

**CREB Working Paper No. 01-10**

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**Ayesha Afzal, Nawazish Mirza**



**Centre for Research in Economics & Business  
Lahore School of Economics**

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## **Preface**

The Centre for Research in Economics and Business (CREB) was established in 2007 to conduct policy-oriented research with a rigorous academic perspective on key development issues facing Pakistan. In addition, CREB (i) facilitates and coordinates research by the faculty at the Lahore School of Economics, (ii) hosts visiting international scholars undertaking research on Pakistan, and (iii) administers the School's postgraduate program leading to the MPhil and PhD degrees.

An important goal of CREB is to promote public debate on policy issues through conferences, seminars, and publications. In this connection, CREB organizes the Lahore School's Annual Conference on the Management of the Pakistan Economy, the proceedings of which are published in a special edition of the *Lahore Journal of Economics*.

The CREB Working Paper Series was initiated to bring to a wider audience, the research being done at CREB. It is hoped that these papers will promote discussion on the subject and contribute to a better understanding of economic and business processes and development issues in Pakistan. Any comments and feedback on these papers would be appreciated.



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## **Abstract**

This paper explores the determinants of interest rate spreads in Pakistan's commercial banking sector in the post-transition period (2004–2009), using an exhaustive set of macro- and firm-level variables to analyze their impact on intermediary efficiency. We introduce two innovative variables: (i) the default likelihood indicator (the Black, Merton, and Scholes option pricing framework), and (ii) the proportion of public sector deposits in total deposits; these are intended to explain the variation in spreads. The results suggest that intermediary efficiency is affected by bank size, operational efficiency, asset quality, liquidity, risk absorption capacity, and gross domestic product (GDP) growth rate. There is evidence of deposit market share and deposit market concentration, establishing the presence of an interest-sensitive deposit market. We could not find evidence to support the impact of interest rate volatility and financial development indicators on banking spreads.

**JEL classifications:** G20, G21.

**Keywords:** banking spread, interest margin, Pakistan's financial system.



# **The Determinants of Interest Rate Spreads in Pakistan's Commercial Banking Sector**

## **1. Introduction**

In any country, economic development hinges critically on patterns and levels of resource mobilization and allocation. Resources are mobilized through savings, which, at the level of the macro-economy, pave the way for the allocation of resources for consumption and investment. Similarly, investment depends on banking credit and the underlying lending system, which enables investors to borrow for the purpose of investing in real capital to enhance existing businesses or establishing new businesses. In this way, banking credit contributes to the generation of economic activity and eventually leads to higher national income and growth. Therefore, all economic players, including households, businesses, and the public sector, are sensitive to the efficient flow of resources from surplus to deficit units. Analysis of resource transfer through the operations of the banking system, therefore, has to contend with the price structure prevailing in the credit market.

The strong correlation of banking system stability with the economic growth and development of a country has only recently been noted. A glance at recent economic history reveals that weaknesses in financial systems have been the root cause of the economic woes of most economies. Supervisory authorities around the world are striving to ensure the safety and soundness of their respective financial systems so that they can play an active role in the economic development of their country.

Like other developing countries, Pakistan initiated financial system reforms in the 1990s with the objective of instilling competition within financial institutions, strengthening their governance and supervision, and adopting an indirect market-based system of monetary exchange and credit management for improved resource allocation. Mainline reforms included the transformation of nationalized entities to privatized entities as well as the deregulation of the financial system. This deregulation liberalized the financial regime governing the structure and operations of the financial system: a shift from a directed system of

credit and administered interest rates to a market-based system of credit and interest rates. Lastly, reestablishing the financial strength of banking institutions and resolving nonperforming loans ensured the solvency of the country's financial system.

These are broad categories of reforms encompassing a large number of reform-oriented changes. Reforms took place gradually and were adjusted continuously according to their impact; there were some reversals as well. The transition of the financial system of Pakistan from an administered to a liberalized financial regime was completed in 2005.

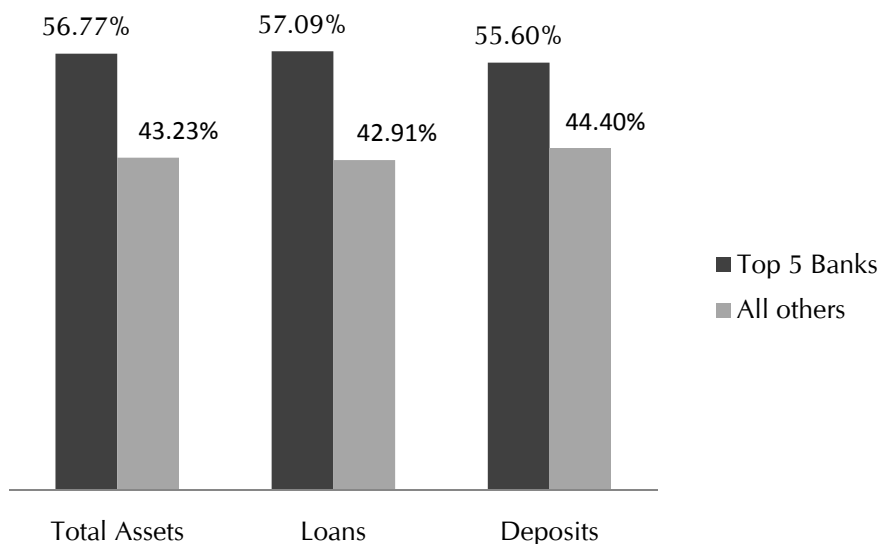
As a result of these reforms, the structure of the financial system altered significantly. Ownership has been transferred predominantly from the public sector to the private sector. Furthermore, the closure or privatization of development finance institutions coupled with the entry of foreign banks subsequent to liberalization has impacted the dynamics of the financial system. Foreign banks, albeit with a limited network and market penetration, have become a source of economic competition for local banks. As a result of privatization, the total number of banks increased from 22 in 1990 to 40 in 2009.

However, there are considerations regarding the operations of the banking system, particularly after the transition from an administered to a liberalized financial regime has been completed. The State Bank of Pakistan requires each bank to have a minimum capital of Rs13 billion till 2013. As a result of this, widespread mergers and acquisitions have taken place. Banks are striving for a larger branch network for greater market penetration. Despite this, the top five commercial banks share the bulk of financial intermediation in every category. These include the National Bank of Pakistan, Habib Bank Limited, United Bank Limited, MCB Bank, and Allied Bank. Despite the fact that these banks have become less dominant in the last few years, their combined assets and the proportion of their deposits and advances is still larger than that of all the remaining banks (see Figure 1).

There are no restrictions on lending and deposit rates so banks will invariably extend credit at high rates for the sake of profit maximization and pay lower returns on their deposits, hence earning higher spreads. Moreover, if there is a concentration in banking activities among a few banks, as is the case in Pakistan, this may lead to an exercise of market power in order to earn higher margins. Higher margins might also reflect

high intermediation costs and managerial inefficiencies. This acts as a disincentive to both saving and investment and implies that the banking system is inefficient in performing its role of effective resource allocation.

**Figure 1: Comparative Share of Top Five Banks, 2009**



Source: Based on data from banks' financial statements.

Financial systems in most developing and underdeveloped countries are subject to structural, informational, and institutional inefficiencies that ultimately lead to high margins between commercial banks' lending and borrowing rates. These high spreads emanate from elevated and volatile lending rates and lead to a higher cost of capital for borrowers, consequently reducing investments or promoting only short-term high-risk ventures. The impact of relatively higher banking spreads can be devastating for businesses with less financial flexibility, especially small and medium enterprises. Finally, sustained high spreads is a vital indicator of the poor performance of a financial system and inter alia the inadequacy of banking regulations, and can ultimately retard economic growth.

To measure the desirable state of efficiency of Pakistan's banking system, it is critical to study spreads and net interest margins as they are often used as proxy variables for measuring the intermediary efficiency of commercial banks. The purpose of this study is to analyze the various macro- and firm-level determinants of banking spreads in Pakistan.

This working paper makes a number of contributions to the existing literature on banking spreads. First, previous studies on banking spreads in Pakistan mainly provide evidence that is skewed toward the pre-transition period (maximum till 2006). However, our discussion provides an insight into the behavior of Pakistan's banking spreads in the post-transition period (i.e., from 2003 to 2009). Second, unlike previous studies on banking spreads in Pakistan which provide limited explanatory factors, our empirical analysis includes a substantially greater number of firm-specific variables, which include every aspect of a bank's operation (core to noncore business) and are expected to reveal superior information about banking spreads. Some of these variables have already been examined in other developing economies and therefore it is interesting to investigate whether they are relevant to Pakistan.

We use at least two innovative firm-specific variables that have not been considered before *vis-à-vis* banking spreads. The first factor is the percentage of public sector share in total deposits per bank. This factor is relevant as public sector entities are somewhat insensitive to the interest rate on their deposits with commercial banks. The second factor is the probability of default (sometimes called distance to default) under the Black, Merton, and Scholes framework that was later adapted by the Bank for International Settlement and KMV risk-metrics. Since a capital base's risk absorption capacity and its reliance on market discipline is a vital feature of the Basle Accord, it is interesting to see whether the probability of default has any significance in banking spreads.

The remaining paper is organized as follows. Section 2 provides a brief overview of the literature on the determinants of banking spreads; Sections 3 and 4 discuss the data, variables, and research methodology used; Section 5 concludes the paper.

## **2. Literature Review**

There is an exhaustive body of literature on the determinants of banking spreads both in developed and developing economies. Since Pakistan is a developing economy, we will focus mainly on literature from similar countries. The underlying bank-specific and economic variables depict similar behavior across all developing countries and our set of variables and econometric methodology emanates from similar research with a few innovations particular to the case of Pakistan.



Maudos and Solis (2009) have investigated the determinants of net interest income in the Mexican banking sector for the period 1993 to 2005. Their sample consists of 43 commercial banks with 289 annual observations of unbalanced panel data. They observe high interest margins—approximately 5%—for Mexico vis-à-vis international standards. They consider various explanatory factors to explain the behavior of banking spreads, including operating costs, volatility of interest rates, implicit interest payments, quality of management, noninterest income, credit risk, degree of risk aversion, market risk, transaction size, liquidity, cost to gross income, GDP growth, and inflation rate. The reported results reflect that, except for liquidity, all other variables are significantly related to interest rate spreads. They conclude that high Mexican spreads are a function mainly of average operating costs and market power while noninterest income, despite having increased over the years, has a low economic impact.

