Determinants of net interest margin under regulatory requirements: an econometric study

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An Econometric Study

Using data for the period 1995-96 to 1999-2000, this paper seeks to identify the factors influencing spreads of Scheduled Commercial Banks in India. Among the explanatory variables, we incorporate, in addition to the standard set of variables, regulatory requirement variables. Our analysis reveals that (i) size does not necessarily correlate with higher spread, and (ii) higher fee income enables banks to tolerate lower spreads. With regard to regulatory requirement variables, it is found that (i) capital plays an important role in affecting spreads of public sector banks, and (ii) non-performing assets is uniformly important across all bank groups in influencing spreads.

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I Introduction

The restructuring exercise initiated by the authorities in 1991 is widely regarded as a watershed in the history of the Indian economy. A salient aspect of the reforms process has been the deregulation of the financial sector, which aimed at lowering intermediation costs and raising efficiency levels of the banking system. For instance, intermediation costs of Scheduled Commercial Banks (SCBs), as percentage of total assets, declined from 2.94 per cent in 1995-96 to 2.49 per cent in 1999-2000. A crucial aspect of the intermediation process is the net interest margin or NIM (popularly termed as the 'spread'). Simply defined, the spread is the difference between the interest paid out by banks on their deposits and the interest earned on the loans normalised by the total assets: it serves as a key indicator of the efficiency of resource intermediation. Judged thus, net interest margin is the bread and butter of banking. Too large a spread in a deregulated environment indicates the absence of competition within the banking system and is perhaps reflective of the existence of a certain degree of monopoly power on part of the financial intermediaries. Therefore, spreads that are unduly high can impinge on the saving and investment potential of an economy. On the other side, too low spreads can affect profit margins of banks, putting requirement on their capital base. This, in turn, can render them vulnerable to shocks, especially in the absence of sufficient capital cushion against adverse movements in market variables (e g, interest rates). Hence, very low interest spreads also augur ill for the banking sector.

Historically, higher spreads have typically been associated with less developed markets – characterised by high operating costs, entry barriers and limited competition. Spreads in select countries in 1997 is given in Table 1. It is observed from the table that spreads of banks in Asian economies are comparable to those elsewhere in the world. An exception however is the Latin American countries, where banks operate on substantially high spreads.

Without loss of generality, one might state that the banking sector in the developed economies displays relatively lower spreads. Question arises, however, about the exact nature of the relationship between interest margin and the other variables indicative of the health and reach of the banking sector. Several developing countries have recently undergone liberalisation of their financial sector in order to raise financial sector efficiency. At the same time, the liberalisation process has been accompanied by the introduction of prudential regulations designed to safeguard the health of the financial system and contain systemic risks. The ushering of liberalisation coupled with prudential norms introduced in these countries provide interesting case studies as to understand the parameters that have been instrumental in determining spreads.

In a recent exercise, Barajas et al (1999) examined the interest spreads in Columbia over a period of about 20 years from 1974 to 1996, covering both the pre-liberalisation period and the post-liberalisation period. Their analysis reveals that the liberalisation process of 1991 in Columbia left the interest spreads in the banking sector largely unaltered. In comparison, financial liberalisation has resulted in a decrease in the spread in the banking systems of Portugal, Chile, Turkey, Spain and Argentina.[1]

In the light of the above discussion, the present study seeks to examine the relationship between the NIM of Scheduled Commercial Banks (SCBs)[2] and variables indicative of the health of banks and the nature of their operations in the post liberalisation period. To recapitulate a bit, deregulation of interest rates were undertaken in a phased manner and it was only in October 1994 that lending rates were completely dismantled.[3] The rest of the paper proceeds as follows. In the following section, we study the broad trends in the net interest margin of the SCBs in the decade of the nineties. Section III explains the methodology of the analysis. The model framework is discussed in Section IV, while Section V is devoted to the empirical analysis. The penultimate section derives certain policy implications that emerge out of the analysis. Concluding remarks are gathered in Section VII.

