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## The Performance of Indian Banks During Financial Liberalization

*Petya Koeva*

**IMF Working Paper**

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Prepared by Petya Koeva

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**Abstract**

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This paper provides new empirical evidence on the impact of financial liberalization on the performance of Indian commercial banks. The analysis focuses on examining the behavior and determinants of bank intermediation costs and profitability during the liberalization period. The empirical results suggest that ownership type has a significant effect on some performance indicators and that the observed increase in competition during financial liberalization has been associated with lower intermediation costs and profitability of the Indian banks.

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Author's E-Mail Address: [pkoeva@imf.org](mailto:pkoeva@imf.org)

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## I. INTRODUCTION

During the past decade, the financial system in India has been undergoing a process of liberalization. Bank deposit and lending rates have been deregulated; reserve requirements have been reduced; and regulations on competition, credit allocation, and prudential supervision have been reformed.

This paper examines the impact of these reforms on the performance of commercial banks in India.<sup>1</sup> In particular, the behavior of industry concentration, cost of intermediation, and profitability of the banking sector are analyzed by focusing on the following questions:

- How has the level of **industry concentration** evolved over the past decade of financial liberalization?
- Have the **cost of intermediation and profitability** of different categories of banks—state, nationalized, old private, new private, and foreign—changed significantly over the period?
- What are the **determinants** of the cost of intermediation and profitability in the Indian banking system?
- Does **ownership structure** matter for the intermediation cost and profitability of Indian banks? Do public banks underperform relative to private and foreign banks?
- What has been the impact (if any) of **entry deregulation** on these indicators?

These questions are addressed using balance sheet and earnings and expenses data for all Indian commercial banks between 1991/92 and 2000/01. Alternative measures of industry concentration, bank spreads, and bank profitability are constructed and used in the empirical analysis. Then the cross-sectional and time-series properties of the data are examined in a panel regression framework, under a variety of model specifications and estimation methods.

The main findings can be summarized as follows:

- Industry concentration has declined during the decade. Nevertheless, the combined market share of the three largest banks remains at about one-third of the total assets of the banking system.

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<sup>1</sup> The structure of the banking sector is described in Chapter 2 of Reserve Bank of India (2001)..

- The cost of financial intermediation and bank profitability appear to have decreased in recent years. This decline is statistically significant for selected definitions of these variables and in most specifications of the regression analysis.
- State and nationalized are the two types of public sector banks in India. On average, nationalized banks have significantly lower profitability than private and foreign banks. The same result does not hold for state banks.
- Operational costs, priority sector lending, nonperforming loans, investment in government securities, and the composition of deposits (demand, term, savings) play an important role in explaining the bank-level variation in intermediation costs and profitability.
- The decrease in industry concentration, following the entry of new foreign and domestic banks, is associated with a significant decline in bank intermediation costs and profitability.

The rest of the paper is organized as follows. Section II provides a brief description of financial liberalization in the Indian banking sector. Section III describes some findings of the empirical literature on the effect of financial liberalization and public ownership on bank intermediation costs and profitability. Section IV discusses the bank-level data and variable definitions used in the empirical analysis. Section V reports the results from the empirical analysis, and Section VI concludes.

## II. FINANCIAL LIBERALIZATION IN INDIA (1991/92–2000/01)

This section highlights the key elements of the gradual liberalization strategy implemented during the past decade. The main reforms included: (1) interest rate liberalization; (2) reduction in reserve requirements; (3) entry deregulation; (4) credit policies; and (5) prudential supervision.<sup>2</sup>

Most deposit and lending rates of commercial banks have been liberalized.<sup>3</sup> Before the onset of financial liberalization, deposit and lending rates in India were heavily regulated. Interest rates were administered for all types of deposits (demand, term, and savings). The lending rate structure, on the other hand, was characterized by six loan size categories, each

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<sup>2</sup> The sources of information for this section are the various issues of *Report on Trend and Progress of Banking in India*, as well as the appendix, “Banking Sector Reform,” to the keynote speech by Deputy Governor Dr. Y.D. Reddy at the Conference on *Growth, Governance and Empowerment: The Future of India’s Economy* at the University of California, Santa Cruz on November 20, 1998.

<sup>3</sup> The regulations for other types of deposits—savings and demand—have not been changed yet. Interest rates on savings deposits are still administered by the Reserve Bank of India, and demand deposits continue to bear no interest.

with a minimum lending rate. The chronology of the main events in this process is shown in Annex I.

Reserve requirements of commercial banks were gradually reduced. In particular, the average cash reserve requirement (CRR) has fallen from 15 percent to its current value of 5 percent since the start of the reform period.<sup>4</sup> The statutory liquidity requirement (SLR) was decreased from 38.5 percent for domestic liabilities and 30 percent for non-resident liabilities to its current level of 25 percent, which is the minimum ratio of liquid assets to demand and time liabilities allowed under the existing law.

Entry and ownership restrictions were liberalized. Prior to these reforms, the entry of foreign banks was restricted, and new domestic private banks had not entered the market since the early 1970s. Moreover, private ownership in public sector banks was not allowed. The key changes in the regulations on competition and ownership are described in Annex I.

The system of credit delivery has undergone significant changes, including the easing of priority sector lending requirements. During the pre-reform period, the credit decisions of Indian commercial banks were governed by detailed regulations on the provision of cash credit for working capital, credit authorization, holdings of inventory and receivables of various industries, consortium arrangements, etc. The reform efforts in this area were focused on giving banks more discretion in making credit decisions. In addition, the definition of priority sector lending has been expanded gradually, thus making this requirement less restrictive.

Prudential supervision norms have been tightening gradually. The specific areas of reform have included the introduction of capital adequacy requirements and the phased improvement of income recognition, asset classification, and provisioning norms.

### III. SELECTED LITERATURE REVIEW

Financial liberalization has generally been found to have a positive effect on bank performance. Using panel data estimation, Barajas, Steiner, and Salazar (2000) find that financial liberalization and foreign investment in Columbia had a beneficial effect on bank behavior by increasing competition, lowering intermediation costs, and improving loan quality. The positive effect on intermediation spreads is also found in Claessens, and others (1998), using cross-county data. In Norway, the deregulation of lending rates and volumes improved the efficiency and productivity of banking sector (Berg, Forsund, and Jansen, 1992). According to Zaim (1999), commercial banks in Turkey had a similar experience. In the Indian context, the impact of liberalization on public sector profitability is analyzed in Chaudhuri (2002) and Mohan (2002).

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<sup>4</sup> The CRR was raised temporarily on several occasions during this period for monetary and exchange rate policy reasons (e.g., December 1997–January 1998, August 1998, July–August 2000).

Although several studies have found that ownership has a significant effect on bank performance in developing countries, the empirical evidence on the Indian banking sector has been mixed. Barth, and others (2001) demonstrate that a larger share of state ownership is associated with higher intermediation costs. Using bank-level data from 80 countries, Demirguc-Kunt and Huizinga (1998) report that foreign banks have higher profitability than domestic banks in developing countries. In the case of the Indian banking system, Sarkar, Sarkar, and Bhaumik (1998) find that the differences in performance between public and private banks are not significant. Shirai (2002) concludes that "...even though foreign banks and private sector banks generally perform better than public sector banks in terms of profitability, earnings efficiency and cost efficiency in the initial stage [of reforms], such differences have diminished as public sector banks have improved profitability and cost efficiency."

In this paper, the analysis of the cost of intermediation—measured by several types of bank spreads—is based mainly on Brock and Suarez (2000). In their investigation of the determinants of bank spreads in seven countries in Latin America, Brock and Suarez (2000) point out that "...the study of interest rate and spreads only makes economic sense in a fully liberalized economy..." Therefore, they construct several measures of bank spreads and proceed to analyze the behavior of banks across time and banks.

#### IV. DATA

##### A. Sample Description

The sample comprises all commercial banks in India between 1991/92 and 2000/2001.<sup>5</sup> The database was constructed using various issues of *Statistical Tables Relating to Indian Banks, Report on Trend and Progress of Banking in India*, and *Database on Indian Banking, 1987–98*. The number of banks in the sample varies across years, owing to the entry and exit of some banks, as well as data availability. The total number of observations in the sample is 882.

The structure of the Indian banking sector is characterized by five categories of commercial banks. There are two types of public banks—eight state banks (SBI and seven associates) and 19 nationalized banks. The classification of private banks into "old private" and "new private" is based on the timing of market entry. Following the RBI guidelines of 1993 to promote competition in the banking sector, nine new private banks entered

Bank Category	Market Share (In percent)
State	31
Nationalized	48
Old private	7
New private	6
Foreign	8

<sup>5</sup> Subject to data availability.

the market in 1994 and 1995.<sup>6</sup> A number of foreign banks were allowed entry into the Indian banking system between 1991 and 1998, and consequently, the total number of foreign banks increased from 24 in 1991/92 to 42 in 2000/2001.<sup>7</sup> The market shares of the five categories of banks in 2000/01 are shown in Table 1.

## B. Variable Definitions

***Industry concentration and composition.*** The changes in the concentration and composition of the Indian banking industry during the sample period are analyzed using several indicators. To capture the evolution of overall concentration, we construct: (1) Herfindahl index of the banking sector in three different ways, using the market share of each bank in the asset, loan, and deposit markets;<sup>8</sup> and (2) M-concentration ratios of the one, three and ten largest banks in the asset, loan, and deposit markets. The effect of entry deregulation on the composition of the banking industry is described by tracing the changes over the sample period in: (1) the number share of each bank type, i.e., the number of banks of type  $i$  ( $i$  = state, nationalized, old private, new private and foreign) divided by the total number of banks in a given year; and (2) the market share of each bank type in the asset, loan and deposit markets.

▪ **Cost of intermediation and profitability.** The cost of financial intermediation is measured by four different bank spreads (see Annex II). The most commonly used definition in the literature is the net interest margin (Spread1), i.e., the difference between interest earned and interest expended, normalized by total assets. Since the net interest margin (Spread1) may not accurately represent the marginal costs and benefits of borrowing and lending, three other bank spread measures are used in the empirical analysis. For example, the definition of Spread4 focuses on the loan and deposit business of the banks only, using the difference between the interest earned on loans (normalized by total loans) and interest expended on deposits (normalized by total deposits). The definitions of Spread2 and Spread3 differ from the net interest margin (Spread1) in their adjustment for balance sheet composition by normalizing interest earned by total loans and interest expended by total deposits (instead of total assets), thus abstracting from non-loan assets (investments in government securities, balances with RBI and liabilities, etc.) and nondeposit liabilities (borrowings, reserves, etc.) The difference between Spread2 and Spread3 is the inclusion of income from commissions, exchange, and brokerage in Spread2.<sup>9</sup>

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<sup>6</sup> Two new private banks (HDFC Bank Ltd. and Times Bank Ltd.) merged in 2000.

<sup>7</sup> In our sample, the number of foreign banks is 21 in 1991/92 due to data availability.

<sup>8</sup> The Herfindahl index is defined as the sum of the squares of the market shares of all market participants. The M-concentration ratio equals to the combined market share of the M-largest market participants.

<sup>9</sup> See Brock and Suarez (2000) for a detailed discussion of these measures of bank spreads.



