1)																
Mean	12.4	14.0	12.1	11.7	10.9	10.7	9.6	9.4	8.2	7.3	7.3	8.0	9.0	9.8	8.9	8.6
SD	2.3	2.0	1.4	1.4	1.0	1.0	1.6	0.9	0.9	0.8	0.5	0.6	0.8	1.3	0.9	0.7
Loan Interest Rate (LRT2$r^2_{L,t}$)																
Mean	17.3	17.0	14.7	14.0	13.7	13.0	12.1	11.0	9.8	10.1	9.6	10.5	11.2	11.9	10.3	10.5
SD	9.1	6.9	2.1	1.9	1.8	1.3	1.6	1.3	1.1	3.6	0.7	0.8	1.1	1.5	0.8	0.8
Loan Interest Rate (LRT3)																
Mean	11.8	13.3	13.0	11.9	11.2	10.8	10.0	9.5	8.8	7.7	7.3	7.7	8.5	9.4	9.3	8.7
SD	1.2	1.8	1.5	1.3	1.1	0.9	1.5	0.9	0.9	0.9	0.5	0.5	0.7	1.0	1.1	0.7
Cost of Deposit (DRT1)																
Mean	6.9	7.4	7.1	7.3	7.1	6.9	6.5	5.9	4.8	4.1	4.1	4.5	5.5	5.7	5.1	4.7
S SD	1.2	1.0	0.8	0.7	0.9	1.0	0.8	0.6	0.7	0.6	0.7	0.5	0.7	0.7	0.8	0.7
Cost of Deposit (DRT2)																
Mean	8.2	12.8	8.8	9.0	8.5	8.0	7.6	6.9	5.6	4.8	4.8	5.6	6.7	7.1	6.1	5.5
SD	1.8	21.4	1.6	1.3	0.8	0.9	0.5	1.1	0.7	0.8	0.6	0.8	0.9	1.0	1.1	0.8
Cost of Deposit (DRT3)																
Mean	6.6	7.2	7.2	7.2	7.2	7.0	6.7	6.2	5.3	4.4	4.1	4.3	5.0	5.6	5.4	4.9
SD	0.7	0.9	0.8	0.7	0.8	0.9	0.7	0.7	0.7	0.7	0.6	0.5	0.6	0.7	0.8	0.7
Yield (RYG1)$r^1_{G,t}$)																
Mean	11.7	10.5	10.8	10.5	10.7	10.5	10.0	9.1	8.4	7.8	8.0	7.2	6.8	6.6	6.2	6.7
SD	2.7	1.2	1.3	1.0	1.0	1.3	1.5	0.8	1.2	1.5	1.4	1.2	0.8	0.7	0.6	0.6
Yield(RYG2) $r^2_{G,t}$)																
Mean	13.1	20.2	13.9	13.9	13.4	12.3	11.9	10.9	9.8	8.4	8.0	8.0	8.2	8.0	7.5	7.4
SD	3.6	38.2	3.1	1.9	1.6	0.8	1.1	1.1	0.9	1.0	1.2	1.4	1.0	0.9	0.7	0.8
Yield(RYG3)																
Mean	11.2	10.9	10.6	10.6	10.6	10.6	10.2	9.5	8.7	8.1	7.9	7.6	7.0	6.7	6.4	6.4
SD	1.6	1.2	1.1	1.0	0.9	1.0	1.4	1.0	0.9	1.4	1.3	1.1	0.9	0.7	0.5	0.5
Yield Spread1																
Mean	7.7	3.1	3.8	3.2	3.7	3.6	3.5	3.2	3.7	3.7	3.9	2.8	1.4	0.8	1.1	2.0
SD	17.7	1.0	1.0	1.0	0.6	1.1	1.1	0.5	1.0	1.1	1.2	1.4	1.2	1.0	1.1	1.1
Yield Spread2																
Mean	4.9	7.4	5.0	4.9	4.9	4.3	4.2	4.0	4.2	3.6	3.1	2.3	1.5	1.0	1.5	1.9
SD	2.3	16.8	1.7	1.2	1.2	0.6	1.0	1.4	0.9	1.0	1.6	1.8	1.5	1.6	1.2	1.4
Yield Spread3																
Mean	4.5	3.8	3.4	3.5	3.5	3.6	3.5	3.3	3.4	3.7	3.8	3.3	2.0	1.1	1.0	1.6
SD	1.6	1.1	0.8	0.9	0.6	0.8	1.0	0.7	0.6	1.0	1.1	1.2	1.2	1.0	1.0	1.0