II
Indian Evidence with regard to NIMs

Prior to the liberalisation process, public sector banks (PSBs) in particular, enjoyed a fair degree of monopoly power in the financial market by virtue of their market presence as given by their extended reach in terms of the number of branches and command over deposits. They had a share of around 90 per cent of the total business (defined as the total of deposits and advances) of SCBs in the early nineties, which came down to around 80 per cent by the end of the nineties. It is therefore, to be expected that the interest spread for PSBs up to the mid-nineties would have been fairly high. However, PSBs in India, unlike their counterparts in other developing economies, have not shown the expected declines in their spreads soon after liberalisation. Since the onset of financial liberalisation with the submission of the first Narasimham Committee Report in 1991, there has been a marked change in bank behaviour. Gone are the days when banks operated under administered lending and deposit rates, which guaranteed them a comfortable spread.[4] For instance, at the beginning of the decade of the nineties, the interest spread of PSBs was not exceptionally high. In 1991-92, the NIM of PSBs stood at 3.22 per cent of total assets as compared to 3.31 per cent for all SCBs. Among PSBs, the spread for the State Bank of India and its seven associates (SBI group) was on the higher side at 3.80 per cent while that for the 19 nationalised banks taken together, was only 2.86 per cent of their total assets. From the Chart, it is clear that the interest spreads of PSBs as well as SCBs declined sharply over the period 1991-92 to 1993-94 and thereafter started picking up slowly. From 1996-97 onwards, the spreads have tended to decline. An overview of some of the select parameters of SCBs over the last five years is presented in Table 2.

The upward movement in the NIM immediately after the liberalisation of interest rates might have been reflective of a knee-jerk reaction on part of these banks to improve their profitability. At the same time, the first half of the nineties was characterised by a high interest rate regime, so much so that lending rates remained comfortably ahead of deposit rates and ensured a steady spread for banks.[5] However, post liberalisation, the gradual lowering of pre-emptions, the increasing competition within the banking sector, the emergence of disintermediation pressures from a liberalised financial marketplace, the advent of 'virtual' banking, the increasing product sophistication demanded by customers, the growing financial maturity of the corporate sector, have been, in all likelihood, responsible for both the decline in margins as well as their progressive convergence. Almost around the same time, capital adequacy requirements have been stipulated for banks in line with the Basle Accord. With hindsight, one might surmise that these measures, to a large extent, propelled banks to reconfigure their portfolios towards low-risk assets to meet the regulatory requirements with a concomitant effect on their spreads.

Table 1: Spreads of Select Economies in 1997

Country (1)	Net Interest Margin (2)
Asia	
India	0.03
Pakistan	0.035
Indonesia	0.04
Singapore	0.02
Japan	0.02
Europe	
France	0.03
Germany	0.02
UK	0.02
Latin America	
Argentina	0.07
Brazil	0.11
Mexico	0.05
Venezuela	0.09
North America	
US	0.04
Canada	0.02

III
Methodology of the Analysis

There are in fact very few studies on the determinants of NIM. In a recent study, Kannan et al (2001) studied the determinants of net interest margins of PSBs for the period 1995-96 to 1999-00 for scheduled commercial banks and found, among others, non-performing loans to be a crucial factor influencing spread. The study however is for SCBs (except RRBs) as a whole and does not consider the impact of regulatory requirements on different bank groups and this, in a way, limits the empirical appeal of the model. At a time, when the banking sector has been adapting itself to the international norms, such forces are likely to impinge spreads of various bank-groups in different ways. We, therefore, modify the earlier framework in order to examine the factors affecting the NIM of SCBs, post interest rate deregulation. In our view, the entire gamut of SCBs provides a fairly comprehensive framework to capture the effects of different variables affecting their margins. Based on availability of data for the period 1995-96 to 1999-2000, the analysis covers 86 banks comprising of 27 public sector banks, 31 private sector banks and 28 foreign banks. This provides a rich set of banks with sufficient heterogeneity in operations to enable one to decipher, with a reasonable degree of confidence, as to what factors might have effected spreads of SCBs.[6]

Towards achieving this objective, it is important that an analytical framework

Table 2: Select Variables for Scheduled Commercial Banks, 1995-96 to 1999-00
(as per cent of total assets)

Year/Variable (1)	Net Profit (2)	Interest Income (3)	Other Income (4)	Interest Expended (5)	Spread (6)	Intermediation Cost (7)
1995-96	0.16	9.36	1.50	6.23	3.13	2.94
1996-97	0.67	9.88	1.45	6.66	3.22	2.85
1997-98	0.82	9.27	1.52	6.32	2.95	2.63
1998-99	0.47	9.18	1.34	6.41	2.78	2.67
1999-2000	0.66	8.96	1.43	6.24	2.72	2.49

Table 3: Summary Statistics for Scheduled Commercial Banks : 1995-96 to 1999-00

Variable	Mean				Standard Deviation			
	Public (27)	Private (31)		Foreign (28)	Public (27)	Private (31)		Foreign (28)
		Old	New			Old	New	
SPREAD	2.98	2.80	2.56	3.76	0.69	0.79	0.74	1.89
SIZE	9.7	7.36	8.36	6.69	0.84	1.07	0.44	1.55
FEE	1.27	1.63	1.48	2.60	0.89	1.88	0.55	2.90
INDEX	0.003	0.0002	0.0006	0.0018	0.005	0.0005	0.0007	0.004