The empirical analysis uses two standard measures of bank profitability, before and after provisioning. Bank profitability before provisions and contingencies (*Profit2*) is equal to the difference between earnings (interest earned plus other income) and expenses (interest expended plus operating expenses), normalized by total assets. Note that *Profit1* is equal to *Profit2* minus (normalized by total assets) provisions and contingencies.

The definitions of profitability and bank spreads are closely related. For example, the profitability before provisioning (*Profit2*) is the sum of the net interest margin (*Spread1*) and the surplus of other income over operating expenses. Therefore, if the net interest margin declines, then bank profitability will decrease unless operating costs fall sufficiently (or other income increases) to compensate for this fall.

## V. RESULTS

### A. Changes in Industry Concentration and Composition

The concentration of the Indian banking sector has declined during the past decade. This fact is illustrated in Figure 1a, which shows the evolution of three types of Herfindahl indices (asset, loan and deposit). The largest change in concentration—comparing the values at the end-points of the sample period—is observed in the case of the loan-based Herfindahl index (*Herf\_Advances*), which dropped from 0.098 in 1991/92 to 0.07 in 2000/01. The asset-based Herfindahl index (*Herf\_Assets*), on the other hand, declined from 0.1 in 1991/92 to 0.08 in 2000/01. The fall in the deposit-based Herfindahl index (*Herf\_Deposit*) is about three times smaller (0.01). It is interesting to note that the asset-based and deposit-based Herfindahl indices assumed their lowest values in 1997/98, unlike *Herf\_Advances*, which continued its decline.

The behavior of the Herfindahl indices is dominated by the change in the largest-bank share of total assets, loans and deposits in the banking sector (see Figure 1b). In particular, the asset market share of SBI fell from 28 percent in 1991/92 to 24 percent in 2000/01, whereas its loan market share declined from 27 percent in 1991/92 to 22 percent in 2000/01. In contrast, the deposit market share of SBI recovered at the end of the sample period to its starting value of 23 percent in 1991/92. The increase in the deposit market share of SBI since 1997/98 materialized at the expense of the nationalized banks.<sup>10</sup>

Additional information about the changes in the market structure is provided by the remaining two M-concentration ratios. Figure 1c and Figure 1d show that despite the decline in their relative share, the combined assets of the three largest banks still comprise about one-third of the total assets of the banking system in 2000/01. The asset, loan, and deposit market shares of the ten largest banks, on the other hand, declined continuously during the sample period to just under 60 percent in 2000/01. All of these banks are public.

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<sup>10</sup> Figures not shown, but available upon request.

The composition of the banking sector changed with the emergence of new private and foreign banks (Figure 2). Although the number shares of old private, nationalized, and state banks decreased at the expense of foreign and new private banks (Figure 2a), their market shares did not adjust as much (Figure 2b–2d). Measured in terms of the total assets of the banking system, the market share of nationalized banks decreased by 6 percentage points, while new private banks gained a market share of 6 percent.<sup>11</sup> The largest decline in the market share of state and nationalized banks occurred in the market for advances—8 and 4 percentage points, respectively. This market share loss was to the benefit of new private banks (6 percentage points), old private banks (3 percentage points) and foreign banks (3 percentage points). New private banks expanded the most in the deposit market as well, as their market share increased at the expense of nationalized banks.

### **B. Changes in Bank Spreads and Profitability<sup>12</sup>**

Several patterns emerge from examining the behavior of bank spreads and profitability:

- *The net interest margin (Spread1) has declined in recent years.* The negative and significant coefficients of *Year99*, *Year00*, and *Year01* in Table 2a–c lend support to this observation.
- The change in *Spread4* follows a similar time pattern to the net interest margin (*Spread1*), although its level is consistently higher than the latter. As in the case of *Spread1*, the coefficients of the year dummies *Year99*, *Year00*, and *Year01* in Table 2a–c are negative and statistically significant. However, the mean value of *Spread4* in the sample is almost twice as high as the mean value of the net interest margin, *Spread1*. This difference indicates that spreads on activities related to lending and deposits are much higher than the simple net interest margin.

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<sup>11</sup> The asset market shares of state, old private and foreign banks changed by –3, 2 and 1 percentage points, respectively.

<sup>12</sup> The median and mean values of the intermediation cost and profitability measures by bank category are shown in Figure 3 and Figure 4. Since the empirical results are not sensitive to the choice of summary variable (median or mean), the discussion in this section focuses on the evolution of median spreads. The statistical significance of the differences in the intermediation cost and profitability across bank types is tested as well (see Annex II for model specifications).

Figure 1. Herfindahl and M-Concentration Indices

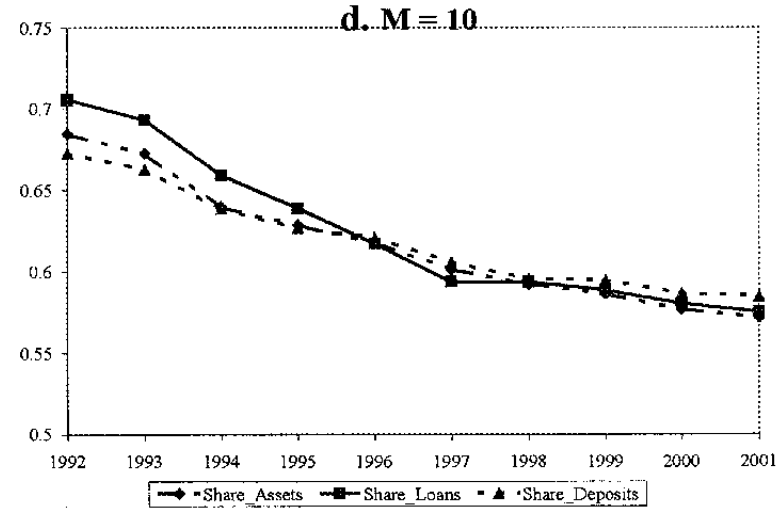
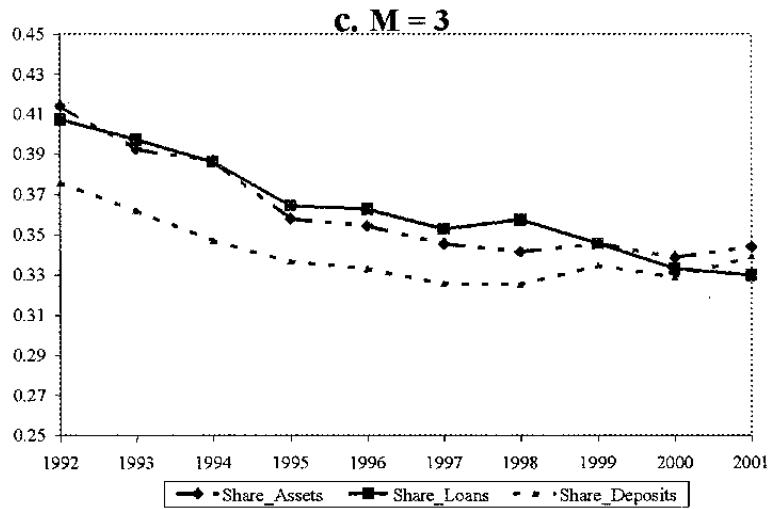
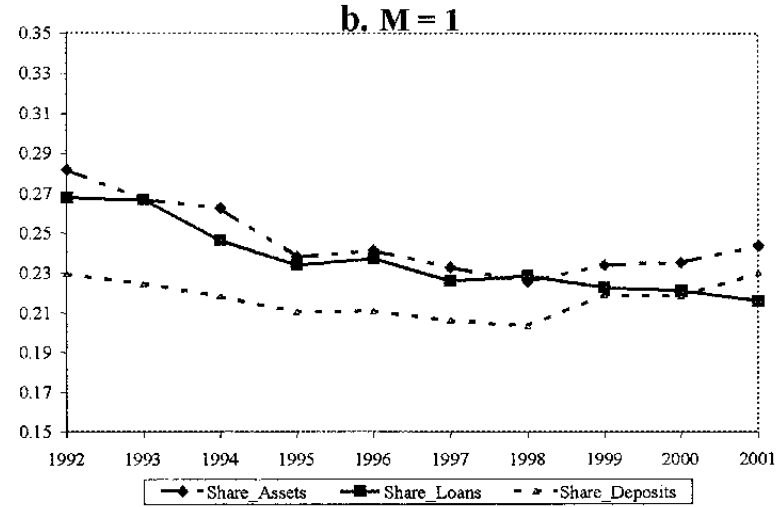
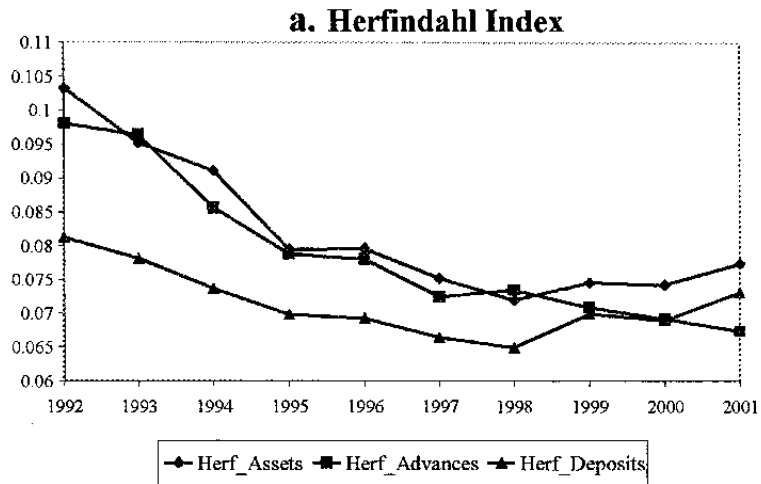


