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Evaluation of riskiness of Indian Banks and probability of book value insolvency

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Abstract

Recently, a lot of questions were raised about the financial health of commercial banks in India. This paper analyzes the Indian banks' riskiness and the probability of book-value insolvency under the framework developed by Hannan and Hanweck (1988). A risk index, known as Z score, for Global Trust Bank that became insolvent in 2004 suggests that the framework developed by Hannan and Hanweck (1988) is also relevant in the Indian context. For a random sample of 15 Indian Banks (public & private sector), we determine the riskiness/probability of book value insolvency over the years and also carry out a relative comparison between public and private sector banks in India. Results obtained in the study show that the probability of book value insolvency of Indian Banks has reduced over years and the probability of book value insolvency is lower in case of public sector banks in comparison to private sector banks.

1. Introduction

The last decade saw many positive developments in the Indian banking sector. The policy makers and financial sector regulatory entities have made several notable efforts to improve regulation in the sector. The sector now compares favourably with banking sectors in the region on metrics like growth, profitability and non-performing assets (NPAs). However, improved regulations, innovation, growth and value creation in the sector remain limited to a small part of it. The cost of banking intermediation in India is higher and bank penetration is far lower than in other markets. India's banking industry must strengthen itself significantly if it has to support the modern and vibrant economy which India aspires to be. In this paper, we have tried to evaluate the riskiness of Indian Banks, a year wise and a relative comparison between Pubic and Private sector banks in India using the risk index suggested by Hannan and Hanweck (1988).

This measure of insolvency risk i.e. Z statistic incorporates data on a bank's expected profits, the likelihood that these profits will be realized, and a bank's capital base. The Z statistic attempts to capture the likelihood of a bank's earnings in a given year becoming low enough to exhaust the bank's capital base and, thus, the likelihood of the bank becoming insolvent. Specifically, Z is defined as:

$$Z = \frac{ROA + (Capital\ to\ Asset\ Ratio)}{S.D.\ of\ ROA}$$

Where:

Return on Assets (ROA) = Net Income/ Average of Total Assets.

Capital-to-Asset Ratio (CAP) = Equity/ Total Assets.

Higher values of Z imply lower insolvency risk because higher values of Z correspond with higher levels of equity relative to a potential shock to the earnings of a bank. Thus, banks with risky loan portfolios can maintain a low risk of insolvency as long as they are adequately capitalized. The risk index suggested by Hannan and Hanweck (1988) was used by Liang and Savage (1990), Eisenbeis and Kwast (1991), Sinkey and Nash (1993), and Sinkey and Blasko (2001)

1.1. Z statistic for individual banks.

The bank's average return on assets(ROA) over the years 2004 through 2008 period proxies for the bank's expected earnings and the standard deviation of each bank's ROA proxies for the riskiness of its earnings. The bank's capital-to-asset ratio is measured as of March 2008. Unfortunately, using this methodology yields Z scores that are implausibly high and, thus, failure probabilities that are implausibly low, since insolvency probabilities are inversely related to Z scores. However, if the ordinal ranking of the banks in terms of their expected return/riskiness trade-off is captured during the 2004 through 2008 time period, even though the level of individual Z scores provides poor estimates of absolute insolvency risk, individual Z scores can still be used to examine relative insolvency risk.

1.2. Z statistic for a group of banks:

Expected earnings for a group are proxied by averaging individual banks' ROA between 2004 and 2008 for all banks in a particular group (failed/survived). Earnings riskiness for each group is proxied by the standard deviation of this distribution of ROAs. The capital-to-asset ratio is the group average as of the end of 2008.

John S. Jordan (1998) found that the banks that failed had an average individual Z score of 21.22 (the median was 16.76) while survivors had an average score of 37.62 (the median was 29.56). The difference in means is significant at the 5 percent level. Group Z scores provide similar results. The group of banks that went on to fail had a composite Z score of 8.71 while the composite score for the surviving banks was 13.33.

2. The Case of Global Trust Bank

Bankruptcy is a situation in which an organization falls short of cash to repay its debt or has liabilities that exceed its assets.

The Indian Company Law Board treats insolvency in a slightly different manner. When over 50 per cent of a company's net worth is washed away, making it impossible to repay debts, the company declares itself potentially 'sick' and BIFR (Board for Industrial and Financial Reconstruction) begins the process of finding out if the company can be rehabilitated.

A case in point is Global Trust Bank. The bank became sick with huge bad debts in 2004. However, the RBI managed the crisis by merging it with Oriental Bank of Commerce.

