The Global Financial Crisis and Indian Banks: Survival of the Fittest?

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Abstract

The Indian banking system was initially thought to be insulated from the global financial crisis owing to heavy public ownership and cautious management. It was thus a surprise when some banks experienced a deposit flight, as depositors shifted their money toward government-owned banks and specifically toward the State Bank of India, the largest public bank. While there was some tendency for depositors to favour healthier banks and the banks with more stable funding, the reallocation of deposits toward the State Bank of India in particular cannot be explained by these factors alone. Nor can it be explained by the impact of explicit capital injections by the government into some public-sector banks. Rather it appears that the implicit guarantee of the liabilities of the country's largest public bank dominated other considerations.

1. Introduction

The Indian banking system was initially believed to be insulated from the global financial crisis owing to heavy public ownership and conservative management. To the surprise of observers, however, Indian banks, private banks in particular, experienced a sharp increase in interbank borrowing rates and deposit flight starting in mid-2008. In the case of the largest private bank, ICICI, deposits dropped by a tenth between June and December, as depositors shifted their money to government owned and operated banks. Public banks, led by the State Bank of India (SBI), meanwhile posted significantly faster deposit growth than the system as a whole (Figures 1 and 2).[2]

We ask two sets of questions about this episode. First, which banks experienced the largest deposit withdrawals and why? Did the reallocation of deposits depend on the health of individual banks, as measured by publicly available indicators such as capital ratios, the quality of balance sheets, and lending growth prior to the crisis? Or was it a function of public versus private ownership pure and simple? Did deposits move to all public banks or only to select public financial institutions? Did public banks attract depositors because they enjoyed an explicit government guarantee, which was manifested by the public injection of bank capital where necessary, or because they enjoyed an implicit guarantee, reflecting the understanding that the government would not allow a public sector bank to fail?[3]

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[2] Apparently this shift to (perceived to be) safer public sector banks is not unique to India and has happened in other emerging markets as well as the advanced economies. Bertay et al (2012) report that in high income countries the share of government ownership in banking assets increased from 7.3 percent in 2007 to 10.8 percent in 2009 (though retreated to 9.9 percent in 2010).

[3] Acharya et al (2010) show that public sector banks outperformed private sector banks despite having greater systemic risk during the crisis and attribute this to the government backing of public sector banks. They also find that riskier public sector banks with high ex ante systemic risk and low Tier 1 capital received greater capital support from the government). They conclude that it was not just the implicit guarantee to the public sector banks but also explicit capital injections by the government that caused depositors to consider public sector banks safer.

Figure 1: Share in Assets across Ownership Groups
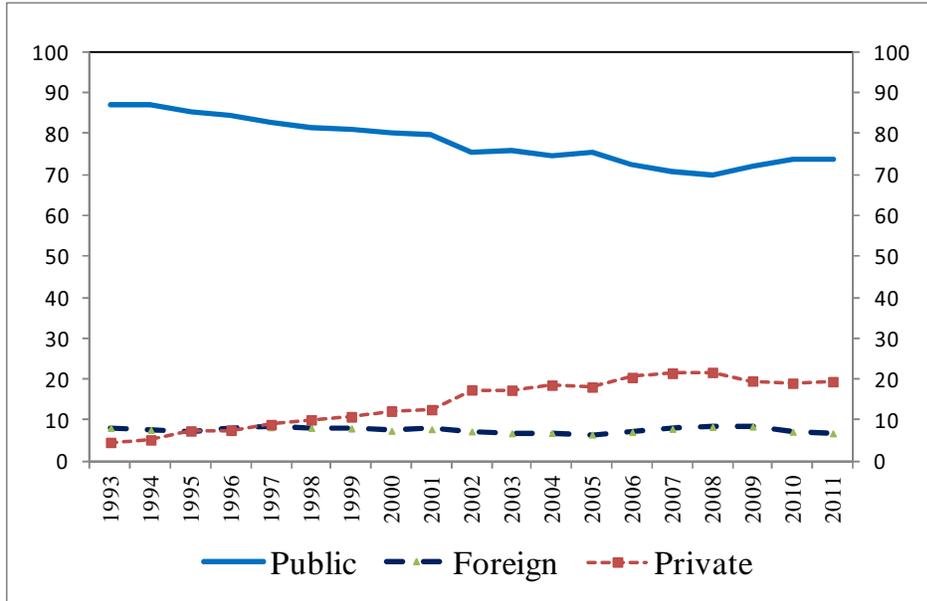
Figure 2: Deposit Growth (average annual) across ownership Groups
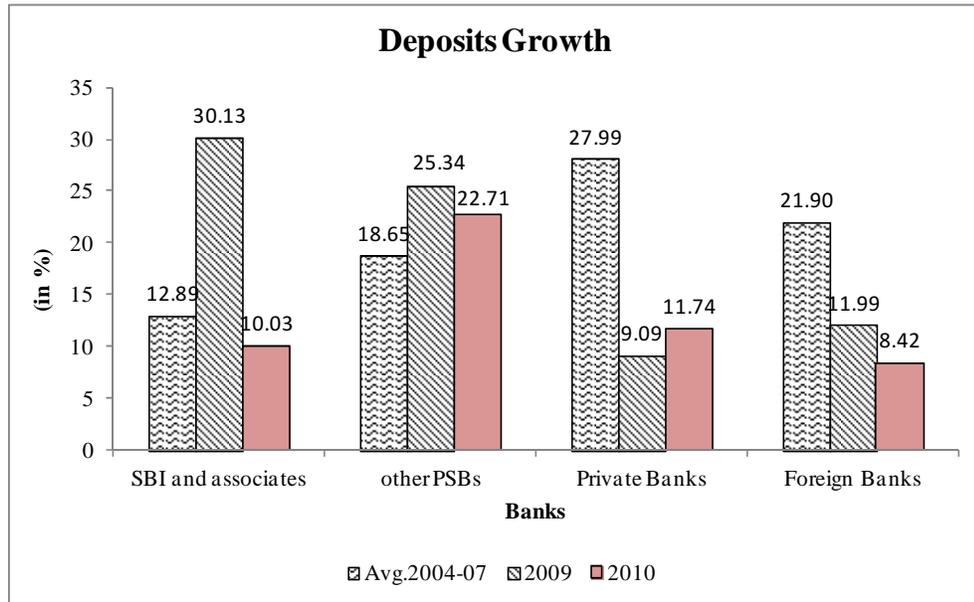
Note: Source for data in Figures 1 and 2 is the Statistical Tables Relating to Banks in India, Various issues, RBI. Years refer to fiscal years, e.g. 2009 refers to FY 2008-09 which runs from April 2008 to March 2009.