Annex - continued

Loan Maturity																
Mean	29.5	33.0	34.5	35.4	36.1	36.4	40.3	43.5	48.1	53.0	55.3	58.0	57.5	58.2	57.7	56.5
SD	13.3	15.3	15.2	12.4	13.1	11.6	13.1	12.7	10.7	11.1	10.9	11.0	11.6	12.4	12.5	12.1
Product diversification																
Mean	1.4	1.4	1.5	1.3	1.4	1.4	1.7	1.9	2.0	1.5	1.1	1.1	1.3	1.3	1.2	1.0
SD	0.6	0.6	0.7	0.6	0.5	0.5	0.6	0.5	0.5	0.5	0.5	0.5	0.6	0.7	0.5	0.4
Managerial Efficiency																
Mean		3.2	2.9	2.7	2.7	2.5	2.7	2.4	2.4	2.3	2.2	2.1	1.9	1.7	1.6	1.6	1.7
SD		0.9	0.5	0.5	0.5	0.5	0.5	0.5	0.4	0.5	0.6	0.4	0.4	0.5	0.4	0.4	0.4
Return on Equity																
Mean		19.0	13.7	14.9	14.2	14.6	13.1	15.3	19.3	22.2	15.9	13.8	15.8	16.2	16.2	16.0	15.1
SD		23.9	8.1	7.2	7.0	6.7	7.7	7.2	7.5	6.1	6.2	5.4	4.1	4.8	4.7	4.9	3.9
Liquidity																
Mean		9.6	0.5	1.4	-0.2	-1.5	-3.6	-8.9	-3.5	-3.4	15.1	16.8	13.8	11.2	12.2	12.0	15.5
SD		56.8	7.6	6.4	9.4	12.4	18.5	26.6	11.8	13.3	49.5	26.5	15.8	10.4	10.3	10.9	12.7
Liquidity1																
Mean		0.9	0.5	1.2	0.2	-0.7	-1.6	-4.2	-2.1	-2.0	-6.1	10.8	-9.7	-8.0	-8.8	-9.0	11.5
Std Dev		7.4	5.6	5.2	7.3	8.9	9.8	11.7	8.1	9.3	12.7	9.5	7.9	6.1	5.6	6.5	7.4
Size																
Mean		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.1	3.1	3.2
SD		4.7	4.6	4.6	4.7	4.6	4.8	4.4	4.3	4.0	3.8	3.6	3.4	3.5	3.6	3.5	3.4
Macro-economic Variables																
GDP growth		7.3	8.0	4.3	6.7	7.6	4.3	5.5	4.0	8.1	7.0	9.5	9.6	9.3	6.7	8.4	8.4
Inflation		8.0	4.6	4.4	5.9	3.3	7.2	3.6	3.4	5.5	6.5	4.4	6.6	4.7	8.1	3.8	9.6
Policy Variables																
Call rate		17.7	7.8	8.7	7.8	8.9	9.2	7.2	5.9	4.6	4.7	5.6	7.2	6.1	7.1	3.2	5.8
Repo rate		14.0	14.0	12.1	10.9	10.0	9.6	8.5	7.8	6.9	6.0	6.2	7.1	7.8	7.4	4.8	6.0

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