Beck and Hesse (2009) analyze factors explaining interest rate spreads in Uganda compared with peer African countries for the period 1999 to 2005. They use a panel data set of 1,390 banks from 86 countries, and report that the variation of spreads is high both across countries and within countries across banks. The average margins are around 10.9% while a mean spread of 18.1% was observed. To explain the high variation in interest rate margins across countries, they use bank size, exchange rate depreciation, real t-bill rate, liquidity ratio, concentration, inflation, GDP growth, institutional development, and overhead costs. They report that most bank-specific as well as macroeconomic factors are relevant in explaining the high banking margins in Uganda. However, foreign banks and changes in market structure had no significant relationship with interest rate spreads. They conclude that size, high t-bill rates, and institutional deficiencies explain the large proportions of Ugandan interest margins.

Hawtrey and Liang (2008) have studied bank interest margins in 14 Organisation for Economic Co-operation and Development (OECD) countries for the period 1987 to 2001. The explanatory variables they use are market structure, operating cost, degree of risk aversion, interest rate volatility, credit risk, scale effects (transaction size of loans and deposits), implicit interest payments, opportunity cost of bank reserves, and managerial efficiency. They employ a single step panel regression with fixed effects and find significant coefficients for most of the variables. Transaction size and managerial efficiency (operating

efficiency to gross income) are negatively related to the margins that they attribute to management efficacy in obtaining low-cost deposits and extending loans at higher interest rates resulting in higher spreads. They conclude that market power, operating costs, risk aversion, volatility of interest rates, credit risk, opportunity cost, and implicit interest payments have a positive impact on overall interest rate spreads.

Norris and Floerkemeir (2007) use a bank-level panel dataset for Armenia to examine the factors explaining interest rate spreads and margins from 2002 to 2006. They employ a variety of bank-specific and macro-variables, including overhead costs, bank size, noninterest income, capital adequacy, return on assets (ROA), liquidity, deposit market share, foreign bank participation, real GDP growth, inflation, money market rate, and change in the nominal exchange rate. Using both pooled ordinary least squares (OLS) and fixed effect regression, they conclude that bank-specific factors such as size, liquidity, ROA, market concentration, and market power explain a large proportion of banking spreads.

Khawaja and Din (2007) investigate the determinants of interest rate spreads in Pakistan using panel data on 29 banks for the period 1998 to 2005. They use the industry variables of concentration and deposit inelasticity (measured as interest rate-insensitive current and saving deposits) and firm variables including market share, liquidity, administrative costs, asset quality, and the macroeconomic variables of real output, inflation, and real interest rates. They conclude that the inelasticity of deposit supply is a major determinant of interest rate spread. We feel that the results of this study are unique to the sample period and we include a larger number of variables to analyze the post-transition period, where firm-specific and macroeconomic variables better explain the cross-bank variations in spreads.

The State Bank of Pakistan (2006) analyzes the efficiency of financial intermediation in Pakistan, using banking spreads and net interest margin for the period 1997 to 2006. It employs the bank-specific indicators of noninterest income, provision to nonperforming loans (NPLs), administrative costs, foreign ownership, the industry-specific variable of concentration, and the macroeconomic indicators of real GDP growth and interest rate volatility. The review concludes that all these variables are significant in explaining interest rate spreads with administrative costs and foreign ownership explaining a higher proportion vis-à-vis other determinants.

Despite using a similar sample period, these two studies on Pakistan's banking spreads depict varied results. Therefore, further empirical evidence could provide additional insight into the determinants of interest rate spread and margins using a much more recent dataset.

### 3. Research Methodology

This section describes our research methodology, including sample criteria, variables, and data model.

#### 3.1. Sample Criteria

We use panel data on various bank-specific and macroeconomic variables to analyze the intermediation efficiency of commercial banks in Pakistan. Our sample is based on the following criteria:

- The sample dates from the post-financial reform period and includes data from 2004 to 2009 (six years).
- All banks should be listed public limited companies and data on balance sheets, income statements, and stock prices should be available.
- Foreign banks (those not incorporated in Pakistan) are excluded since they constitute a minimal proportion of Pakistan's banking sector (both in terms of total assets and network size).
- To account for survivorship bias, banks that have been delisted/merged are not included in the sample.

Based on these sample criteria, we have an unbalanced panel for each year. Table 1 represents the per year sample distribution.

**Table 1: Sample Distribution, 2004–2009**

Year	2009	2008	2007	2006	2005	2004
No. of Banks	25	25	25	24	21	21

Source: Authors' estimates.

### 3.2. Dependent Variables

The literature on banking spreads proposes alternative definitions of intermediary efficiency. The most common of these include spread and net interest margin (NIM). Both are considered better measures to gauge intermediary efficiency because both are related to the core intermediary business of commercial banks. We use both definitions as dependent variables as a proxy for financial intermediation. The two variables are measured as follows:

$$Spread = \tau_{it} = \frac{r_{it}}{EA_{it} - EquityINV_{it}} - \frac{c_{it}}{IntLiab_{it}}$$

$$NIM_{it} = \frac{r_{it} - c_{it}}{EA_{it}}$$

*NIM* is net interest margin, *r* is interest revenue, *c* is interest expense, *EA* is total earning assets, *EquityINV* represents the bank's investment in equities, *IntLiab* includes all interest-bearing liabilities, and the suffix *it* represents bank *i* at time *t*.

### 3.3. Independent Variables

Our set of independent variables includes firm-specific and macroeconomic variables that might possibly explain the dynamics of banking spreads in Pakistan. We have classified firm-specific variables as either operational or financial efficiency factors. These are explained in detail below.

#### 3.3.1. Bank Size

Bank size is used to gauge the possibility of economies of scale in banking. Banks that enjoy economies of scale incur a lower cost of gathering and processing information, resulting in greater financial flexibility and, ultimately, higher spreads. Similarly, banks with a large branch network can penetrate deposit markets and mobilize savings at a lower cost. To account for bank size, we adopt two measures, the bank's financial standing and network size.

##### *Total Assets [log(TA<sub>it</sub>)]*

Our first variable in bank size is the log of total assets, *log(TA<sub>it</sub>)*. A stronger asset base is expected to positively impact interest rate spreads (Maudos & Solis, 2009).

### *Network Size [ $\lambda_{it}$ ]*

The second variable relates to the number of branches. In Pakistan, network size is skewed toward a few banks and dispersion in the number of branches is substantially high. To account for this disparity, we use a dummy variable, ( $\lambda_{it} = 1$ ), for all banks with a network size greater than 500 branches. Branch size is likely to contribute positively toward intermediary efficiency (Beck & Hesse, 2008).

### *3.3.2. Operational Efficiency*

Operational efficiency refers to the ability of a bank's management to generate interest and noninterest revenue with the optimal deployment of assets and services at minimal cost through effective acquisition of funds. Operational efficiency is critical for a bank as it requires efficient asset liability management, the mobilization of low-cost deposits, and allocation of advances to high-earning ventures at an acceptable risk level. This calls for an optimal combination of managerial skills in respective areas of expertise. The innovation in banking practices due to liberalization has led to other avenues of income generation through other value-added services and off-balance sheet activities that provide an alternative but stable source of noninterest revenue. Similarly, the contribution of the investment portfolio (equities and mutual funds) has complemented the bank's earnings and helped sustain overall profitability even in periods of high liquidity and low interest rates. The operational efficiency emanating from effective bank management enhances productivity and is expected to positively impact interest rate spreads and margins. The following variables measure operational efficiency.

### *Market Power*

Market power is measured by a bank's market share of loans and deposits. Banks with greater market shares of loans and deposits are likely to enjoy more market power (Norris & Floerkemeier, 2007). Banks dominating the banking system may collude to exercise market power, leading to augmented interest rate spreads and supernormal profits. On the contrary, even if they do not collude, greater market power will result in higher spreads on a standalone basis. The market share of loans and deposits is calculated as follows:

$$\gamma_{Loans} = \frac{Loans_{it}}{\sum_{i=1}^n Loans_{it}}$$

$$\gamma_{dep} = \frac{Deposits_{it}}{\sum_{i=1}^n Deposits_{it}}$$

$\gamma_{Loans}$  and  $\gamma_{dep}$  represent loan market share and deposit market share, respectively, for  $n$  banks.

#### *Noninterest Income to Total Assets [(NII<sub>it</sub>/TA<sub>it</sub>)]*

The ratio of noninterest income to total assets refers to the contribution of noncore business toward profitability. Noninterest income includes commissions, fees and brokerage, capital gains, dividends, and income from foreign exchange transactions. Banks with diversified and stable revenue sources are expected to influence the pricing of loan products and may therefore charge lower margins owing to the cross subsidization of bank activities (Maudos & Solis, 2009).

#### *Return on Assets [ROA<sub>it</sub>]*

ROA explains the overall profitability of a bank emanating from its asset portfolio (both advances and investments). It is another effective measure for evaluating the performance of a bank's management. A bank with higher profitability can otherwise afford to charge lower spreads (Norris & Floerkemeier, 2007). However, banks with a higher ROA can have higher spreads while their interest-sensitive assets perform better.

#### *Overheads to Total Assets [(OH<sub>it</sub>/TA<sub>it</sub>)]*

Overhead costs include salaries and other administrative expenses, including wages, other staff costs, motor vehicles, premises, depreciation on fixed assets, and other noninterest expenses. If a bank incurs high overhead costs in the process of providing services, then it is likely to charge a higher spread to sustain its overall profitability (Brock & Suarez, 2000).

### *Employee Productivity*

Bank productivity is measured as per employee contribution to loans and deposits. It is estimated as  $D_{it}/E_{it}$  for deposits per employee and  $L_{it}/E_{it}$  for loans per employee (to account for the efficient use of resources, we also include performing loans per employee). A higher ratio would indicate the greater contribution of employees in both loan and deposit markets, and such banks are expected to earn higher spreads.

### *3.3.3. Asset Quality*

Asset quality refers to the performance of the loan portfolio. A higher share of NPLs can impair bank performance in at least two ways. The loan losses immediately reduce the interest revenue, bringing spreads under pressure. Simultaneously, banks are required to make provision for classified loans, thus increasing noninterest expenses and resulting in lower profitability. This explanation of asset quality warrants an inverse relationship between asset quality and banking margins. However, Angbazo (1997) argues that a diminution in asset quality calls for increasing loans' loss provisions. Banks are likely to charge higher spreads to compensate for the increase in loan loss reserves and consequently an increase in credit risk would result in increasing spreads. We use two variables to estimate asset quality.

#### *Impaired Lending to Gross Advances [(NPL<sub>it</sub>/GL<sub>it</sub>)]*

This estimate is based on the proportion of classified loans to total advances. A higher (lower) ratio of impaired lending to total finances depicts a deteriorating loan portfolio, resulting in a decline (or increase) in spreads.