Figures in brackets indicate number of banks in that category.
SPREAD is the net interest margin to total assets. SIZE is the log of total assets. FEE is the ratio of non-interest income to total assets. INDEX is the proxy for market power

that can characterise all risk factors and bank-specific behaviour be posited. Within the framework, the bank is said to behave like a risk-averse dealer in mobilising and deploying deposit resources. The bank will engage in arbitrage between deposit and lending rates up to a point depending on its degree of risk aversion. The second justification for risk aversion is that "it ensures a finite bank size, as well as the existence of riskless investments in money market instruments. Without risk aversion, there is no limit to the extent that banks may engage in arbitrage. Banks will expand ad infinitum until the margin is completely eliminated" [Angbazo 1997, Allen 1988].

For the purpose of our analysis, we use time-series cross-section data (or pooled data) estimation procedure. Pooled data models presuppose the fact that differences across units can be captured in differences in constant term (as in fixed effects models) or alternately, individual specific constant terms are randomly distributed across cross-sectional units (as in random effects models) [Judge et al 1994]. Formally, the model is written as

$y_{it} = i\alpha_i + \beta' x_{it} + \varepsilon_{it}$ fixed effects model

$y_{it} = \alpha + \beta' x_{it} + u_{it} + \varepsilon_{it}$ random effects model (1)

In the above formulations, y_{it} and x_{it} are the t^{th} observation for the i^{th} unit and ε_{it} is the associated vector of disturbances, β is the vector of explanatory variables and i is an identity matrix. The difference between the two sets of models lies in the component u_i. This component reflects the random disturbance characterising the i th observation and is constant through time. It is furthermore assumed that

$E(\varepsilon_{it})=E(u_i)=0$; $E(\varepsilon_{it}^2)=\sigma_\varepsilon^2$; $E(u_i^2)=\sigma_u^2$; $E(\varepsilon_{it}\, u_i)=0$ for all i, t and j; $E(\varepsilon_{it}\varepsilon_{js})=0$ if $t \neq s$ or $i \neq j$; and $E(u_i\, u_j)=0$ if $i \neq j$.

The model is then estimated using Generalised Least Square (GLS) approach.

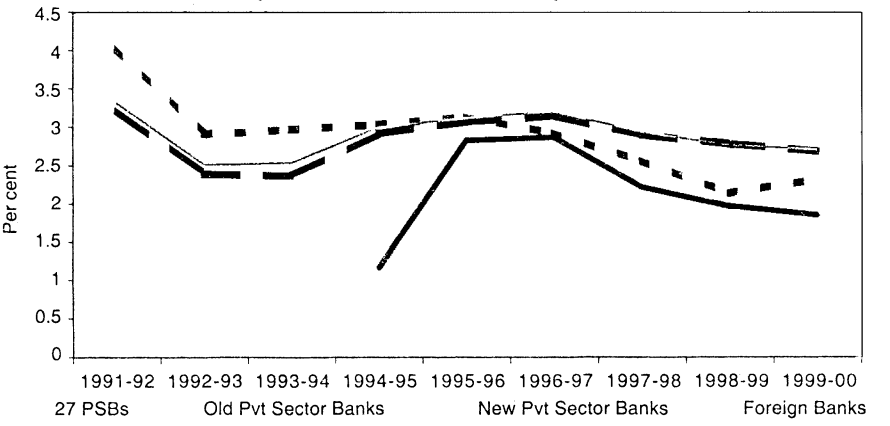
If the interest lies in with the FEM, then one can test the null hypothesis that the constant terms are all equal with an F-test. Under the null hypothesis, the efficient estimator is pooled least square. The F-ratio used for the test is

$$F(n-1,\ nT-n-K) = [R_u^2-R_p^2)/(n-1)]/[1-R_u^2)/(nT-n-K)] \quad (2)$$

where u indicates the unrestricted model and p indicates the pooled model (with only a single overall constant term).

For the random effects model, one can use the Breusch and Pagan (1980) LM test.

Chart : Spreads of Various Bank Groups: 1991-92 to 1999-00



$H_0^2:\sigma_u^2 = 0$ vs $H_0:\sigma_u^2 \neq 0$

the test statistics is

$$LM = [nT/2(T-1)][\sum_i (\sum_t e_{it})^2 / \sum_i \sum_t e_{it}^2 - 1]^2 \approx \chi^2\ (1) \quad (3)$$

Given that the data set exhausts the population of SCBs, there is a priori support for the hypothesis that bankwise variances in performance emanates from divergences in initial conditions, e g, scale of operations; in other words, there are bank-specific constants. This tilts the choice of model in favour of 'fixed effects' estimators. However, there is no a priori reason to assume correlation between regressors and errors; consequently, panel regressions were also estimated for 'random effects' model. In order to make a choice between the two sets of models, a Hausman test for choice of one vis-a-vis the other was conducted under the null hypothesis of no correlation between regressors and errors. The significance of the Chi-Square (χ^2) statistic of the Hausman test enables rejection of the variable effects model under all cases.