Now, when we apply the framework developed by Hannan and Hanweck to GTB for the year 2003, we get the Z-statistic for GTB as 1.93, which is much less than the survivors Z-score found during the study conducted on the Banks in New England. Hence the framework is relevant in the current scenario.

Year	2003
ROA	0.004601
CAP	0.034901
Standard Deviation (ROA)	0.02041
Z	1.935419

Table1. Case of Global Trust Bank

3. Measuring the Risk Index for Indian Banks

If we want to capture the overall risk of a bank, the variability of ROA provides a comprehensive measure that reflects not only credit risk but also interest rate risk, liquidity risk and any other risk that is realized in bank earnings. The standard deviation of ROA is a good measure of the variability of ROA.

Thus, the Z-statistic is a function of the normal profit margin of the bank, the variation in that profit margin, and the equity capital available to absorb that variation. In effect, the Z-ratio measures the number of standard deviations by which ROA would have to decline before the book equity capital of the bank would be exhausted. The relationship between the Z-ratio and the probability of insolvency is an inverse one, with higher Z-ratios indicating a lower probability of insolvency. If the assumption is made that the potential ROAs of the business are normally distributed, then the one-period probability of insolvency can be calculated as a function of the Z-ratio:

$$P=1/[2Z^2]$$

However, empirical studies indicate that ROAs are not normally distributed, but instead are "fat-tailed," so that the actual probability of insolvency may be greater than that calculated using the assumption of normality. Moreover, this one-period probability may understate the true probability of insolvency because it measures the risk of a single-period loss being so large it wipes out equity. In reality, insolvency often occurs after a sequence of smaller losses occurring over several periods, indicating that serial correlation between negative shocks may exist.

Year	2006	2007	2008
CAP	0.067845	0.06090309	0.076489
E(ROA)	0.008694	0.00878688	0.009143
Standard Deviation (ROA)	0.006402	0.0054265	0.004814
Z	11.95607	12.842528	17.78941
Probability of book value insolvency (P)	0.003497788	0.00303158	0.00158

Table 2. Z statistic & probability of book value insolvency for Indian Banks over years

A random sample of 15 banks were chosen consisting of 6 public sector banks and 9 private sector banks. Table 2. shows that with relatively strong capital position, stable earnings, and accepted E(ROA), the Z – statictic has increased over years and hence the probability of book-value insolvency has decreased.

It can be observed from table 2. that the group score obtained for various years are much higher than the Z statistic obtained for banks that failed(obtained from the studies conducted on the banks in New England). Also, the two measures of risk, the risk index and the standard deviation of ROA indicate that Indian banks became safer in 2008 as compared to 2007 or 2006.

The Z statistic was also calculated for the two groups of Public and Private sector banks separately for the year 2008. Table 3 shows the results obtained for the same.

Year: 2008	Public Sector Banks	Private Sector Banks
CAP	0.0573255	0.089264111
ROA	0.010486681	0.008246557
Standard Deviation(ROA)	0.001664097	0.006046488
Z	40.75013312	16.12682808
P	0.000301101	0.001922525

Table 3. Z statistic& probability of book value insolvency for Public & Private sector banks

From table 3 it can be observed that the Z statistics obtained for the group for the group of public and private sector banks are much higher than the Z values obtained for banks that failed (obtained from the studies conducted on the banks in New England). Also, from the table, it can be observed that the Z statistic obtained for Public sector banks are much higher than that obtained for Private sector banks indicating that Public sector banks are safer as compared to Private banks and the probability of book value insolvency is lower.

4. Conclusion

Financial sector reforms were initiated as part of overall economic reforms in the country and wide ranging reforms covering industry, trade, taxation, external sector, banking and financial markets have been carried out since mid 1991. A decade of economic and financial sector reforms has strengthened the fundamentals of the Indian economy and transformed the operating environment for banks and financial institutions in the country. The sustained and gradual pace of reforms has helped avoid any crisis and has actually fuelled growth. The most significant achievement of the financial sector reforms has been the marked improvement in the financial health of commercial banks in terms of capital adequacy, profitability and asset quality as also greater attention to risk management and this improvement is visible in the form of increasing Z-statistic values obtained over years.

Some of the major reform initiatives in the last decade that have changed the face of the Indian banking and financial sector are:

- Interest rate deregulation.

- Adoption of prudential norms in terms of capital adequacy, asset classification, income recognition, provisioning, exposure limits, investment fluctuation reserve, etc.

- Lowering of reserve requirements (SLR and CRR), thus releasing more lendable resources which banks can deploy profitably.

- Government equity in banks has been reduced and strong banks have been allowed to access the capital market for raising additional capital.