Our analysis confirms that private banks indeed experienced slower deposit growth during and after the crisis than before; and that this differential was most pronounced in FY 2009 and

2010. Public banks, in contrast, did not experience a similar slowdown in deposit growth, and the largest and oldest public bank, the SBI, experienced especially rapid growth in deposits.[4]

We consider several explanations for the differential response, including the source of funding, i.e. whether banks that relied more on wholesale funding experienced a sharper deposit slowdown; credit growth prior to the crisis, which may have been an indication of low or declining lending standards; lower realized profitability, as a measure of bank health; bank size, as a proxy for capacity to diversify and too big to fail; and explicit capital support by the government.[5]

While there was some tendency for depositors to favour healthy banks with stable funding, our results suggest that the reallocation of deposits toward the SBI, in particular, cannot be explained by these factors alone. Nor can it be explained by explicit capital injections by the government. It seems that depositors were confident for other reasons that their deposits were safer with the SBI due to the government's implicit guarantee of its liabilities, and that this dominated other considerations.[6]

The consequences of this behaviour are unlikely to be desirable. Insofar as investors flee to the SBI in the belief that it enjoys an implicit government guarantee, other banks will be destabilized. Other banks will have to hold more capital and maintain more liquidity to reassure depositors, which will work to their competitive disadvantage, and it is not clear in extreme circumstances that any level of capital and liquidity will suffice.[7] In addition, the perception that public-sector banks, and larger public-sector banks especially, enjoy an implicit guarantee is a

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[4] Besides deposits we also look at credit growth, return on assets or capital ratio of the banks but do not find the relative effect of the crisis to be as sharp across banks under different ownership patterns.
[5] We enter these variables in three ways: their historic (2004) values; their average values in three years prior to the crisis; and their values in the current and most recent year.
[6] In addition, there is the fact that the SBI has the largest network of bank branches, which may make it relatively easy for depositors to shift their funds there, as opposed to other public banks, when time is of the essence.
[7] Deposits in banks are guaranteed by the Reserve Bank of India but only up to a limit of INR100,000.

moral hazard that limits the incentive to enhance efficiency and may encourage excessive risk taking.

Extending the state guarantee from public to private sector banks would address the first problem (flight from private banks) but aggravate the second (moral hazard). Blanket guarantees are also expensive for the state. Efforts to reduce the implicit guarantee enjoyed by public-sector banks, on the other hand, may not be credible and may have undesirable consequences for financial stability. The best ways of squaring the circle are by preventing institutions from becoming too large and connected to fail in the first place, requiring generation of the kind of data that enables the authorities to clearly distinguish cases of insolvency from cases of illiquidity, and setting up mechanisms for the orderly resolution of insolvent institutions (Demirguc-Kunt and Serven 2009).

Our second set of questions asks how different banks fared during the recovery from the crisis. Did the same banks that did poorly when uncertainty spiked do well when it receded, or is comparative performance during the recovery phase attributable to other factors? We compare the behaviour of indicators of bank performance in the run-up to the crisis, during the crisis itself, and in the subsequent recovery. To the extent that performance in the recovery differed across banks, we ask how it is related to bank characteristics such as size, asset composition, ownership, capital ratios, and source of funding.[8]

Our results show that the superior performance of public-sector banks did not last. Public banks, including the SBI, experienced slower deposit growth after 2010. In particular, banks that received capital injections in 2009 or 2010 had slower deposit growth. Public banks also experienced slower credit growth, lower returns, and higher provisioning. These results hold after

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[8] One caveat is that with the data available only up to fiscal year 2012, hence till March 2012; the complete fall out of the crisis on asset quality is perhaps not known yet. News reports suggest that the NPLs of the public banks are increasing and these are perhaps related to the lending done during the crisis years.

controlling for the pace of credit growth during the crisis as well as for other bank-specific indicators such as bank size, profitability and provisioning prior to the crisis.

The only previous attempt to provide such an analysis of the effect of the crisis on the Indian banking system, of which we are aware, is Acharya, Agarwal and Kulkarni (2012). They show that while Indian financial firms were fairly resilient to the crisis, private banks experienced larger losses. Using a stock market-based measure of systemic risk, they estimate the systemic risk contributed by each Indian bank in the period preceding the crisis (January 2007 to December 2007) and compare it to realized returns during the crisis (January 2008 to February 2009). They find that public banks outperformed private banks during the crisis. They attribute this result to explicit government support of public-sector banks.[9] Our approach differs in that we consider a wider variety of bank characteristics and utilize information on not just the pre-crisis and crisis periods but also on the post-crisis recovery.

2. The Banking Sector

At independence, the Indian banking system consisted mainly of private and foreign banks. The government took control of the larger banks in 1955, 1969, and 1982. By 1982 private and foreign banks accounted for less than 10 per cent of bank assets.

Until the early 1990s, banks were subject to strict limits on asset allocation, interest rate ceilings and entry barriers. Half of bank assets were channelled into cash, deposits with the central bank, and investments in government securities. This was done through the Cash Reserve Requirements (CRR), which required the banks to hold cash and other liquid assets, and the Statutory Liquidity Requirements (SLR), which required them to hold safe and liquid assets, mostly

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[9] This despite the fact that it was the riskier public sector banks with high ex ante systemic risk and low Tier 1 capital which received greater capital support from the government.

securities of central government and other approved securities such as state development loans of the state governments.[10]

Financial reforms were initiated in 1991 and deepened in the mid-1990s. This entailed removing controls on interest rates, reducing reserve and liquidity ratios, deregulating entry, relaxing credit controls, creating an inter-bank money market, and introducing auction-based repurchase agreements and reverse repos.

With data on financial reforms in 91 countries from Abiad, Detragiache and Tressel (2010), we can compare the pace of financial liberalization in India with other countries. Abiad et al. consider credit controls, reserve requirements, interest rate controls, entry barriers, policies on securities markets, bank regulation, and restrictions on capital account, aggregating measures of these elements into a composite index of financial liberalization.[11] In Figure 3 we see that, compared with both emerging Asian economies and other countries, India's financial sector was repressed until the late 1980s. Liberalization then gathered pace, and catch-up has been fast since the mid-1990s.

Reform and liberalization had effects. With the easing of barriers to entry by private and foreign banks, their share in total banking sector assets rose from 3.5 percent in 1991 to about 21 per cent in 2007. Still, compared to many other countries the Indian banking sector remained predominantly under government ownership, with 70 per cent of assets of the banking sector in the

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[10] CRR is defined as percentage of a bank's net demand and time liabilities and has varied between 5 and 15 percent since 1990. Under the SLR, scheduled commercial banks are required to maintain an amount between 25 to 40 percent of demand and time liabilities in cash, gold, or unencumbered approved government securities. See Gupta et al (2011) on how public and private banks have responded to changes in these requirements.

