Analysing Soundness and Efficiency of Banking in India

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Abstract - **The objectives of this paper are to analyse the soundness and to measure the efficiency of 12 public and private sector banks based on market cap. DEA results exhibit that among the public sector banks, the performance of Bank of India, Canara Bank and Punjab National Bank got dampened in the last two years under study whereas among the private sector banks, except Axis Bank which was not found to be satisfactory at all, the remaining private sector banks shows marked consistency at their efficiency level during the period under study.**

Key Words: CAMEL approach, DEA Approach, Public and Private Sector Banks, Financial Stability

1. INTRODUCTION

The Indian Banking Sector has been the backbone of the Indian economy over the past few decades, helping it survive various national and worldwide economic shocks and meltdowns. It is one of the healthiest performers in the world banking industry seeing tremendous competitiveness, growth, efficiency, profitability and soundness, especially in the recent years. Various aspects of the Indian Banking Sector have been highlighted in recent studies. Many of these refer to Convergence and Soundness of the sector. There has been a lot of literature covering both of these aspects and, to a great extent, establishing different relationships between these and key macroeconomic and financial variables. Convergence, as regards to Indian Banking, could refer to the convergence between various categories of banks including Public Sector Banks, Old and New Private Sector Banks, Foreign Banks etc. or to the convergence of the existing accounting standards in the country with the internationally accepted accounting standards (IFRS). In the former case, various studies based on different econometrics parameters have been conducted to show a pattern that is emerging in this sector where increased privatization and competitiveness are leading all kinds of banks to an optimum performance and efficiency level, or in other words, banks are converging to an optimum efficiency level. As regards to the latter, the RBI and the Institute of Chartered Accountants of India (ICAI) have decided to converge the current Generally Accepted Accounting Principles (GAAP) and the International Accounting Standards (IAS) with the now internationally accepted and widely implemented International Financial Accounting Standards (IFRS) for various different reasons, the most important being India's increasing participation in global markets.

Soundness is a key factor in any financial sector. One of the major measures of economic development and financial growth of a country has been the soundness of it banks. Soundness of the banking sector is synonymous with efficiency, productivity, profitability, stability and a shock free environment. Achieving stability in banking is only the beginning of a sound banking system. The main goal of banks today is to maintain stability and make sure they are impervious to external shocks while at the same time being internally sound and sensible. Hence, it is important to measure soundness across various banks in the country, identify the weaker sections of the banking sector, devise appropriate strategies and policies to lift these sections and eventually create an environment that leads banks to converge in soundness and result in a consistently stable system. This study analyzes the various aspects of convergence and soundness in the Indian Banking sector, computes various factors affecting and determining the two using econometric analysis and provides policy suggestions on tackling obstacles encountered while achieving soundness and convergence and how to maintain stability for longer periods.

2. REVIEW OF LITERATURE

The paper by Prasad et al (2011)[1] along with that by Chowdhury (2011)[2] deals with financial soundness in the Indian banking sector using the CAMEL model. Both papers have selected certain PSBs and NPBs on some criteria and both suggest that the Indian Banking is sound overall, but the authors themselves only rank various banks in order of soundness while not making a conclusive statement about soundness of the banking sector as a whole. On similar lines, Manoj P. K. (2010)[3] has written a paper on application of 'CAMEL' approach to OPBs with special reference to Kerala OPBs. His conclusion is that OPBs lag the most as regards to soundness in banking and remedial measures be quickly adopted by these, but the paper doesn't describe the method to

