

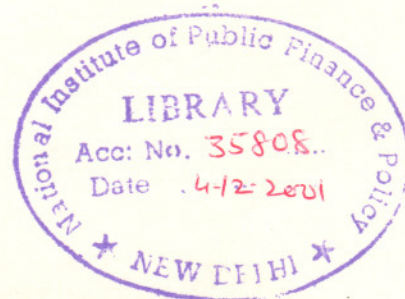
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Panel Results

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NON-PERFORMING LOANS OF PSU BANKS: SOME PANEL RESULTS

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Abstract: The paper performs a panel regression on the definitionally uniform data now available for a five-year period ending in 1999-2000, on non-performing loans of commercial banks. The exercise is confined to 27 public sector banks, so as to investigate variations within a class that is homogenous on the ownership dimension. The exercise groups banks with higher than average NPAs into those explained by poor operating efficiency, and those where the operational indicator does not suffice to explain the high level of NPAs, and leaves an unexplained intercept shift. Two of the three weak banks identified by the Varma Committee, Indian Bank and United Bank of India, fall in this category. Recapitalisation of these banks with operational restructuring may therefore not be the solution, since there is clearly a residual problem even after controlling for operating efficiency.

Keywords: non-performing loans; banking reform; fixed effects

JEL Classification: G18, G21

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I. INTRODUCTION

The health of the financial sector is a matter of policy concern, most especially in developing countries where failure in financial intermediation can critically disrupt the development process. The link between the financial sector and growth has been the subject of a large literature, most recently reviewed by Khan and Senhadji, 2001, who conclude that while there is strong empirical evidence that robust financial markets support economic growth, there is very little work of operational relevance for improving the functioning of the financial sector.

This paper attempts to do that for commercial banks in India by performing a panel regression on the data now available over a five-year period ending in 1999-2000 on (definitionally unchanged) non-performing loans. The exercise is confined to 27 government-owned (PSU) banks,¹ so as to investigate the variations within a class that is homogenous on the ownership dimension. Ownership type is a well-known correlate of bank functioning everywhere (see Demirguc-Kunt and Huizinga, 1999, for 80 countries, and Sarkar *et.al.*, 1998, for India) and of the incidence of NPAs in the Indian environment in particular (Rajaraman *et.al.* 1999). Simple visual inspection of NPAs of banks shows that public sector banks in India carry some of the highest NPAs. The paradox is that public institutions have been least effective in performing the intermediation function.

The February 1999 Report of the M.S. Varma Working Group² classified public sector banks according to seven parameters covering solvency, operating efficiency

¹ Not all necessarily with 100 percent government ownership. A further Bill introduced in 2000 seeks to reduce the minimum shareholding by government to 33 percent.

² As summarised in Economic Survey 1999-2000.

and returns on assets, and identified three banks as weak: Indian Bank, UCO bank and United Bank of India. The Committee recommended recapitalisation subject to strict conditionalities relating to operational restructuring. Of the total capital injected into 19 PSU banks between 1992-93 and 1998-99 of Rs 20.45 thousand crore, 28 percent was injected into these three weak banks.³

For those banks identified through the panel exercise in this paper as having a problem beyond operating efficiency, recapitalisation even with operational restructuring may not be the answer.

Section II presents some background information on non-performing loans carried by commercial banks in India (termed non-performing assets, hence NPAs). Section III presents the model estimated and the results. Section IV concludes with implications of the findings for policy towards weak banks.

II. NPA LEVELS OF COMMERCIAL BANKS

The high level of NPAs has to some degree been an outcome of the lifting of financial suppression since the mid-eighties, further accelerated with economic reform in the early nineties, in conjunction with the usual maturity mismatch of banks. NPAs are an important post-facto indicator of failure in evaluating credit risk, although clearly there are a number of exogenous factors at work, such as the legal and procedural obstacles that remain to liquidation of loss-making enterprises. Box 1 shows some decline in average gross and net NPAs as percentages of gross and net total advances respectively across all commercial banks, from 1995-96, the first year from which definitional stability obtains following a process of phased tightening over the earlier nineties of the definition of what constitutes an NPA. Net NPAs are obtained after adjusting part payments received and kept in suspense accounts, and total bank provisioning.⁴ Definitional stability will be further disrupted in 2003-04, when the duration

³ Report on Trend and Progress of Banking in India 1999-2000: 70.

