

INTEREST RATE SPREADS IN AN EMERGING ECONOMY: THE CASE OF PAKISTAN'S COMMERCIAL BANKING SECTOR

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This paper explores the determinants of interest rate spreads in Pakistan's commercial banking sector in 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 of default likelihood indicator (Black Merton and Scholes option pricing framework) and proportion of public sector deposits in total deposits 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 GDP growth rate. There is evidence for deposit market share as well as deposit market concentration establishing the presence of an interest sensitive deposit market. We could not find support for impact of interest rate volatility and financial development indicator on banking spreads.

Keywords:

Banking
Spreads

Interest
Margins

Pakistan's
Financial
System

JEL:

G20

G21

G28



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The authors are thankful to Dr Naved Hamid at Lahore School of Economics and an anonymous referee for valuable suggestions.

1. INTRODUCTION

Economic development critically hinges on patterns and levels of resource mobilization and allocation in any country. The strong correlation of banking system stability with the economic growth and development of any country has only recently been appreciated. A glance at the recent economic history reveals that weaknesses in the financial systems were the root cause of the economic woes of most of the economies. The supervisory authorities around the world are striving to ensure safety and soundness of their respective financial systems so that they can play an active role in the economic development of their countries.

Pakistan like other developing countries around the world, initiated financial system reforms in 1990s resulting in a transition of the financial system of Pakistan from administered to a liberalized financial regime, which was completed in 2005. As a result of these reforms, the structure of financial system was significantly altered. The ownership has predominantly been transferred from the public sector to the private sector. Furthermore, the closure or privatization of Development Finance Institutions (DFIs) coupled with the entry of foreign banks subsequent to liberalization impacted the dynamics of financial system. The foreign banks, albeit with limited network and market penetration, have provided a source of economic competition to local banks. As a result of privatization, the total number of banks has increased from 22 in 1990 to 40 in 2009. However, there are considerations regarding the operations of the banking system particularly after the transition is completed from administered to a liberalized financial regime.

There are no restrictions on lending and deposit rates so banks will invariably extend credit at high rates for sake of profit maximization and pay lower returns on their deposits hence earning higher spreads. Moreover if there is concentration in the banking activities with a few banks, as is the case in Pakistan, it may lead to exercise of market power in order to earn higher margins. Moreover, higher margins may also be reflective of high intermediation cost and managerial inefficiencies. This acts as a disincentive to both saving and investment and hence reflects that the banking system is inefficient in performing its role of effective resource allocation.

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

In order to measure the desirable state of efficiency of the banking system of Pakistan, it is critical to study the spreads and net interest margins as they have often been used as proxy variables for measuring intermediary efficiency for commercial banks. The purpose of this study is to analyse the various macro and firm level determinants of the banking spreads in Pakistan. This paper would provide multiple contributions towards existing literature on banking spreads. Firstly, the previous studies on banking spreads in Pakistan mainly provide evidences that are skewed towards pre transition period (maximum till 2006). However, our discussion would provide an insight into the behavior of Pakistan's banking spreads in post transition periods (i.e. from 2003 – 2009). Secondly, unlike previous studies on banking spreads in Pakistan with limited explanatory factors, our empirical analysis includes substantially greater number of firm specific variables.

These exhaustive variables would 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 are already examined in other developing economies and therefore it would be interesting to investigate if they hold any relevance in Pakistan's case.

Lastly, we use at least two innovative firm specific variables that have not been considered before vis-à-vis banking spreads. The first factor is percentage of Public sector share in total deposits per bank. We feel that this factor would be relevant as Public sector entities are somewhat insensitive towards interest rate on their deposits with commercial banks. The second factor is probability of default (sometimes called distance to default) under Black Merton Scholes framework that was later adapted by Bank for International Settlement (BIS) and KMV risk metrics. Since capital base as risk absorption capacity and its reliance on market discipline is a vital feature of Basle Accord, it would be interesting to see if probability of default has any significance in banking spreads. The rest of the story is as follows. Section II will provide a brief overview of the literature on determinants of banking spreads and Section III will discuss data, variables and research methodology.