achieve better soundness. Reddy and Prasad(2011)[4] have applied the 'CAMEL' approach to Rural Regional banks in India and used hypothesis testing aided by the t-statistic to distinguish between two classes of these banks. However, this could have been extended to other banks in the country. Papers by Gupta and Jain(2010)[5],Singh(2007)[6],Satoshi Shimizu(2010)[7] and Ghosh and Ghosh(2011)[8]use parameters like Return on Assets, NPA Ratio, and Capital Adequacy Ratio etc. to measure soundness of Indian banks and compare with that of the world. (1), (2) & (4) highlight a lower degree of leverage, higher stability in RoA and decreasing NPA ratios leading to soundness in Indian banking. Most of (1) & (4) deal with NPAs without highlighting further soundness estimators. (2), (3) and papers by Raghavan (2003)[9]and Sharma (2009)[10] talk about Basel-II analysis associated with risk management and explain its relationship with soundness, with the main focus on a higher CRAR for better soundness. Sen Gupta's(2011)[11]paper deals with the introduction of Basel III norms post the 2008 financial crisis, the challenges associated with their implementation but doesn't specify how much of Basel III should India adopt. He concludes that maintenance of financial stability requires constant vigilance and proactive measures but doesn't delve deep into the procedure required for the same. The paper by Gupta et al. (2008) [12]and another by Das et. al (2005) [13] examine the performance of the Indian Banking Sector using the non- parametric frontier: DEA – Data Envelopment Analysis and further finding the productive efficiency using the TOBIT model. Through these, it was found that the efficiency increase in the private bank sector has come from the small banks. Using Capital Adequacy Ratio analysis, the paper finds that an increase in CAR results in higher productive efficiency which stems out of high profitability of banks and thus better soundness.

Paper by Shahchera and Jouzdani (2011)[14] investigates the impact of regulation on sound banking. The authors measure the Z-score of soundness and suggest more transparency and better information exchange for sound banking. They also prove the ∩ shape relationship between regulation of banking and financial soundness. The paper by Ghosh (2010)[15]analyses the performance of the previously owned state-owned banks after the partial privatization. Privatization improves bank soundness, enhances profitability and efficiency. Government ownership has been empirically proven to be detrimental to growth. It was synonymous to higher spread, lower resources to lend and a low activity on the stock market. Apart from the above measures, the paper by Shirai (2001)[16], highlights the impact of diversification of banking activities. It dilutes the impact of direct lending and thus enhances the soundness by encouraging the banks to function properly. Goyal(2010)[17] in his paper analyses the various risk management measures and strategies in place in India owing to increase in competition, deregulation, innovative financial instruments and delivery channels. Market discipline improves safety and soundness in banks and financial systems. Das (2010)[18], in his paper analyses that, while the profitability of all banks went up, the profitability of foreign banks was higher. The main aim of these reforms was to enhance the soundness and this was seen through credit deposit ratios; wherein a higher ratio depicted greater soundness. The asset quality was indicative of the structural soundness of the banks which was higher in PSBs whereas the financial soundness in terms of profitability was higher for Pvt. Sector banks (ROA and ROE). The paper by Chaudhry and Singh (2012)[19] analyzes the impact of the financial reforms of 1991 on the increase in soundness of Indian Banking through its impact on the asset quality. The key players to ensure this soundness are again, risk management, NPA levels, effective cost management and financial inclusion. In another paper, Ghosh (2010)[20] examines the interplay between credit growth bank soundness and financial fragility in Indian banks. The soundness of banks is measured by their distance to default. Loan growth is often directly associated with soundness but and an extension could weaken bank soundness. Also high growth in the private sector credit augments bank soundness. The paper by Santha et. al (2006)[21] highlights the importance soundness on the economic development of a country. It draws a direct relation between the integrity system, the capacity to innovate and the soundness of the banks. It throws light on the importance of intellectual capital and infrastructure amongst the other factors. Due to variation in the drivers for soundness, the gap in soundness between developing, UDCs and developed countries is wide. Empirical analysis using OLS show that there is a positive yet insignificant relationship between infrastructure and intellectual capital and soundness, while it is significant with regards to institutions and integrity.