⁴ Net NPAs are obtained from gross NPAs after deduction of the following:

- i. balance in interest suspense account i.e. interest due but not received;
- ii. claims received from credit guarantors and kept in suspense account pending adjustment

of non-receipt of loan servicing for classification as non-performing will be reduced from two quarters to one.⁵

Box 1: All Commercial Banks		
	% NPA/advances	
	Gross	Net
End- March 1996	18.0%	8.9%
End-March 1997	15.7%	8.1%
End-March 1998	14.4%	7.3%
End-March 1999	14.7%	7.6%
End-March 2000	12.8%	6.8%

Source: Report on Trend and Progress of Banking in India, assorted issues.

A particular characteristic of NPAs in India is the extraordinarily wide cross-sectional variation between banks. Clearly there are factors at work other than the barriers to industrial liquidation which are economy-wide and impact on all banks uniformly. In an earlier paper (Rajaraman *et.al.* 1999), these inter-bank variations in 1996-97 were examined for 99 banks across the entire ownership spectrum, in terms of net NPAs alone, since the redefinition of NPAs was initially accompanied by a move to a net from a gross concept. Fortunately the gross figures are also now reported.⁶ The paper added to the conventional distinction between domestic and foreign ownership a further distinction between foreign banks by country of origin of dominant ownership, in order to test whether it is foreign ownership in and of itself, or the banking efficiency and technology correlates of the country of origin of the foreign bank, which determine NPA performance in the Indian environment. Foreign banks of Asian⁷ origin were no better than long established domestic privately owned banks, but foreign banks originating in Europe and the U.S. were found to have significantly lower NPAs. The practice, especially, in developing/emerging countries, of seeing foreign banks in a single category in terms of superiority of risk management techniques is surprisingly

- (for final settlement);
- iii. part payment received and kept in suspense account; and
- iv. total provisions held.

(Report on Trend and Progress of Banking in India 1996-97: 13).

⁵ RBI Annual Report 2001, reporting a policy announced on 19 April 2001.

⁶ Starting with the Report on Trend and Progress of Banks in India 1997-98.

robust (see for example Hahm and Mishkin, 2000; Goldstein and Turner, 1996). In terms of other ownership categories, new domestic privately owned banks also had significantly lower NPAs. Domestic public-sector banks were the only category with higher NPAs. The other major finding of that exercise was that after controlling for bank-specific characteristics such as ownership, adherence to prudential solvency norms, or operating efficiency, the region of operation of the bank as measured by branch presence as a percent of the national total mattered. For every percent increase in bank exposure in a cluster of northeastern and eastern states,⁸ there was a statistically significant⁹ increase in NPAs as a percent of total advances. Another cluster of the four southern states together with Goa, Delhi, Chandigarh, Punjab, Haryana and Gujarat showed a statistically significant¹⁰ decrease in percent NPAs for every percent increase in branch exposure. The limitation of that exercise, of course, was that credit exposure need not conform closely to branch exposure, although there should be a reasonably high correlation between the two. There has always been dissatisfaction about the low credit/deposit ratio in some regions, but clearly branch exposure would carry some local credit exposure as well. Were sub-nationally disaggregated indicators of performance for each bank available, this impact would be more transparently evident, but RBI bank-specific data are reported only in aggregate at national level. The importance of the operating environment has been highlighted by other empirical findings, most notably those of Demirguc-Kunt and Huizinga, 1998.

III. THE MODEL AND FINDINGS

The model estimated for the set of 27 PSU banks covering the five years 1996-96 to 1999-2000,¹¹ had the following general structure for estimation of fixed group and time-effects:

$$y_{it} = k + \alpha_i + \gamma_t + \beta x_{it} + \epsilon_{it}$$

7 Middle Eastern and East Asian origin.
 8 Assam, Manipur, Tripura, Meghalaya, Nagaland, Bihar, West Bengal and Orissa.
 9 Coefficient of 0.07.
 10 Coefficient of 0.03.
 11 Data sourced from Report on Trend and Progress of Banking in India, assorted issues.

where

y_{it} = % Gross (Net) NPA/Gross (Net) Advances; i^{th} bank, t^{th} year.

k = common intercept.

α_i = fixed group-effect intercept for i^{th} bank; $i=1, \dots, 27$.

γ_t = fixed time-effect intercept for t^{th} year; $t=1, \dots, 5$.

x_{it} = indicator of solvency or operating efficiency; i^{th} bank, t^{th} year.