2. LITERATURE REVIEW

There is exhaustive literature on the determinants of banking spreads both in developed and developing economies. Pakistan is a case of a developing economy; therefore, we will mainly focus 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 researches with few innovations particular to case of Pakistan.

Maudos and Solis (2009) investigated the determinants of net interest income in Mexican banking sector for the period between 1993 and 2005. Their sample constituted of 43 commercial banks with 289 annual observations of an unbalanced panel data. They observed high interest margins for Mexico, of approximately 5%, vis-à-vis international standards. They considered various explanatory factors such as operating costs, volatility of interest rates, implicit interest payments, quality of management, non interest income, credit risk, degree of risk aversion, market risk, transaction size, liquidity, cost to gross income, GDP growth and inflation rate. The results reflected that except for liquidity all other variables were significantly related to interest rate spreads. They concluded that the high Mexican spreads are mainly a function of operating costs and market power while non interest income, despite of increasing over the years, has low economic impact.

Beck and Hesse (2009) analyzed factors explaining interest rate spreads in Uganda and compared with peer African countries for the period between 1999 and 2005. They used a panel data set of 1390 banks from 86 countries. They reported that variation of spreads was high both across countries and within countries across banks. They concluded that size, high t bill rates and institutional deficiencies explained large proportions of Ugandan interest margins. However, the foreign banks and changes in market structure had no significant relation with interest rate spreads.

Hawtrey and Liang (2008) studied the bank interest margins in fourteen OECD countries for the period 1987 to 2001. The explanatory variables they used were 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 used a single step panel regression with fixed effects and found out significant

coefficients for most of the variables. The transaction size and managerial efficiency (operating efficiency to gross income) were negatively related to the margins that they attributed towards management efficacy in getting low cost deposits and extending loans at higher interest rates resulting in higher spreads. They concluded that market power, operating costs, risk aversion, volatility of interest rates, credit risk, opportunity cost and implicit interest payments have positive impact on overall interest rate spreads.

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

Khawaja and Din (2007) investigated the determinants of interest rate spreads in Pakistan using panel data of 29 banks from 1998 to 2005. They used industry variables of concentration and deposit inelasticity (measured as interest rate insensitive current and saving deposits) and firm variables of market share, liquidity, administrative costs, asset quality and macroeconomic variables of real output, inflation and real interest rates. They concluded that inelasticity of deposit supply was the 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 if in post transition period the firm specific and macroeconomic variables better explain the cross bank variations in spreads.

SBP Financial stability review (2006) analyzed the efficiency of financial intermediation in Pakistan using banking spreads and net interest margin for the period 1997 to 2006. They employed bank specific indicators of non interest income, provision to NPLs, administrative costs, foreign ownership and industry specific variable of concentration and macroeconomic indicator of real GDP growth and interest rate volatility. The review concluded that all of the variables were significant in explaining interest rate spreads with administrative costs and foreign ownership explaining a higher proportion vis-à-vis other determinants. Despite of using similar sample period, the two studies on Pakistan's banking spreads depict variation in results. Therefore, further empirical evidence could provide additional insight about the determinants of interest rate spread and margins using much recent dataset.

3. RESEARCH METHODOLOGY

A. Sample Criterion

We will use panel data of various bank specific and macroeconomic variables to analyze intermediation efficiency of commercial banks in Pakistan. The sample will be from post financial reform period and will include data from 2004 to 2009 (six years). We include all listed banks for which data on balance sheets, income statements and stock prices is available. The foreign banks (not incorporated in Pakistan) are excluded since they constitute a minimal proportion in Pakistan's banking sector (both in term of total assets and network size). Based on this sample criterion, we have an unbalanced panel for every year ranging from 21 banks in 2004 to 25 banks in 2009.