3. METHODOLOGY OF THE STUDY

(A)CAMEL Analysis

To look at the financial soundness and infer about convergence of the commercial banks operating in India we use a very simplified approach using internationally accepted CAMEL rating parameters. CAMELS is an acronym for six measures (capital adequacy, assets quality, management soundness, earnings, liquidity, and sensitivity to market risk) (Hilbers et al 2000)[22]. In this analysis the six indicators which reflect the soundness of the institution framework are considered. Twelve commercial banks were selected purposively for the study. The banks selected for the purpose for the study are traded in National Stock Exchange and are part of CNX

bank Index. CNX Bank Index is an index comprised of the most liquid and large capitalized Indian Banking stocks. It provides investors and market intermediaries with a benchmark that captures the capital market performance of the Indian banks.

The banks selected for the purpose of the study are Axis Bank Ltd. Bank of Baroda(BOB), Bank of India(BOI), Canara Bank, HDFC Bank Ltd (HDFC),ICICI Bank Ltd(ICICI),IDBI Bank Ltd(IDBI),Kotak Mahindra Bank Ltd(KMB), Oriental Bank of Commerce(OBC), Punjab National Bank(PNB), State Bank of India(SBI) and Union Bank of India(Union Bank). Once soundness across banks is determined using the CAMEL model, inferences can be drawn regarding convergence across these banks based on the model. The ratios depicting the CAMEL parameters were calculated based on the publicly available information published at Reserve Bank of India, Indian Bankers' Association and Moneycontrol.com. The paper referred to for further details, analysis and data for the year 2011.The CAMEL parameters are discussed in the following section

(a). Capital Adequacy Ratio

Capital adequacy ratios ("CAR") are a measure of the amount of a bank's core capital expressed as a percentage of its risk-weighted asset. Capital adequacy ratio is defined as

CAR = (Tier 1 Capital + Tier 2 Capital) / Risk weighted Assets

TIER 1 CAPITAL - (paid up capital + statutory reserves + disclosed free reserves) - (equity investments in subsidiary + intangible assets + current &b/f losses)

TIER 2 CAPITAL -A) Undisclosed Reserves, B)General Loss reserves, C) hybrid debt capital instruments and subordinated debts where Risk can either be weighted assets (a) or the respective national regulator's minimum total capital requirement. If using risk weighted assets,

CAR = [(T_1 + T_2) / a] ≥ 10%

The percent threshold varies from bank to bank (10% in this case, a common requirement for regulators conforming to the Basel Accords) is set by the national banking regulator of different countries. Two types of capital are measured: tier one capital (T1 above), which can absorb losses without a bank being required to cease trading, and tier two capital (T2 above), which can absorb losses in the event of a winding-up and so provides a lesser degree of protection to depositors.

(b). Asset Quality

To account for the extent of Non Performing Asset in the portfolios of the banks and the extent of damage this particular asset class can have on the financial performance the following ratio is considered for the purpose of analysis.

Net NPA to Net Advances: The ratio portrays the quality of the asset class in the portfolio and the also the extent of deterioration of the quality of the asset portfolio. This dimension of CAMEL analysis conveys the portfolio risk the bank is subjected to and the effects it could have in the overall performance of the bank.

(c). Management Quality

The management dimension in CAMEL analysis has assumed much important position like never before. To capture the possible dynamics of management efficiency affecting the financial performance of the banks the following ratios are considered.

- Market Value to Equity Capital
- Total Advances to Total Deposits
- Business Per Employee
- Profit Per Employee

(d). Earnings Quality

Banks depend on their strong capability of earnings for performing the activities like funding dividends, maintaining adequate capital levels, providing for opportunities of investment for bank to grow, strategies for engaging in new activities and maintaining the competitive outlook.

However apart from the sources of earning, the following dimensions also decide significantly the financial performance of the banks.

- Level, trend, and stability of earnings
- Quality and sources of earnings
- Ability to augment capital through retained earnings
- Exposure to market risks
- Provisions for loan losses

Keeping in purview the above mentioned dynamics the following ratios in the dimension of earning ability of the banks to measure financial performance are considered.