[11] The index is normalized between zero and one, with higher values indicating a more liberalized financial sector.

hands of public banks.[12] The share of public banks then increased further during and after the crisis, reversing the declining trend of the previous many years (see Table 1).

Figure 3: Financial Liberalization in India
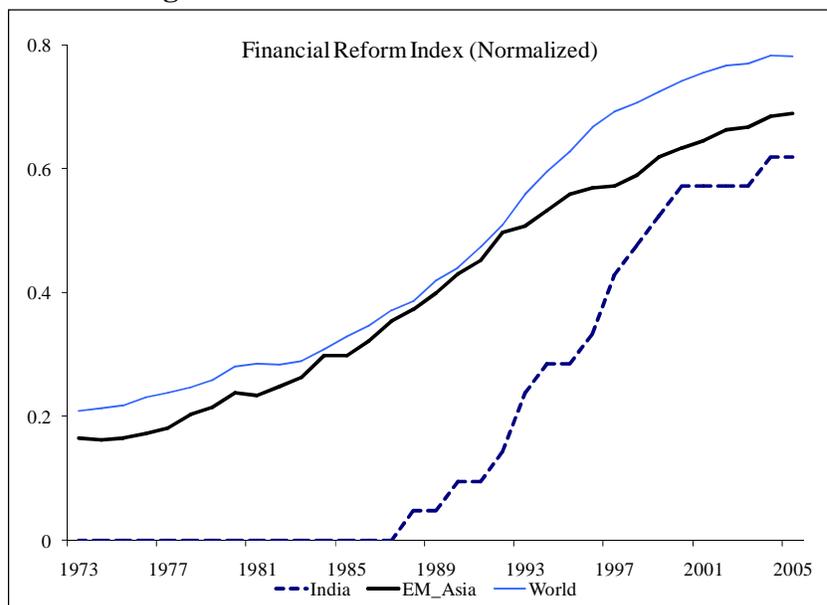
Source: Constructed using the data from Abiad, Detragiache, and Tressel (2008)

Table 1: Number of Banks and the Share of Banks in Total Assets, by Ownership Groups

Bank Type	No of Banks	Percent Share in Assets	No of Banks	Percent Share in Assets
	2007		2011	
All Public Sector Banks	28	70.5	26	73.7
State Bank of India	8	23.3	6	22.2
Other Public Sector Banks	20	47.2	20	51.5
Private Banks	25	21.5	21	19.5
Foreign Banks	29	8.0	34	6.8

Source: Statistical Tables Relating to Banks in India, various issues, RBI; years 2007 and 2011 refer to FY 2006-07 and 2010-11 respectively.

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[12] Due to the entry of new banks, the number of private sector banks first increased in the mid-1990s, but since then the number has declined due to mergers or closures. The number of foreign banks also increased steadily through the 1980s, and mid 1990s, and then declined. The total number of banks peaked at 105 in the mid-1990s, but by 2007 the number had declined to 82, which was only marginally higher than their number in the early 1990s when the liberalization had started.

Due to entry and the increase in the share of private institutions, concentration has declined since the early 1990s. Figure 4 shows a Herfindhal Index based on the shares in assets for domestic banks. It suggests a gradual decline in concentration from the late 1980s, followed by a sharp decline after the turn of the century. Although the crisis raised concentration by increasing the share of the larger public banks in banking assets, that rise was not pronounced.

Figure 4: Herfindahl Index for the Banking Sector
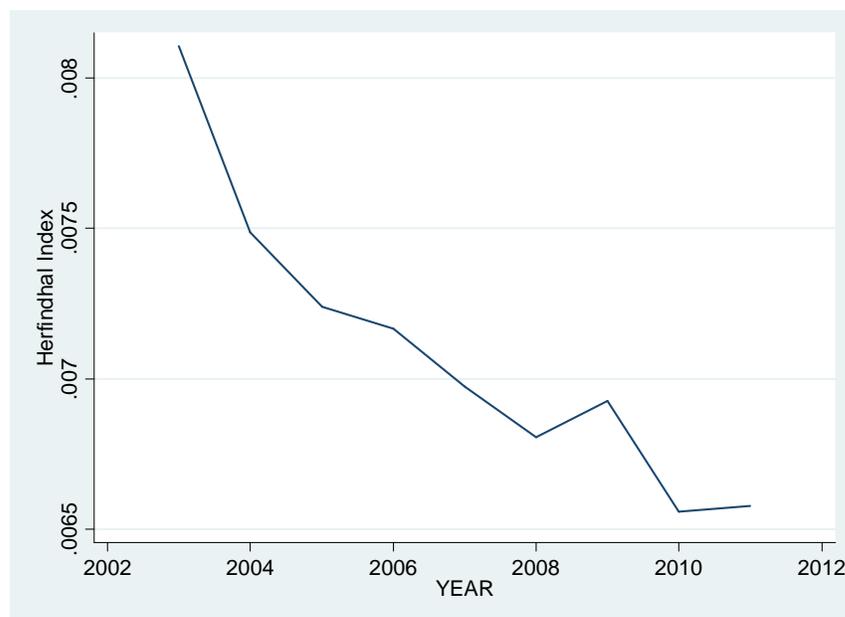
There are indications that increased competition has been associated with improvements in efficiency and profitability, especially among public banks. Having had significantly lower operating profits and lower returns on assets in the early 1990s, public-sector banks caught up with their private sector competitors by these metrics by 2007 (Table 2).

Table 2: Trends in Credit, Deposits and other Indicators for Public and Private Banks

	1993		2000		2007	
	Public	Private	Public	Public	Public	Private
Credit/assets	20.8*	24.98	18.5***	25.2	27.2***	32.1
Deposit Growth	8.4***	14.4	12.3**	20.8	17.7	15.2
Capital/Assets	2.05**	.74	1.81***	.91	.97	.98
Return on Assets	-2.42***	.40	.42**	.88	.86	.85
Provision/Assets	2.07***	.82	.95	1.03	.95	.98

Note: The numbers represent simple means of variables for bank groups. *, **, *** denote if the average of the public banks is significantly different from the average of the private banks at 10, 5, and 1 percent levels respectively.