B. Variables

The two variables that are used to measure intermediary efficiency of commercial banks are spreads and net interest margins. We will use both these variables to proxy financial intermediation. These two variables will be measured as follows

$$\text{Spread} = \tau_{it} = \frac{r_{it}}{EA_{it} - \text{Equity}INV_{it}} - \frac{c_{it}}{\text{IntLiab}_{it}}$$

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

Where *NIM* is Net Interest Margin, *r* represents interest revenue, *c* is interest expense, *EA* is total earning assets, *EquityINV* represents bank's investment in equities, *IntLiab* includes all interest bearing liabilities, while suffix *it* represents bank *i* at time *t*. *NIM* is defined as net yield on earnings assets to assess the efficiency of bank management in a synthetic arbitrage situation where bank management attempts to borrow at a rate lower than their expected potential returns¹.

The set of independent variables include firm specific and macroeconomic variables that could possibly explain the dynamics of banking spreads in Pakistan. We have classified the firm specific variables into operational and financial efficiency factors. Bank size is used to gauge the possibility of economies of scale in banking. To account for bank size, we will adopt two measures related to bank's financial standing and network size. These include log of total assets $\log(TA_{it})$ and network size captured by a dummy variable equal to 1 for all banks having a network size greater than 500.

To measure operational efficiency we use market power estimated by the market share of loans and deposits of a particular bank. The banks dominating the banking system may collude to exercise market power leading to augmented interest rate spreads and super normal profits. We also include non interest income to total assets, return on assets (ROA), overhead costs to total assets and employee productivity estimated as D_{it}/E_{it} for deposits per employee and L_{it}/E_{it} for loans per employee. In order to account for efficient use of resources, we further include performing loans per employee.

The next set of explanatory variables refers to asset quality that includes proportion of classified loans to total advances and sectoral diversification in advances and deposits. The deposit diversification (DPublic) is estimated as proportion of public sector deposits to total deposits. On the advances side we include exposure to major sectors of the economy namely agriculture (Lagr), textile (Ltex), energy (Len) and consumers (Lcons). These exposures are taken as percentage of total advances. Liquidity is measured as ratio of liquid assets to demand deposits. The liquid assets would include cash and bank balances, deposits with banks, government securities, listed TFCs, listed equity investments and net reverse repos. The risk absorption capacity is critical to mitigate various risks emanating from banking activity. Our risk absorption variables include regulatory capital adequacy, dummy for credit ratings with 1 for a rating of AA- or higher and Merton (1974), Black and Scholes (1973) based ex ante default likelihood indicator following an iterative process suggested by Vassalou and Xing (2004).

Since macroeconomic factors are vital in performance of banks, we employ four macro level variables to explain the impact of macroeconomic indicators. These include bank concentration and competition structure measured through Herfindahl Index (Ht) for concentration of loans and deposits, interest rate volatility measured as standard deviation of one year T Bill yield ($\sigma_{R_{it}}$), YOY GDP growth rate and monetization in the financial system of an economy ($M2/GDP$).

¹ This is standard NIM definition used by Beck and Hesse (2009), Norris and Floerkemeir (2007) etc

The data is based on secondary information from financial statements of all banks for the period between 2004 and 2009. Stock prices for calculation of probability of default were extracted from Thomson Data Stream². We use an unbalanced panel of commercial banks and run the following regressions of spreads on bank specific and macroeconomic variables.

$$\tau_{it} = \alpha + \beta_1 \log(TA_{it}) + \beta_2 \beta_{it} + \beta_3 Y_{Loans} + \beta_4 Y_{dep} + \beta_5 (NII_{it}/TA_{it}) + \beta_6 ROA_{it} + \beta_7 (OH_{it}/TA_{it}) + \beta_8 (D_{it}/E_{it}) + \beta_9 (L_{it}/E_{it}) + \beta_{10} (NPL_{it}/GL_{it}) + \beta_{11} D_{Public} + \beta_{12} L_{agr} + \beta_{13} L_{tex} + \beta_{14} L_{en} + \beta_{15} L_{cons} + \beta_{16} (LA_{it}/DD_{it}) + \beta_{17} CAR_{it} + \beta_{18} \delta_{it} + \beta_{19} PD_{it} + \beta_{20} H(L)_t + \beta_{21} H(D)_t + \beta_{22} \sigma_{Rft} + \beta_{23} g_{GDP} + \beta_{24} (M2/GDP) + \epsilon_{it} \dots \dots (1)$$