IV
The Model Framework

The representative bank is modelled as a dealer in deposit mobilisation and deployment of the mobilised resource for a net interest margin, which includes compensation for risks and other influencing factors. Assuming that the money market risk-free rate of interest R captures both the true opportunity cost of capital and the true time preference of the savers, the price of loan will be interest rate plus a service fee a, so that $P_l=R+a$. The price of deposits will be equal to the expected money market risk-free rate of interest R minus a fee for servicing deposits, b, so that $P_d=R-b$. Thus, the interest spread becomes,

$$P_l-P_d=[R+\alpha)-(R-\beta)]=\alpha+\beta \quad (4)$$

If the planning horizon is unitary, the loan and deposit rates are given. But risk averse banks face un-synchronised arrival of demand for loans and supply of deposits to "select the optimal loan and deposit rate which minimises the risks of excessive demand for (risky) loans and insufficient supply of deposits" [Angbazo 1997]. In other words, the objective is to select 'a' and 'b', so as to maximise the net change in the terminal value of the bank subject to these unsynchronised transactions. The resulting model makes the optimal spread depend on several market forces and bank-specific features [Ho and Saunders 1981].

The independent variables chosen for the purpose are bank size (SIZE), non-interest income as a share of total assets (FEE), an index of market power of each bank for each year (INDEX) and an index of banking service (SERVICE). At the same time, given that the bank has to comply with various regulatory stipulations, we use two indices of regulatory requirement, as discussed below.

The specification of the model can therefore is given as

SPREAD = f [SIZE, FEE, INDEX, SERVICE, CARH, CARL, NPAH, NPAL]

V
Empirical Specification of the Variables

The dependent variable is the SPREAD. The spread is measured as the difference between the interest revenue on bank assets and interest expense on its liabilities as a proportion of total bank assets.[7]

International experiences reveal that spreads vary positively with bank size (SIZE), when SIZE is proxied by log of total assets. The large variation in bank size captures the accounting influence of size. Smaller banks may have the advantages of smaller base and larger margins. But though foreign banks are relatively small, their home country compulsions might drive them into a positive relation between size and margin. Therefore, the relationship between spread and the logarithm of total assets is expected to be positive.

Interest spreads tend to be affected by the amount of non-interest income being earned by a bank. We consider the ratio of Non-interest Income to Total Assets (FEE). A higher level of non-interest income enables the bank to tolerate a lower spread and so the relation is expected to be negative.

The increasing competitiveness of financial markets reflected in, for instance, the deregulation of interest rates, the emergence of several other types of bank and non-bank financial intermediaries, the emergence of disintermediation pressures have resulted in a gradual thinning of spreads. To capture the power of a bank within the market we define an index of market power. The index (INDEX) is defined as

$$INDEX_t = br_{i,t}\frac{B_{i,t}}{\sum_{\substack{i=1\\ t=1,2,\ldots,T}}^{N} B_{i,t}} + (1-br_{i,t})\frac{OBS_{i,t}}{\sum_{\substack{i=1\\ t=1,2,\ldots,T}}^{N} OBS_{i,t}}$$

This index is a weighted average of the presence of a bank in business (deposit plus advances) and off-balance sheet (OBS) activity, the weights being measured in terms of the number of branches of bank i at time t. In other words, the index normalises the number of branches of a bank to unity and estimates the relative importance of balance sheet (deposits plus advances) and off-balance sheet activity of the bank in the branch. So if a bank has a large branch network (so that, $br_{i,t}$ is high) and the bank commands a large business as well (B is large), the first term on the RHS will be high, so that the INDEX will be high. This will, more often than not, be the case with public sector banks. On the other hand, for banks with low branch network and high off-balance sheet activity, the second term on the RHS will be relatively higher vis-a-vis the first, indicating greater presence of the bank in OBS. Greater market presence, as captured by INDEX, is likely to enhance bank's NIM and so this relation could be positive.