ϵ_{it} = error term; i^{th} bank, t^{th} year.

Estimation was confined to an 'effects' model alone, using LIMDEP which routinely report the Hausman test for fixed versus random effects. A random coefficients model was not estimated, since the attempt is to capture variations across banks in NPA levels, after controlling for an underlying uniform impact upon NPAs of the bank-specific solvency or operating indicator.

Two runs were attempted, one with capital adequacy as the bank-specific indicator of solvency, the second with operating profit as a percent of working funds as the indicator of operating efficiency.¹² The only alternative measure of operating efficiency from among the published indicators available, the net intermediation margin, was not chosen because, with public ownership, an overstaffed bank will more readily squeeze operating profit than vary the intermediation margin. Operating profits do not deduct provisioning for bad loans.

There was no prior expectation that solvency would be a correlate of bank performance with respect to NPAs, but the run serves as a benchmark against which to assess the incremental explanatory value of operating efficiency. A word of justification is called for on a model which regresses a stock variable (percent NPA of total advances) on a flow variable like operating profits. The intent is to capture the response of the stock to variations over time and across banks in operating efficiency, rather than to assess the impact on increments to the NPA stock of concurrent operating profits, which would in any case suffer from simultaneity bias.

¹² This was estimated only over four years since data on operating profits were not available for

Results for gross NPAs are in table 1.¹³ The estimated coefficient of capital adequacy in the first run is not statistically significant but carries the expected sign. Thus, the fixed group effects in that run basically separate the banks into those carrying statistically significant higher or lower NPAs than the mean for the pool. These intercepts are listed in the table. Intercepts that were not statistically significant, are not given in the table, but the banks are listed. All the seven banks in the State Bank group can be seen to fall at the mean (for PSU banks).

There are also two significant time-effect coefficients, showing a rise in gross NPAs by 1.96 percent in 1996-97 (a year of sharp deceleration in non-agricultural growth), and a fall of 2.74 percent in 1999-2000.

The Hausman statistic had a large value, thus favouring the fixed effects model over random effects.

In the second run, the coefficient for operating profits at (-)2.40 carries the expected negative sign, and is statistically significant. The time-effects are identical to those in the first run in terms of year, and similar in terms of magnitude of coefficient. But the group effects differ.

Two banks with higher than mean NPAs carry insignificant intercepts after controlling for operating profits, clearly indicating that the high NPAs in this case are a correlate of low operating efficiency. But there are four banks with high positive and significant intercepts, even after controlling for operating efficiency. They are: Indian Bank; Allahabad Bank; United Bank of India; and Punjab and Sind Bank. In all cases, the intercept is lower with operating efficiency, thus showing that low operating efficiency explains some, though not all of the NPA stock. Policy implications for financial sector reform are examined in the concluding section of the paper.

1995-96.

¹³ NPAs are taken as a percent of total (gross/net) advances rather than as a percent of total assets. The former is a post-facto measure of failure to judge credit risk, whereas the latter is a measure of the

Among banks with lower than average NPAs, likewise, there is one explained by better operating efficiency, and four with negative intercepts even after controlling for operating efficiency. In two of these (Bank of India and Union Bank of India), the intercept actually becomes a larger negative number. These together with a set of three which carry negative intercepts only in the second run, constitute a set of banks with lower NPAs than warranted by operating efficiency.

Finally, table 2 compares the results for the second run in table 1 with net NPA regressed on operating efficiency. The set of four banks with positive gross NPA intercepts in table 1 after controlling for operating efficiency is reduced by one with net NPA (more than mean provisioning) and is increased by three (less than mean provisioning). Likewise, two of the seven banks with low gross NPA drop out of the net NPA list because of less than mean provisioning, and one gets added because of more than mean provisioning.

IV. CONCLUSIONS

The exercise reported in this paper groups banks (Box 2) with higher than average NPAs into those explained by poor operating efficiency, and those where the operational indicator does not suffice to explain the high level of NPAs and leaves an unexplained intercept shift. Two of the three weak banks identified by the Varma Committee, Indian Bank and United Bank of India, fall in this category. Recapitalisation of these banks with operational restructuring may therefore not be the solution, since there is clearly a residual problem even after controlling for operating efficiency. Box 2 also provides information on the dominant region of operation of each bank (20 percent or more of branch concentration). For banks operating in regions where there has been marked industrial decline, such as United Bank of India with its branch concentration in West Bengal, recapitalisation with operational structuring amounts to use of public funds with no discernible public purpose. Closure with liquidation of assets including real estate at market value should prove to be far more cost-effective even with full depositor protection.

threat to solvency posed by that misjudgement.