#### *Sectoral Diversification*

Sectoral diversification refers to the diversified allocation and acquisition of funds. On the deposit side, public sector institutions are less likely to base their decision on the rate of return being offered by banks. Therefore, a bank with a higher proportion of public sector deposits is likely to enjoy a lower cost of funds and is expected to earn higher margins. The deposit side variable ( $D_{Public}$ ) is estimated as the proportion of public sector deposits to total deposits.

On the advances side, it is pertinent to measure the diversification of the loan portfolio in terms of share to major sectors of the economy. Lending rates to various sectors could reflect the risk premiums that banks are likely to earn. Banks with high exposure to agriculture and consumer loans (State Bank of Pakistan, 2006) are likely to earn higher spreads than banks lending to manufacturing sectors such as textiles and energy. There are four sectoral variables incorporating the proportionate exposure to agriculture ( $L_{agr}$ ), textiles ( $L_{tex}$ ), energy ( $L_{en}$ ), and consumers ( $L_{cons}$ ) (Beck & Hesse, 2008).

#### 3.3.4. *Liquidity [ $LA_{it}/DD_{it}$ ]*

Liquidity measures the extent to which a bank is able to meet the withdrawal of funds. There is a tradeoff between liquidity and interest rate margins, and banks with a higher proportion of liquid assets are likely to generate lower spreads. We measure liquidity as the ratio of liquid assets to demand deposits. Liquid assets include cash and bank balances, deposits with banks, government securities, listed term finance certificates, listed equity investments, and net reverse repos.

#### 3.3.5. *Risk Absorption Capacity*

Risk absorption capacity refers to the cushion that banks have against unforeseen losses. The cushion against possible losses is central to the financial structure of commercial banks. The recent financial crisis was triggered by the financial sector's excessive risk taking, which became worse with the simultaneous erosion of banks' capacity to absorb various risks. This has warranted the increased significance of risk absorption capacity for banking operations. A bank with a higher risk absorption capacity is perceived as resistant against credit and market risks and ultimately enjoys a competitive borrowing profile both in deposit and interbank markets with a low rate of return for lenders. Therefore, a strong cushion is likely to positively impact interest rate spreads. We use three variables to proxy risk absorption capacity.

#### *Capital Adequacy Ratio [ $CAR_{it}$ ]*

The capital adequacy ratio (CAR) is a regulatory scale (proposed by the Bank for International Settlement in the Basle Accord) that determines a bank's capacity to absorb losses arising from various risks. This ratio compares the bank's core and noncore capital with risk-weighted assets; a



minimum ratio<sup>1</sup> of 10% is required for a bank to have adequate capital (before December 2009, the required CAR was 8%). The CAR is superior to the ratio of equity to total assets for two reasons. First, it recognizes different risk levels for every asset, and second, unlike the accounting definition of equity, it considers two tiers of capital. Tier 1 consists of paid-up capital and disclosed reserves and is expected to absorb losses without requiring the liquidation of the bank. Tier 2 capital comprises noncore capital and includes undisclosed reserves, revaluation surplus, hybrid instruments, and subordinated loans. Tier 2 capital is expected to minimize depositors' losses in the extreme event of a bank's liquidation.

A strong CAR is expected to have a positive impact on spreads (Norris & Floerkemeier, 2007). However, there is one caveat to this expectation. In banks where the CAR is exceptionally high, asset deployment is likely to be low-risk (for example, government securities) and could therefore result in lower spreads.

### *Credit Ratings [ $\delta_{it}$ ]*

Credit ratings are an opinion of the timely debt service capacity of an entity. The rating agency incorporates most of the qualitative and quantitative factors underlying a firm's credit worthiness and provides a substantial view of the level of default risk. In order to include this independent opinion of a bank's capacity, we use a dummy variable (banks with a rating of AA – or higher,  $\delta_{it} = 1$  and 0 otherwise). Banks with higher credit ratings are expected to have higher spreads and margins.

### *Default Likelihood Indicator*

The traditional measure of default risk takes into account the volatility of assets' book value. However, in the extreme case of default, only the market value of assets matters. The market value of assets (and related volatility) per se is not evident because, although the market value of equity is observable, not all liabilities are marked to market. Merton (1974) proposes an asset value model to extract credit information embedded in equity markets using the Black and Scholes (1973) option pricing framework.

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<sup>1</sup> State Bank of Pakistan, BSD Circular No. 07 of 2009, BSD Circular No. 30 of 2008, and BSD Circular No. 16 of 2008.

The asset value model treats the firm's equity as a call option (European) on the assets of the firm with a maturity equal to the maturity of its debt, and strike price equal to the amount paid to its creditors. The firm will be distant from default as long as the market value of its assets exceeds the amount of liabilities to be repaid. In the option pricing framework, the market value of a bank's assets will follow a geometric Brownian motion of the form

$$dV_A = \mu V_A dt + \sigma_A V_A dW$$

$V_A$  is the bank's asset value, with a drift  $\mu$  and volatility  $\sigma_A$  in a standard Wiener Process  $W$ . The equity of the bank  $V_E$  with liabilities  $X$  of maturity  $T$ , a risk free rate of  $r$ , and a cumulative density function  $N$  of normal standard distribution, can be modeled as

$$V_E = V_A N(d_1) - X e^{-rT} N(d_2)$$

$$\text{with } d_1 = \frac{\ln(V_A/X) + (r + 1/2 \sigma_A^2)T}{\sigma_A \sqrt{T}}, \text{ and } d_2 = d_1 - \sigma_A \sqrt{T}$$

It is possible to estimate  $V_A$  from the above equation if the value of  $\sigma_A$  is known.

To calculate  $\sigma_A$ , we adopt an iterative process as proposed by Vassalou and Xing (2004).<sup>2</sup> Initially, the past 12 months' daily prices for every bank are used to estimate the volatility of equity  $\sigma_E$ . This estimate of volatility in equity will be used as a proxy for  $\sigma_A$  and the daily  $V_A$  is calculated given  $V_E$ . In the next step, the standard deviation of  $V_A$  is estimated and used as  $\sigma_A$  for the next iteration. This process continues till both estimates of  $\sigma_A$  and  $\sigma_E$  converge within 0.0001. Once the converged value is obtained, we re-estimate  $V_A$  for every bank and calculate drift  $\mu$  as the log of  $V_A$ .  $X_i$  represents liabilities maturing within  $T$  (one year) and  $r$  is the daily yield on one-year treasury bills. Once all these variables are in place, the default likelihood indicator (DLI) (distance to default) can be estimated as

$$DLI_{it} = 1 - N \left[ \frac{\ln(V_{Ai}/X_i) + (r + 1/2 \sigma_{Ai}^2)T}{\sigma_{Ai} \sqrt{T}} \right]$$

<sup>2</sup> A similar iterative process is used by Moody's KMV to estimate the expected default frequency.

A lower probability of default would imply a low level of default risk, and banks that are distant from default are expected to have high spreads.

### 3.3.6. Bank Concentration

The primary macroeconomic variable that is vital to spreads is bank concentration and competition structure. To account for competition, we use the Herfindahl Index ( $H_t$ ) for the concentration of loans and deposits. The Herfindahl index measures a bank's size relative to its peers and is used to proxy the amount of competition. It is calculated as the sum of the squared market share of all banks in the industry. A higher index reflects less competition and increasing market power for a few banks. The estimation using the square of the market share provides additional weight to large firms that are more likely to influence the competition structure. The Herfindahl index for loans and deposits is calculated as follows:

$$H(L)_t = \sum_{i=1}^n S(L_i)^2$$

$$H(D)_t = \sum_{i=1}^n S(D_i)^2$$

$H(L)_t$  and  $H(D)_t$  represent the Herfindahl index for loans and deposits, respectively, while  $S(L_i)^2$  and  $S(D_i)^2$  reflect the squared loan and deposit market share of every bank. A positive association between concentration and interest rate margins indicates greater market power and less competition in the banking system. Banks in a highly concentrated market tend to collude and, as a result, higher interest rates are charged on loans and a smaller rate of return is paid to depositors.

### 3.3.7. Interest Rate Volatility ( $\sigma_{Rft}$ )

There are two aspects to interest rate volatility. The first one is related to interest rate risk. Volatility in the money market yields changes in the marginal cost of funds faced by banks and therefore provides a benchmark for setting up target spreads. Interest rate volatility is measured as the standard deviation of a one year T-Bill yield ( $\sigma_{Rft}$ ). An increase in volatility is expected to increase interest rate spreads. The

second aspect of volatility in interest rates relates to market risk, which refers to a change in the market value of assets due to a change in interest rate yield. An increasing interest rate would result in a revaluation deficit that warrants a provision in profit-and-loss accounts (held for trading securities and permanent impairment)<sup>3</sup> resulting in a deterioration in profitability. On average, 25% of a bank's earning assets are fixed income marketable securities that are sensitive to changes in interest rate yield. Therefore, to allow for market risk, banks are apt to charge higher spreads to compensate for possible provision against a diminution in assets.

### *3.3.8. GDP Growth [ $g_{GDP}$ ]*

Business cycle effects are measured by the growth in an economy's GDP. Changes in business cycle impact the creditworthiness of borrowers in terms of repayment capacity. In order to compensate against expected default emanating from changing business cycles, banks are likely to impose higher lending rates. In case of accelerating GDP growth, banks tend to charge lower spreads while in periods of stagnant or low growth, banks' spreads are expected to increase (Saunders & Schumacher, 2000).

### *3.3.9. Financial Development Indicator (M2/GDP)*

M2/GDP captures the degree of monetization in the financial system of an economy. It measures the overall size of the financial intermediary sector and is correlated with growth in GDP. Lower monetization of the financial system may reflect a lower level of efficiency in intermediation activity, leading to higher spreads.

## **3.4. Data and Econometric Model**

The data for this study was collected from all banks' financial statements for the period 2004 to 2009. These include information from income statements, balance sheets, statement of changes in equity, and notes accompanying these financial statements. The independent and bank-specific dependent variables were computed in the manner described above. Daily stock prices for calculating the probability of default were

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<sup>3</sup> State Bank of Pakistan, BP&RD Circular Letter No. 16 of 2007.

extracted from the Thomson Data Stream.<sup>4</sup> The macroeconomic variables were collected from various sources, including the State Bank of Pakistan's website, the *Business Recorder*, and *Pakistan Economic Survey*.