- Banks now enjoy greater operational freedom

- Banks have been allowed to operate in new areas like bank financing: insurance, infrastructure financing, leasing, gold banking, besides of course investment banking, asset management, factoring, etc.

- New instruments have been introduced for greater flexibility and better risk management

- Several new institutions have been set up including the National Securities Depositories Ltd., Central Depositories Services Ltd. and the Clearing Corporation of India Ltd.

- Limits for investment in overseas markets by banks, mutual funds and corporates have been liberalised. Full convertibility for deposit schemes of NRIs introduced.

• Adoption of global standards. Prudential norms for capital adequacy, asset classification, income recognition and provisioning are now close to global standards. RBI has introduced Risk Based Supervision of banks (against the traditional transaction based approach). Best international practices in accounting systems, corporate governance, payment and settlement systems, etc. are being adopted.

• RBI guidelines have been issued for putting in place risk management systems in banks. Risk Management Committees in banks address credit risk, market risk and operational risk. Banks have specialised committees to measure and monitor various risks and have been upgrading their risk management skills and systems.

All these measure have proved to be fruitful. Results obtained from the study conducted have shown that the probability of book value insolvency has reduced over years and the the probability of book value insolvency is lower in case of public sector banks in comparison to private sector banks in India.

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Appendix

Table A1: Table shows consolidated results for the randomly selected group of Banks.

Banks	2006	2006	2007	2007	2008	2008
	CAP	ROA	CAP	ROA	CAP	ROA
Punjab National Bank	0.064546	0.010637	0.064249	0.010348563	0.061895	0.0103377
Bank of Baroda	0.06918	0.008602	0.060427	0.008243882	0.061492	0.0081936
Indian Overseas Bank	0.05353	0.012284	0.048511	0.012277591	0.04768	0.012183
Federal Bank	0.060552	0.008428	0.059873	0.009237702	0.120767	0.0096546
IndusInd Bank	0.069335	0.014928	0.068191	0.014543322	0.077135	0.0144032
State Bank of Mysore	0.048363	0.012163	0.042519	0.011443279	0.041664	0.0110829
HDFC Bank	0.072097	0.012277	0.070511	0.012335399	0.086331	0.0122564
Bank of Rajasthan	0.036804	0.004513	0.037016	0.005669631	0.059398	0.0059937
Centurion Bank of Punjab	0.127945	-0.01056	0.082188	-0.00736005	0.075535	-0.0045746
ING Vysya Bank	0.060815	0.000841	0.057205	0.001783488	0.060128	0.0024961
Allahabad Bank	0.065806	0.012708	0.066163	0.012302648	0.063265	0.0121926
ICICI Bank	0.089725	0.011712	0.071559	0.011040261	0.117111	0.0130728
Axis Bank	0.058025	0.010048	0.046442	0.009784708	0.080041	0.0097826
Kotak Mahindra Bank	0.084971	0.012729	0.083449	0.011321709	0.126931	0.011134
State Bank of India	0.055974	0.009103	0.055243	0.008831108	0.067957	0.0089301
Average Values	0.067845	0.008694	0.060903	0.008786883	0.07648866	0.0091426
Standard Deviation	0.021229	0.006402	0.013568	0.005426499	0.02612330	0.0048136
Z Statistic		11.95607		12.84252797		17.789413

Table A2: Table shows consolidated results for Public Sector Banks in India.

	ROA	CAP
Public Sector Banks		
Punjab National Bank	0.010337695	0.061895
Bank of Baroda	0.008193684	0.061492
Indian Overseas Bank	0.012183	0.04768
State Bank of Mysore	0.011082974	0.041664
Allahabad Bank	0.0121926	0.063265
State Bank of India	0.008930133	0.067957
Average	0.010486681	0.0573255
Standard Deviation	0.001664097	0.010245631
Z- Statistic	40.75013312	

Table A3: Table shows consolidated results for Private Sector Banks in India.

	ROA	CAP
Private Sector Banks		
Federal Bank	0.009654636	0.120767
IndusInd Bank	0.014403209	0.077135
HDFC Bank	0.0122564	0.086331
Bank of Rajasthan	0.005993734	0.059398
Centurion Bank of Punjab	-0.004574603	0.075535
ING Vysya Bank	0.002496176	0.060128
ICICI Bank	0.013072864	0.117111
Axis Bank	0.009782596	0.080041
Kotak Mahindra Bank	0.011134	0.126931
Average	0.008246557	0.089264111
Standard Deviation	0.006046488	0.025876742
Z- Statistic	16.12682808	