- Operating profit by Average working funds
- Net profit to average assets

- Interest income to total income
- Non Interest income to total income

(e). Liquidity

Liquidity management in banks has assumed prime importance due to competitive pressure and the easy flow of foreign capital in the domestic markets. The impact of liquidity crisis in the banks can adversely impact the financial performance of the banks. Inability of the banks to manage its short term liquidity liabilities and loan commitments can adversely impact the performance of the banks by substantially increasing its cost of fund and over exposure to unrated asset category. Also the cash flow from principal and interest payments could vary due to the types of loans on the balance sheet impacting the liquidity position.

To capture the impact of liquidity on the financial performance of the banks two ratios are considered.

- Liquid assets to total assets
- Liquid asset to total deposit

Based on the values of the ratios the selected banks will be ranked. Higher average value of the ratios gets ranked higher. The best ratio gets rank one followed up to rank twelve with an interval of one. In case of tie the average rank is assigned to the banks. All the ratios having higher value get higher rank whereas the ratio Net NPA to Total Asset gets the rank in reverse order. Higher Net NPA to Total Asset ratio attracts lower rank as well.

(B) DEA Analyses

The focus of the paper is also to assess the efficiency of the select banks. There are two approaches for determining efficiency of a firm: parametric (econometric) and non-parametric (based on mathematical programming). The parametric approach is based on the underlying relationship between the parameter under study and various observed independent variables. It, therefore, requires a specific pre-specified function form of the production or cost function. Non-parametric approaches have the benefit of not assuming a particular functional form/shape for the frontier; however they do not provide a general relationship (equation) relating output and input.

Data envelopment analysis (DEA) is a nonparametric method in operations research and economics for the estimation of production frontiers. It is used to empirically measure productive efficiency of decision making units (or DMUs). It is a very powerful service management and benchmarking technique originally developed by Chames, Cooper and Rhodes (1978)[23] to evaluate nonprofit and public sector organizations. DEA compares service units considering all resources used and services provided, and identify the most efficient units or best practice units (branches, departments, individuals) and the inefficient units in which real efficiency improvements are possible(Rajput and Gupta, 2011)[24]. The primary elements in a DEA study are a set of *decision-making units* (DMUs), along with their measured inputs and outputs.

4. RESULTS

The overall ranking of the banks considering all the sub criteria rankings under CAMEL analysis over the eleven years period (2000-2011) is presented in the Table 1-6. The group rankings of all the banks considered for the purpose of study is taken and averaged out to reach at the overall grand ranking (Table 6). HDFC is ranked first under the CAMEL analysis followed by ICICI. Axis Bank occupied the third position. The fourth position is occupied by IDBI and KMB jointly while Bank of Baroda and PNB follow. The last position under CAMEL analysis is occupied by Union bank amongst all the selected banks during the year 2000-2011.

Table 1-Capital Adequacy Parameter -Group Ranking

	Axis	BOB	Canara	BOI	HDFC	ICICI	IDBI	KMB	Oriental	PNB	SBI	UBI
Capital adequacy ratio Tier I	9	5	7	11	4	3	2	1	10	8	6	12
Advances to total assets ratio	10	6	4	2	12	8	1	11	7	5	9	3
Average	9.5	5.5	5.5	6.5	8	5.5	1.5	6	8.5	6.5	7.5	7.5
Rank	12	2.33	2.33	6	10	2.33	1	5	11	6	8.5	8.5

Table 2-Asset Quality Parameter Group Ranking

	Axis	BOB	Canara	BOI	HDFC	ICICI	IDBI	KMB	Oriental	PNB	SBI	UBI
Net NPA to Net Advances (%)	4	8	6	11	1	5	12	2	3	7	10	9

Table 3-Management Quality Parameter Group Ranking

	Axis	BOB	Canara	BOI	HDFC	ICICI	IDBI	KMB	Oriental	PNB	SBI	UBI
Market value to equity capital	4	7	8	10	2	3	12	6	9	5	1	11
Total Advances to Total Deposits	12	9	7	4	10	3	1	2	11	8	6	5
Business Per Employee	2	6	7	8	4	3	1	12	5	10	11	9
Profit per Employee	3	9	10	7	5	2	1	6	8	4	12	10
Average	5.3	7.8	8.0	7.3	5.3	2.8	3.8	6.5	8.3	6.8	7.5	8.8
Rank	3.5	9	10	7	3.5	1	2	5	11	6	8	12