Figure 2. Number and Market Shares by Bank Category

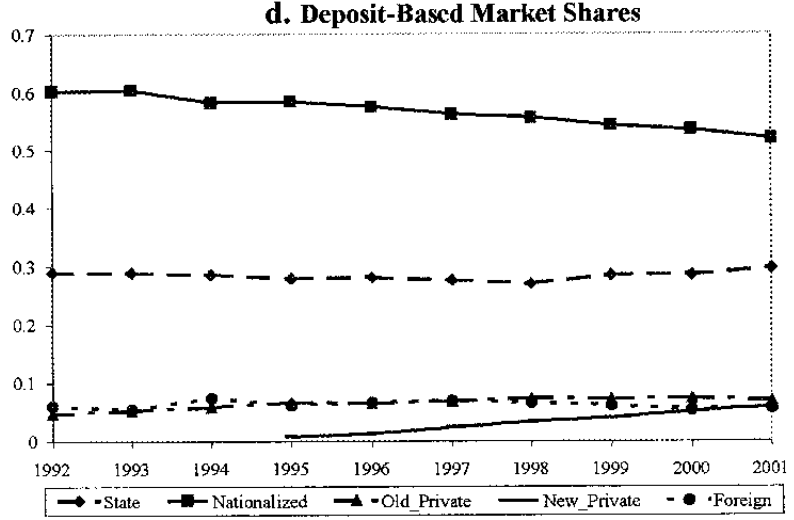
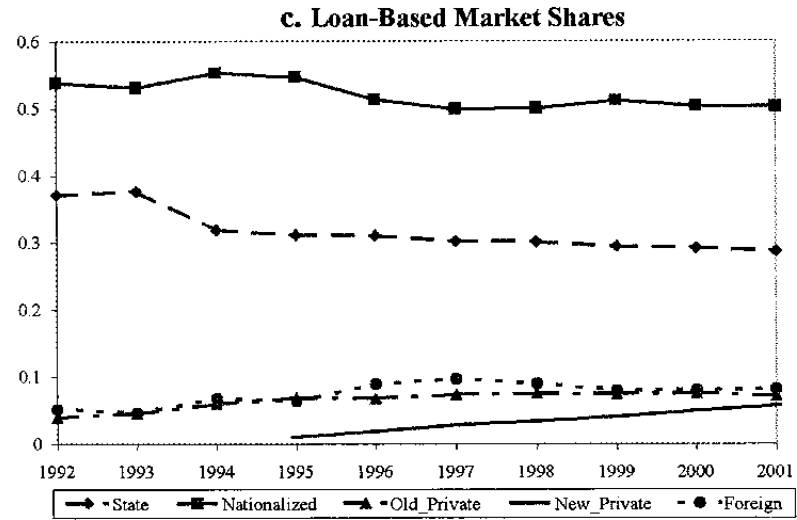
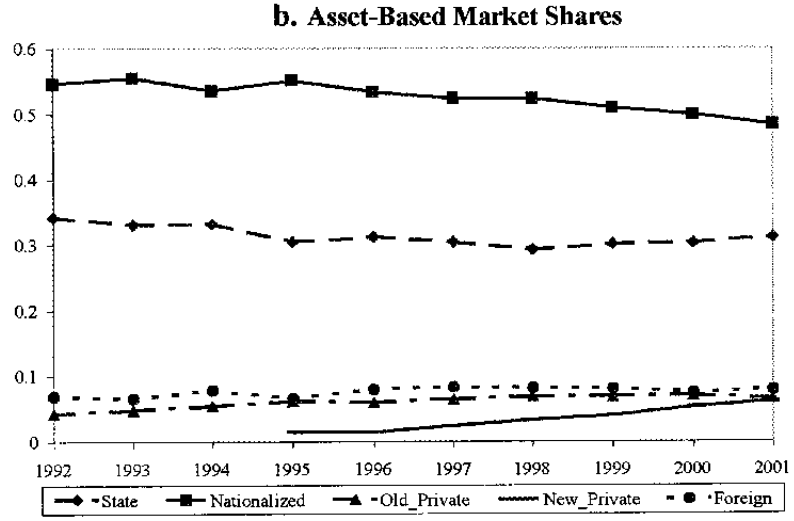
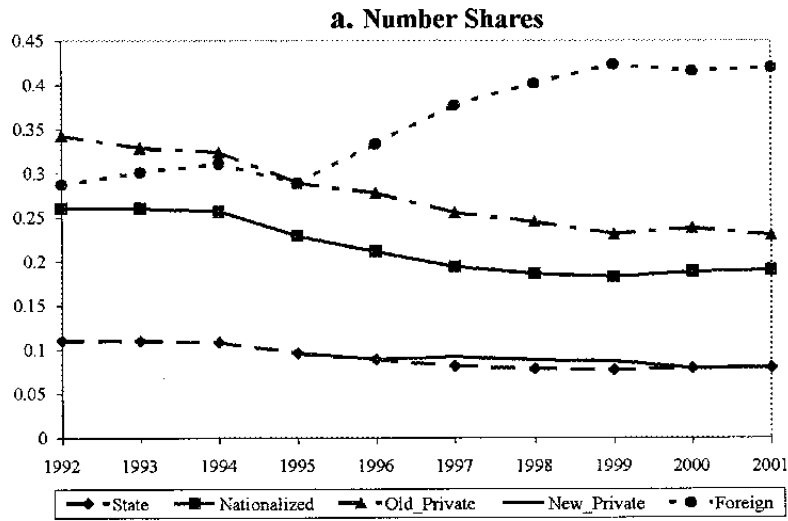