3. Data, Methodology and Results

In the analysis that follows, we use annual bank-level data for the period 2004-2012 from Reserve Bank of India (2012). These data are for fiscal years: 2008 refers to fiscal year 2007-08, which runs from April 2007 to March 2008, for example. We consider only banks that existed throughout the period. We have data for 44 private and public banks. Of these 25 are public sector banks, including the SBI. Five additional banks are associated with the SBI. In addition there are19 other public sector banks and 19 are private banks.[13]

We use data on deposit growth (i.e. total deposits which include current, saving and term deposits), as the dependent variable in our baseline regressions. In addition we report regressions where asset growth, credit growth, return on assets, and capital are the dependent variables. As controls we include profitability (return on assets), indicators of asset quality (loan loss provisions

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[13] While no domestic private or public banks entered or exited during this period, some new foreign banks entered the Indian banking sector in 2008-2011. There were a few bank mergers, as recorded in the appendix, though there was no spike in mergers during this period. We record the merger information in the same way as in Gupta, Kochhar and Panth (2011). We record information on mergers by dropping the merged bank from the database. For the parent bank we add the balance sheets of the parent and merged bank and treat it as a merged bank from the beginning of the sample. Where the name of a bank changed during the sample period we matched the changed names..

and capital ratio), funding source (share of saving and current account deposits in total liabilities) and size (log of assets) of the banks. We regress deposit growth on dummies for the crisis years, a public-bank dummy interacted with the dummy variables for the crisis years, a vector of bank characteristics, and the interaction of those bank characteristics with the crisis-year dummies.

$$Deposit\ growth_{it} = Bank\ Fixed\ Effects_i + Dummies\ for\ years\ 2008, 2009, 2010 +$$
$$Dummies\ for\ years\ 2008, 2009, 2010 * Dummy\ for\ Public\ Ownership\ of\ Banks + \varepsilon_{it} \qquad (1)$$

where subscripts i and t refer to bank and year respectively. We include bank fixed effects and report robust standard errors. In addition we include separate interaction effects for the SBI, which media report suggest attracted especially large deposit inflows. The coefficients of the dummies for 2008, 2009, and 2010 capture the change in deposit growth for private banks relative to pre-crisis years 2004-2007.[14] The coefficients of the interaction between year dummies and ownership dummies are "difference in difference" estimates measuring the change in deposit growth for public banks in the respective crisis year over the pre crisis years, relative to the change experienced by the control group, i.e. the private banks. Thus the coefficient on "Year 2008*Public Banks" estimates the change in deposits growth for public banks in 2008 over their average growth in 2004-2007 minus the change in deposits growth for private banks in 2008 over average deposit growth in 2004-2007.

We estimate extensions of the specification in equation 1 by including bank characteristics and their interactions with year dummies, as in equation 2 below.

$$Depositgrowth_{it} = Bank\ Fixed\ Effects_i + Dummies\ for\ years\ 2008, 2009, 2010 +$$
$$Dummies\ for\ years\ 2008, 2009, 2010 * Dummy\ for\ Public\ Ownership\ of\ Banks +$$
$$Bank\ Characteristics\ (Size_{it}, return\ on\ assets_{it}, asset\ quality, funding\ structure) +$$
$$Dummies\ for\ years\ 2008, 2009, 2010 * Bank\ Characteristics +$$
$$Government\ support\ to\ banks\ in\ t\ or\ t - 1 + \varepsilon_{it} \qquad (2)$$

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[14] We analyse data from 2004 through 2012, but in most specifications we use data only through 2010, since the effect of the crisis had clearly dissipated by 2011.

In addition, to test whether explicit guarantees mattered more than ownership per se we include capital injected in the banks before and during the crisis year to ask whether the coefficient of public sector banks becomes smaller or insignificant.

The resulting estimates should help us to address questions such as: What was the effect on deposit growth of the crisis? Did public-sector banks experience faster deposit growth? Is the deposit slowdown correlated with ownership or other bank characteristics? Did funding affect the deposit response? Did capital injections affect depositors' confidence in a bank? How did private banks do in terms of credit growth, return, provisioning, and investment in government securities? In extensions we estimate similar regressions for other dependent variables such as credit growth; credit over assets and return on assets?

In column 1 of Table 2 we club together all public banks in one dummy, while in column 2 we separate the SBI from the other public banks. In column 3 we include the dummies for SBI and other public banks and drop the bank fixed effects, estimating the regressions using the random effects rather. In column 4, finally, we include the interaction of the dummy for 2011 with dummies for the SBI and other public banks.

The effect of the crisis on deposits is evident in 2009 and 2010. The results confirm that the private banks experienced slower deposit growth (note the negative coefficients on the year dummy variables for 2009 and 2010). The effect on deposit growth for public banks appears to have been positive, although the coefficients do not differ significantly from zero. In contrast, the effect is positive, large and significant for the SBI, although this effect is not evident in 2011.

These estimates lend some support to the view that depositors discriminate between healthier and weaker banks. More profitable banks, banks that rely on retail funding, and banks

with lower provisioning display faster deposit growth (Table 3). But even when we include these variables, individually or together, the coefficient for the SBI remains positive and significant in 2008 and 2009, while the coefficients on the year dummies remain negative and significant, except when we include size. Even then, however, the faster deposit growth experienced by the SBI cannot be explained simply by its large size.

Table 2: Change in Bank Deposits
(Dependent variable: Percent Change in Real Deposits)

	(1)	(2)	(3)	(4)
Dummy, Year 2008	1.47	1.47	1.47	1.47
	[0.42]	[0.41]	[0.44]	[0.42]
Dummy, Year 2009	-7.00*	-7.00*	-7.00*	-7.00*
	[1.70]	[1.69]	[1.82]	[1.70]
Dummy, Year 2010	-7.52*	-7.52*	-7.52**	-7.52*
	[1.86]	[1.85]	[1.99]	[1.86]
Dummy, Year 2011				0.20
				[0.05]
Dummy for State Bank of India			-8.16***	
			[3.59]	
Dummy for all other Public Banks			-0.65	
			[0.27]	
Year 2008*Public banks, State Bank of India	-0.89			
	[0.23]			
Year 2009*Public banks, State Bank of India	5.07			
	[1.12]			
Year 2010*Public banks, State Bank of India	4.23			
	[0.93]			
Year 2008*Public Banks		-1.21	-1.21	-1.21
		[0.31]	[0.33]	[0.31]
Year 2009*Public Banks		4.25	4.25	4.25
		[0.94]	[1.01]	[0.95]
Year 2010*Public Banks		4.38	4.38	4.38
		[0.95]	[1.02]	[0.95]
Year 2011*Public Banks				-4.69
				[-1.01]
Year 2008*State Bank of India		6.77*	6.77**	6.77*
		[1.90]	[2.05]	[1.92]
Year 2009*State Bank of India		24.89***	24.89***	24.89***
		[5.99]	[6.46]	[6.04]
Year 2010*State Bank of India		0.70	0.70	0.70
		[0.17]	[0.19]	[0.17]
Year 2011*State Bank of India				0.03
				[0.01]
Bank Fixed Effects	Yes	Yes	No	Yes
Observations	308	308	308	351
R-squared	0.25	0.26		0.25
Number of banks	44	44	44	44

Note: The dependent variable is percent change in deposits (deflated by CPI). Regression specification is given in equation 1 and 2. Data are from 2004-2010. Regressions include bank fixed effects, except in column 3 in which the regression is estimated with random effect. Standard errors are robust and clustered by banks.