We also provide an index of banking service (SERVICE) defined as the sum of per capita number of commercial bank offices and per capita number of commercial bank employees. Such a definition of banking service has been used in the literature of late [Sarr 2000]. In the Indian context, however, such a definition might be of little relevance, given the uneven concentration of different bank groups in metropolitan and non-metropolitan areas. For purposes of analysis, we also use an alternative definition (CONS), as the sum of Other Fixed Assets (OFA) per bank office to Fixed Assets (FA) per bank office plus Repairs and Maintenance (R and M) plus Insurance (I) per bank office to total Non-Wage Expenses (NWE) per bank office.[8] Economically, CONS attempts to capture the service improvement, as reflected in banks expenditure on technology and generating greater customer friendliness, proxied by their expenses on other fixed assets and repairs and insurance components. Intuitively, enhancements in customer friendliness, as proxied by CONS would enable the bank to tolerate a lower spread, and so the relationship could be negative.

Of crucial importance from the point of view of the present exercise are the regulatory requirement variables. In particular, the study focuses on the response of banks to the 8 per cent risk-based capital standards.[9] Here CARH and CARL signal the degree of regulatory requirement brought about by the risk-based capital standards on bank capital ratio. Specifically, the regulatory requirement variable equals the difference between the inverse of the bank's actual risk-based capital ratio (RBC_j) and the inverse of the regulatory minimum risk-based ratio of 8 per cent. Because banks with total risk-based capital ratios above and below the 8 per cent regulatory minimum may react differently, this study partitioned regulatory requirement into two variables: CARH and CARL.[10] CARL equals ($1/RBC_j$-1/8) for all banks with a total risk-based capital ratio less than 8 per cent, and zero otherwise.[11] Therefore, CARL should positively affect spread, as these banks will seek a larger margin to meet the capital adequacy standards. Similarly, adequately capitalised banks (CRAR at least equal to prescribed minimum) would also seek a higher spread in order to maintain their margins. So CARH would be expected to have a positive effect on spreads. In case of a foreign bank, the capital requirement is met by the parent bank itself, which generally has a good standing in the home country and has the consent of the authority to apply for a banking licence as a branch in India.[12] Regulatory requirement with respect to capital might be of limited relevance for this bank group.

The second set of regulatory requirement variables is defined with regard to non-performing assets (NPAs). The Discussion Paper of the Reserve Bank on Prompt Corrective Action (PCA) has established as one of the trigger points a net NPA to net advances (net NPA ratio) of 10 per cent for initiating regulatory action. In line with the above, we define our regulatory requirement for NPA with respect to this 10 per cent benchmark. Accordingly,

NPAL=($1/NPA_j$-1/10) for all banks with a Net NPA ratio < 10 per cent, = 0, otherwise.

NPAH = ($1/10-1/NPA_j$) for all banks with a Net NPA ratio ≥ 10 per cent, = 0, otherwise.

In other words, NPAL defines the regulatory requirement for banks with net NPA ratio below 10 per cent, whereas NPAH is the regulatory requirement for banks with net NPA ratio above 10 per cent. Clearly, banks in the latter category would be under considerable pressure to lower

Table 4: Matrix of Correlation Coefficients

	SPREAD	SIZE	FEE	INDEX	SERVICE
SPREAD	1.00				
SIZE	-0.20	1.00			
FEE	-0.09	-0.31	1.00		
INDEX	0.03	0.48	0.03	1.00	
SERVICE	-0.07	0.55	-0.09	0.65	1.00

Table 5: Summary Results for Pooled Data Model – All Banks
Dependent Variable: SPREAD

Variable	Value	
(1)	(2)	(3)
SIZE	-1.19 (0.14)*	-1.19 (0.14)*
FEE	-0.22 (0.04)*	-0.22 (0.04)*
INDEX	2.71 (33.16)	3.33 (32.36)
SERVICE	6.62 (7.32)	-0.02 (0.007)**
CARTH	0.61 (0.89)	0.68 (0.70)
CARL	0.61 (0.89)	0.003 (0.008)
NPAL	-0.009(0.02)*	-0.009 (0.002)*
NPAH	-12.86(5.33)*	-13.15 (5.16)*
Hausman Test H_o:		
RE versus FE – χ^2 (8)	50.63	50.26
R^2	0.64	0.65
No of observations	430	430

Note: Figures in brackets indicate standard errors
*significant at 1 per cent ** significant at 5 per cent
significant at 10 per cent

their NPA ratios to a reasonable level, so that these banks might reconfigure their asset portfolios away from loans and towards low-risk investments, negatively impacting their spreads in the process. On the other hand, banks with net NPA ratio below the 10 per cent benchmark might also be expected to exert caution in their advance portfolio, tolerating lower spreads in the process. Therefore, the sign of the coefficient in both cases could be negative.