We further use an alternate definition of spreads for robustness and run the regression of same independent variables on net interest margin.

$$NIM_{it} = \alpha + \beta_1 \log(TA_{it}) + \beta_2 \lambda_{it} + \beta_3 Y_{Loans} + \beta_4 Y_{dep} + \beta_5 (NII_{it}/TA_{it}) + \beta_6 ROA_{it} + \beta_7 (OH_{it}/TA_{it}) + \beta_8 (D_{it}/E_{it}) + \beta_9 (L_{it}/E_{it}) + \beta_{10} (NPL_{it}/GL_{it}) + \beta_{11} D_{Public} + \beta_{12} L_{agr} + \beta_{13} L_{tex} + \beta_{14} L_{en} + \beta_{15} L_{cons} + \beta_{16} (LA_{it}/DD_{it}) + \beta_{17} CAR_{it} + \beta_{18} \delta_{it} + \beta_{19} PD_{it} + \beta_{20} H(L)_t + \beta_{21} H(D)_t + \beta_{22} \sigma_{Rft} + \beta_{23} g_{GDP} + \beta_{24} (M2/GDP) + \epsilon_{it} \dots \dots (2)$$

Given the large numbers of variables it is least likely that, despite being a random variable, α is uncorrelated with any of the independent variables. Therefore, assumption of random effect would be too stringent and appropriate regression would be using fixed effects. This is complemented by the Hausman test that favours the use of fixed effect model³.

4. EMPIRICAL RESULTS AND ANALYSIS

A. Descriptive Statistics

Table 1 compares the descriptive statistics of top six banks (based on total assets) with rest of the banks in our sample. The larger banks dominate spread and margins owing to their higher operational efficiency depicted by higher loans and deposits per employee, low overheads to total assets and better asset quality. These bigger banks have better diversification in loan portfolio while medium to small banks have their exposure concentrated in textile and consumer sector. The average capital adequacy and liquidity is higher for medium and small banks indicating their investment in low risk and liquid assets that result in lower return on assets vis-à-vis top six banks. It is interesting to note that medium to small banks have relatively higher non-interest income to total assets as compared to larger banks indicating higher tendency to complement their overall profitability from non interest sources.

Table 2 reports average statistics of banks classified on the basis of their ownership. This includes foreign banks, domestic private sector banks and public sector banks. The average spreads are highest for public sector banks followed by private sector and foreign banks. The asset quality is worst for public sector banks that largely emanates from the politically motivated credit by such institutions. It is also evident that public sector deposits are concentrated in public sector banks that partly explain their better spreads and profitability vis-à-vis private and foreign banks.

² The DataStream prices were extracted from terminal installed at Paris Dauphine

³ Hausman test analyses the hypothesis that estimated coefficients from random effect estimators are same as consistent fixed effect estimators. Our Hausman test p value is 0.00034 that rejects Random Effect Model in favour of fixed effects.

The overhead cost are highest for foreign banks resulting in the lowest ROA compared to private and public sector banks. This high overhead cost is largely reflected in the 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 agriculture sector while they dominate in loans to textile sector and individuals. This reflects on the cautious approach of these 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. Moreover with the development and innovation in consumer banking products loans to individuals have become a major proportion of 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.

The summary statistics of all independent and dependent variables are represented in Table 3. In macro variables, Herfindahl index for loans and deposits are 9.5% and 9.7% that represent a competition in 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 implies on reduced concentration of banking business with the larger six banks in the country.

The interest rate volatility for the sample period remained modest with average of 0.7% with 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 is a reflection on the trends in business activity that prevailed during our study period.