We use an unbalanced panel of commercial banks and run the following regressions of spreads on bank-specific and macroeconomic variables.

$$\begin{aligned} \tau_{it} = & \alpha + \beta_1 \log(TA_{it}) + \beta_2 \lambda_{it} + \beta_3 \gamma_{Loans} + \beta_4 \gamma_{dep} + \beta_5 (NII_{it}/TA_{it}) + \\ & \beta_6 ROA_{it} + \beta_7 (OH_{it}/TA_{it}) + \beta_8 (D_{it}/E_{it}) + \beta_9 (L_{it}/E_{it}) + \beta_{10} (NPL_{it}/GL_{it}) + \\ & \beta_{11} D_{Public} + \beta_{12} L_{agr} + \beta_{13} L_{tex} + \beta_{14} L_{en} + \beta_{15} L_{cons} + \beta_{16} (LA_{it}/DD_{it}) + \beta_{17} CAR_{it} \\ & + \beta_{18} \delta_{it} + \beta_{19} PD_{it} + \beta_{20} H(L)_t + \beta_{21} H(D)_t + \beta_{22} \sigma_{Rt} + \beta_{23} g_{GDP} + \\ & \beta_{24} (M2/GDP) + \varepsilon_{it} \end{aligned}$$

We further use an alternative definition of spreads for robustness and run a regression of the same independent variables on NIM.

$$\begin{aligned} NIM_{it} = & \beta_1 \log(TA_{it}) + \beta_2 \lambda_{it} + \beta_3 \gamma_{Loans} + \beta_4 \gamma_{dep} + \beta_5 (NII_{it}/TA_{it}) + \\ & \beta_6 ROA_{it} + \beta_7 (OH_{it}/TA_{it}) + \beta_8 (D_{it}/E_{it}) + \beta_9 (L_{it}/E_{it}) + \beta_{10} (NPL_{it}/GL_{it}) + \\ & \beta_{11} D_{Public} + \beta_{12} L_{agr} + \beta_{13} L_{tex} + \beta_{14} L_{en} + \beta_{15} L_{cons} + \beta_{16} (LA_{it}/DD_{it}) + \beta_{17} CAR_{it} \\ & + \beta_{18} \delta_{it} + \beta_{19} PD_{it} + \beta_{20} H(L)_t + \beta_{21} H(D)_t + \beta_{22} \sigma_{Rt} + \beta_{23} g_{GDP} + \\ & \beta_{24} (M2/GDP) + \varepsilon_{it} \end{aligned}$$

Given the large number of variables, it is least likely that, despite being a random variable,  $\alpha$  is uncorrelated with any of the independent variables. Therefore, the assumption of random effect would be too stringent and an appropriate regression would use fixed effects. Table 2 summarizes the variables and their expected signs.

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<sup>4</sup> The DataStream prices were extracted from a terminal installed at Paris Dauphine.

**Table 2: Expected Signs of Coefficients**

<b>Bank-Specific Variables</b>	<b>Variable</b>	<b>Expected Sign</b>
Bank size	Total assets	+
	Network size	+
Operational efficiency	Loan market share	+
	Deposit market share	+
	Net interest margin to total assets	-
	Return on assets	- or +
	Overheads to total assets	+
	Deposits per employee	+
	Loans per employee	+
Asset quality	Impaired lending to gross advances	+ or -
	Public sector deposits to total deposits	+
	Loans to agriculture to total advances	+
	Loans to textile to total advances	-
	Loans to energy to total advances	-
	Loans to consumers to total advances	+
Liquidity	Liquid assets to demand deposits	+
Risk absorption capacity	Capital adequacy ratio	+ or -
	Credit ratings	+
	Probability of default	-
<b>Macro-Level Variables</b>		
Bank concentration	Herfindahl index for loans	+
	Herfindahl index for deposits	+
Interest rate volatility	Volatility in T-bills yield	+ or -
GDP growth	Yoy growth in GDP	+
Financial development indicator	M2/GDP	-

GDP = gross domestic product.

Source: Authors' estimates.

## 4. Empirical Results and Analysis

This section presents our empirical results and analysis.

### 4.1. Descriptive Statistics

The bank-specific descriptive statistics for 2004 to 2009 are reported in Table 3. On average, the Royal Bank of Scotland reported the highest spread for six years at 8.0%, followed by Standard Chartered Bank Limited with a mean spread of 7.1%. For the sample period, Samba has the lowest spread of 2.6% owing mainly to its poor asset quality with average nonperforming to gross loans of 38.5%. Despite a high average spread of 6.9%, Bank Islami Pakistan has a mean ROA of -8.0%—a consequence of massive overheads. The average overheads to total assets for Bank Islami Pakistan remained at 4.9%, which is significantly higher than all other banks in our sample.

The proportion of public sector deposits to total deposits was at a maximum in the public sector banks (Bank of Punjab: 49.6%, Bank of Khyber: 45.4%, National Bank of Pakistan: 37.5%), which in part explains above-average spreads and margins for the National Bank of Pakistan and Bank of Punjab. However, the spread for Bank of Khyber was lower (4.3%) in nationalized banks mainly because of asset quality with NPLs to gross loans of 26.4%. The major exposure of banks was concentrated in the textiles sector with Habib Metro at 54.4%, Bank Al Habib at 42.0%, and Soneri Bank at 35.7%. In the consumer sector, Standard Chartered Bank Limited, the Royal Bank of Scotland, and Bank Alfalah Limited had notable average exposure during the sample period. The average CAR was highest for Samba (42.6%) which, coupled with its lowest asset quality, contributes toward its constrained spread and interest margins. The DLI was highest for Habib Bank Limited (20.6%) owing to its highly volatile equity prices that result in the highly volatile market value of assets.

Table 3: Average Statistics by Bank, 2004–2009

Bank	Spread (%)	NIM (%)	Total Assets (mln)	Noninterest Income to Total Assets (%)	ROA (%)	Overhead to Total Assets (%)	Deposits per Employee (mln)	Loans per Employee (mln)	NPLs to Gross Loans (%)	Public Sector Deposits (%)	Loans to Agriculture Sector (%)	Loans to Textiles Sector (%)	Loans to Energy Sector (%)	Loans to Individuals (%)	Liquidity (X)	CAR (%)	DII (%)
Allied Bank Limited	5.8	5.2	267,639.7	1.2	4.6	2.5	23.7	16.6	9.8	11.7	5.3	19.6	11.0	3.2	1.3	13.2	4.6
Arif Habib Bank Limited	4.6	4.3	17,681.1	1.0	-0.4	3.3	31.1	23.6	13.5	17.8	0.0	6.7	6.5	12.5	2.9	33.6	0.3
Askari Bank	5.4	4.6	170,613.3	1.5	1.2	1.6	27.0	20.5	6.1	24.8	3.0	20.9	4.2	15.9	1.9	10.5	6.0
Atlas Bank	3.0	1.8	14,739.8	0.5	12.4	4.1	18.0	13.9	8.6	14.3	0.1	14.5	3.4	5.3	17.7	29.6	0.0
Al Habib Bank	4.3	3.8	130,627.1	1.2	1.6	2.3	36.1	25.4	0.8	13.7	2.2	42.0	5.8	3.7	1.0	11.5	11.3
Bank Al Falah	4.4	3.4	279,130.0	1.3	1.8	2.5	33.0	20.7	3.6	23.8	4.5	16.9	6.3	25.3	1.7	9.4	2.2
Bank Islami Pakistan	6.9	4.6	13,967.1	1.0	-8.0	4.9	13.7	6.5	3.6	6.0	3.5	15.0	1.4	15.4	2.6	27.2	0.0
Bank of Khyber	4.3	3.4	28,931.5	1.4	2.7	1.8	32.7	17.1	26.4	45.4	3.1	2.7	6.0	7.4	3.7	17.7	0.1
Bank of Punjab	6.7	2.7	139,639.8	1.8	2.5	1.7	33.6	26.0	7.1	49.6	5.6	26.1	1.2	2.9	1.8	9.5	7.0
Faysal Bank Limited	4.7	0.6	123,410.9	2.0	3.7	2.0	38.3	33.2	6.3	8.7	3.1	16.2	7.2	16.2	2.1	12.1	5.9
Habib Bank Limited	6.3	5.9	614,681.6	1.6	2.9	2.9	34.1	25.6	9.5	15.3	6.7	21.0	5.0	12.2	1.8	11.4	20.6
JS Bank	4.2	2.3	20,638.6	1.3	4.6	3.5	116.5	16.3	3.0	8.5	3.5	10.6	1.4	15.9	2.2	32.5	0.0
KASB	4.8	1.8	31,665.8	1.4	-2.0	2.9	26.0	19.8	12.6	14.1	0.9	20.2	1.2	15.1	2.0	4.2	0.0
MCB Bank	7.3	4.5	367,326.6	1.5	3.9	2.0	24.7	18.9	5.8	3.4	1.5	15.7	8.5	8.9	1.5	17.8	12.7
Meezan Bank	5.4	4.8	52,083.5	1.6	2.8	3.0	25.8	18.4	2.8	0.3	0.3	32.1	2.2	18.1	1.5	11.2	0.0

Continued...



Table 3: Average Statistics by Bank, 2004–2009 (Continued)

Bank	Spread (%)	NIM (%)	Total Assets (mln)	Noninterest Income to Total Assets (%)	ROA (%)	Overhead to Total Assets (%)	Deposits per Employee (mln)	Loans per Employee (mln)	NPLs to Gross Loans (%)	Public Sector Deposits (%)	Loans to Agriculture Sector (%)	Loans to Textiles Sector (%)	Loans to Energy Sector (%)	Loans to Individuals (%)	Liquidity (X)	CAR (%)	DLI (%)
Habib Metro	3.2	3.1	134,867.2	1.5	1.7	1.5	51.0	40.4	1.6	12.9	2.7	54.4	0.9	1.5	1.5	11.2	6.5
My Bank	6.1	3.1	26,532.1	2.3	-0.1	2.8	23.2	16.9	20.7	14.2	1.3	19.6	0.1	2.1	1.6	16.9	0.2
National Bank of Pakistan	6.1	5.7	701,108.8	1.8	4.2	2.1	88.1	51.7	12.3	37.5	5.0	16.3	10.5	17.1	1.3	16.0	12.5
NIB Bank	4.2	3.2	76,960.7	3.0	-1.1	2.3	19.2	15.8	14.0	13.4	0.4	32.4	1.2	16.0	2.2	11.5	0.0
Royal Bank of Scotland	8.0	4.7	102,791.3	2.8	-1.1	5.8	18.3	15.0	13.0	2.8	1.2	14.4	3.3	30.7	1.5	10.7	5.7
Samba	2.6	2.3	13,742.3	0.9	-0.6	5.8	12.6	8.3	38.5	12.0	0.3	16.7	17.7	25.6	4.5	42.6	0.0
Standard Chartered Bank	7.3	7.2	195,078.2	2.2	1.7	3.4	66.2	63.9	6.4	3.5	1.0	13.4	10.1	32.4	1.4	11.7	0.3
Silk Bank	3.9	2.0	53,987.2	0.8	-6.2	2.6	22.3	16.9	22.7	14.3	0.2	14.3	1.5	5.9	4.1	7.8	0.0
Soneri Bank	4.4	3.1	71,381.5	1.4	2.4	1.7	36.3	25.2	3.5	20.4	2.1	35.7	0.9	4.6	2.4	11.0	1.0
United Bank Limited	6.4	6.0	449,322.8	1.7	3.3	2.8	64.1	49.3	8.6	16.9	6.1	20.5	6.3	17.1	1.5	11.2	7.1

CAR = capital adequacy ratio, DLI = default likelihood indicator, NIM = net interest margin, NPL = nonperforming loan, ROA = return on assets.