Figure 3. Median Bank Spread and Profitability Measures

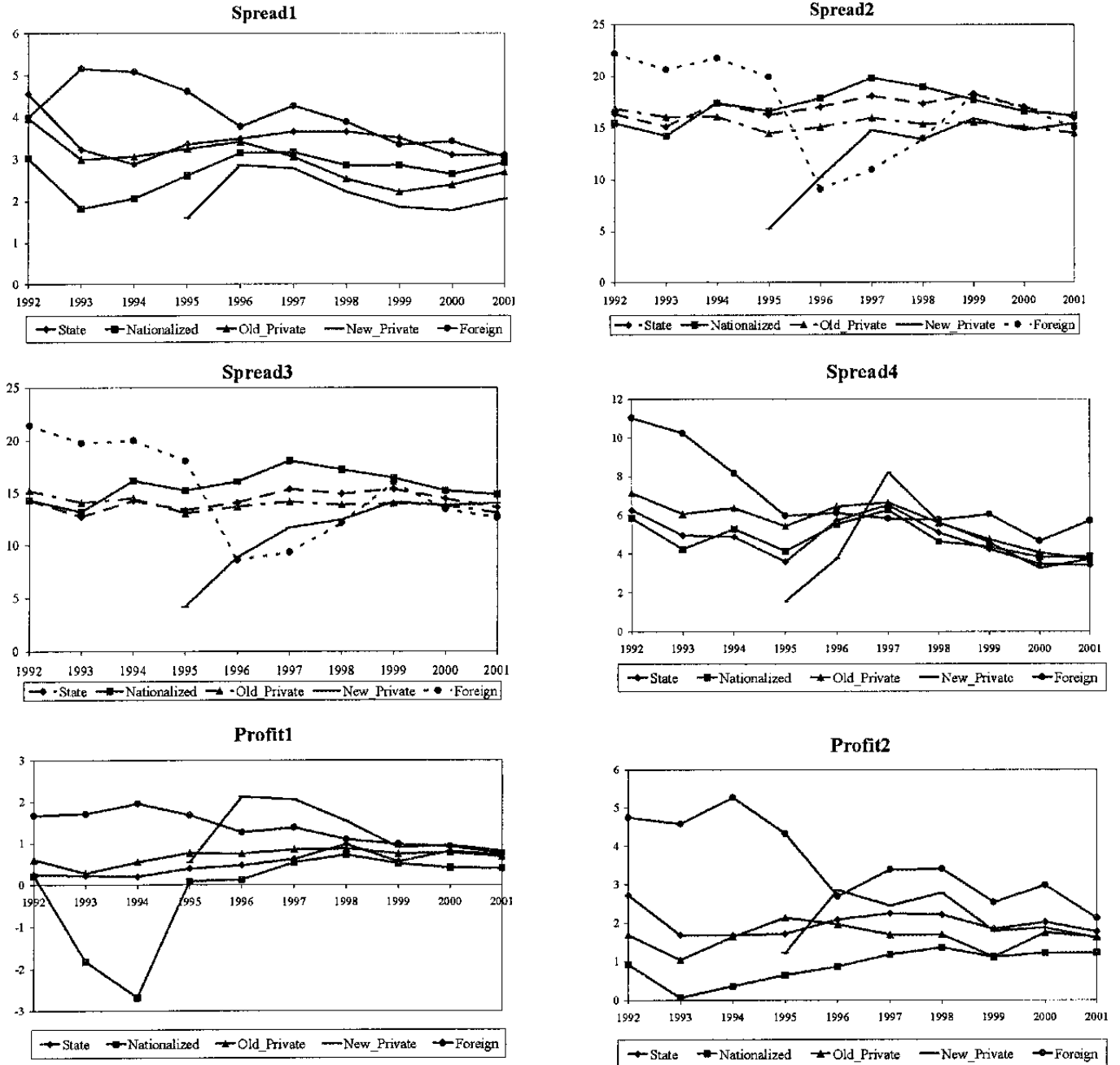


Figure 4. Mean Bank Spread and Profitability Measures

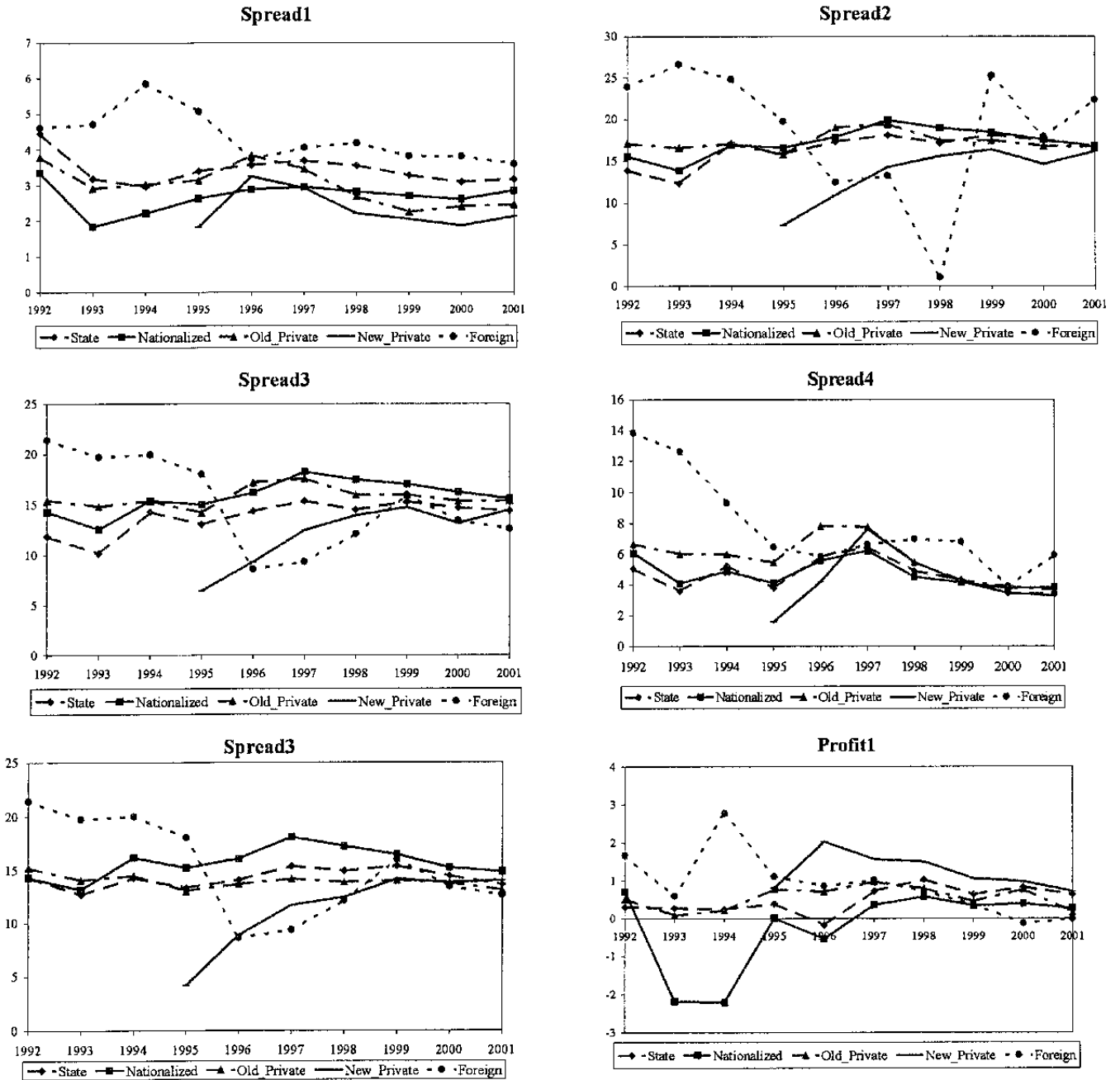


Table 2a. Panel Regressions with Time Dummies<sup>1,2</sup> Only

	<i>Spread1</i>		<i>Spread2</i>		<i>Spread3</i>		<i>Spread4</i>		<i>Profit1</i>		<i>Profit2</i>	
	OLS	FE	OLS	FE	OLS	FE	OLS	FE	OLS	FE	OLS	FE
<i>Year92</i>	0.43 (0.24)*	0.61 (0.21)***	1.68 (1.48)	-0.54 (4.04)	2.29 (1.33)*	1.46 (2.44)	1.47 (0.75)*	1.44 (0.62)**	-0.03 (0.24)	-0.04 (0.36)	0.38 (0.33)	0.55 (0.33)*
<i>Year93</i>	-0.37 (0.25)	-0.20 (0.21)	1.68 (1.90)	-0.56 (4.04)	2.20 (1.74)	1.34 (2.44)	0.25 (0.79)	0.18 (0.62)	-1.25 (0.45)***	-1.26 (0.36)***	-0.54 (0.37)	-0.39 (0.33)
<i>Year94</i>	0.14 (0.31)	0.26 (0.21)	2.8 (1.99)	0.39 (3.99)	2.68 (1.37)*	1.72 (2.41)	-0.27 (0.570)	-0.31 (0.614)	-0.51 (0.34)	-0.54 (0.36)	0.27 (0.40)	0.33 (0.33)
<i>Year95</i>	-0.07 (0.27)	0.17 (0.20)	-0.14 (1.48)	-1.73 (3.89)	0.25 (1.22)	0.06 (2.35)	(1.95) (0.52)***	(1.83) (0.60)***	-0.24 (0.31)	-0.28 (0.34)	-0.25 (0.41)	-0.16 (0.32)
<i>Year96</i>	-0.03 (0.25)	0.14 (0.20)	-0.86 (3.35)	-1.73 (3.77)	-1.64 (2.27)	-1.21 (2.28)	-0.73 (0.70)	-0.60 (0.58)	-0.37 (0.26)	-0.37 (0.34)	-0.17 (0.34)	-0.09 (0.31)
<i>Year98</i>	-0.22 (0.25)	-0.36 (0.19)*	-5.47 (6.19)	-5.69 (3.65)	0.39 (1.31)	0.53 (2.21)	-1.09 (0.56)*	-0.95 (0.56)*	-0.10 (0.33)	-0.13 (0.33)	0.34 (0.29)	0.29 (0.30)
<i>Year99</i>	-0.50 (0.24)**	-0.62 (0.19)***	4.09 (2.03)**	4.02 (3.65)	3.36 (1.66)**	3.92 (2.20)*	-1.68 (0.60)***	-1.54 (0.56)***	-0.44 (0.261)*	-0.47 (0.33)	-0.63 (0.42)	-0.66 (0.30)**
<i>Year00</i>	-0.52 (0.22)**	-0.60 (0.19)***	0.62 (2.08)	0.38 (3.67)	-0.99 (2.59)	-0.61 (2.22)	-3.13 (0.61)***	-3.05 (0.57)***	-0.56 (0.27)**	-0.60 (0.33)*	-0.23 (0.30)	-0.25 (0.30)
<i>Year01</i>	-0.52 (0.24)**	-0.60 (0.19)***	2.38 (4.77)	5.21 (3.68)	1.64 (4.50)	5.13 (2.22)**	-2.34 (0.54)***	-2.37 (0.57)***	-0.71 (0.34)**	-0.75 (0.33)**	-0.35 (0.32)	-0.37 (0.30)
<i>Constant</i>	3.55 (0.17)***	3.52 (0.14)***	16.62 (1.07)***	17.16 (2.61)***	14.14 (0.92)***	13.82 (1.57)***	6.93 (0.40)***	6.88 (0.40)***	0.90 (0.14)***	0.93 (0.23)***	2.29 (0.22)***	2.25 (0.22)***
R-squared	0.03	-	0.01	-	0.01	-	0.08	-	0.02	-	0.02	-
No of Obs.	897	897	883	883	882	882	883	883	895	895	897	897

1/ The significance levels of 1 percent, 5 percent and 10 percent are denoted by (\*), (\*\*) and (\*\*\*), respectively.

2/ The reference categories in the regression are Year97 and Old\_private.

Table 2b. Panel Regressions with Time and Category Dummies<sup>1,2</sup>

	<i>Spread1</i> OLS	<i>Spread2</i> OLS	<i>Spread3</i> OLS	<i>Spread4</i> OLS	<i>Profit1</i> OLS	<i>Profit2</i> OLS
<i>State</i>	0.43 (0.10)***	-0.98 (0.78)	-1.97 (0.69)***	-1.11 (0.35)***	-0.05 (0.11)	0.41 (0.09)***
<i>Nationalized</i>	-0.31 (0.11)***	-0.14 (0.66)	0.04 (0.59)	-0.99 (0.26)***	-0.77 (0.14)***	-0.60 (0.11)***
<i>New_Private</i>	-0.56 (0.15)***	-2.91 (1.11)***	-2.95 (0.91)***	-0.65 (0.39)*	0.66 (0.13)***	0.68 (0.15)***
<i>Foreign</i>	1.26 (0.15)***	0.61 (2.69)	-0.75 (1.78)	1.79 (0.42)***	0.20 (0.22)	1.71 (0.22)***
<i>Year92</i>	0.50 (0.23)**	1.49 (1.51)	2.01 (1.35)	1.66 (0.72)**	0.11 (0.24)	0.63 (0.28)**
<i>Year93</i>	-0.30 (0.22)	1.5 (1.94)	1.92 (1.78)	0.43 (0.75)	-1.12 (0.44)**	-0.30 (0.32)
<i>Year94</i>	0.18 (0.28)	2.6 (2.03)	2.40 (1.40)*	-0.13 (0.56)	-0.39 (0.32)	0.47 (0.34)
<i>Year95</i>	0.05 (0.24)	-0.12 (1.50)	0.17 (1.22)	-1.75 (0.53)***	-0.20 (0.31)	-0.09 (0.39)
<i>Year96</i>	0.03 (0.25)	-0.83 (3.40)	-1.67 (2.28)	-0.62 (0.72)	-0.35 (0.25)	-0.08 (0.33)
<i>Year98</i>	-0.25 (0.23)	-5.5 (6.18)	0.39 (1.30)	-1.14 (0.56)**	-0.11 (0.33)	0.30 (0.27)
<i>Year99</i>	-0.56 (0.23)**	4.06 (2.02)**	3.36 (1.65)**	-1.74 (0.60)***	-0.45 (0.26)*	-0.71 (0.41)*
<i>Year00</i>	-0.57 (0.21)***	0.56 (2.08)	-1.00 (2.57)	-3.21 (0.63)***	-0.56 (0.27)**	-0.29 (0.29)
<i>Year01</i>	-0.58 (0.23)**	2.32 (4.73)	1.63 (4.45)	-2.43 (0.54)***	-0.72 (0.34)**	-0.42 (0.31)
<i>Interactions</i>	no	no	no	no	no	no
<i>Constant</i>	3.15 (0.19)***	16.77 (1.55)***	14.85 (1.23)***	6.60 (0.52)***	0.92 (0.16)***	1.66 (0.22)***
R-squared	0.18	0.01	0.01	0.15	0.04	0.14
No of Obs.	897	883	882	883	895	897

1/ The significance levels of 1 percent, 5 percent and 10 percent are denoted by (\*), (\*\*) and (\*\*\*), respectively.

2/ The reference categories in the regression are Year97 and Old\_private.



Table 2c. Panel Regressions with Time and Category Dummies and Their Interactions<sup>1,2</sup>

	<i>Spread1</i>	<i>Spread2</i>	<i>Spread3</i>	<i>Spread4</i>	<i>Profit1</i>	<i>Profit2</i>
	OLS	OLS	OLS	OLS	OLS	OLS
<i>State</i>	0.23 (0.41)	-1.33 (2.68)	-2.22 (2.43)	-1.32 (1.26)	-0.25 (0.19)	0.22 (0.28)
<i>Nationalized</i>	-0.50 (0.43)	0.47 (2.78)	0.65 (2.53)	-1.56 (1.25)	-0.61 (0.26)**	-0.85 (0.36)**
<i>New_Private</i>	-0.54 (0.43)	-5.18 (3.23)	-5.11 (2.89)*	-0.15 (1.48)	0.60 (0.28)**	0.71 (0.42)*
<i>Foreign</i>	0.59 (0.50)	-6.21 (3.35)*	-7.86 (2.84)***	-1.15 (1.39)	0.04 (0.37)	0.98 (0.57)*
<i>Year92</i>	0.34 (0.42)	-2.33 (2.78)	-2.13 (2.51)	-1.12 (1.28)	-0.45 (0.18)**	-0.42 (0.35)
<i>Year93</i>	-0.54 (0.42)	-2.87 (2.82)	-2.74 (2.55)	-1.76 (1.27)	-0.88 (0.30)***	-1.02 (0.35)***
<i>Year94</i>	-0.43 (0.42)	-2.38 (2.84)	-2.20 (2.58)	-1.79 (1.27)	-0.76 (0.28)***	-0.56 (0.34)
<i>Year95</i>	-0.31 (0.42)	-3.67 (2.82)	-3.36 (2.57)	-2.32 (1.26)*	-0.20 (0.23)	-0.25 (0.34)
<i>Year96</i>	0.38 (0.60)	-0.4 (3.97)	-0.38 (3.64)	0.06 (2.10)	-0.26 (0.29)	0.12 (0.38)
<i>Year98</i>	-0.77 (0.41)*	-1.99 (3.02)	-1.64 (2.79)	-2.32 (1.26)*	-0.18 (0.24)	-0.17 (0.32)
<i>Year99</i>	-1.20 (0.41)***	-1.96 (3.02)	-1.60 (2.79)	-3.51 (1.29)***	-0.52 (0.24)**	-0.83 (0.32)***
<i>Year00</i>	-1.04 (0.41)**	-2.64 (3.04)	-2.22 (2.82)	-3.89 (1.27)***	-0.20 (0.19)	-0.24 (0.32)
<i>Year01</i>	-1.00 (0.42)**	-2.74 (3.10)	-2.19 (2.90)	-4.11 (1.25)***	-0.81 (0.40)**	-0.47 (0.32)
<i>Interactions</i>	yes	yes	yes	yes	yes	yes
<i>Constant</i>	3.45 (0.39)***	19.42 (2.67)***	17.59 (2.42)***	7.78 (1.23)***	0.97 (0.15)***	2.00 (0.27)***
R-squared	0.24	0.10	0.03	0.23	0.10	0.19
No of Obs.	897	883	882	883	895	897

1/ The significance levels of 1 percent, 5 percent and 10 percent are denoted by (\*), (\*\*) and (\*\*\*), respectively.