Before embarking on a formal analysis, we present some clinical tests of the data in order to understand the relationship among the variables. In Table 3, we present the mean and standard deviation (SD) of the important variables under consideration for the different bank groups while Table 4 presents the correlation matrix.

Several broad characteristics about the different bank groups are discernible from Table 3. First, on average, spreads tend to be highest for foreign banks and thereafter for PSBs. Spreads of private sector banks tend to be the lowest, on average. Secondly, in terms of size, PSBs far outweigh their private sector or foreign counterparts. Thirdly, foreign banks far outpace the public sector or, for that matter, the private sector banks in terms of fee incomes. Finally, the index of market power is the highest for PSBs and the lowest for private sector banks; foreign banks lie in between these two bank groups.

Having conducted these clinical tests, we proceed to conduct our empirical analysis on the lines delineated above. The result of the empirical estimation of the pooled data model is presented in Table 5.

As the results of column (2) of the Table reveals, SIZE does not necessarily imply higher spreads. This runs contrary to perceived studies for other countries that find SIZE to be positively related to spread [Bajaras et al 1998]. Secondly, fee income (FEE), not surprisingly, enables banks to tolerate a lower spread. The index of market power (INDEX) and SERVICE variables have the expected signs; they are, however, insignificant at conventional levels.

As regards regulatory requirement, the capital adequacy variable is insignificant for banks, which have capital levels below and above the prescribed stipulation. For NPA, on the other hand, both banks with NPA ratios below and above the 10 per cent benchmark experience lower spreads; the decrease is higher for banks with high NPA (NPAH) vis-a-vis those with low NPA (NPAL).

The analysis is then conducted separately for the four groups of banks (public sector, private sector – old and new and foreign banks). The results of the analysis are presented in Table 6. The analysis in column (2) is based on PSBs. In addition to the set of variables referred to above, in case of PSBs, we also include a dummy variable for autonomy (AUTON), indicating which banks were eligible for autonomy in a particular year.[13] The results throw up some interesting conclusions. First, in addition to SIZE and FEE, the index of market power (INDEX) is statistically significant for PSBs. This lends support to the belief that increased market power of PSBs has been instrumental in preserving their spreads. With regard to the regulatory requirement variable on capital, the analysis reveals banks with CRAR above the prescribed level have witnessed a higher increase in spread (which is statistically significant) vis-a-vis those below the threshold (which is statistically insignificant). With regard to NPA ratio, PSBs with high net NPA ratio (NPAH) witnessed a greater decline in spread vis-a-vis those with low net NPA ratio (NPAL) and this result was uniformly valid across all bank groups. The Net NPA ratio therefore turns out to be a critical factor influencing spreads of various bank groups, especially those with high NPA. The autonomy variable however does not seem to have been effective in influencing spreads of PSBs.

Column 3 focuses on old private sector banks. As with PSBs, both the SIZE and FEE variables are significant at conventional levels. Among others, banks with high NPAs posted a much higher decline in spread as compared with those with relatively low NPAs. This might be suggestive of an element of 'loan conservatism' on the part of banks with relatively poor asset quality, which adversely impacted their spreads. As regards new private sector banks (column 4), the SERVICE variable was found to be statistically significant; better service enabled foreign banks to garner higher spreads. This indicates relatively greater service consciousness on the part of these banks vis-a-vis their public sector counterparts. The SERVICE variable is significant for foreign banks as well, in addition to SIZE and FEE, as adhered to above.

As an additional exercise, a similar analysis was conducted on the lines described above, with CONS as the alternative explanatory variable (instead of SERVICE). The third column of Table 5 presents the results for SCBs. Evidently, in addition to the significance of the variables adhered to above, the CONS variable is significant at conventional levels, suggesting that expenditure on enhancing customer service as proxied by CONS, performs relatively better vis-a-vis the SERVICE indicator. The explanatory power of the results is broadly similar to the earlier analysis. The bank groupwise exposition, presented in Table 7 corroborates our findings as regards the coefficient on CONS. The coefficient is significant for new private sector and foreign banks, while the INDEX coefficient remains significant for public sector banks alone. Among others, public and foreign banks with high NPA experience larger decrease in spreads in contrast to foreign banks.