Box 2: Gross NPA and Operating Efficiency			
High NPA, explained by low operating efficiency	Regional presence (% branches)	Low NPA, explained by high operating efficiency	Regional presence (% branches)
Central Bank of India UCO Bank	- -	SB Patiala	PN: 49%
High NPA, even after controlling for operating efficiency		Low NPA, even after controlling for operating efficiency	
Indian Bank United Bank of India Allahabad Bank Punjab & Sind Bank	TN: 48% WB: 53% UP: 32% WB: 24% PN: 47%	Corporation Bank Bank of India Union Bank of India Oriental Bank of Commerce	KN: 37% MH: 24% UP: 21% UP: 25% PN: 22%
		Low NPA despite low operating efficiency	
		Indian Overseas Bank Syndicate Bank Andhra Bank	TN: 47% KN: 29% AN: 77%

Interestingly, the two banks in the first group fully explained by low operating efficiency do not display regional concentration. But the banks in the second group do, and two of them (Indian Bank; Punjab and Sind Bank) have marked branch concentration in states (Tamil Nadu and Punjab respectively) identified in the earlier paper in the cluster where NPAs were lower. Clearly the reasons for the high NPAs of these two banks cannot be blamed on exogenous environmental factors such as region of operation.

Given that all banks in this investigation were entirely government-owned until fairly recently, with to that extent a certain commonality of organisational structure, the composition of the residual bag of explanatory factors is an important area for further

investigation.

Box 3: Gross/Net NPA and Operating Efficiency	
<i>High NPA, both gross and net</i>	<i>Low NPA, both gross and net</i>
Indian Bank	Corporation Bank
United Bank of India	Oriental Bank of Commerce
Allahabad Bank	Indian Overseas Bank
	Syndicate Bank
	Andhra Bank
<i>High gross NPA, more than mean provisioning</i>	<i>Low gross NPA, less than mean provisioning</i>
Punjab & Sind Bank	Bank of India
	Union Bank of India
<i>Mean gross NPA, less than mean provisioning</i>	<i>Mean gross NPA, more than mean provisioning</i>
SB Hyderabad	Vijaya Bank
SB Mysore	
SB Indore	

The box also lists banks with lower than average NPAs grouped into those explained by high operating efficiency, and those where the level of operating efficiency leaves an unexplained (negative) residual. Comparing the regional concentration of these with high-NPA banks, there is clear scope for pair-wise comparative studies of banks in the same region of operation so as to identify what may be the organisational or other bank-specific factors accounting for their very different outcomes in terms of NPAs. Punjab and Sind Bank and Oriental Bank of Commerce constitute one such pair. Indian Bank and Indian Overseas Bank constitute another.

Gross NPA is the better indicator than net NPA of the quality of the loan portfolio, since it does not incorporate the endogenous provisioning response. Of the set of four banks with high gross NPA unaccounted for by operating efficiency, Punjab and Sind Bank drops out in terms of net NPA owing to higher than mean provisioning (see Box 3). Three with less than mean provisioning, SB Hyderabad, Mysore and Indore, are in the high category only when NPAs are taken net.

The fixed effects model carries better explanatory power than the random effects model, as tested by the Hausman statistic. Finally, all the results are relative to the mean for PSU banks, the pool used in this exercise, which as a group carry higher NPAs than all other ownership categories.