2/ The reference categories in the regression are Year97 and Old\_private.

*Spread3*, however, has not shown a significant decline. Moreover, the level of *Spread3* is much higher than those of the net interest margin (*Spread1*) and *Spread4* (see Figure 3). As in the case of *Spread4*, this spread focuses on the loans and the deposits on the balance sheet side, while using the total interest earned and interest expended of the banks. The rationale behind the definition of *Spread3* is to attempt to capture the bank spread that measures the marginal cost of intermediation. *Spread3* has not decreased significantly in recent years, as indicated by the lack of statistical significance of the relevant year dummies in Table 2a–c. Compared to the net interest margin and *Spread4*, the difference in the evolution of *Spread3* can be explained mainly by the increasing share of bank investments in government securities as a proportion of total assets, occurring at the expense of total loans.

- *The results for Spread2 are almost identical to those for Spread3.* The difference in levels between the two bank spreads is due to the incorporation of income from commissions, fees, and brokerage in *Spread2*. Otherwise, the evolution of *Spread2* over time is fairly similar to the time pattern exhibited by *Spread3*.
- *Bank profitability indicators after provisioning (Profit1) and before provisioning (Profit2) have generally decreased in recent years.* This conclusion is stronger for bank profitability after provisioning, as indicated by the negative and statistically significant coefficients of the year dummies *Year99*, *Year00*, and *Year01* in Table 2a-c.
- *Finally, the bank spreads and profitability indicators of the five bank categories have converged in recent years.* For example, the median values of *Spread1* for all banks are fairly similar in fiscal year 2000/01.<sup>13</sup>

### C. Determinants of Bank Spreads and Profitability<sup>14</sup>

Operating costs, priority sector lending, non-performing loans, investment in government securities, and the composition of deposits are among the determinants of bank spreads and profitability in the Indian banking sector. The cost ratio, defined as the ratio of operating costs to total assets, is a key explanatory variable for bank spreads in India. Banks with higher administrative costs have significantly higher spreads and lower profitability. High levels of priority sector lending<sup>15</sup> are generally associated with significantly higher

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<sup>13</sup> Before 1995/96, the foreign bank spreads were higher than those of all other types of banks, regardless of the definition used. During this period, the relative ranking of the remaining three categories of banks is not the same across years and variable definitions. Following their entry, the new private banks had lower spreads than the rest of the banking institutions, although this finding is not robust.

<sup>14</sup> The model specification and estimation are described in Annex II.

<sup>15</sup> Defined as the ratio of priority sector lending to total advances.

bank spreads. Banks with higher levels of non-performing loans have significantly lower profitability. In some specifications, a larger share of investment in government securities (as a proportion of total assets) is linked to higher spreads (see Table 3a). Finally, banks with a higher share of current deposits (as a proportion of total deposits) have significantly lower bank spreads and higher profitability.<sup>16</sup>

A surprising empirical finding is that the number of branches does not have a significant effect on the profitability of Indian banks, but is positively and significantly related to the net interest margin (*Spread1*). This robustness of this result is demonstrated by the insignificant coefficient of the variable *Branch* in all four specifications of the model. This coefficient does not become significant even after dropping the market share and operating costs variable from the model specifications in order to avoid possible multicollinearity. However, the number of branches is found to have a positive and significant impact on the net interest margin (*Spread1*). In other words, banks with a more extensive branch network tend to have higher net interest margins (see Table 3b). One possible explanation for these results could be that banks with large branch networks maintain their profits by charging higher net interest margins in some geographic areas, where there are few other bank branches, i.e., less competition.

#### **D. Ownership**

New private banks have significantly lower bank spreads and higher profitability than old private banks. For example, the coefficient of the dummy variable *New\_private* is negative and significant in Table 3b. In addition, new private banks have higher profitability than old private banks, both before and after provisioning. However, these results are not robust.

Foreign banks have generally higher bank spreads and higher profitability before provisioning than old private banks. This result is supported by the significant coefficients of *Foreign* in Table 2b and Table 3a–d. Although many foreign banks have high operating expenses,<sup>17</sup> these banks have preserved their higher profitability by maintaining relatively high spreads. This phenomenon could be partly explained if one presumes that foreign banks

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<sup>16</sup> Other bank-level variables with a significant effect on profitability and interest margins are bank size (market share) and reserve ratios.

<sup>17</sup> The median cost ratio for foreign banks in 2000/01 was close to 3 percent, i.e., similar to that of nationalized banks.

Table 3a. Determinants of Bank Intermediation Cost and Profitability: Specification 1 (*Herf*)<sup>1,2</sup>

	<i>Spread1</i>		<i>Spread2</i>		<i>Spread3</i>		<i>Spread4</i>		<i>Profit1</i>		<i>Profit2</i>	
	OLS	FE	OLS	FE	OLS	FE	OLS	FE	OLS	FE	OLS	FE
<i>Oexp</i>	0.10 (0.09)	0.10 (0.04)***	1.21 (0.92)	0.58 (0.39)	0.88 (0.68)	0.47 (0.34)	0.16 (0.23)	0.26 (0.10)***	-0.32 (0.16)**	-0.20 (0.06)***	-0.69 (0.16)***	-0.79 (0.04)***
<i>Resv</i>	0.05 (0.02)***	0.05 (0.01)***	0.19 (0.33)	-0.07 (0.14)	0.17 (0.28)	-0.13 (0.12)	0.03 (0.04)	-0.02 (0.04)	0.11 (0.02)***	0.11 (0.02)***	0.10 (0.02)***	0.09 (0.01)***
<i>Priority</i>	0.01 (0.01)	0.02 (0.00)***	0.00 (0.05)	0.09 (0.05)*	0.01 (0.04)	0.08 (0.04)*	0.02 (0.02)	0.08 (0.01)***	0.00 (0.00)	0.01 (0.01)*	0.00 (0.01)	0.03 (0.01)***
<i>Cdeposit</i>	0.02 (0.01)	0.00 (0.01)	0.48 (0.30)	-0.29 (0.10)***	0.16 (0.15)	-0.30 (0.09)***	0.05 (0.02)***	-0.05 (0.03)*	0.03 (0.01)***	0.00 (0.02)	0.05 (0.01)***	-0.01 (0.01)
<i>Igovsec</i>	-0.02 (0.02)	0.02 (0.01)*	0.75 (0.30)**	0.63 (0.13)***	0.70 (0.25)***	0.69 (0.11)***	0.05 (0.02)**	0.02 (0.03)	0.01 (0.01)	0.02 (0.02)	0.01 (0.02)	0.01 (0.01)
<i>Branch</i>	0.06 (0.02)**	0.14 (0.10)	-0.02 (0.15)	-0.97 (1.11)	-0.03 (0.12)	-0.65 (0.99)	0.02 (0.04)	0.39 (0.28)	0.03 (0.03)	0.07 (0.17)	0.03 (0.03)	0.04 (0.12)
<i>Mshare</i>	-0.23 (0.08)***	-0.34 (0.17)**	0.03 (0.58)	-0.29 (1.88)	0.15 (0.46)	-0.08 (1.67)	-0.09 (0.14)	-0.31 (0.48)	-0.11 (0.11)	-0.43 (0.29)	-0.14 (0.10)	-0.52 (0.20)**
<i>State</i>	0.40 (0.20)**	-	-5.85 (2.46)**	-	-5.36 (2.02)***	-	-1.64 (0.63)**	-	-0.17 (0.15)	-	0.30 (0.20)	-
<i>Nationalized</i>	-0.52 (0.28)	-	-2.68 (1.94)	-	-2.33 (1.72)	-	-1.47 (0.67)**	-	-0.84 (0.31)***	-	-0.69 (0.31)**	-
<i>Old_private</i>	-	-	-	-	-	-	-	-	-	-	-	-
<i>New_private</i>	-0.11 (0.27)	-	-2.16 (2.10)	-	-1.13 (1.56)	-	0.29 (0.53)	-	0.54 (0.24)**	-	0.20 (0.26)	-
<i>Foreign</i>	0.99 (0.24)***	-	-0.08 (2.08)	-	-0.18 (1.87)	-	1.60 (0.53)***	-	-0.50 (0.33)	-	1.20 (0.25)***	-
<i>Herf</i>	0.26 (0.11)**	0.42 (0.08)***	0.39 (0.98)	0.25 (0.89)	0.75 (0.76)	0.65 (0.79)	0.77 (0.32)**	0.75 (0.23)***	-0.07 (0.14)	0.00 (0.14)	0.14 (0.11)	0.27 (0.10)***
<i>dGdp</i>	-0.01 (0.04)	0.02 (0.04)	-0.04 (0.34)	-0.04 (0.40)	-0.09 (0.30)	-0.06 (0.36)	-0.16 (0.11)	-0.22 (0.10)**	-0.11 (0.05)**	-0.09 (0.06)	-0.06 (0.04)	-0.03 (0.04)
<i>Inflation</i>	0.06 (0.03)*	0.06 (0.03)*	-0.39 (0.35)	-0.03 (0.36)	-0.32 (0.33)	-0.03 (0.32)	0.27 (0.11)**	0.31 (0.09)***	0.07 (0.04)*	0.07 (0.05)	0.07 (0.03)**	0.08 (0.04)**
<i>Constant</i>	0.14 (1.31)	-2.35 (1.15)**	-8.41 (9.03)	9.63 (12.54)	-7.49 (6.79)	1.80 (11.13)	-4.64 (3.22)	-5.58 (3.20)*	1.11 (1.30)	-0.26 (1.91)	0.93 (1.24)	0.95 (1.35)
R-squared	840	840	840	840	840	840	840	840	840	840	840	840
No of Obs.	0.27	-	0.18	-	0.11	-	0.18	-	0.18	-	0.52	-

1/ The significance levels of 1 percent, 5 percent and 10 percent are denoted by (\*), (\*\*), and (\*\*\*), respectively.

2/ The reference categories in the regression are Year97 and Old\_private.