An interesting aspect that emerges from Tables 6 and 7 is that both private and foreign banks are relatively immune to the regulatory requirement on capital. This is not surprising, since foreign banks and

Table 6: Summary Results for Pooled Data Model according to Bank Group
Dependent Variable: SPREAD

Variable	Bank Group			
	Public Sector Banks	Private Sector Banks		Foreign Banks
		Old	New	
(1)	(2)	(3)	(4)	(5)
SIZE	-0.88 (0.15)*	-1.31 (0.15)*	-1.26 (0.22)*	-0.75 (0.43)#
FEE	-0.21 (0.05)*	-0.15 (0.03)*	-0.09 (0.04)*	-0.27 (0.09)*
INDEX	24.43 (14.68)#	-19.31 (17.01)	-47.57 (58.99)	0.88 (7.04)
SERVICE	4.32 (20.57)	2.03 (7.58)	7.27 (3.34)*	9.65 (3.21)*
CARH	0.60 (0.24)*	1.99 (2.71)	7.46 (3.67)**	19.55 (36.18)
CARL	-0.52 (0.33)	-0.003 (0.004)	-0.68 (0.37)#	-32.19 (33.07)
NPAL	-0.37 (0.78)	0.28 (0.29)	2.10 (1.18)#	-0.009 (0.004)#
NPAH	-18.79 (3.82)*	-9.74 (5.39)#	-7.68 (13.24)	-13.30 (11.32)
AUTON	-0.01 (0.07)	--	--	--
Hausman Test H_0: RE vs FE	χ^2 (9)=28.89	χ^2(8)=47.91	χ^2(8)=8.97	χ^2(8)=8.97
R^2	0.91	0.81	0.87	0.55
No of observations	135	115	40	140

Note: Figures in brackets indicate standard errors.
*significant at 1 per cent ** significant at 5 per cent # significant at 10 per cent.

new private sector banks have perforce to meet the CRAR requirements in order to conduct banking business in India. An exception is, however, the new private sector banks, especially those which are adequately capitalised. These banks experienced a significant increase in spreads, indicative of perhaps their prudent lending policies and relatively lower NPAs. The coefficient is also significant only in case of adequately capitalised PSBs, being perhaps suggestive of the fact that these banks were making pro-active efforts to raise their spreads via lending.

VI
Policy Implications

Several broad policy implications can be derived from the analysis. First, most analysis of interest spread determination, especially for developed countries, assume a standard set of variables that commonly affect net interest margins. Such analyses, however, need to be appropriately modified, if applied to developing country markets. For one, financial markets in developing countries are relatively less perfect vis-a-vis developed ones: informational asymmetry is often quite pervasive and regulatory and accounting norms might be in a state of evolution. In the light of these differences, it is important that such factors are taken into account while understanding the determinants of micro behaviour of banks. Banks, in general, and public sector banks, in particular, would need to factor such regulatory requirements into account before analysing their spreads. Secondly, the evidence in the Indian context reveals that SIZE does not necessarily imply higher spreads. In other words, bigger banks do not give rise to higher spreads. This assumes importance in the present scenario, wherein a spate of mergers and acquisitions have been ongoing in the Indian banking sector. Thirdly, diversification by banks is important in order to garner higher spreads. In other words, higher fee income is a crucial component of generating or even sustaining higher spreads on the part of banks. Diversification into fee-based activity has the added advantage of not being subject to prudential norms, which testifies the first point made above. Fourthly, the AUTONOMY variable is insignificant for public sector banks. This supports a recent study by Sarker et al (1998) which found that, in the absence of well functioning capital markets, there might not be significant differences in the performance of public and private enterprises. One would need to go beyond the simple AUTONOMY measure and address issues of ownership in this regard. Finally, our analysis supports the Prompt Corrective Action Standards in the Indian context. Put differently, banks with high net NPA ratio might witness a further deterioration in their balance sheets. In view of the above, early stage recognition of their problems might enable the supervisory authorities to initiate corrective action to pro-actively address the weaknesses.

VII
Concluding Remarks

While appreciating the various policy implications, as explained above, one has to equally recognise the limitations of the analysis. The SCBs have to meet various targeted credit requirements like loans to priority sectors, export credit, etc. These have not been taken into consideration. Secondly, the structure of the banking industry determines the interactions and the cross-effects among various determinants of spread, which cannot be easily captured by this framework. Thirdly, a bank's attitude towards risk varies from risk-averse to risk loving via the risk-neutrality depending on the risk appetite of the management. Finally, the regulatory requirement variable was defined with respect to prescribed stipulation on CRAR and some benchmark level of net NPA ratio. With regard to CRAR, in particular, more often than not, it is peer requirement that serves as a trigger to maintain desired levels of capital. The CARH and CARL variables would then need to be redefined to incorporate regulatory requirement among similar banks (e g, based on comparable asset size). Such an analysis would provide a far richer dynamics regarding the intermediation process of banks under various regulatory constraints. These remain part of the future research agenda. EPW

Table 7: Summary Results for Pooled Data Model according to Bank Group
Dependent Variable: SPREAD