Table 3: Change in Bank Deposits, Including other Controls
(Dependent variable: Percent change in Real Deposits)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Year 2008	1.51	0.18	1.32	0.59	6.13**	1.47	3.85
	[0.44]	[0.06]	[0.37]	[0.16]	[2.14]	[0.41]	[1.52]
Year 2009	-7.39*	-7.88*	-7.06*	-8.15*	0.04	-7.00*	-2.28
	[1.74]	[1.86]	[1.69]	[1.78]	[0.01]	[1.68]	[0.72]
Year 2010	-7.84*	-7.37*	-7.57*	-8.07**	0.30	-7.52*	0.12
	[1.94]	[1.72]	[1.86]	[2.03]	[0.09]	[1.85]	[0.04]
Year 2008*Public Banks	-1.03	0.81	-0.86	-1.63	-0.95	-1.21	1.14
	[0.27]	[0.24]	[0.22]	[0.43]	[0.26]	[0.31]	[0.36]
Year 2009*Public Banks	4.80	7.13	4.57	3.49	4.21	4.25	7.18*
	[1.05]	[1.60]	[0.97]	[0.83]	[0.99]	[0.94]	[1.74]
Year 2010*Public Banks	4.88	7.46	4.71	3.35	4.86	4.56	7.45*
	[1.06]	[1.65]	[0.99]	[0.77]	[1.08]	[0.96]	[1.71]
Year 2008*State Bank of India	7.00**	5.11	6.92*	6.42*	4.36	6.77*	1.97
	[2.02]	[1.32]	[1.94]	[1.86]	[1.46]	[1.90]	[0.63]
Year 2009*State Bank of India	25.14***	24.30***	24.96***	24.59***	22.66***	24.89***	21.62***
	[5.92]	[5.70]	[5.96]	[6.22]	[6.44]	[5.98]	[6.43]
Year 2010*State Bank of India	0.84	0.97	0.76	-0.12	0.54	0.70	-0.09
	[0.21]	[0.23]	[0.19]	[0.03]	[0.14]	[0.17]	[0.02]
Return on Assets, Lag	3.16**						2.75*
	[2.14]						[1.74]
Current+Sav Deposits/Liabilities, Lag		0.64*					0.76**
		[1.97]					[2.39]
Capital/Assets, Lag			0.35				0.07
			[0.58]				[0.22]
Provisioning/Assets, Lag				-2.91			-3.85
				[1.38]			[1.59]
Size, Log Assets, Lag					-16.46***		-17.85***
					[3.25]		[3.04]
Capital Support/Assets, Lag						-2.09	2.94
						[0.28]	[0.37]
Bank Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	308	308	308	308	308	308	308
R-squared	0.28	0.29	0.27	0.28	0.31	0.27	0.38
Number of Banks	44	44	44	44	44	44	44

Notes: The dependent variable is percent change in deposits (deflated by CPI). Regression specification is given in equations 1 and 2. Data are for the period 2004-2010. Regressions include bank fixed effects. Standard errors are robust and clustered by banks.

Table 4 interacts contemporaneous values of the bank-specific variables with the dummies

for 2008, 2009 and 2010 to see whether public ownership is simply acting as a proxy for these other

bank characteristics. The coefficients for 2008, 2009 and 2010, while still negative, become

insignificant. The coefficient of the interaction of the dummies for the crisis years with the SBI is

still positive and mostly significant, however. Deposit growth during the crisis years is slower for larger banks and for banks with more provisioning (i.e. poorer asset quality). Deposit growth during the crisis is also faster for banks with higher profitability and more capital. These results suggest that even if depositors did discriminate in favor of stronger private banks, they had even more trust in the resilience of the SBI.

Table 4: Change in Bank Deposits across Ownership Groups (Including other Controls)
(Dependent variable: Percent change in Real Deposits

	(1)	(2)	(3)	(4)	(5)
year 2008	41.37	-3.17	-8.34	-0.80	-2.42
	[1.45]	[0.67]	[0.76]	[0.20]	[0.39]
year 2009	37.24	-14.22***	-9.14	-6.39	3.58
	[1.19]	[3.04]	[0.82]	[1.37]	[0.70]
year 2010	57.18**	-6.72*	2.66	-9.84*	-0.26
	[2.48]	[1.73]	[0.29]	[1.97]	[0.04]
Year 2008*Public Banks	6.48	1.02	-6.72*	-0.95	-2.25
	[0.91]	[0.29]	[1.89]	[0.24]	[0.61]
Year 2009*Public Banks	12.30	6.48	-0.31	3.45	-0.20
	[1.57]	[1.53]	[0.08]	[0.74]	[0.06]
Year 2010*Public Banks	15.74***	4.90	-1.41	4.90	1.63
	[2.73]	[1.04]	[0.36]	[0.97]	[0.42]
Year 2008*State Bank of India	26.91*	8.18**	2.82	8.81**	5.90*
	[1.93]	[2.53]	[0.73]	[2.23]	[1.77]
Year 2009*State Bank of India	45.19***	25.87***	23.2***	24.3***	21.17***
	[2.97]	[6.67]	[7.25]	[5.26]	[6.79]
Year 2010*State Bank of India	30.72***	1.13	5.75	2.82	-1.76
	[2.91]	[0.27]	[1.36]	[0.57]	[0.55]
Bank Characteristic included	Bank Size	Return on Assets	Retail Funding	Capital/ Assets	Provisioning/ Assets
Bank Characteristic	20.24***	8.62***	-1.29***	-0.89*	-5.73*
	[3.93]	[4.10]	[4.10]	[1.89]	[1.96]
Bank Characteristic*Year 2008	-4.88	3.00	0.41	2.36***	2.59
	[1.53]	[0.65]	[1.11]	[2.75]	[0.46]
Bank Characteristic* Year 2009	-5.42	6.02**	0.01	-0.61	-10.05**
	[1.58]	[2.05]	[0.04]	[0.25]	[2.44]
Bank Characteristic* Year 2010	-7.65***	-1.29	-0.37	2.57	-8.44
	[3.06]	[0.42]	[1.19]	[1.62]	[1.63]
Bank Fixed Effects	Yes	Yes	Yes	Yes	Yes
Observations	308	308	308	308	308
R-squared	0.40	0.38	0.37	0.28	0.36
Number of id	44	44	44	44	44

Notes: The dependent variable is percent change in deposits (deflated by CPI). Regression specification is given in equations 1 and 2. Data are for the period 2004-2010. Regressions include bank fixed effects. Standard errors are robust and clustered by banks.