Table 4-Earnings Quality Parameter Group Ranking

	Axis	BOB	Canara	BOI	HDFC	ICICI	IDBI	KMB	Oriental	PNB	SBI	UBI
Operating profit by Average working funds	3	9	7	11	1	6	12	2	4	5	10	8
Net profit to average assets	3	9	7	11	2	6	12	1	5	4	10	8
Interest income to total income	10	5	7	6	9	11	3	12	1	4	8	2
Non-Interest income to total income	8	6	7	4	2	10	1	12	9	5	11	12
Average	6	7.25	7	8	3.5	8.25	7	6.75	4.75	4.5	9.75	7.5
Rank	4	8	6	10	1	11	6	5	3	2	12	9

Table 5-Liquidity Parameter Group Ranking

	Axis	BOB	Canara	BOI	HDFC	ICICI	IDBI	KMB	Oriental	PNB	SBI	UBI
Liquid assets to total assets	2	1	5	7	4	6	12	11	8	9	3	10
Liquid asset to total deposit	6	7	8	2	5	3	1	10	9	11	4	12
Average	4	4	6.5	4.5	4.5	4.5	6.5	10.5	8.5	10	3.5	11
Rank	2.5	2.5	7	4.33	4.33	4.33	7	11	9	10	1	12

Table 6-Overall Rankings Based On the Camel Parameter

	Axis	BOB	Canara	BOI	HDFC	ICICI	IDBI	KMB	Oriental	PNB	SBI	UBI
Capital Adequacy Parameter - Group Ranking	12	2.33	2.33	6	10	2.33	1	5	11	6	8.5	8.5
Asset Quality Parameter Group Ranking	4	8	6	11	1	5	12	2	3	7	10	9
Management Quality Parameter Group Ranking	3.5	9	10	7	3.5	1	2	5	11	6	8	12
Earnings Quality Parameter Group Ranking	4	8	6	10	1	11	6	5	3	2	12	9
Liquidity Parameter Group Ranking	2.5	2.5	7	4.33	4.33	4.33	7	11	9	10	1	12
Average	5.20	5.97	6.27	7.67	3.97	4.73	5.60	5.60	7.40	6.20	7.90	10.10
Rank	3	6	7	10	1	2	4	5	8	9	11	12

Source: (1) Reserve Bank of India (http://dbie.rbi.org.in/DBIE/dbie.rbi?site=home)
(2) Indian Banks' Association (http://www.iba.org.in/)
(3) Moneycontrol.com: India's No.1 Financial Portal (http://atww.moneycontrol.com/stocksmarketsindia/)
Note: Estimated by the authors

The study has measured the efficiency level of 12 selected banks operating in India during the recent three years from 2010-12 by assessing the efficiency scores and to observe the relative efficiency of the banks using DEA analysis. All the CRS (output), VRS (output) and scale efficiency scores of the banks are given in Table 7.

Table 7 shows the technical efficiency scores for all the 12 DMUs. Here what we found that among the public sector banks, the performance of Bank of India, Canara Bank and Punjab National Bank got dampened in the last two years under study whereas among the private sector banks, the performance of Axis Bank was not found to be satisfactory during the period under study. Moreover, the performance of majority of private sector banks was impressive, but on the other hand, such trend could not be observed in the case of most of the public sector banks.