TABLE 1 - BANK SPECIFIC STATISTICS TOP SIX VS. REST OF THE BANKS (2004 - 2009)

	Spread	NIM	Total Assets (Mlns)	Non Interest Income to TA	ROA	OH to TA	Dep per Employee (Mlns)	Loans per Employee (Mlns)	NPLs to Gross Loans	Public Sector Deposits	Loans to Agri	Loans to Tex	Loans to Energy Sector	Loans to Ind	Liq (X)	CAR	DLI
Avg	6.0%	5.1%	446534.9	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%
Med	6.2%	5.5%	408324.7	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%	267639.7	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%	701108.8	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%
Avg	5.0%	3.3%	74702.1	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%
Med	4.6%	3.1%	53987.2	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%	13742.3	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%	195078.2	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%

*Top six banks based on average total assets from 2004 to 2009

TABLE 2 - BANKS AVERAGE STATISTICS 2004 – 2009 (OWNERSHIP CLASSIFICATION)

	Spread	NIM	Total Assets	Non Interest Income/T total Assets	ROA	OH to TA	Deposits per Employee	Loans per Employee	NPLs to Gross Loans	Public Sector Dep	Loans to Agri	Loans to Tex	Loans to Energy Sector	Loans to Individuals	Liq (X)	CAR	DLI
Foreign Banks	4.9%	3.5%	114672.4	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%	168985.9	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%	289893.4	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%

**TABLE 2. SUMMARY STATISTICS OF DEPENDENT AND INDEPENDENT VARIABLES
(2004 – 2009)**

		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)	96126.3	108092.4	3.6	3686.7	944232.8
Market Power	Loans	0.044	0.030	0.048	0.000	0.198
	Deposits	0.044	0.026	0.049	0.000	0.224
	Non Interest 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 (in Mlns)	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
Loans	Agriculture	0.026	0.013	0.032	0.000	0.154
	Textile	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

B. Regression Results

The results for fixed effect regressions are summarized in Table 4 and Table 5. The results reveal a positive relation between bank size and interest rate spreads with significant coefficients for both log of total assets and branch network. Therefore, the larger banks are expected to have higher intermediary efficiency from economies of scale. The return on asset is significant and positive indicating higher spreads for banks with efficient use of assets. The positive relation between

spreads and return on asset has profound policy implication. The banks with better return on assets have the leverage of reducing spreads and improving the intermediation efficiency of the financial system.

The coefficient on deposit market share is significant but negative that contradicts the common intuition of a positive linkage between interest rate spreads and market power of deposits. The results remained robust both for spread and net interest margin regressions. Beck and Hesse (2009) argue that a negative relation provides evidence for the small financial system view (financial deepening indicator is not significant reflecting on the low level of monetization in the country) which inevitably is the case in Pakistan. The negative coefficient for deposit market share is an indication of banks mobilizing deposits by offering higher interest rate to depositors and thus earning lower interest rate spreads. These results provide evidence for an interest sensitive deposit market in Pakistan and these findings are in contradiction with Khawaja and Din (2007) who argued in favour of 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 that shows competition in the deposit as well as the loan market in Pakistan.

The coefficient for gross loans per employee depicts a negative relation between loans per employee and spreads. The rationale lies in quality of the loan portfolio with average non performing loans equalling 8% for the top six banks (while it is approximately 11% on average for remaining 19 banks). In order to account for the loan quality vis-à-vis employee productivity, we introduce a new variable of performing loans per employee. The coefficient on performing loans per employee is significant at 1% for both spread and net interest margin. These results suggest that employee productivity is vital for intermediary efficiency with the caveat of maintained asset quality.

The asset quality variables provide valuable explanations for the behavior of interest rate spreads. The first and foremost was the magnitude of nonperforming loans to gross loans that depicted a significantly negative relation with spreads. Therefore, these non performing loans 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 bank's exposure to textile sector. The coefficient of public sector deposits was statistically significant with a positive sign reflecting insensitivity of these deposits to interest rate offered by banks. Therefore banks with higher proportion of the government deposits to total deposits are likely to yield better returns on account of low interest cost associated with such deposits. Table 6 represents weighted average rates on public and private sector deposits.