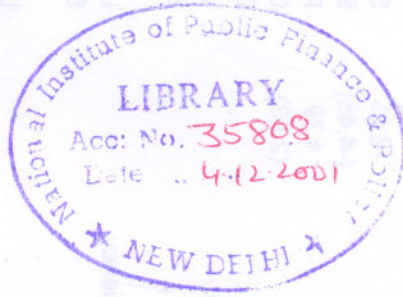


Table 1

Dependent variable	%Gr.NPA/Gr.Adv	%Gr.NPA/Gr.Adv	Dependent variable	%Gr.NPA/Gr.Adv	%Gr.NPA/Gr.Adv
Explanatory variable	Cap Adeq	%Opprof/W-funds	Explanatory variable	Cap Adeq	%Opprof/W-funds
No. of obs.	131	107			
Adj. R sq.	87.04	89.97	<i>Statistically insignificant bank intercepts</i>		
Slope coefficient	-0.15	-2.40	SBI		
t-value	(-1.22)	(-2.67)	SB Hyderabad		
Common intercept	17.92	20.17	SB Travancore		
t-value	(14.27)	(13.98)	SB Bikaner & Jaipur		
			SB Mysore		
Year intercepts			SB Saurashtra		
1999-00	-2.74	-2.05	SB Indore		
t-value	(-5.32)	(-4.45)	Bank of Baroda		
1996-97	1.96	1.39	Punjab National Bank		
t-value	(3.84)	(2.93)	Canara Bank		
			Dena Bank		
			Vijaya Bank		
			Bank of Maharashtra		
Bank intercepts					
High NPA, explained by poor operating efficiency			Low NPA, explained by better operating efficiency		
Central Bank of India	4.09		SB Patiala	-4.26	
	(3.28)			(-3.40)	
UCO Bank	6.87		Low NPA, even after controlling for operating efficiency		
	(5.33)		Corporation Bank	-8.36	-6.22
High NPA, even after controlling for operating efficiency				(-6.46)	(-3.16)
Indian Bank	19.84	16.80	Bank of India	-3.97	-4.67
	(5.94)	(6.89)		(-3.21)	(-3.43)
United Bank of India	16.77	12.63	Union Bank of India	-5.06	-5.40
	(13.06)	(6.71)		(-4.10)	(-3.91)
Allahabad Bank	5.72	4.93	Oriental Bank of Commerce	-9.47	-8.01
	(4.62)	(3.63)		(-6.67)	(-4.83)
Punjab & Sind Bank	8.13	6.08	Lower NPA than warranted by operating efficiency		
	(6.54)	(3.97)	Indian Overseas Bank		-4.59
					(-2.70)
			Syndicate Bank		-4.87
					(-3.04)
			Andhra Bank		-6.40
					(-4.72)

Table 2

Dependent variable	%Gr.NPA/Gr.Adv	%NetNPA/NetAdv	Dependent variable	%Gr.NPA/Gr.Adv	%NetNPA/NetAdv
Explanatory variable	%Opprof/W-funds	%Opprof/W-funds	Explanatory variable	%Opprof/W-funds	%Opprof/W-funds
No. of obs.	107	107	Statistically insignificant bank intercepts		
Adj. R sq.	89.97	87.71	SBI		
Slope coefficient	-2.40	-1.90	SB Patiala		
t-value	(-2.67)	(-3.30)	SB Travancore		
Common intercept	20.17	11.89	SB Bikaner & Jaipur		
t-value	(13.98)	(12.82)	SB Saurashtra		
Year intercepts			Bank of Baroda		
1999-00	-2.05	-0.82	Punjab National Bank		
t-value	(-4.45)	(-3.18)	Canara Bank		
1996-97	1.39	0.58	Central Bank of India		
t-value	(2.93)	-2.21	UCO Bank		
			Dena Bank		
			Bank of Maharashtra		
Bank intercepts			Low NPA, both gross and net		
High NPA, both gross and net			Corporation Bank	-6.22	-3.88
Indian Bank	16.80	10.04		(-3.16)	(-3.52)
	(6.89)	(7.38)	Oriental Bank of Commerce	-8.01	-2.67
United Bank of India	12.63	4.59		(-4.83)	(-2.88)
	(6.71)	(6.05)	Indian Overseas Bank	-4.59	-3.37
Allahabad Bank	4.93	3.24		(-2.70)	(-3.55)
	(3.63)	(3.08)	Syndicate Bank	-4.87	-5.26
High gross NPA, more than mean provisioning				(-3.04)	(-5.89)
Punjab & Sind Bank	6.08		Andhra Bank	-5.40	-5.00
	(3.97)			(-4.72)	(-6.61)
Mean gross NPA, less than mean provisioning			Low gross NPA, less than mean provisioning		
SB Hyderabad		2.65	Bank of India	-4.67	
		(2.67)		(-3.43)	
SB Mysore		2.24	Union Bank of India	-5.40	
		(2.71)		(-3.91)	
SB Indore		2.57	Mean gross NPA, more than mean provisioning		
		(2.85)	Vijaya Bank		-2.53
					(-2.91)

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