Variable	Bank Group			
	Public Sector Banks	Private Sector Banks		Foreign Banks
		Old	New	
(1)	(2)	(3)	(4)	(5)
SIZE	-0.90 (0.16)*	-1.26 (0.15)*	-0.96 (0.26)*	-0.77 (0.43)**
FEE	-0.22 (0.05)*	-0.14 (0.03)*	-0.09 (0.03)*	-0.27 (0.09)*
INDEX	-25.21 (14.16)#	-18.23 (17.13)	-6.83 (6.02)	-7.20 (77.25)
CONS	0.37 (0.31)	0.15 (0.12)	0.54 (0.28)#	-0.02 (0.012)#
CARH	0.27 (0.21)	2.16 (2.73)	7.09 (3.60)#	13.55 (9.31)
CARL	-0.05 (0.38)	-0.004 (0.05)	-0.59 (0.36)	-7.58 (11.31)
NPAL	-0.29 (0.78)	0.26 (0.28)	1.70 (1.13)	-0.01 (0.004)*
NPAH	-19.29 (3.95)*	-9.43 (5.42)#	-0.27 (13.77)	-11.59 (11.01)
AUTON	0.01 (0.07)	--	--	--
Hausman Test H_0: RE vs FE	$\chi^2(9)=36.33$	$\chi^2(8)=46.19$	$\chi^2(7)=10.78$	$\chi^2(8)=9.91$
R^2	0.90	0.81	0.87	0.54
No of observations	135	115	40	140

Note: Figures in brackets indicate standard errors.
*significant at 1 per cent ** significant at 5 per cent # significant at 10 per cent.

Data Source

1 Handbook of Statistics on Indian Economy, 1998-99.
2 Report on Trend and Progress of Banking in India (various years).
3 Statistical Tables Relating to Banks in India (various years).

Notes

[The views expressed in the paper are the personal views of authors.]

1 For experience in the developed countries, see, for instance, Williams (1998).
2 Scheduled commercial banks (SCBs) refer to the combination of public sector banks, private sector banks and foreign banks. Regional rural banks, which also form part of the SCBs, are not considered for the present analysis.
3 Banks are allowed to fix interest rates on all term-deposits of more than 15 days maturity. Likewise, on the deposit side, the only administered interest rate on rupee rate deposits is the savings bank deposits, currently fixed at 4 per cent.
4 At present, the only administered rate is the savings bank deposit rate, fixed at 4 per cent.
5 For instance, the deposit rate on 1-3 years maturity was 12 per cent in 1991-92, while the lending rate of the comparable period was 19 per cent. By 1996-97, while the deposit rate had come down to 11-12 per cent, the lending rate of 5 major public sector banks had declined to 14-15 per cent. By 1998-99, these rates had declined even further to 9-11 per cent and 12-13 per cent, respectively.
6 The following mergers have taken place in the banking sector during 1999-2000. The Bareilly Corporation Bank was amalgamated with Bank of Baroda with effect from June 3, 1999. The Sikkim Bank was amalgamated with Union

Bank of India with effect from December 22, 1999. The Times Bank was amalgamated voluntarily with HDFC Bank with effect from February 26, 2000. The branches of the British Bank of the Middle East in India were amalgamated with HSBC with effect from September 25, 1999.

7 Strictly speaking, the denominator should be total earning assets (in contrast to total assets), but data constraints prevent us from taking this into consideration.

8 $$CONS = [\frac{OFA / bank\ office}{FA / bank\ office} + \frac{(R \& M\ plus\ I) / bank\ office}{NWE / bank\ office}]$$

9 As on March 31, 1997 and 1998, SCBs had to comply with a CRAR of 8 per cent. This ratio has been raised to 9 per cent effective March 31, 2000.

10 CARL refers to banks with low CAR (below the prescribed minimum). Reverse is the case for CARH. A similar logic applies to the notations NPAL and NPAH.

11 For the year 2000, the CRAR has been taken at 9 per cent.

12 Total capital requirement for entry for a foreign bank is presently US $25 million, of which US $ 10 million of assigned capital needs to be brought in prior to opening of the first branch (the principal office), a further US $ 10 million at the time of opening the second branch and a further US $ 5 million at the time of opening the third branch. No further capital requirements are imposed for opening of more branches. The capital needs to be brought into the country before the start of banking operations.

13 The autonomy granted by the government to the public sector banks is subject to fulfilling the following criteria: (i) Positive net profits for the last three years, (ii) Capital Adequacy Ratio not below the prescribed minimum, (iii) Net NPA ratio below 9 per cent of net advances, and (iv) Minimum Net Owned Funds of Rs100 crore.

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