Table 7: Efficiency Scores of Selected Banks (using DEA)

	2010				
	Efficiency scores	Scale efficiencies	Returns-to-scale	CCR score	NIRS score
BOB	1.0000	1.0000	constant	1.0000	1.0000
BOI	0.9930	1.0000	increasing	0.9929	0.9929
Canara	1.0000	1.0000	constant	1.0000	1.0000
Oriental	1.0000	1.0000	constant	1.0000	1.0000
PNB	1.0000	1.0000	constant	1.0000	1.0000
UBI	0.9889	0.9690	decreasing	0.9583	0.9889
SBI	1.0000	0.9990	decreasing	0.9990	1.0000
IDBI	1.0000	1.0000	constant	1.0000	1.0000
Axis	1.0000	0.9257	decreasing	0.9257	1.0000
HDFC	1.0000	1.0000	constant	1.0000	1.0000
ICICI	1.0000	1.0000	constant	1.0000	1.0000
KMB	1.0000	1.0000	constant	1.0000	1.0000

	2011				
	Efficiency scores	Scale efficiencies	Returns-to-scale	CCR score	NIRS score
BOB	1.0000	1.0000	constant	1.0000	1.0000
BOI	0.9002	0.9977	decreasing	0.8982	0.9002
Canara	1.0000	0.9434	decreasing	0.9434	1.0000
Oriental	1.0000	0.9424	increasing	0.9424	0.9424
PNB	1.0000	0.9764	decreasing	0.9764	1.0000
UBI	0.9543	0.9994	increasing	0.9537	0.9537
SBI	1.0000	1.0000	constant	1.0000	1.0000
IDBI	1.0000	1.0000	constant	1.0000	1.0000
Axis	1.0000	0.8821	decreasing	0.8821	1.0000
HDFC	1.0000	1.0000	constant	1.0000	1.0000
ICICI	1.0000	1.0000	constant	1.0000	1.0000
KMB	1.0000	1.0000	constant	1.0000	1.0000

	2012				
	Efficiency scores	Scale efficiencies	Returns-to-scale	CCR score	NIRS score
BOB	1.0000	1.0000	constant	1.0000	1.0000
BOI	0.9987	0.9955	decreasing	0.9942	0.9987
Canara	1.0000	0.9669	decreasing	0.9669	1.0000
Oriental	1.0000	1.0000	constant	1.0000	1.0000
PNB	0.9954	0.9449	decreasing	0.9405	0.9954
UBI	1.0000	1.0000	constant	1.0000	1.0000
SBI	1.0000	1.0000	constant	1.0000	1.0000
IDBI	1.0000	1.0000	constant	1.0000	1.0000
Axis	1.0000	0.8842	decreasing	0.8842	1.0000
HDFC	1.0000	0.9313	decreasing	0.9313	1.0000
ICICI	1.0000	1.0000	constant	1.0000	1.0000
KMB	1.0000	1.0000	constant	1.0000	1.0000

5. CONCLUSIONS AND POLICY RECOMMENDATIONS

Here we have obtained a ranking of various Indian banks' in terms of their CAMEL variable values. Ranking the commercial banks is difficult to the extent that any type of ranking is subject to criticism as the ratios used for the purpose of ranking can be interpreted in the way one likes. This method of analysis provides a simplistic, reader friendly version of presenting complex data regarding performance of a set of players in the banking industry. The ranking system makes judging and analysing the financial data of banks much simpler for the common man. Thus through this particular data set, it can be established that private sector banks are at the top of the list with their performances in terms of soundness being the best. Public sector banks like Union Bank and SBI have taken a backseat and display low economic soundness in comparison. This implies that the Government needs to focus more on the Public Sector Banks in order to increase the net profit to average assets ratio, profit per employee etc. Although these will be good for the soundness of the bank, it may defeat the purpose of Public Sector Banks lending at comparative lower rates. As for convergence, using parameters of the CAMEL model, we can see that the private sector banks are heading towards convergence, not in the short, but in the long run. Most of these banks, including ICICI, Axis and HDFC lie in a similar rank region. However, these banks' assets etc. vary a great deal and they cannot be judged solely based on the absolute values of the CAMEL ratios. Looking at the trend, we can say that private banks are growing at a faster pace than public sector banks and will head towards convergence faster than the PSBs. DEA provides significant insights on efficiency of different banks and places private sector ones at an advantage situation and thereby hints out the possibility of further improvisation of most of the public sector banks. Nonetheless, further investigations are needed in order to identify approaches for each bank to increase efficiency by moving towards the efficient frontier.

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