Source: Authors' estimates based on banks' financial statements.

Table 4 compares the descriptive statistics of the top six banks (based on total assets) with that of the remaining banks in our sample. The larger banks dominate spread and margins owing to their higher operational efficiency, which is depicted by higher loans and deposits per employee, low overheads to total assets, and better asset quality. These banks have a better diversified loan portfolio, while medium to small banks have their exposure concentrated in the textiles and consumer sector. Average capital adequacy and liquidity is higher for medium and small banks, indicating their investment in low-risk and liquid assets, which results in lower return on assets vis-à-vis the top six banks. It is interesting to note that medium to small banks have relatively higher noninterest income to total assets than larger banks, indicating the former's tendency to complement their overall profitability with noninterest sources.

Table 5 reports the average statistics of banks classified on the basis of ownership. This includes foreign banks, domestic private sector banks, and public sector banks. This table reveals some interesting facts about the performance and efficiency of these three classes of banks. Average spreads are highest for public sector banks, followed by private sector and foreign banks. Asset quality is lowest for public sector banks, which largely emanates from politically motivated credit by such institutions. It also shows that public sector deposits are concentrated in public sector banks, which partly explains their better spread and profitability vis-à-vis private and foreign banks.

Table 4: Bank-Specific Statistics: Top Six Banks vs. Remaining Banks, 2004–2009

Bank	Variable	Spread (%)	NIM (%)	Total Assets (mln)	Noninterest Income to Total Assets (%)	ROA (%)	Overhead to Total Assets (%)	Deposits per Employee (mln)	Loans per Employee (mln)	NPLs to Gross Loans (%)	Public Sector Deposits (%)	Loans to Agriculture Sector (%)	Loans to Textiles Sector (%)	Loans to Energy Sector (%)	Loans to Individuals (%)	Liquidity (X)	CAR (%)	DLI (%)
Top six banks <sup>a</sup>	Average	6.0	5.1	446,534.9	1.5	3.4	2.5	44.6	30.5	8.3	18.1	4.8	18.3	7.9	14.0	1.5	13.2	10.0
	Median	6.2	5.5	408,324.7	1.5	3.6	2.5	33.6	23.1	9.1	16.1	5.1	18.3	7.4	14.6	1.5	12.3	9.8
	Min	4.4	3.4	267,639.7	1.2	1.8	2.0	23.7	16.6	3.6	3.4	1.5	15.7	5.0	3.2	1.3	9.4	2.2
	Max	7.3	6.0	701,108.8	1.8	4.6	2.9	88.1	51.7	12.3	37.5	6.7	21.0	11.0	25.3	1.8	17.8	20.6
Remaining banks	Average	5.0	3.3	74,702.1	1.6	1.0	3.0	28.8	22.3	11.1	15.6	1.8	21.5	4.0	13.0	3.1	17.0	2.3
	Median	4.6	3.1	53,987.2	1.4	1.6	2.8	26.0	18.4	7.1	13.7	1.3	16.7	2.2	15.1	2.1	11.5	0.2
	Min	2.6	0.6	13,742.3	0.5	-8.0	1.5	12.6	6.5	0.8	0.3	0.0	2.7	0.1	1.5	1.0	4.2	0.0
	Max	8.0	7.2	195,078.2	3.0	12.4	5.8	66.2	63.9	38.5	49.6	5.6	54.4	17.7	32.4	17.7	42.6	11.3

CAR = capital adequacy ratio, DLI = default likelihood indicator, NIM = net interest margin, NPL = nonperforming loan, ROA = return on assets.

<sup>a</sup> Top six banks based on average total assets from 2004 to 2009.

Source: Authors' estimates based on banks' financial statements.

Table 5: Banks' Average Statistics, 2004–2009 (Ownership Classification)

Bank	Spread (%)	NIM (%)	Total Assets (mln)	Noninterest Income/Total Assets (%)	ROA (%)	Overhead to Total Assets	Deposits per Employee (mln)	Loans per Employee (mln)	NPLs to Gross Loans (%)	Public Sector Deposits (%)	Loans to Agriculture Sector (%)	Loans to Textiles Sector (%)	Loans to Energy Sector (%)	Loans to Individuals (%)	Liquidity (X)	CAR (%)	DLI (%)
Foreign banks	4.9	3.5	114,672.4	1.8	0.3	3.2%	31.9	25.8	12.1	10.2	1.5	23.4	5.6	19.1	2.3	14.3	2.3
Private sector banks	5.3	3.9	168,985.9	1.3	2.0	2.9%	36.5	21.4	8.2	13.9	2.8	20.2	4.3	10.1	3.1	17.7	4.9
Public sector banks	5.7	3.9	289,893.4	1.7	3.1	1.9%	51.5	31.6	15.2	44.2	4.5	15.0	5.9	9.1	2.2	14.4	6.5

CAR = capital adequacy ratio, DLI = default likelihood indicator, NIM = net interest margin, NPL = nonperforming loan, ROA = return on assets.

Source: Authors' estimates based on banks' financial statements.

Overhead costs are highest for foreign banks, resulting in the lowest ROA compared to private and public sector banks. These high overhead costs are largely reflected in high employee payments and highly automated and well designed and furnished bank branches. Moreover, domestic private sector banks and foreign banks have lower exposure in the agriculture sector while they dominate in loans to the textiles sector. There are many explanations for this phenomenon. Primarily, most medium and small private sector and foreign banks have fewer branches in rural areas (probably none in the case of foreign banks) as compared to public sector banks. This also reflects the cautious approach of private sector banks in extending credit to riskier sectors of the economy as is expected in a market-oriented financial regime. In a liberalized financial system, banks are most likely to lend to large corporations and blue chip companies who have a banking history and audited financial accounts to ensure lower transaction costs and prudent credit extension. With the development of and innovation in consumer banking products, loans to individuals have become a major proportion of the credit structure of these banks. Since consumer loans inherently carry a higher interest rate due to their risk profile, they also lead to higher spreads for banks. There is hardly any difference in exposure to individuals between domestic private and public banks. However, foreign banks demonstrate a much higher exposure. The reason is probably that foreign banks have been pioneers in consumer lending in Pakistan and on the basis of their international experience coupled with effective systems, they are still leaders in this field.

Table 6 represents yearly statistics for bank-specific variables. Spreads and margins are increasing over time owing to an increase in the deposit and advances base (per employee contribution). However, it is interesting to note that profitability was eroded with average ROA of -1.82% for 2008 and -0.87% for 2009. This regression in overall profitability can be partially explained by eroding asset quality (NPLs to gross loans of 16.95% in 2009), which have led to higher provisioning and increasing overheads to total assets (3.39% in the financial year [FY] 2008, and 3.28% in FY2009).

Table 6: Statistics for Bank-Specific Factors by Year

Variable	2004		2005		2006		2007		2008		2009	
	Mean	Median	Mean	Median	Mean	Median	Mean	Median	Mean	Median	Mean	Median
Spread	3.50%	3.59%	4.56%	4.63%	4.34%	4.79%	4.62%	4.05%	6.87%	6.58%	6.57%	6.45%
NIM	3.12%	3.30%	4.04%	3.87%	3.28%	3.16%	3.31%	3.33%	4.10%	4.54%	4.64%	4.35%
Total assets (mln)	59,190.2	67,890.5	77,283.3	91,502.4	71,870.3	89,039.5	104,267.9	141,234.3	113,046.9	138,241.5	135,635.1	149,867.2
Noninterest income/total assets	1.80%	1.53%	1.39%	1.22%	1.59%	1.25%	1.73%	1.84%	1.57%	1.38%	1.23%	1.09%
ROA	17.41%	12.89%	1.62%	1.75%	1.38%	1.79%	0.16%	1.43%	-1.82%	0.32%	-0.87%	0.22%
Overheads to total assets	2.22%	1.99%	2.32%	2.14%	2.56%	2.37%	2.57%	2.18%	3.39%	2.78%	3.28%	2.81%
Deposits per employee (mln)	46.127	25.012	27.041	26.207	31.089	30.657	29.318	29.670	27.446	27.372	31.898	28.501
Loans per employee (mln)	29.948	17.384	19.096	19.488	26.051	22.373	20.218	19.131	22.126	21.596	20.553	18.969
NPLs to gross loans	10.55%	8.32%	7.87%	3.69%	7.31%	4.63%	6.89%	5.22%	12.52%	7.88%	16.95%	12.40%
Public sector deposits	15.92%	15.98%	17.58%	14.72%	18.08%	13.49%	15.68%	14.29%	16.61%	14.00%	15.87%	12.51%

Continued...

**Table 6: Statistics for Bank-Specific Factors by Year (Continued)**

Variable	2004		2005		2006		2007		2008		2009	
	Mean	Median	Mean	Median	Mean	Median	Mean	Median	Mean	Median	Mean	Median
Loans to agriculture sector	2.80%	2.00%	2.86%	1.35%	2.16%	0.87%	2.15%	1.19%	3.01%	1.75%	2.99%	1.23%
Loans to textiles sector	31.91%	24.94%	21.21%	19.51%	19.41%	17.83%	20.51%	16.85%	20.69%	16.82%	20.72%	16.65%
Loans to energy sector	4.43%	3.11%	3.07%	1.36%	3.05%	1.27%	4.61%	3.38%	6.97%	4.99%	8.13%	5.92%
Loans to individuals	11.04%	10.01%	13.54%	11.81%	14.33%	14.34%	15.42%	13.41%	12.86%	11.32%	11.49%	12.23%
Liquidity (x)	4.473	1.742	3.163	1.817	3.137	2.050	2.743	1.969	1.749	1.486	1.638	1.531
CAR	17.41%	12.89%	14.83%	12.54%	18.36%	12.80%	17.53%	11.46%	13.43%	10.81%	15.27%	13.01%
DLI	2.36%	0.07%	5.56%	0.81%	5.11%	1.95%	4.97%	1.35%	4.11%	0.99%	2.31%	0.00%

CAR = capital adequacy ratio, DLI = default likelihood indicator, NIM = net interest margin, NPL = nonperforming loan, ROA = return on assets.