Since the coefficients on contemporaneous bank characteristics may be subject to endogeneity bias, we also take 2004 values of these variables and interact them with the dummies for the crisis years. Alternatively, we take averages of these variables for the three years before the crisis (2005-07) and interact them with the dummies for 2008, 2009 and 2010. [15] The results are similar to those in Table 4 above in that after controlling for the banks's size and health at their historical value or the values prior to the crisis the coefficient of the SBI is positive, large and significant.[16] This suggests that trust in the safety of deposits at the SBI was not rooted in these factors but instead stemmed from the broader implications of public ownership.

We can also analyze asset growth, credit growth, return on assets and capital held by the banks using this framework. As shown in Table 5, credit growth does not differ as much across banks; in particular the credit growth of the SBI is not unusually large during the crisis (column 2).[17] The return on assets, in column 3, is not lower during the crisis across banks, and again differences are not large across ownership groups. Interestingly the largest hit on capital during the crisis appears to have been taken by public banks other than the SBI.

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[15] When we include credit growth before the crisis in our regression, we also find that banks increasing credit more aggressively in three years prior to the crisis experienced slower deposit growth during the crisis.

[16] Results available on request.

[17] Thus in contrast to Bertay et al (2012) we do not find that the state banks stabilized credit over the period of financial stability.

Table 5: Credit Growth, Returns and Capital during Crisis across ownership Groups

	(1)	(2)	(3)	(4)
Dependent Variable	Assets Growth	Credit Growth	Return on Assets	Capital/Assets
Year 2008	3.19	-3.56	0.21	0.08
	[1.14]	[0.67]	[1.59]	[0.46]
Year 2009	-7.14**	-9.49	0.18	0.03
	[2.17]	[1.67]	[1.57]	[0.25]
Year 2010	-5.88*	-10.05*	0.02	-0.02
	[1.72]	[1.80]	[0.21]	[0.14]
Year 2008*Public Banks	-1.98	0.27	-0.23	-0.60*
	[0.59]	[0.04]	[1.61]	[2.01]
Year 2009*Public Banks	3.02	-3.03	-0.22	-0.64**
	[0.82]	[0.47]	[1.55]	[2.20]
Year 2010*Public Banks	2.22	-7.50	-0.04	-0.71**
	[0.56]	[1.19]	[0.33]	[2.22]
Year 2008*State Bank of India	8.10***	1.69	-0.16	-0.10
	[2.88]	[0.32]	[1.21]	[0.60]
Year 2009*State Bank of India	20.53***	0.68	-0.12	-0.08
	[6.24]	[0.12]	[1.04]	[0.58]
Year 2010*State Bank of India	-0.73	-7.95	-0.04	-0.03
	[0.21]	[1.43]	[0.32]	[0.29]
Bank Fixed Effects	Yes	Yes	Yes	Yes
Observations	308	308	308	308
R-squared	0.28	0.27	0.56	0.63
Number of Banks	44	44	44	44

Notes: The dependent variables are as indicated in each column; growth of assets and credit, columns 1 and 2 respectively is calculated after deflating by CPI. Data are from 2004-2010. Regressions include bank fixed effects. Standard errors are robust and clustered by banks.

4. After the Crisis

We have data for two post-crisis years, 2011 and 2012. We use it to analyse whether or not the same banks that did relatively poorly when uncertainty spiked then did relatively well when it receded. Or did banks which extended more credit during the crisis experience a deterioration subsequently in asset quality? More generally, to the extent that recovery-period performance differed across banks, we ask how it is related to various banks indicators, such as size, profitability, provisioning, capital support from the government and ownership.

We estimate regressions for deposit growth, credit allocation, return on assets and provisions using the pooled data for 2011 and 2012, controlling for the values of these variables during the crisis and pre crisis years and controlling for various bank characteristics, as per the specification in equation 3.[18]

$$Y_{i,2011,2012} = Y_{i,avg\ in\ 2009,2010} + Y_{i,avg\ in\ 2005-07} + Dummy\ for\ Public\ Banks$$
$$+ Other\ Controls\ (size, returns, provisions, capital\ injection)_{avg\ in\ 2009,2010} + \varepsilon_{it} \qquad (3)$$

Results show that public-sector banks and the SBI in particular experienced slower deposit growth after controlling for the growth in preceding years (Table 6). In addition, banks that received capital injections in 2009 and 2010 had slower deposit growth. Public-sector banks also had slower credit growth, after controlling for credit growth during the crisis and prior to the crisis and for bank size, profitability and provisioning. Finally, public-sector banks and the SBI also had lower returns and higher provisioning (Table 7).

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[18] We also estimate regressions using the data separately for 2011 and 2012, and obtain similar results.

Table 6: Deposit Growth and Credit Growth in 2011, 2012

Dependent Variable	(1)	(2)	(3)	(4)	(5)	(6)
	Deposits Growth			Credit Growth		
Dummy for all other PSB	-4.15*	-4.00*	-4.43*	-3.82	-4.27	-4.42
	[1.79]	[1.68]	[1.79]	[1.29]	[1.29]	[1.40]
Dummy for the SBI	-7.25*	-8.15	-8.89	-11.45***	-11.56***	-11.91***
	[1.80]	[1.50]	[1.64]	[3.87]	[3.80]	[3.99]
Avg. Change in Deposits in 2005-07	-0.03	0.01	-0.01			
	[0.22]	[0.04]	[0.12]			
Avg. Change in Deposits in 2009-10		0.29	0.23			0.09
		[0.83]	[1.13]			[0.36]
Capital Injection in 2009, 2010		-5.54**	-5.73***			
		[2.54]	[2.79]			
Avg. Size in 2009, 2010		0.01	0.13			
		[0.01]	[0.10]			
Avg. Return in 2009, 2010		-0.88				
		[0.21]				
Avg. Provision in 2009, 2010			-1.80			
			[0.61]			
Credit Growth (2005-07)				-0.12	-0.09	-0.09
				[0.60]	[0.49]	[0.51]
Credit Growth (2009-10)					0.12	0.08
					[0.52]	[0.23]
Constant	8.24***	6.61	7.30	17.61***	15.82***	15.83***
	[2.72]	[0.53]	[0.54]	[3.22]	[3.98]	[3.93]
Observations	82	82	82	82	82	82
R-squared	0.052	0.135	0.137	0.048	0.059	0.060

Note: *, **, *** indicate that the coefficients are significant at 10, 5 and 1 percent levels respectively. Standard errors are robust.