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

We examined four sectoral diversification variables of loans to agriculture, textile, energy and consumers. The results revealed that the proportional loan to textile sector was significant with positive impact on spreads. The major exposure of Pakistani banks is in textile sector that over the years has notably contributed towards spreads. This is largely because the textile industry is the prime contributor to manufacturing sector and GDP of the country. In times of robust economic growth this sector is the major contributor to the GDP as well as to the profits of banking system. In times of an economic downturn the textile sector still remains a significant

variable for banks in Pakistan. As the textile sector in Pakistan is mostly export driven, the recent global recession has seriously impacted the industry performance resulting in erosion of the repayment capacity of the borrower. Similarly, the domestic issues of political instability coupled with energy crisis complemented the bad performance of textile sector in Pakistan thus increasing the default risk. Therefore, the banks with exposure to textile sector are expected to charge a higher risk premia in interest rate contributing positively towards spreads

The liquidity coefficient is negative and significant at 1% indicating lower interest rate spreads for banks with higher proportion of liquid assets. The negative relation remained consistent even when the net interest margin was used. The high liquidity mainly arises from inability and/or 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 non interest income) and post pressures on spreads.

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

The concentration measure of deposit is significant and negative. This reflects that there is competition in the deposit market rather than concentration leading to high cost of deposit mobilization and lower spreads for the banks, hence explaining the negative sign. The results remain consistent for net interest margin confirming a robust negative relation between deposit concentration and intermediary efficiency. This is also consistent with our earlier findings on relation of spreads with deposit market share. The GDP growth was significant and positively related to variations in spreads and margins depicting the relevance of trends in business activity towards intermediation efficiency.

In order to investigate that our results are not driven by the unique features of public sector banks, we repeat the panel regression excluding National Bank of Pakistan, Bank of Punjab and Bank of Khyber. The results for reduced sample are reported in Table 7 that are similar to those of complete sample and we could not deduce any incremental significant variable. However, it is interesting to note that variable of CAR is now significant at 5% (10% in full sample) representing an increased role of capital adequacy in private sector banks. This is logical because public sector banks are backed by contractual guarantees and Government provides support by injecting more capital making 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 relevant risks.

TABLE 4. PANEL REGRESSION RESULTS - INTEREST RATE SPREADS ON SELECTED VARIABLES

Dependent Variable: Interest Rate Spread						
	<i>Independent Variables</i>	<i>Coefficient</i>	<i>Std. Error</i>	<i>t-ratio</i>	<i>p-value</i>	
	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	0.199	1.2145	0.2278	
	Deposit Market Share	-0.693	0.1581	-4.3832	0.000	***
	Non Interest Income to Total Assets	0.1185	0.0935	1.267	0.2085	
	Return on Assets	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 Loans to Agriculture to Total Advances	0.0532	0.0258	2.064	0.0431	**
	Loans to Textile to Total Advances	-0.0732	0.0454	-1.6111	0.1107	
	Loans to Energy to Total Advances	0.0808	0.0308	2.6222	0.0103	**
	Loans to Consumers to Total Advances	-0.0056	0.0295	-0.1907	0.8492	
Liquidity	Liquid Assets to Demand Deposits	0.0318	0.0234	1.3586	0.1778	
Risk Absorption Capacity	Capital Adequacy Ratio	-0.003	0.001	-2.935	0.0046	***
	Credit Ratings	-0.0271	0.0136	-1.9839	0.0504	*
	DLI	0.0139	0.0049	2.8216	0.0059	***
Bank Concentration	DLI	-0.0019	0.0006	-3.228	0.0016	***
	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	M2/GDP	-0.0021	0.0354	-0.0591	0.9530	
	Adjusted R-squared	0.7125				
	Durbin-Watson	2.0433				