Source: Authors' estimates based on banks' financial statements.

The summary statistics of all independent and dependent variables are represented in Table 7. Among macro-variables, the Herfindahl index for loans and deposits is 9.5% and 9.7%, respectively, which represents competition in the advances and deposits markets of banks in Pakistan. A Herfindahl index of less than 10% indicates a competitive market. As measured by the Herfindahl index, the banking sector of Pakistan has become more and more competitive in deposit mobilization and credit extension over our study period. This indicates the reduced concentration of banking business with the larger six banks in the country.

**Table 7: Summary Statistics of Dependent and Independent Variables, 2004–2009**

Variable	Variable	Mean	Median	SD	Min	Max
	Spread	0.050	0.048	0.021	0.000	0.122
	NIM	0.038	0.038	0.022	-0.015	0.092
	Total assets (mln)	96,126.3	108,092.4	3.6	3,686.7	944,232.8
Market power	Loans	0.044	0.030	0.048	0.000	0.198
	Deposits	0.044	0.026	0.049	0.000	0.224
	Noninterest income to total assets	0.015	0.014	0.010	0.000008	0.090
	ROA	0.011	0.013	0.051	-0.300	0.262
	Overheads to total assets	0.027	0.024	0.014	0.000	0.079
Per employee (mln)	Deposits	27.956	27.866	10.901	1.530	52.860
	Gross loans	20.430	19.531	9.019	0.450	44.639
	Good loans	18.588	18.476	8.995	0.384	43.932
	NPLs to gross loans	0.104	0.069	0.104	0.00009	0.482
	Public sector deposits	0.163	0.135	0.136	0.000	0.513

Continued...



**Table 7: Summary Statistics of Dependent and Independent Variables, 2004–2009 (Continued)**

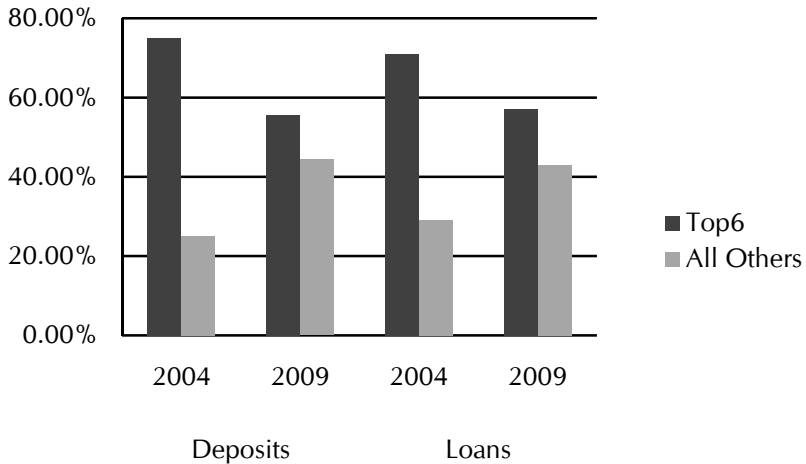
Variable	Variable	Mean	Median	SD	Min	Max
Loans	Agriculture	0.026	0.013	0.032	0.000	0.154
	Textiles	0.210	0.185	0.123	0.000	0.577
	Energy	0.048	0.031	0.055	0.000	0.290
	Individuals	0.129	0.113	0.099	0.000	0.452
	Liquidity	2.228	1.678	2.049	0.010	19.870
	CAR	0.157	0.122	0.124	0.000	0.710
	DLI	0.041	0.003	0.061	0.000	0.231
Herfindahl	Deposits	0.097	0.092	0.012	0.085	0.122
	Loans	0.095	0.094	0.010	0.084	0.111
	Interest Rate Volatility	0.007	0.007	0.005	0.001	0.016
	GDP Growth	0.051	0.045	0.027	0.0121	0.089
	M2/GDP	0.445	0.460	0.027	0.390	0.470

CAR = capital adequacy ratio, DLI = default likelihood indicator, GDP = gross domestic product, NIM = net interest margin, NPL = nonperforming loan, ROA = return on assets, SD = standard deviation.

Source: Authors' estimates based on banks' financial statements.

Figure 2 is a comparative representation of the share of the top six banks in the loans and deposits markets. In 2004, the top six banks accounted for 74% of total deposits and 71% of loans in Pakistan's banking sector. In 2009, their share had been significantly reduced to 55% in the deposit market, while they represented 57% of total loans. This is clear evidence of the transition of the banking sector from a concentrated to a competitive industry, which is an outcome of the financial sector reforms aimed at deregulation and increased competition in the banking sector. With further mergers and acquisitions taking place, largely due to the State Bank of Pakistan's regulations of a minimum capital requirement and branch network, competition in the banking sector is likely to continue to increase.

The interest rate volatility for the sample period remained modest with an average of 0.7% and a standard deviation of 0.5%. The GDP growth rate has been volatile with a maximum of 8.9% and a minimum of 1.2% during the sample period. This reflects the trends in business activity that prevailed during our study period.

**Figure 2: Comparative Share of Top Six Banks, 2004 and 2009**

Source: Authors' estimates based on banks' financial statements.

The correlations between bank-specific variables are presented in Table 8. The spread has a positive correlation with total assets, market power, noninterest income to total assets, and public sector deposits, while it is negatively correlated with NPLs to gross loans, liquidity, CAR, and DLI. The correlation coefficients of the DLI with some of the other variables reveal some interesting facts. The correlation between the DLI and NPLs to gross loans is positive, indicating that a lower asset quality (increase in NPLs to gross loans) would augment the default likelihood. Similarly, there is a positive correlation between consumer exposure and the DLI, indicating a high risk associated with loans to individuals. The correlations between the DLI and liquidity and the DLI and CAR are negative, representing a high default possibility with a decline in liquidity and capital adequacy.

Table 8: Correlation Matrix of Bank-Level Variables

Variable	Spread	NIM	Total Assets (mln)	Market Share Loans	Market Share Deposits	Noninterest Income to Total Assets	ROA	Overheads	Deposits per Employee (mln)	Gross Loans per Employee (mln)	Good Loans (mln)	NPLs to Gross Loans	Public Sector Deposits	Loans to Agriculture Sector	Loans to Textiles Sector	Loans to Energy Sector	Loans to Consumers	Liquidity	CAR	
NIM	0.60																			
Total assets	0.40	0.42																		
Market share loans	0.31	0.42	0.82																	
Market share deposits	0.29	0.42	0.81	0.99																
Noninterest income to total assets	0.08	0.04	0.08	0.06	0.04															
ROA	0.06	0.12	0.20	0.27	0.27	0.08														
Overheads	0.24	0.12	-0.25	-0.17	-0.17	0.01	-0.32													
Deposits per employee	0.03	0.02	0.46	0.27	0.27	0.07	0.11	-0.43												
Gross loans per employee	-0.08	-0.10	0.43	0.24	0.21	0.16	0.15	-0.46	0.90											

Continued...

Table 8: Correlation Matrix of Bank-Level Variables (Continued)

Variable	Spread	NIM	Total Assets (mln)	Market Share Loans	Market Share Deposits	Noninterest Income to Total Assets	ROA	Overheads	Deposits per Employee (mln)	Gross Loans per Employee (mln)	Good Loans (mln)	NPLs to Gross Loans	Public Sector Deposits	Loans to Agriculture Sector	Loans to Textiles Sector	Loans to Energy Sector	Loans to Consumers	Liquidity	CAR	
Good loans per employee	0.11	0.08	0.43	0.23	0.21	0.16	0.18	-0.47	0.87	0.98										
NPLs to gross loans	-0.02	-0.14	-0.26	-0.17	-0.16	-0.15	-0.14	0.29	-0.26	-0.31	-0.48									
Public sector deposits	0.12	0.09	0.14	0.17	0.21	-0.09	0.06	-0.27	0.35	0.21	0.14	0.20								
Loans to agriculture sector	0.10	0.21	0.38	0.43	0.43	0.03	0.22	-0.09	0.20	0.14	0.14	-0.10	0.29							
Loans to textiles sector	0.13	0.04	0.17	0.01	-0.01	0.14	0.07	-0.20	0.43	0.46	0.51	-0.32	-0.11	-0.02						
Loans to energy sector	0.19	0.28	0.23	0.23	0.25	-0.13	-0.07	0.28	0.02	-0.05	-0.09	0.26	-0.01	0.06	-0.20					
Loans to consumers	0.16	0.20	0.08	0.11	0.12	0.16	-0.03	0.40	-0.24	-0.19	-0.16	-0.03	-0.17	-0.08	-0.30	0.27				
Liquidity	-0.35	-0.29	-0.23	-0.27	-0.26	-0.11	-0.13	0.12	-0.13	-0.11	-0.12	0.18	-0.01	-0.18	-0.24	-0.01	0.01			
CAR	-0.22	-0.06	-0.50	-0.23	-0.22	-0.25	-0.14	0.28	-0.37	-0.40	-0.38	0.19	-0.15	-0.18	-0.31	0.27	0.12	0.22		
DLI	-0.23	-0.25	0.61	0.73	0.69	0.06	0.16	-0.18	0.29	0.32	0.34	0.24	-0.13	0.32	0.12	0.11	0.03	-0.21	-0.17	

CAR = capital adequacy ratio, DLI = default likelihood indicator, NIM = net interest margin, NPL = nonperforming loan, ROA = return on assets.

Source: Authors' estimates based on banks' financial statements.

## 4.2. Regression Results

We estimate fixed effect regressions for two measures of intermediary efficiency (interest rate spread and net interest margin) on various firm- and macro-level variables using our panel of 25 banks for the period 2004–2009. The results for these regressions are summarized in Tables 9 and 10. The results reveal a positive relationship between bank size and interest rate spreads with significant coefficients for both the log of total assets and branch network. Therefore, larger banks are expected to have a higher level of intermediary efficiency from economies of scale, which emanate from their substantial asset base and effective resource mobilization capacity, given a strong branch network. The coefficients on the measures for operational efficiency reveal some interesting results. ROA is significant and positive, indicating higher spreads for banks with an efficient use of assets. The positive relationship between spreads and ROA has profound policy implications. Banks with a better ROA have the leverage to reduce spreads and improve the intermediation efficiency of the financial system.