Table 7: Return on Assets and Provisioning in 2011, 2012

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Return on Assets			Provisions			
Dummy for all other PSB	-.22***	-.29***	-.21***	0.23***	0.12	0.13*	0.24***
	[3.22]	[5.31]	[2.66]	[3.93]	[1.44]	[1.75]	[4.31]
Dummy for the SBI	-.30***	-.56***	-.41***	0.70***	0.45**	0.46***	0.72***
	[3.10]	[3.97]	[2.89]	[10.80]	[2.62]	[2.94]	[11.51]
Avg. Return on Assets in 2005-07	0.12	0.12	0.02				
	[0.76]	[0.78]	[0.17]				
Avg. Return on Assets, in 2009-10	0.42**	0.34*	0.56***				
	[2.44]	[1.83]	[4.00]				
Capital Injection in 2009, 2010		-0.21**	-0.14		-0.04	-0.03	
		[2.59]	[1.47]		[0.43]	[0.36]	
Avg. Size in 2009-10		0.07*	0.03		0.06	0.06	
		[1.79]	[1.15]		[1.48]	[1.62]	
Credit Growth in 2009-10			-0.01**			0.00	0.00
			[1.99]			[1.19]	[1.12]
Avg. Provision in 2005-7					-0.13	-0.13	-0.23*
					[1.18]	[1.21]	[1.92]
Avg. Provision in 2009, 2010					0.31**	0.38***	0.45***
					[2.15]	[2.86]	[3.96]
Observations	81	81	81	81	81	81	81
R-squared	0.455	0.498	0.586	0.330	0.357	0.380	0.351

Note: *, **, *** indicate that the coefficients are significant at 10, 5 and 1 percent levels respectively. Standard errors are robust.

Figures 5-7 confirm the results we obtain from the regressions. After the crisis the return on assets declined for public-sector banks, and especially for the SBI, while increasing for private banks. Similarly, asset quality deteriorated starting in FY 2010 for the public-sector banks, while improving for the private banks. The decline in asset quality was most dramatic for the SBI.

Figure 5: Return on Assets
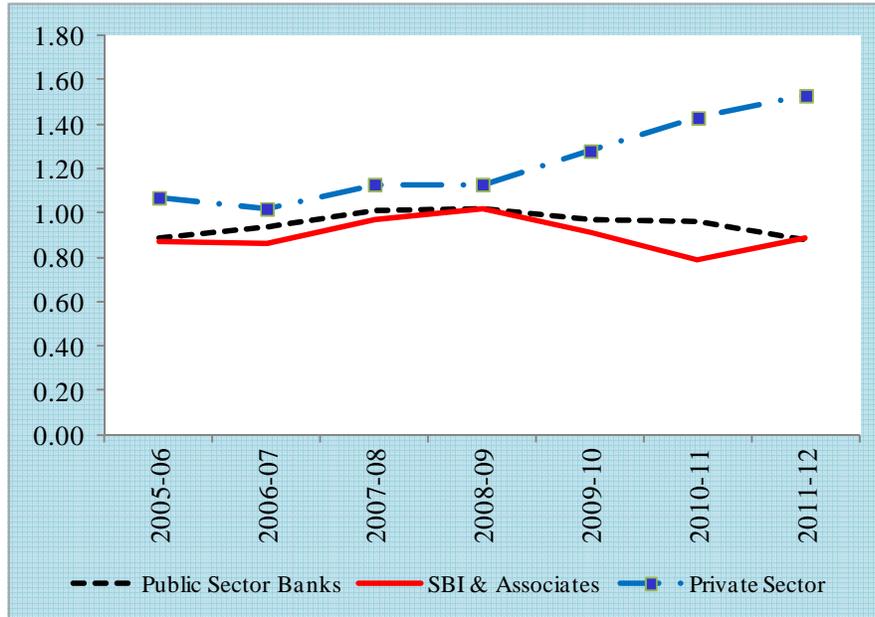
Figure 6: Non Performing Loans/Assets
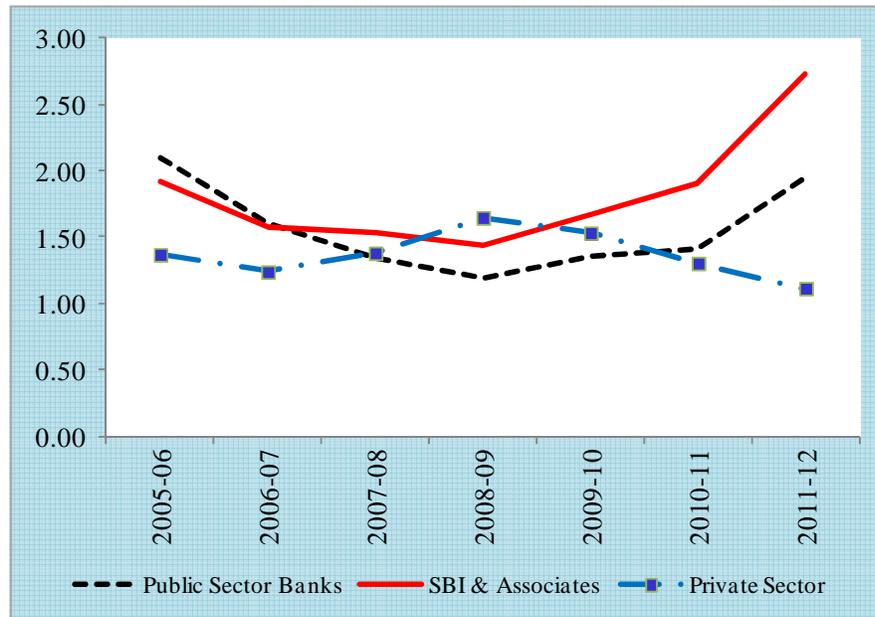
Figure 7: Credit Growth
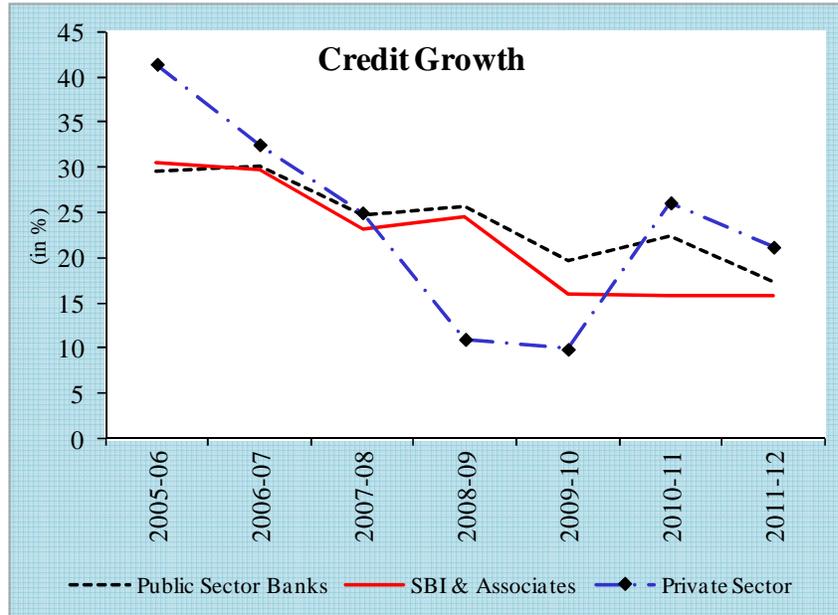
Note: Source for data in Figures 5-7 is the Statistical Tables Relating to Banks in India, various issues, RBI; years refer to fiscal years.