*** represent significance at 1%, ** at 5% and * at 10% respectively

TABLE 5. PANEL REGRESSION RESULTS - NET INTEREST MARGIN ON SELECTED VARIABLES

Dependent Variable: Net Interest Margin						
	<i>Independent Variables</i>	<i>Coefficient</i>	<i>Std. Error</i>	<i>t-ratio</i>	<i>p-value</i>	
	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	***
	Non Interest Income to Total Assets	0.0089	0.1132	0.0783	0.9378	
	Return on Assets	0.0662	0.0281	2.3543	0.0208	**
	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	***
Asset Quality	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	
Liquidity	Liquid Assets to Demand Deposits	-0.0011	0.0007	-1.7076	0.0905	*
Risk Absorption Capacity	Capital Adequacy Ratio	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	0.665	0.2354	0.8144	
	Adjusted R-squared	0.5521				
	Durbin-Watson	1.9878				

*** represent significance at 1%, ** at 5% and * at 10% respectively

TABLE 6. YEAR END WEIGHTED AVERAGE DEPOSIT RATES

	Outstanding Deposits	
	Including Zero Markup	Excluding Zero Markup
December, 2004		
Public	1.30	1.69
Private	1.22	1.68
December, 2005		
Public	2.31	3.07
Private	2.56	3.56
December - 2007		
Public	3.96	5.11
Private	4.13	5.55
January - 2008		
Public	4.02	5.11
Private	4.20	5.57
December - 2008		
Public	6.40	8.54
Private	6.75	9.09
December - 2009		
Public	5.98	7.88
Private	6.16	8.40
December - 2010		
Public	5.86	7.72
Private	5.89	8.19

Source: State Bank of Pakistan

TABLE 7 : PANEL REGRESSION RESULTS (EXCLUDING PUBLIC SECTOR BANKS) - INTEREST RATE SPREADS ON SELECTED VARIABLES

Dependent Variable: Interest Rate Spread						
	<i>Independent Variables</i>	<i>Coefficient</i>	<i>Std. Error</i>	<i>t-ratio</i>	<i>p-value</i>	
	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	***
	Non Interest Income to Total Assets	0.1516	0.1033	1.4680	0.1464	
	Return on Assets	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	***
	Performing Loans per Employee	0.0094	0.0036	2.6070	0.0106	**
Asset Quality	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	
Liquidity	Liquid Assets to Demand Deposits	-0.0020	0.0006	-3.5610	0.0006	***
Risk Absorption Capacity	Capital Adequacy Ratio	-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				

*** represent significance at 1%, ** at 5% and * at 10% respectively

5. CONCLUSION

This paper analyzed 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 existent literature, we also analyzed the impact of two innovative factors of default likelihood indicator and proportion of public sector deposits on intermediary efficiency. We found strong evidence of bank size in explaining interest rate spreads. Similarly, operational efficiency, asset quality, liquidity, risk absorption capacity and GDP growth were important determinants of banking spreads. In bank concentration, we found evidence for deposit competition rather than concentration while loans concentration was not a relevant factor for our sample period. The interest rate volatility and financial development indicator was not significant.

These results provide important policy implications. Unlike Khawaja and Din (2007), we found a significant negative relation between deposit market share and spreads reflecting a shift from inelastic to interest rate elastic deposits. We feel that dynamics of banking system have changed as a consequence of the financial system reforms and therefore the banks are competing not only on services but also on 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, the banks could indulge in aggressive and risky credit extensions for volume growths and compromising on asset quality. The negative relation of spreads with loans per employee and a positive relation with performing loan per employee clearly indicate that employee efficiency would count if asset quality is maintained and therefore, banks should indulge in aggressive credit volumes only if they can control non performing loans through effective and prudent risk management procedures. These results are complimented by various asset quality indicators warranting the need of prudent credit extensions from banks as well as impose responsibility on central bank for effective surveillance of these credit decisions.

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

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

There are some important caveats to note. Our results 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 lending market is not related to interest rate spreads or margins but probably the loan market structure in our sample period was dynamic enough to be captured by

the proxy of loan concentration and market share. Similarly, we feel that the insignificant relation between spreads and interest rate volatility should be 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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