

# “Evaluating the nationalization & privatization effect: a case of Indian banking industry”

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# EVALUATING THE NATIONALIZATION & PRIVATIZATION EFFECT: A CASE OF INDIAN BANKING INDUSTRY

## Abstract

The facilitation of economic transactions and friendly investor environment is undertaken through effective performance of financial systems. Mobilization of savings and funding the profitable business opportunities are essential in improving the efficiency of intermediation. The study aims to evaluate the effects of nationalization and privatization on Indian banks. Various factors have been considered to examine the effects of privatization and nationalization, including sources of public sector inefficiency, measures of firm performance, econometric issues, and the mode of privatization. The data was collected for the period of 1998 to 2016 from Indian banks. Data Envelopment Analysis (DEA) was used to evaluate the financial reports of the banks selected to evaluate the efficiency of input and output variables. Positive results were observed, concerning the efficiency and profitability of banking industry after banks privatization. Performance of private banks has been observed effective and efficient as compared to the public sector banks. Privatization of banks must be increased and maintained to sustain the efficiency of the banks and implement strategies to maintain the assets. Future studies may recruit more appropriate sample size to evaluate the privatization and nationalization effects of Indian banking industry. Greater number of banks will provide more precise results, using data envelopment analysis.

## Keywords

banks, Data Envelopment Analysis, efficiency, Indian banking industry, privatization, nationalization

## JEL Classification

H13, L33, H21

## INTRODUCTION

The performance of financial system is an essential aspect in the development of economy for any country. The existence of established financial system can be used to promote the financial stability of a country. On the contrary, distortion can be experienced by an unstable banking system among interest rates, economic activity, and inflation. Therefore, privatization and nationalization of banks are undertaken to sustain the financial performance of banks (Chaudhary & Arshad, 2016). Privatization of the banks owned by government and other measures introduced were the main financial reforms, commenced in the early years to invigorate the country's financial system (Khalid, 2006). Due to efficiency of privatization, there is an influence on balancing the budgets in the capital markets of developing countries, especially. The effect of nationalization and privatization of banks has been focused to determine the financial efficiency of Indian banking system.

Privatization is considered as one of the major issues experienced by the governments across the globe. Governments are concerned to examine the impact of nationalization and privatization on banking

industry's performance. Government of India decided to nationalize their banks in order to monitor and exercise control over the banks. Both economic and political factors are used to motivate government for nationalizing the banking sector. The government of India had specifically nationalized Reserve Bank of India to own the Indian banking industry (Acharya & Subramanian, 2016). Therefore, this study will analyze the effect of privatization and nationalization on the Indian banking industry.

The effect of privatization and nationalization is empirically evidenced on banking sector performance. Various factors have been considered to examine the effect of privatization and nationalization including sources of public sector inefficiency, measures of firm performance, econometric issues, and the mode of privatization. On the contrary, mixed evidence has shown the doubt of privatization and nationalization effect on the performance of banking industry. According to Kausar et al. (2014), performance enhancement of Indian banking sector is reported to be 28% after privatization.

The effect of nationalization and privatization has not been empirically evidenced, considering the case of Indian banks for the period of 90s till present. There is a need to consider and focus on the impact of privatization of national banks on their financial performance in India. Thereby, the focus of this study has been to examine the nationalization and privatization effect on Indian banking industry.

The existing literature has indicated that privatization of nationalized banks is foreseen across five years at the end of banking crisis. It indicates an immense attention of policymakers toward the private ownership of banks. Moreover, the significance of this study lies in emphasizing the financial sector stability issues, strength of the supervisory instrument, and the soundness of banks in terms of growth and fiscal issues. Moreover, the relevance of this study consists in the emphasis towards the impact of privatization with the consideration of the accounting indicators.

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## 1. LITERATURE REVIEW

### 1.1. Performance of banks after privatization

By considering the performance of Indian banks, pooled ordinary least square method is integrated to observe the profitability and growth after privatization. It has been determined that market capitalization, assets, equity, and inflation significantly affected the performance of Indian banking industry after nationalization. The financial and operating performance has been examined by Ghosh (2016), who showed that privatization effect simply declined the performance of banks in terms of employment, proficiency and real sales.

The significance of privatization has been emerged among nationalized banks in Indian economy. The study has analyzed substantial extent of banks, before and after privatization. The anticipation of pre-privatization selection bias is observed for the long-run impact. Mariappan et al. (2013) have founded that privatization

strongly affected the financial performance of nationalized banking industry in the pre-privatization phase. CAMEL rating system has been effectively used to gauge the consequences of privatization and nationalization for the financial performance of Indian banks for the period 1990–2010. Berkowitz et al. (2014) have selected all privatized banks, foreign banks, domestic private banks, and public-sector banks to examine the consequences of privatization and nationalization. From the findings, it was observed that there was a moderate impact of privatization and nationalization on the financial performance of banks. This consequence might be shaped from the policies, implemented in the banking sector of India.