Table 3b. Determinants of Bank Intermediation Cost and Profitability: Specification 2 ( *Fnum* and *Dnum*<sup>1,2</sup> )

	<i>Spread1</i>		<i>Spread2</i>		<i>Spread3</i>		<i>Spread4</i>		<i>Profit1</i>		<i>Profit2</i>	
	OLS	FE	OLS	FE	OLS	FE	OLS	FE	OLS	FE	OLS	FE
<i>Oexp</i>	0.11 (0.09)	0.10 (0.03)***	1.21 (0.93)	0.58 (0.39)	0.89 (0.68)	0.46 (0.34)	0.16 (0.23)	0.25 (0.10)**	-0.32 (0.16)**	-0.20 (0.06)***	-0.69 (0.16)***	-0.79 (0.04)***
<i>Resv</i>	0.05 (0.02)***	0.05 (0.01)***	0.19 (0.33)	-0.08 (0.14)	0.17 (0.28)	-0.14 (0.12)	0.03 (0.04)	-0.03 (0.04)	0.11 (0.02)***	0.11 (0.02)***	0.10 (0.02)***	0.09 (0.01)***
<i>Priority</i>	0.01 (0.01)	0.02 (0.00)***	0.00 (0.05)	0.09 (0.05)*	0.01 (0.04)	0.08 (0.04)*	0.02 (0.02)	0.07 (0.01)***	0.00 (0.00)	0.01 (0.01)*	0.00 (0.01)	0.02 (0.01)***
<i>Cdeposit</i>	0.02 (0.01)	0.00 (0.01)	0.48 (0.30)	-0.28 (0.10)***	0.16 (0.15)	-0.30 (0.09)***	0.05 (0.02)***	-0.05 (0.03)*	0.03 (0.01)***	-0.01 (0.02)	0.05 (0.01)***	-0.02 (0.01)
<i>Igovsec</i>	-0.02 (0.02)	0.03 (0.01)**	0.74 (0.30)**	0.62 (0.13)***	0.69 (0.25)***	0.68 (0.11)***	0.05 (0.02)*	0.01 (0.03)	0.01 (0.01)	0.04 (0.02)**	0.01 (0.02)	0.02 (0.01)
<i>Branch</i>	0.06 (0.02)***	0.19 (0.10)*	-0.02 (0.15)	-1.04 (1.11)	-0.03 (0.12)	-0.72 (0.99)	0.02 (0.04)	0.32 (0.28)	0.03 (0.03)	0.13 (0.17)	0.03 (0.03)	0.08 (0.12)
<i>Mshare</i>	-0.24 (0.08)***	-0.34 (0.17)**	0.02 (0.59)	-0.3 (1.88)	0.14 (0.47)	-0.08 (1.67)	-0.08 (0.14)	-0.31 (0.48)	-0.12 (0.11)	-0.39 (0.28)	-0.15 (0.10)	-0.51 (0.20)**
<i>State</i>	0.39 (0.20)*	-	-5.82 (2.47)**	-	-5.33 (2.03)**	-	-1.62 (0.63)**	-	-0.20 (0.15)	-	0.29 (0.20)	-
<i>Nationalized</i>	-0.54 (0.28)*	-	-2.67 (1.94)	-	-2.31 (1.72)	-	-1.44 (0.66)**	-	-0.88 (0.32)***	-	-0.71 (0.31)**	-
<i>New_private</i>	-0.04 (0.27)	-	-2.10 (2.07)	-	-1.09 (1.56)	-	0.26 (0.53)	-	0.58 (0.25)**	-	0.25 (0.27)	-
<i>Foreign</i>	1.02 (0.24)***	-	-0.11 (2.08)	-	-0.20 (1.87)	-	1.59 (0.53)***	-	-0.45 (0.32)	-	1.23 (0.25)***	-
<i>Fnum</i>	-0.08 (0.02)***	-0.11 (0.01)***	0.01 (0.12)	0.01 (0.16)	-0.06 (0.08)	-0.07 (0.14)	-0.10 (0.04)**	-0.09 (0.04)**	-0.07 (0.02)***	-0.09 (0.02)***	-0.06 (0.02)***	-0.09 (0.02)***
<i>Dnum</i>	0.03 (0.02)	0.03 (0.02)	-0.16 (0.16)	-0.04 (0.22)	-0.14 (0.15)	-0.01 (0.19)	-0.01 (0.06)	0.00 (0.06)	0.13 (0.03)***	0.13 (0.03)***	0.04 (0.02)*	0.05 (0.02)**
<i>dGdp</i>	-0.06 (0.04)	-0.07 (0.04)**	0.06 (0.39)	-0.07 (0.40)	-0.10 (0.31)	-0.19 (0.36)	-0.31 (0.10)***	-0.39 (0.10)***	-0.20 (0.05)***	-0.20 (0.06)***	-0.11 (0.05)**	-0.12 (0.04)***
<i>Inflation</i>	0.00 (0.03)	0.01 (0.03)	-0.38 (0.36)	0.02 (0.37)	-0.31 (0.32)	0.00 (0.33)	0.29 (0.11)**	0.34 (0.09)***	0.01 (0.05)	0.01 (0.06)	0.03 (0.04)	0.04 (0.04)
<i>Constant</i>	5.42 (0.80)***	5.18 (0.85)***	-5.01 (9.48)	12.01 (9.50)	1.49 (6.98)	10.69 (8.43)	5.91 (2.24)***	5.10 (2.43)**	3.20 (0.75)***	2.51 (1.43)*	4.52 (0.91)***	6.36 (1.01)***
R-squared	840	840	840	840	840	840	840	840	840	840	840	840
No of Obs.	0.28	-	0.18	-	0.11	-	0.17	-	0.20	-	0.53	-

1/ The significance levels of 1 percent, 5 percent and 10 percent are denoted by (\*), (\*\*) and (\*\*\*), respectively.

2/ The reference categories in the regression are Year97 and Old\_private.

Table 3c. Determinants of Bank Intermediation Cost and Profitability: Specification 3 ( *Fmarket* and *Dmarket* )<sup>1,2</sup>

	<i>Spread1</i>		<i>Spread2</i>		<i>Spread3</i>		<i>Spread4</i>		<i>Profit1</i>		<i>Profit2</i>	
	OLS	FE	OLS	FE	OLS	FE	OLS	FE	OLS	FE	OLS	FE
<i>Oexp</i>	0.10 (0.09)	0.10 (0.03)***	1.20 (0.93)	0.58 (0.39)	0.88 (0.69)	0.46 (0.34)	0.16 (0.23)	0.26 (0.10)***	-0.32 (0.16)**	-0.19 (0.06)***	-0.69 (0.16)***	-0.79 (0.04)***
<i>Resv</i>	0.05 (0.02)***	0.05 (0.01)***	0.19 (0.33)	-0.08 (0.14)	0.17 (0.28)	-0.14 (0.12)	0.03 (0.04)	-0.03 (0.03)	0.12 (0.02)***	0.11 (0.02)***	0.10 (0.02)***	0.09 (0.01)***
<i>Priority</i>	0.01 (0.01)	0.02 (0.00)***	0.00 (0.05)	0.09 (0.05)*	0.01 (0.04)	0.08 (0.04)*	0.02 (0.02)	0.07 (0.01)***	0.00 (0.00)	0.01 (0.01)*	0.00 (0.01)	0.02 (0.01)***
<i>Cdeposit</i>	0.02 (0.01)	0.00 (0.01)	0.48 (0.30)	-0.28 (0.10)***	0.16 (0.15)	-0.30 (0.09)***	0.05 (0.02)***	-0.05 (0.03)*	0.03 (0.01)***	0.00 (0.02)	0.05 (0.01)***	-0.02 (0.01)
<i>Igovsec</i>	-0.02 (0.02)	0.03 (0.01)**	0.75 (0.30)**	0.63 (0.13)***	0.69 (0.24)***	0.68 (0.11)***	0.05 (0.03)**	0.03 (0.03)	0.01 (0.01)	0.03 (0.02)*	0.01 (0.02)	0.02 (0.01)
<i>Branch</i>	0.06 (0.02)***	0.19 (0.10)*	-0.03 (0.14)	-1.05 (1.12)	-0.03 (0.12)	-0.68 (0.99)	0.02 (0.04)	0.42 (0.28)	0.03 (0.03)	0.16 (0.17)	0.03 (0.03)	0.09 (0.12)
<i>Mshare</i>	-0.24 (0.08)***	-0.33 (0.17)*	0.05 (0.57)	-0.27 (1.88)	0.16 (0.46)	-0.07 (1.67)	-0.08 (0.13)	-0.24 (0.48)	-0.13 (0.11)	-0.41 (0.29)	-0.14 (0.10)	-0.5 (0.20)**
<i>State</i>	0.40 (0.20)*	-	-5.83 (2.46)**	-	-5.34 (2.02)***	-	-1.64 (0.63)**	-	-0.18 (0.15)	-	0.30 (0.20)	-
<i>Nationalized</i>	-0.53 (0.28)*	-	-2.63 (1.92)	-	-2.30 (1.71)	-	-1.46 (0.66)**	-	-0.88 (0.32)***	-	-0.70 (0.31)**	-
<i>New_private</i>	-0.08 (0.27)	-	-2.26 (2.18)	-	-1.14 (1.57)	-	0.20 (0.51)	-	0.60 (0.24)**	-	0.22 (0.26)	-
<i>Foreign</i>	1.01 (0.24)***	-	-0.11 (2.07)	-	-0.19 (1.85)	-	1.63 (0.53)***	-	-0.47 (0.32)	-	1.22 (0.25)***	-
<i>Fmarket</i>	-0.03 (0.09)	-0.09 (0.09)	-0.08 (0.93)	0.13 (0.96)	-0.54 (0.68)	-0.26 (0.86)	0.43 (0.25)*	0.38 (0.24)	0.15 (0.15)	0.10 (0.15)	0.07 (0.10)	-0.01 (0.10)
<i>Dmarket</i>	-0.17 (0.05)***	-0.25 (0.04)***	-0.06 (0.42)	-0.06 (0.45)	-0.14 (0.39)	-0.19 (0.40)	-0.55 (0.13)***	-0.54 (0.11)***	-0.11 (0.05)**	-0.16 (0.07)**	-0.14 (0.05)***	-0.20 (0.05)***
<i>dGdp</i>	-0.02 (0.03)	-0.01 (0.03)	-0.14 (0.35)	-0.10 (0.35)	-0.26 (0.31)	-0.18 (0.31)	-0.19 (0.10)*	-0.25 (0.09)***	-0.04 (0.04)	-0.03 (0.05)	-0.05 (0.04)	-0.04 (0.04)
<i>Inflation</i>	-0.01 (0.03)	-0.03 (0.04)	-0.33 (0.32)	-0.01 (0.43)	-0.25 (0.30)	-0.02 (0.38)	0.05 (0.12)	0.10 (0.11)	-0.03 (0.04)	-0.04 (0.07)	0.00 (0.03)	0.00 (0.05)
<i>Constant</i>	3.38 (0.97)***	2.65 (0.91)***	-4.39 (12.25)	11.55 (10.09)	3.33 (8.98)	10.34 (8.96)	1.37 (3.13)	0.18 (2.55)	0.10 (1.18)	-0.86 (1.53)	2.37 (1.14)**	3.93 (1.08)***
R-squared	840	840	840	840	840	840	840	840	840	840	840	840
No of Obs.	0.28	-	0.18	-	0.11	-	0.19	-	0.19	-	0.53	-

1/ The significance levels of 1 percent, 5 percent and 10 percent are denoted by (\*), (\*\*) and (\*\*\*), respectively.

2/ The reference categories in the regression are Year97 and Old\_private.