The coefficient on deposit market share is significant but negative, which contradicts common intuition that there is a positive linkage between interest rate spreads and market power of deposits. The results remain robust both for spread and net interest margin regressions. Beck and Hesse (2009) argue that a negative relationship provides evidence for the small financial system view (financial deepening indicator is not significant, reflecting the low level of monetization in the country) which is inevitably the case in Pakistan. The negative coefficient on deposit market share is an indication of banks mobilizing deposits by offering higher interest rates to depositors and thus earning lower interest rate spreads. These results provide evidence for an interest-sensitive deposit market in Pakistan; these findings contradict Khawaja and Din (2007) who argue in favor of an inelastic deposit supply. Since our sample period captures all post-transition years, an interest-sensitive deposit market is an encouraging indicator of a liberalized financial regime. This argument is further supported by the Herfindhal index, which shows competition in the deposit market as well as the loan market in Pakistan.

The overhead costs were highly significant for both spreads and interest rate margins. The positive sign indicates the need of high spreads to

absorb the overhead cost. Therefore, banks with high overheads are expected to charge higher spreads to maintain overall profitability. However, in the long run, it is not possible to maintain such high spreads to cover overheads, and such banks have to revert to cost efficiency by managing their overheads better.

The deposits-per-employee term was statistically significant for NIM, suggesting that a higher contribution per employee toward deposit mobilization could improve a bank's NIM. This further shows that, under a market-based banking system, employee efficiency is paramount. However, deposits per employee remained insignificant for spreads.

The sign on the significant coefficient (at 1% for spreads and 5% for NIM) for gross loans per employee is also interesting. It depicts a negative relationship between loans per employee and spreads. The rationale lies in the quality of the loan portfolio, with average NPLs equaling 8% for the top six banks (approximately 11% on average for the remaining 19 banks). In order to account for loan quality vis-à-vis employee productivity, we introduce a new variable: performing loans per employee. The coefficient on performing loans per employee is significant at 1% for both spread and NIM. These results suggest that employee productivity is vital for intermediary efficiency with the caveat of maintained asset quality. The variables of noninterest income to total assets remained insignificant for our sample banks.

**Table 9: Panel Regression Results, Interest Rate Spreads on Selected Variables**  
**Dependent Variable: Interest Rate Spread**

Variable	Independent Variable	Coefficient	Standard Error	t-ratio	p-value	
	Constant	-0.2698	0.3154	-0.8553	0.3942	
Bank size	Total assets	0.0085	0.0037	2.3284	0.0222	**
	Network size	0.0201	0.0052	3.885	0.0002	***
Operational efficiency	Loan market share	0.2417	0.1990	1.2145	0.2278	
	Deposit market share	-0.693	0.1581	-4.3832	0.000	***
	Noninterest income to total assets	0.1185	0.0935	1.267	0.2085	
	ROA	0.0564	0.0245	2.3047	0.0235	**
	Overheads to total assets	0.3039	0.0505	5.865	0.000	***
	Deposits per employee	0.0003	0.0003	1.0069	0.3167	
	Gross loans per employee	-0.0064	0.0022	-2.9344	0.0043	***
Asset quality	Performing loans per employee	0.0055	0.0021	2.6514	0.0095	***
	Impaired lending to gross advances	-0.0836	0.0366	-2.287	0.0277	**
	Public sector deposits to total deposits	0.0532	0.0258	2.064	0.0431	**
	Loans to agriculture to total advances	-0.0732	0.0454	-1.6111	0.1107	
	Loans to textile to total advances	0.0808	0.0308	2.6222	0.0103	**
	Loans to energy to total advances	-0.0056	0.0295	-0.1907	0.8492	
	Loans to consumers to total advances	0.0318	0.0234	1.3586	0.1778	

Continued...

**Table 9: Panel Regression Results, Interest Rate Spreads on Selected Variables**  
**Dependent Variable: Interest Rate Spread (Continued)**

Variable	Independent Variable	Coefficient	Standard Error	t-ratio	p-value	
Liquidity	Liquid assets to demand deposits	-0.003	0.0010	-2.935	0.0046	***
Risk absorption capacity	CAR	-0.0271	0.0136	-1.9839	0.0504	*
	Credit ratings	0.0139	0.0049	2.8216	0.0059	***
	DLI	-0.0019	0.0006	-3.228	0.0016	***
Bank concentration	Herfindahl index for deposits	-0.9011	0.3734	-2.4132	0.0174	**
	Herfindahl index for loans	0.0269	0.0178	1.5142	0.1335	
Interest rate volatility	Volatility in T-bills yield	-0.6519	0.7648	-0.8523	0.3964	
GDP growth	YoY growth in GDP	0.01028	0.0033	3.0250	0.0031	***
Financial development indicator	M2/GDP	-0.0021	0.0354	-0.0591	0.9530	
	Adjusted R-squared	0.7125				
	Durbin-Watson	2.0433				

CAR = capital adequacy ratio, DLI = default likelihood indicator, GDP = gross domestic product, ROA = return on assets.

\*\*\* Significance at 1%, \*\* significance at 5%, \* significance at 10%.

Source: Authors' estimates.



**Table 10: Panel Regression Results, Net Interest Margin on Selected Variables**  
**Dependent Variable: Net Interest Margin**

Variable	Independent Variable	Coefficient	Standard Error	t-ratio	p-value	
	Constant	-0.1467	0.4932	-0.2974	0.7669	
Bank size	Total assets	0.0048	0.0025	1.9006	0.0599	*
	Network size	0.0186	0.0061	3.0471	0.0029	***
Operational efficiency	Loan market share	0.1572	0.2404	0.6539	0.5149	
	Deposit market share	-0.6215	0.1646	-3.7751	0.0003	***
	Noninterest income to total assets	0.0089	0.1132	0.0783	0.9378	
	ROA	0.0662	0.0281	2.3543	0.0208	**
Asset quality	Overheads to total assets	0.2500	0.0426	5.8650	0.000	***
	Deposits per employee	0.001	0.0004	2.6517	0.0092	***
	Gross loans per employee	-0.0035	0.0015	-2.3634	0.0203	**
	Performing loans per employee	0.0011	0.0003	4.056	0.001	***
	Impaired lending to gross advances	-0.0555	0.0325	-1.7053	0.0909	*
	Public sector deposits to total deposits	0.0289	0.0159	1.8201	0.0721	*
	Loans to agriculture to total advances	-0.0105	0.0326	-0.3231	0.7472	
	Loans to textile to total advances	0.049	0.0172	2.8552	0.0051	***
	Loans to energy to total advances	0.0039	0.0069	0.5698	0.5703	
	Loans to consumers to total advances	0.0323	0.0239	1.3495	0.1806	

Continued...

**Table 10: Panel Regression Results, Net Interest Margin on Selected Variables**  
**Dependent Variable: Net Interest Margin (Continued)**

Variable	Independent Variable	Coefficient	Standard Error	t-ratio	p-value	
Liquidity	Liquid assets to demand deposits	-0.0011	0.0007	-1.7076	0.0905	*
Risk absorption capacity	CAR	0.0092	0.0144	0.6403	0.5233	
	Credit ratings	0.0201	0.0077	2.6	0.0116	**
	DLI	-0.0732	0.0418	-1.749	0.0837	*
Bank concentration	Herfindahl index for deposits	-0.52692	0.105737	-4.983	0.000	***
	Herfindahl index for loans	0.008	0.0279	0.2867	0.7748	
Interest rate volatility	Volatility in T-bills yield	0.2151	1.4629	0.147	0.8835	
GDP growth	YoY growth in GDP	0.0056	0.0013	4.3440	0.0000	***
Financial development indicator	M2/GDP	0.1566	0.6650	0.2354	0.8144	
	Adjusted R-squared	0.5521				
	Durbin-Watson	1.9878				

CAR = capital adequacy ratio, DLI = default likelihood indicator, GDP = gross domestic product, ROA = return on assets.

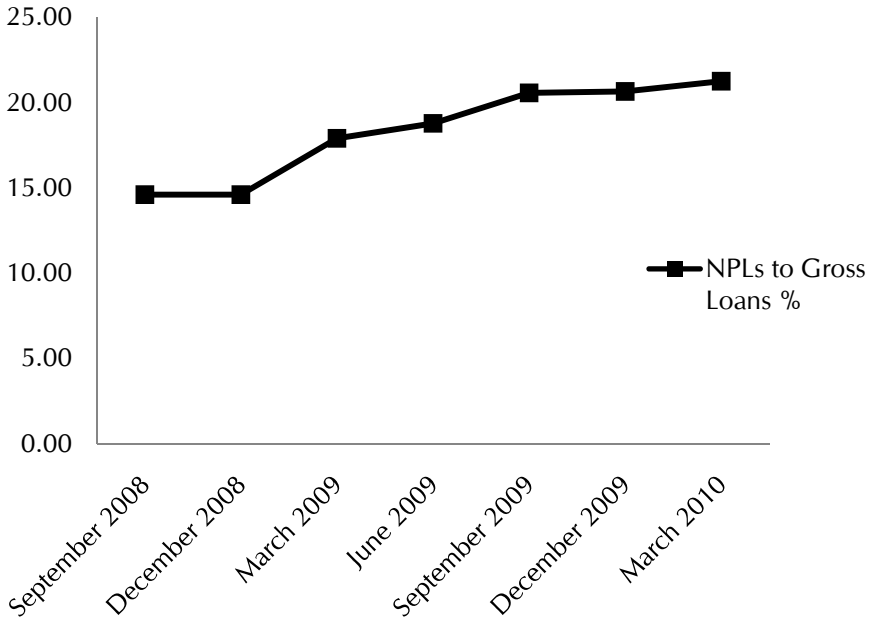
\*\*\* Significance at 1%, \*\* significance at 5%, \* significance at 10%.

Source: Authors' estimates.

The asset quality variables provide valuable explanations for the behavior of interest rate spreads. The first and foremost is the magnitude of NPLs to gross loans, which depicted a significantly negative relationship with spreads. Therefore, these NPLs are likely to reduce spreads substantially through a reduction in interest revenue. The subsequent significant measures of diversification include the share of public sector deposits in total deposits and the bank's exposure to the textiles sector. The coefficient of public sector deposits was statistically significant with a positive sign, reflecting the insensitivity of these deposits to the interest rate offered by banks. Therefore banks with a higher proportion of government deposits to total deposits are likely to yield better returns on account of the low interest cost associated with such deposits.

It is interesting to note, however, that another explanatory variable, market share of deposits, yields a negative coefficient, suggesting the relevance of interest rates for private sector depositors. We can conclude that the market for deposits has become competitive for the private sector only as a result of financial liberalization. The impact on public sector deposits remains minimal and it is possible to acquire public deposits at a relatively low cost.