So far we have focused only on domestic private and public banks. Excluding foreign banks is justified insofar as their share in banking assets is small. But we can add foreign banks to see whether the dynamics of deposits and other variables differed for them. We do this by including three additional variables, the interactions of the dummies for years 2008, 2009, and 2010 with the dummy for foreign banks in our specification in equations 1 and 2. We include these variables in the regressions for deposit growth as well as for credit growth.

When we do so, the coefficients for these additional variables turn to be negative, numerically large, but statistically insignificant. This implies that the deposit reallocation from the foreign banks was statistically as sharp as from the domestic private banks; and the credit growth slowdown from the foreign banks was also comparable to that of the Indian private banks.[19] The

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[19] IMF in its most recent Global Stability Report says that the Indian banking system escaped the worst effects of the global crisis because of the limited presence of foreign banks, which tended to react most violently by restricting credit.

results also point to considerable variation across foreign banks in rates of deposit and credit growth.[20]

5. Conclusion

In this paper we have considered the reallocation of flight of deposits from private- to public-sector banks in India following the onset of the global financial crisis. This deposit reallocation was a surprise to many commentators, who had regarded private-sector banks as sound and cautiously managed. Our analysis suggests that the flight of deposits was predominantly in the direction of the largest and best-known of the public banks, the State Bank of India, rather than toward public-sector banks as a whole. The pattern cannot be explained by obvious balance-sheet variables such as credit growth prior to the crisis, lower realized profitability, or explicit capital support by the government. Similarly, there is no sign of superior stability or returns for public banks in general and the State Bank of India in particular in the recovery period following the crisis. Other factors therefore presumably motivated the shift of deposits toward the SBI. The most plausible such factor is the expectation of an implicit guarantee for the oldest and best known public-sector institution.

To the extent that investors fled toward the SBI in the belief that it enjoyed an implicit government guarantee, other banks were destabilized. The effects on the efficiency of the financial system would not have been positive insofar as other banks were forced to hold more capital and maintain more liquidity to reassure depositors. The perception that public-sector banks, and larger public-sector banks especially, enjoy an implicit guarantee is a moral hazard that limits the incentive to enhance efficiency and may encourage excessive risk taking. This points to the

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[20] It would be useful to extend this analysis further to understand the sources of this heterogeneity. For one thing one could relate the performance of the foreign banks to their country of origin and the health of the parent banks. See Detragiache and Gupta (2006) for this kind of analysis for Malaysian banks during the Asian crisis.

desirability of scaling back implicit guarantees to the SBI and public-sector banks in general,

whether by preventing them from becoming too large and connected to fail or by setting up more

effective mechanisms for the orderly resolution of insolvent institutions.

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Appendix

Table A1: Variable Definitions

Variable	Details
Deposits	Deposits include demand deposits savings deposits and term deposits. We take percent change in real deposits (deflated by CPI)
Size	Log, Assets
Return on Assets	Income minus expenses and provisions as percent of assets
Credit (Other)/Assets	Advances made to "others" (i.e. to non government, non priority, and non bank sectors) as percent of assets
Capital/Assets	Bank Capital/Assets
Provision/Assets	Loan Loss Provisions/Assets
Capital Injection/Assets	Capital Injections from Government/Assets

The source of data for banking sector related variables is the RBI's database *"Statistical Tables Relating to Banks in India"* and *"Basic Statistical Returns"*.

Table A2: Summary Statistics

Variable	Number of Observations	Mean	Std. Dev.	Min	Max
Provision/Assets	308	1.08	0.47	0.04	3.41
Return on Assets	308	0.86	0.56	-3.50	2.27
Capital/Assets	308	0.90	1.40	0.00	11.68
Assets Change	308	11.37	9.78	-30.28	49.93
Credit Change	308	17.92	16.82	-35.93	76.56
Deposits Change	308	11.38	10.13	-31.95	56.32
Size (Log Assets)	308	10.26	1.33	6.75	13.46
Capital Injection/Assets	308	0.01	0.10	0.00	1.10

Banks Included in the Data:

From the list of private banks currently operating in India we include all banks except Kotak Mahindra Bank and Yes Bank. These are new banks and only have data from 2005 and 2006 respectively. The first few years of the data for these banks show values that are unusually large (or small) as would be expected to be the case in the initial few years of operations. We treat Bank of Rajasthan as a separate bank, even though the bank merged with ICICI in 2010.

We include the data for all foreign banks for which the data are available for 2003-2011. This included 29 banks. For all of these banks we had data for all years, except for American Express Banks, RBS and Arab Bangladesh Bank. In addition to the data on the Indian operation of these banks, we collect the information on the country of origin of these banks, and code dummies for their origin: US/UK/other European countries (France, Belgium, Germany), Asian banks, (China, Singapore, Bangladesh, Sri Lanka, Korea, Thai, Indonesian), and other banks (Canada, Mauritius, Bahrain, Oman, Japan, UAE)

Mergers

The following cases of mergers are accounted for in the data, besides the ones listed in Gupta et al (2011): merger of Ganesh Bank of Kurunwad Ltd with The Federal Bank Ltd; merger of Sangli Bank Ltd with ICICI Bank Ltd.; merger of Lord Krishna Bank Ltd with Centurion Bank of Punjab Ltd.; merger of Centurion Bank of Punjab Ltd with HDFC Bank Ltd.; merger of State Bank of Saurashtra with State Bank of India; merger of State Bank of Indore with State Bank of India.

Capital Injections in Public Sector Banks

In February 2009, the government announced a capital injection in UCO Bank (Rs. 450 crores), Central Bank of India (Rs. 700 crores) and Vijaya Bank (Rs. 500 crores). In 2008-2009 the government injected Rs. 250 crores into United Bank of India. In the 2010-2011 budget, the government announced capital infusion in IDBI Bank (Rs. 3,119 crores), Central Bank (Rs. 2,016 crores), Bank of Maharashtra (Rs. 590 crores), UCO Bank (Rs. 375 crores) and Union Bank (Rs. 111 crores). News reports indicate that the amount of capital injections was determined based on PSB funding requirements and the need for a capital buffer.