Table 3d. Determinants of Bank Intermediation Cost and Profitability: Specification 4 (*Npl*)<sup>1,2</sup>

	<i>Spread1</i>		<i>Spread2</i>		<i>Spread3</i>		<i>Spread4</i>		<i>Profit1</i>		<i>Profit2</i>	
	OLS	FE	OLS	FE	OLS	FE	OLS	FE	OLS	FE	OLS	FE
<i>Gexp</i>	0.15 (0.08)*	0.06 (0.03)**	1.22 (0.92)	0.06 (0.46)	0.85 (0.65)	-0.14 (0.45)	0.17 (0.15)	0.24 (0.10)**	-0.17 (0.13)	-0.01 (0.06)	-0.65 (0.16)***	-0.86 (0.04)***
<i>Resv</i>	0.03 (0.02)*	0.04 (0.01)***	0.40 (0.35)	0.05 (0.17)	0.30 (0.33)	0.02 (0.16)	-0.01 (0.05)	0.05 (0.04)	0.08 (0.02)***	0.13 (0.02)***	0.08 (0.02)***	0.10 (0.01)***
<i>Priority</i>	0.01 (0.01)	0.02 (0.00)***	0.02 (0.06)	0.13 (0.08)*	0.05 (0.05)	0.11 (0.07)	0.03 (0.03)	0.11 (0.02)***	0.01 (0.00)***	0.02 (0.01)**	0.01 (0.01)	0.04 (0.01)***
<i>Npl</i>	-0.04 (0.01)***	-0.03 (0.01)***	-0.13 (0.11)	-0.09 (0.11)	-0.12 (0.10)	-0.11 (0.10)	-0.05 (0.02)**	-0.05 (0.02)**	-0.12 (0.03)***	-0.16 (0.01)***	-0.06 (0.01)***	-0.04 (0.01)***
<i>Cdeposit</i>	0.01 (0.02)	-0.01 (0.01)	0.34 (0.25)	-0.33 (0.13)**	0.08 (0.16)	-0.34 (0.13)***	0.05 (0.02)***	-0.12 (0.03)***	0.02 (0.01)**	0.01 (0.02)	0.05 (0.01)***	-0.03 (0.01)**
<i>Igovsec</i>	-0.04 (0.02)**	0.00 (0.01)	0.79 (0.42)*	0.45 (0.22)**	0.73 (0.35)**	0.54 (0.22)**	0.03 (0.03)	0.04 (0.05)	0.00 (0.01)	0.01 (0.03)	0.00 (0.03)	0.01 (0.02)
<i>Branch</i>	0.07 (0.02)***	-0.09 (0.21)	0.22 (0.27)	-6.26 (3.178)*	0.17 (0.24)	-5.61 (3.11)*	0.09 (0.053)*	-0.80 (0.72)	0.05 (0.02)***	-0.57 (0.42)	0.06 (0.02)**	-0.13 (0.26)
<i>Mshare</i>	-0.28 (0.07)***	-0.71 (0.36)**	-0.87 (1.05)	1.45 (5.45)	-0.59 (0.92)	1.31 (5.33)	-0.35 (0.19)*	-0.55 (1.24)	-0.21 (0.07)***	0.3 (0.72)	-0.26 (0.09)***	-1.27 (0.44)***
<i>State</i>	0.83 (0.23)***	-	-7.03 (3.37)**	-	-6.37 (2.97)**	-	-1.18 (0.58)**	-	0.20 (0.18)	-	0.45 (0.27)	-
<i>Nationalized</i>	0.05 (0.25)	-	-4.10 (3.17)	-	-3.42 (2.85)	-	-1.24 (0.74)*	-	-0.08 (0.17)	-	-0.42 (0.29)	-
<i>New_private</i>	-0.25 (0.25)	-	-2.37 (2.23)	-	-1.20 (1.91)	-	-0.03 (0.52)	-	-0.33 (0.24)	-	-0.15 (0.26)	-
<i>Foreign</i>	0.80 (0.25)***	-	-1.29 (3.72)	-	-0.93 (3.35)	-	0.97 (0.57)*	-	-0.75 (0.26)***	-	1.01 (0.28)***	-
<i>Herf</i>	-0.03 (0.28)	0.25 (0.29)	1.19 (4.30)	-4.67 (4.47)	1.32 (3.80)	-3.76 (4.37)	1.73 (1.12)	1.81 (1.02)*	0.34 (0.70)	-0.08 (0.59)	0.30 (0.28)	0.47 (0.36)
<i>dGdp</i>	0.07 (0.05)	0.09 (0.04)**	-0.84 (0.52)	-0.71 (0.60)	-0.77 (0.49)	-0.70 (0.59)	-0.01 (0.13)	-0.01 (0.14)	-0.09 (0.06)	-0.04 (0.08)	0.03 (0.07)	0.05 (0.05)
<i>Inflation</i>	0.10 (0.03)***	0.10 (0.04)**	-1.08 (0.45)**	-0.20 (0.59)	-0.80 (0.43)*	-0.16 (0.58)	0.27 (0.20)	0.36 (0.13)***	0.03 (0.06)	0.05 (0.08)	0.07 (0.04)*	0.12 (0.05)**
<i>Constant</i>	2.13 (2.23)	0.83 (2.54)	-3.56 (30.19)	79.82 (38.81)**	-3.81 (24.61)	67.60 (37.94)*	-11.20 (7.44)	-7.64 (8.84)	-0.34 (4.63)	3.92 (5.11)	0.02 (1.97)	1.05 (3.15)
<i>R-squared</i>	468	468	468	468	468	468	468	468	468	468	468	468
<i>No of Obs.</i>	0.37	-	0.18	-	0.12	-	0.18	-	0.46	-	0.65	-

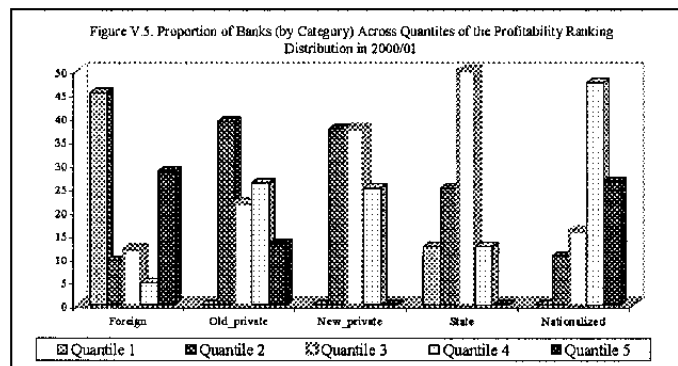
1/ The significance levels of 1 percent, 5 percent and 10 percent are denoted by (\*), (\*\*) and (\*\*\*), respectively.

2/ The reference categories in the regression are Year97 and Old\_private.

offer their customers different type of services than domestic banks. Consistent with this explanation is the fact that foreign banks continue to have higher levels of income from other sources (commissions, brokerage fees, exchange transactions, etc.) than domestic banks, although the median ratio of “other income” of these banks has declined in recent years.

Nationalized banks have lower profitability than private and foreign banks. As demonstrated in last two columns of Tables 2b and 2c and Table 3a–d, the coefficient of the dummy variable *Nationalized* is consistently negative and significant across model specifications, particularly in the equations for profitability after provisioning (*Profit1*). The result can be largely attributed to their high level of operating costs, mainly because of large wage bill expenses. The median

employment costs of nationalized banks have persistently exceeded those of other bank categories. A different (non-regression) examination of the data also reveals that nationalized banks perform worse than other types of banks. A ranking of banks by profitability before provisioning (*Profit2*) in 2000/01 indicates that



most nationalized banks are at the lower end of the profitability distribution. More specifically, 75 percent of all nationalized banks have profitability before provisioning in the lowest two quantiles of the distribution (see Figure 5).

State banks do not exhibit lower profitability than old private banks. The coefficient of the variable *State* is insignificant in most of the profitability regressions. Complementary evidence on the relative profitability of state banks is presented in Figure 5, which indicates that most of the state banks are in the top or middle quantiles of the profitability distribution (before provisioning) in 2000/01.

### E. Entry Deregulation

The entry of new foreign and domestic banks and the concurrent decrease in industry concentration are associated with a significant decline in bank spreads and profitability. The explanatory variables used to capture this effect are the Herfindahl index (*Herf*), the market shares of domestic and foreign banks (*Dmarket* and *Fmarket*), and the number shares of domestic and foreign banks (*Dnum* and *Fnum*). The positive and significant coefficient of the variable *Herf* in some model specifications (see Table 3a) suggests that lower industry concentration is linked to lower spreads and profitability. The negative and significant coefficient of the variable *Fnum* in Table 3b indicates that the entry of these banks could explain part of the decrease in bank spreads. In contrast, the effect of *Dnum* on bank spreads is insignificant. However, the increase in the market share of the new private banks (*Dmarket*) is related to a significant fall in the overall level of bank spreads and profitability (see Table 3c). An important caveat of these findings is that the contribution of foreign and



domestic entry may be overstated, given that the effect of other reforms is not explicitly controlled for in the regression.<sup>18</sup>

## VI. CONCLUSIONS

The main conclusions of this paper can be summarized as follows:

- Industry concentration, bank spreads, and profitability in the banking sector have broadly declined during the period of financial liberalization.
- The ownership type is found to affect some of the performance indicators of the banks in the sample.
- The main determinants of bank intermediation costs and profitability in India are operating costs, priority sector lending, nonperforming loans, investment in government securities, and the composition of deposits.
- The empirical results also suggest that the increase in competition has lowered the spreads and profitability of Indian banks.

In this environment of increased competition, the successful performance of Indian commercial banks in the future would largely depend on their ability to improve efficiency and react to market forces. In this context, the transfer of effective control to private shareholders in the case of lagging nationalized banks could help ensure that the necessary incentive structure is introduced in the system swiftly and decisively.

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<sup>18</sup> For example, the more frequent repricing of existing loans relative to (fixed) deposits—in an environment of falling interest rates—has also been cited as a factor behind the decline in net interest spreads (Chaudhuri, 2002).

## REFERENCES

- Barth, J., G. Caprio, and R. Levine, 2001, "Banking Systems Around the Globe: Do Regulation and Ownership Affect Performance and Stability?" in *Financial Supervision and Regulation: What Works and What Doesn't*, by F. Mishkin, (Chicago: University of Chicago Press).
- Barajas, A., R. Steiner, and N. Salazar, 2000, "The Impact of Liberalization and Foreign Investment on Columbia's Financial Sector," *Journal of Development Economics*, Vol. 63, No. 1, pp. 157–96.
- Berg, S., F. Forsund, and E. Jansen, 1992, "Malmquist Indices of Productivity Growth During the Deregulation of Norwegian Banking, 1980–89," *Scandinavian Journal of Economics*, Vol. 94, No. 10, pp. 211–28.
- Brock, P., and L. Suarez, 2000, "Understanding the Behavior of Bank Spreads in Latin America," *Journal of Development Economics*, Vol. 63, No. 1, pp. 113–34.
- Chaudhuri, S., 2002, "Some Issues in Growth and Profitability in Indian Public Sector Banks," *Economic and Political Weekly*, Vol. 37, No. 6, pp. 5-22.
- Claessens, S., A. Demirguic-Kunt, and H. Huizinga, 2001, "How Does Foreign Entry Affect the Domestic Banking Sector?" *Journal of Banking and Finance*, Vol. 25, pp. 891-991.
- Demirguic-Kunt, A., and H. Huizinga, 1998, "Determinants of Commercial Bank Interest Margins and Profitability: Some International Evidence," World Bank Policy Research Working Paper No. 1918 (Washington: World Bank).
- Mohan, R., 2002, "Deregulation and Performance of Public Sector Banks," *Economic and Political Weekly*, Vol. 37, No. 2, pp. 393-97.
- Reserve Bank of India, 2001, *Report on Trend and Progress of Banking India in India 2001-01* (Mumbai).
- Sarkar, J., S. Sarkar, and S. Bhaumik, 1998, "Does Ownership Always Matter? Evidence from the Indian Banking Industry," *Journal of Comparative Economics*, Vol. 26, No. 2, pp. 262–81.
- Shirai, S., 2002, "Road from State to Market—Assessing the Gradual Approach of Banking Sector Reforms in India," ADB Research Institute Working Paper No. 32 (Tokyo: Asian Bank for Development).
- Zaim, O., 1995, "The Effect of Financial Liberalization on the Efficiency of Turkish Commercial Banks," *Applied Financial Economics*, Vol. 5, No. 2, pp. 257–64.