We have examined four sectoral diversification variables: loans to (i) agriculture, (ii) textiles, (iii) energy, and (iv) consumers. The results reveal that the proportional loan to the textiles sector was significant with a positive impact on spreads. The major exposure of Pakistani banks is to the textiles sector, which has over the years contributed notably toward spreads. This is largely because the textile industry is the prime contributor to the manufacturing sector and GDP of the country. In times of robust economic growth, this sector is the major contributor to GDP as well as to the profits of the banking system. In an economic downturn, the textiles sector still remains a significant variable for banks in Pakistan. As the textiles sector in Pakistan is mostly export-driven, the recent global recession has seriously impacted industry performance, eroding the repayment capacity of the borrower. Similarly, domestic issues of political instability coupled with the energy crisis have complemented the poor performance of the textiles sector in Pakistan, thus increasing the default risk. Therefore, banks with exposure to the textiles sector are expected to charge a higher risk premium in the interest rate, contributing positively toward spreads. Figure 3 represents overall asset quality in the textiles sector.

**Figure 3: Textile Sector's NPLs to Gross Loans**

NPL = nonperforming loan.

Source: Adapted from the State Bank of Pakistan's Quarterly Reviews, 2008–2010.

The increase in classified loans to gross loans is evident over the years, having resulted in increased credit risk in exposure to the textiles sector. The results remain consistent for NIMs with significant coefficients on NPLs, public sector deposits, and loans to the textiles sector.

The liquidity coefficient is negative and significant at 1%, indicating lower interest rate spreads for banks with a higher proportion of liquid assets. The negative relationship remains consistent even when the NIM was used. The high level of liquidity arises mainly from the inability/reluctance of commercial banks to extend risky loans at competitive rates. Consequently, such banks tend to invest in short-term liquid investments that yield lower interest revenue (or noninterest income) and post pressures on spreads.

The variables of risk absorption capacity are significant for interest rate spread. As expected, we observe a negative relationship between spreads and the CAR, since banks with a higher CAR tend to invest more in low-risk assets that yield lower returns, resulting in lower spreads. Credit ratings have a positive relationship with spreads since banks with higher credit ratings are expected to raise funds (especially through interbank markets and subordinated loans) at competitive rates that lower their overall spreads. The significance of the rating coefficient also supports the relevance of credit ratings to the capital structure of commercial banks. Our estimate of the probability of default is negative and significant at 1%. Therefore, an increase in the probability of default is expected to reduce spreads owing to an increase in the default premium. These results suggest that the relevant credit (default) information can be extracted from the market prices of equity under the Black, Merton, and Scholes option pricing framework, and that such default information contributes to banking risks and spreads. The risk absorption variables of ratings and probability of default remains significant in NIM, while the CAR is insignificant.

The concentration measure of deposits is significant and negative. This implies that there is competition in the deposit market rather than concentration, leading to the high cost of deposit mobilization and lower spreads for banks, explaining the negative sign. The results remain consistent for NIM confirming a robust negative relationship between deposit concentration and intermediary efficiency. This is also consistent with our earlier findings on the relation of spreads with deposit market share. However, we do not deduce a significant coefficient for loan concentration (neither for spreads nor for interest margin) for our sample period. GDP growth is significant and positively related to variations in spreads and margins, depicting the relevance of trends in business activity to intermediation efficiency.<sup>5</sup> Interest rate volatility and the financial development indicator remain insignificant for our study period.<sup>6</sup>

To ascertain that our results are not driven by the unique features of public sector banks, we repeat the panel regression excluding the

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<sup>5</sup> The results remained robust when we used deviation in GDP growth trends (first difference) instead of year-on-year absolute growth rates.

<sup>6</sup> In recent years, an increase in currency in circulation was observed. To adjust for this increase, we used an alternative definition of financial development as  $(M2 - \text{currency})/GDP$ . However, financial deepening still remained insignificant both for margins and spreads.

National Bank of Pakistan, Bank of Punjab, and Bank of Khyber. The results for the reduced sample are reported in Table 11; they are similar to those of the complete sample and we could not deduce any incremental significant variable. However, it is interesting to note that the variable CAR is now significant at 5% (10% in the full sample), pointing to the increased role of capital adequacy in private sector banks. This is logical because public sector banks are backed by contractual guarantees and the government provides support by injecting more capital, making the CAR somewhat less relevant. On the contrary, private sector banks lack such leverage and are sensitive to their risk-weighted assets and subsequent capital to absorb the relevant risks.

**Table 11: Panel Regression Results (Excluding Public Sector Banks), Interest Rate Spreads on Selected Variables**  
**Dependent Variable: Interest Rate Spread**

Variable	Independent Variable	Coefficient	Std. Error	t-ratio	p-value	
	Constant	0.0026	0.0018	1.5004	0.1378	
Bank size	Total assets	0.0106	0.0038	2.7875	0.0068	***
	Network size	0.0179	0.0052	3.4780	0.0008	***
Operational efficiency	Loan market share	0.5130	0.2735	1.8760	0.0646	*
	Deposit market share	-0.6564	0.2236	-2.9360	0.0044	***
	Noninterest income to total assets	0.1516	0.1033	1.4680	0.1464	
	ROA	0.0043	0.0019	2.2710	0.0254	**
	Overheads to total assets	-0.0076	0.0624	-0.1220	0.9033	
	Deposits per employee	0.0002	0.0004	0.5521	0.5826	
	Gross loans per employee	-0.0053	0.0018	-2.8760	0.0050	***
Asset quality	Performing loans per employee	0.0094	0.0036	2.6070	0.0106	**
	Impaired lending to gross advances	-0.1074	0.0507	-2.1190	0.0375	**
	Public sector deposits to total deposits	0.0632	0.0300	2.1070	0.0398	**
	Loans to agriculture to total advances	-0.0215	0.0135	-1.5920	0.1148	
	Loans to textile to total advances	0.0732	0.0332	2.2028	0.0307	**
	Loans to energy to total advances	-0.0287	0.0285	-1.0046	0.3184	
	Loans to consumers to total advances	0.0345	0.0251	1.3758	0.1731	

Continued...

**Table 11: Panel Regression Results (Excluding Public Sector Banks), Interest Rate Spreads on Selected Variables**  
**Dependent Variable: Interest Rate Spread (Continued)**

Variable	Independent Variable	Coefficient	Std. Error	t-ratio	p-value	
Liquidity	Liquid assets to demand deposits	-0.0020	0.0006	-3.5610	0.0006	***
Risk absorption capacity	CAR	-0.0582	0.0240	-2.4310	0.0170	**
	Credit ratings	0.0131	0.0050	2.6448	0.0100	***
	DLI	-0.0807	0.0300	-2.6880	0.0085	***
Bank concentration	Herfindahl index for deposits	-0.7284	0.3607	-2.0192	0.0471	**
	Herfindahl index for loans	1.3744	0.8479	1.6209	0.1093	
Interest rate volatility	Volatility in T-bills yield	-0.9122	0.9548	-0.9554	0.3425	
GDP growth	YoY growth in GDP	0.7998	0.3703	2.1599	0.0340	**
Financial development indicator	M2/GDP	-0.0075	0.0142	-0.5294	0.5978	
	Adjusted R-squared	0.725261				
	Durbin-Watson	2.092401				

CAR = capital adequacy ratio, DLI = default likelihood indicator, GDP = gross domestic product, ROA = return on assets.

\*\*\* Significance at 1%, \*\* significance at 5%, \* significance at 10%.

Source: Authors' estimates.



## 5. Conclusion

This paper analyzes the determinants of interest rate spreads and margins in Pakistan's commercial banking sector in the post-transition period. Building on an exhaustive set of firm-level and macro-variables from the existing literature, we analyze the impact of two innovative factors of the DLI and proportion of public sector deposits on intermediary efficiency. We find strong evidence that bank size explains interest rate spreads. Similarly, operational efficiency, asset quality, liquidity, risk absorption capacity and GDP growth are found to be important determinants of banking spreads. In bank concentration, we find evidence for deposit competition rather than concentration while loan concentration was not a relevant factor for our sample period. Interest rate volatility and the financial development indicator were not found significant.

These results have important policy implications. Unlike Khawaja and Din (2007), we find a significant negative relationship between deposit market share and spreads, reflecting a shift from inelastic to interest rate-elastic deposits. The dynamics of the banking system have changed as a consequence of the financial system reforms and banks now compete not only in terms of services but also in terms of product prices. Therefore, banks should cater to interest-sensitive depositors to sustain their deposit base and spreads.

Another important result is vis-à-vis employee efficiency and asset quality. Generally, an increase in loans per employee is likely to have a positive impact on interest rate spreads. However, in limited credit markets, banks may indulge in aggressive and risky credit extensions for volume growths and compromise on asset quality. The negative relationship between spreads and loans per employee and the positive relationship with performing loans per employee clearly indicates that employee efficiency would count if asset quality were maintained. Banks should therefore indulge in aggressive credit volumes only if they can control NPLs using effective and prudent risk management procedures. These results are complemented by various asset quality indicators warranting the need for prudent credit extensions from banks as well as imposing responsibility on the central bank for the effective surveillance of these credit decisions.

Risk absorption capacity is vital to intermediary efficiency, given the presence of substantial uninsured liabilities (mainly deposits) in the financing mix. The credit rating component presents an independent view of both the balance sheet and contingent off-balance sheet risks. The significant coefficient of the ratings variable depicts the important role of credit rating agencies in identifying the risk levels of financial institutions and thus facilitating the intermediary role of commercial banks. The DLI provides support to the theory that risk absorption capacity is a determinant of interest rate spreads. This also confirms that the relevant credit information can be extracted from the market prices of listed securities, and regulators and lenders can use the Black, Merton, and Scholes option pricing framework to assess the credit capacity of an obligor.

An interesting implication of our study is that Pakistan's financial sector reforms have been successful in inculcating increased competition and reducing concentration in the banking sector. Banks now operate in a heavily regulated environment, which ensures prudent business practices and emphasizes the need for operational efficiencies if they are to earn higher profits in an increasingly competitive market.

There are some important caveats. Our study could not produce significant results in favor of loan concentration or loan market share. This should not imply that loan market structure and competition in the lending market is not related to interest rate spreads or margins, but rather that the loan market structure in our sample period was probably dynamic enough to be captured by the proxy of loan concentration and market share. Similarly, we feel that the insignificant relationship between spreads and interest rate volatility should be considered unique to our sample and further research can be done to explore in detail the term structure of interest rates and their impact on intermediary efficiency.

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