### Selected Financial Liberalization Reforms (1990/91-2000/01)

Areas of Reform	Initiatives	Dates	Chronology of Reforms	
Interest rate deregulation	Deregulation of rupee-denominated deposit rates	1992	First steps toward deposit rate liberalization, with the partial deregulation of rupee-denominated term deposit rates. The initial reform measure involved the substitution of the single interest rate for each term deposit category with a ceiling, below which banks were free to fix their rates.	
		1995-1996	The Reserve Bank of India (RBI) gradually eliminated the ceilings on both domestic and Non-Resident External (NRE) rupee deposits with maturities over one year.	
		1997	Banks were allowed to determine interest rates on their domestic term deposits of 30 days and above. The interest rates on NRE deposits with maturities over 6 months were deregulated.	
		1998	The minimum lock-in period for term deposits was reduced from 30 days to 15 days. In addition, banks were permitted to offer differential interest rates on domestic term deposits above Rs. 1.5 million and to determine their own penalties for early withdrawal of domestic and NRE deposits and loans against fixed deposits.	
		2000	The restrictions that prevented banks from charging differential rates on NRE deposits (depending on the deposit size) were relaxed.	
	Deregulation of foreign-currency denominated deposit rates	1993	The Foreign Currency (Non-Resident) Deposit Scheme from the pre-reform period was replaced by a new scheme. Initially, interest rates under the new scheme were stipulated by the RBI. In contrast to the old scheme, however, the exchange rate risk was now shifted from the RBI to the commercial banks.	
		1997	Banks were allowed to set interest rates on their Foreign Currency Non-Resident (Bank) [FCNR (B)] deposits, subject to a ceiling imposed by the RBI. Later during the same year, the ceiling rates for certain FCNR (B) deposits were linked to LIBOR, i.e. the floating rate deposits and the deposits with maturity over six months but less than one year. The interest rate for FCNR(B) deposits with maturity over one year was stipulated to be within the ceiling of swap rates for the corresponding currency/maturity configuration.	
		1998	As in the case of rupee-denominated deposits, banks were allowed to establish their own penalties for early	

Areas of Reform	Initiatives	Dates	Chronology of Reforms
	Deregulation of lending rates	2000	<p>withdrawal of FCNR(B) deposits.</p> <p>Differential rates on FCNR(B) deposits, depending on deposit size and subject to the overall ceiling rate, were introduced. During the same year, banks were given the option to choose their current swap rates, while offering FCNR(B) deposits.</p>
		1992-1994	The number of lending categories was reduced from six to three.
		1998	The lending structure was rationalized further, when another category was eliminated.
		1998	The interest rates on loans against term deposits were liberalized, starting with the April 1998 stipulation that the interest rate on loans against domestic and NRE term deposits not exceed the bank-specific PLR.
		1999	Banks were given the freedom to charge their own interest rates on advances against domestic/NRE deposits without reference to the PLR ceiling if certain deposit rate conditions were satisfied. Since October 1999, the interest rates on loans against domestic/NRE/FCNR(B) term deposits could be determined without any reference to PLR.
		2000	The restrictions on interest rates on advances up to Rs.200,000 against third party deposits were removed.
	Deregulation of Prime Lending Rate (PLR) restrictions	1994	The easing of lending rate restrictions began in October 1994, when banks were permitted to establish their own Prime Lending Rate (PLR) for advances over Rs.200, 000.
		1997	The rules were relaxed further in October 1997, and banks were allowed to charge separate Prime Term Lending Rates (PTLR) for term loans with at least 3-year maturity.
		1998	The bank-specific PLR became the ceiling for loans below Rs.200,000. At the same time, each bank had to announce its PLR, as well as the maximum spread charged over it.
		1999	The scheduled commercial banks were given the freedom to offer fixed rate term loans, as long as they adhered to the guidelines of Asset Liability Management (ALM) system. Since April 1999, different PLRs could be used for loans with different maturities. During the same year, banks were allowed to charge interest rates without reference to PLR for: i) loans covered by refinancing schemes of term lending



Areas of Reform	Initiatives	Dates	Chronology of Reforms
	Ownership	<p>2001</p> <p>1990–2001</p> <p>1993</p> <p>1994</p> <p>1994–2001</p>	<p>The guidelines for licensing new private sector banks were revised in January 2001. The minimum capital requirement was raised and the private bank ownership of large industrial houses was restricted.</p> <p>New foreign banks entered the market and existing foreign banks were allowed to open additional branches. In the period from 1990 to 2001, the number of foreign banks increased from 21 to 42. During the past ten years, foreign banks acquired 51 additional offices, bringing up the total number of their branches from 151 in 1992 to 202 in 2001.</p> <p>The State Bank of India (SBI) Act was amended, and the SBI became the first public bank to raise capital from the public in December 1993.</p> <p>Nationalized banks were allowed to raise up to 40 percent of their capital from the market in 1994.</p> <p>Eleven public sector banks accessed the market.</p>
Credit policies	<p>Credit controls</p> <p>Priority sector lending</p>	<p>1992–2001</p> <p>1992–2001</p>	<p>The focus of reform efforts has been on: i) giving banks more freedom to set the credit requirements for their borrowers; ii) relaxing the conditions for consortium lending; iii) withdrawing the regulations on Maximum Permissible Bank Finance (MPBF) and allowing banks to use their own methods in order to assess working capital requirements; iv) allowing banks to use their discretion in levying commitment charges; v) deciding on the level of inventory and receivable holdings of different industries.</p> <p>The definition of priority sector has been expanded to include: i) bank investments in designated bonds (NABARD, SIDBI, NHB, for example) and contributions to the Rural Infrastructure Development Fund; ii) irrigation, agricultural machinery, food and agro-based processing, and traditional plantation loans; iii) advances to the housing, retail trade, software, transport operator industries, subject to various loan-size restrictions; iv) venture capital; v) micro-credit to individuals, extended directly or through intermediaries; vi) credit to NDFCs for small road, water transport operator, and tiny sector lending.</p>

Areas of Reform	Initiatives	Dates	Chronology of Reforms
		1992-2001	<p>At the beginning of the reform period, the overall target for Indian banks was 40 percent of net bank credit, with sub-targets of 18 percent for agriculture and 10 percent for weaker sections. In early 1992, the priority sector lending requirements for foreign banks included an export credit target of 15 percent. During the same year, the foreign bank target was revised to 32 percent, with sub-targets for export credit (10 percent) and small scale industry credit (10 percent). In 1993, indirect loans in the amount of 4.5 percent of net bank credit were allowed as part of agricultural target of 18 percent. The export credit target was revised to 12 percent in 1996. Currently, the overall priority sector lending targets for domestic and foreign banks remain 40 percent (18 percent for agriculture and 10 percent for weaker sections) and 32 percent (12 percent for export credit and 10 percent for SSI), respectively.</p>

## Variable Definitions, Model Specification, and Estimation

### A. Variable Definitions

The four measures of intermediation costs and two profitability measures are presented in Equation (1) – Equation (6) below. Note that these variables are constructed using balance sheet data and the earnings and expenses information.

$$Spread1 \equiv \frac{(IntEarned - IntExpended)}{Assets} * 100 \quad (1)$$

$$Spread2 \equiv \left( \frac{(IntEarned + Commissions)}{Loans} - \frac{IntExpended}{Deposits} \right) * 100 \quad (2)$$

$$Spread3 \equiv \left( \frac{IntEarned}{Loans} - \frac{IntExpended}{Deposits} \right) * 100 \quad (3)$$

$$Spread4 \equiv \left( \frac{IntEarned \text{ on Loans Only}}{Loans} - \frac{IntExpended \text{ on Deposits Only}}{Deposits} \right) * 100 \quad (4)$$

$$Profit1 \equiv \frac{(IntEarned + OtherIncome - IntExpended - OperExpend - Prov)}{Assets} * 100 \quad (5)$$

$$Profit2 \equiv \frac{(IntEarned + OtherIncome - IntExpended - OperExpend)}{Assets} * 100 \quad (6)$$

Therefore, the bank spread and profitability variables are related as follows:

$$Profit2 = Spread1 + (OtherIncome - OperExpend)/Assets * 100 \quad (7)$$

$$Profit1 = Profit2 - Prov/Assets * 100 \quad (8)$$

$$Spread3 = Spread4 + (InvInc + IntEarned \text{ on RBIBalances} + Others)/Loans * 100 - (IntExpended \text{ on RBI Borrowings} + Others)/Deposits * 100 \quad (9)$$

$$Spread2 = Spread3 + Commissions/Loans * 100 \quad (10)$$

The bank spread—the difference between the charge to borrowers and the payment to depositors—is a standard measure of the cost of financial intermediation in the literature. However, the computation of the spread is complicated by several factors. First, lending and



deposit rates typically differ across different categories of customers and products. Second, banks may follow different rules in setting the interest rates on loans and deposits, depending on their specialization, degree of risk aversion, ownership, etc. Third, commissions and fees are often ignored in the calculation of bank spreads, although they could increase substantially the costs of borrowing and lending (Brock and Suarez, 2000). Fourth, most banks do not report the entire spectrum of their paid and charged interest rates.

The empirical analysis uses four measures of bank spreads. The net interest margin is computed in Equation (1) and denoted by *Spread1*. However, the net interest margin may not accurately represent the marginal costs and benefits of borrowing and lending, especially in cases where banks hold a significant amount of reserves and government bonds. The remaining three bank spread measures (*Spread2—Spread4*) have narrower definitions than the net interest margin (*Spread1*).

### B. Model Specification

The variations in bank spreads and profitability are analyzed using three model specifications. Each dependent variable is regressed on: i) time dummies only; ii) time dummies and bank category dummies; and iii) time dummies, category dummies, and their interactions.

The determinants of bank spreads and profitability are also examined in a regression framework. In particular, the measures of bank spreads and profitability are regressed on three types of explanatory variables (bank, industry and aggregate). The *bank-specific* regressors are: operating cost and reserve ratios, priority sector and nonperforming loan ratios, current deposits as a share of total deposits, investment in government securities as a share of total assets, market share, number of branches, and bank type. The *industry-level* regressors include the Herfindahl index and the number and market shares of different types of banks. The *aggregate* regressors are inflation and GDP growth. Four different model specifications are estimated, corresponding to the use of three measures of the change in industry concentration and the inclusion of the nonperforming loan ratio in the regression. This approach is prompted by the multicollinearity among the different measures of industry concentration and the fact that the sample size drops substantially when the nonperforming loan ratio is included in the regression.

### C. Estimation

Three different estimators—ordinary least squares (OLS), fixed effects (FE) and random effects (RE)—are used in the regressions. Note that the fixed effects estimator does not allow the identification of time-invariant coefficients, such as bank category. Although all combinations of specification/estimator/dependent variable were estimated for completeness, the discussion focuses on the most robust empirical findings. The estimates of the RE coefficients are not reported, as the random effects specification was rejected in favor of fixed effects in all but one equation.