Patel and Patel (2015) have examined that there is a strong and positive impact of possession structure on the financial performance of banks. The study has examined the performance of banks and their stocks after officially privatized from the State Bank of India. The study has certainly influenced the performance of ICICI Bank and HDFC Bank. The findings have certified that there was a

significant effect of privatization of both banks on the number of trades and average share prices. On the contrary, there was no significant influence of privatization on stock returns. According to the financial statistics reports, operating profit margin, and return on equity, earnings per ratio share, and net profit margin dignify the deterioration in the monetary performance of both banks. It is a fact that there is a certain influence of privatization on the pace of economic growth in every country. This pace is collaboratively contributed to the shared beliefs and opinions of customers that respond toward incentives. The accomplishment of privatization is possible from the incentives of economic growth. The progress of economic efficiency, investment, and technologies is certainly specified from appropriate structural reforms that develop incentives for the economic growth (Ghosh, 2016).

Jiang et al. (2013) have combined the dynamic effects of privatization and the static effects of ownership on bank performance in China during 1995–2010. The data was collected from state-owned commercial banks, joint stock commercial banks, and city commercial banks for evaluating their higher performance. The findings have indicated that the enhanced performance in the short or long run by giving consideration to efficiency gains revenue inflow due to privatization of banks. Chinese banks are more efficient in producing interest income as compared to non-interest revenue.

Hagemejer et al. (2014) have measured the effects of privatization on the medium and large firms of Poland during the period of 1995–2009. The findings have shown that the enhancement in the performance of medium and large polish firms is rare, indicating an immense impact of the endogeneity bias. Moreover, the study has indicated that if endogeneity exists, then there are less chances of productivity improvement. Berkowitz et al. (2014) have examined the improvement of finance and economic growth for privatized state-owned banks. The study has exploited the variation in the number of spetsbanks per million inhabitants in October 1995 across the Russian region. The results have shown that privatized banking did not escalate economic growth, while it significantly increased lending. On the contrary,

there was an increase in the growth due to privatization, when banks' considerations to political connections were controlled and regional property rights were better secured.

Mohsni and Otchere (2014) have examined the risk-taking behavior of privatized banks before and after privatization. The data was comprised of 242 bank privatizations in 42 countries over the period of 1988 to 2007. In precise, the data was collected from the country classifications of the World Bank with respect to developed and developing countries. The study has found that a significant decrease in risk is experienced by privatized banks after privatization and revealed higher risk taking as compared to their competitors. Moreover, the study has reported that higher risk taking is induced by a higher fraction of the shares sold by privatized banks. Additionally, a U-shaped relationship between risk taking and private ownership has been found.

Brown and Earle (2015) have estimated the effects of domestic and foreign privatization on the banks' productivity via long panel data of state-owned manufacturing firms in Ukraine. The study has used the longitudinal dimension of data for measuring and controlling pre-privatization selection bias and for estimating long-run impacts. The findings have shown that increasing multifactor productivity is eventually emerged in domestic privatization, indicating a 25% relative response to state-owned firms after six years. Similarly, a productivity advantage of approximately 40% in 2004–2005 is produced from foreign privatization.

The relationship between privatization of national banks and their performance has been examined by numerous studies (Ferrao & Ansari, 2015; Chaudhary & Arshad, 2016). These studies have deployed DEA system to measure the effect of privatization on the financial performance of banking industry. The findings indicated that there was a positive and significant influence of privatization on the financial performance of banking industry. The contribution of liquidity and liability ratios is moderately implicated on the expansion of financial efficiency and banking industry profitability. Thereby, privatization incurs an effective approach in sustaining and enhancing the performance of banking industry (Zhang et al., 2013).

## 1.2. Performance of banks after nationalization

It has been determined that the performance of banks after nationalization enabled to direct the credits to priority fields of small scale, exports and agriculture, which cannot be expanded in rural areas. By integrating such processes, public confidence can be improved on banks and ultimately the performance of banks can be increased. Ferrao and Ansari (2015) have witnessed that banks are enabled to charge lower rate of interest from the vulnerable areas and exporting sector after nationalization.

The performance of the banking industry is specifically evaluated based on the financial management tool; mainly including ratio analysis technique. The intention of ratio analysis technique is to explore financial statements using distinct ratios and then compare them with the pre-defined benchmark. On the contrary, DEA is an effective tool to measure the efficiency of financial measures and the performance of organizations based on these measures. The efficacy of data envelopment analysis has been determined from the investigation of nationalization and profitability of commercial banks of Indian banking industry. The findings have specifically suggested that financial performance of large banks is higher than the performance of small banks. Nationalization factor has been massively determined among the small-scale banks as compared to large-scale banks (Paul & Das, 2015). Natarajan and Naser (2014) have studied the impact of nationalization on the Kenyan banking industry using DEA. Return on assets and return on equity were used to determine the proficiency of banking industry of Kenya. The findings further indicated that profit variations were comparatively higher as compared to the cost variations.

Geetharaj and Paramasivan (2014) have examined the effect of asset quality of nationalized banks and new private sector banks on priority sector lending. The study has revealed that banks remain a never-ending system of economy due to the industrial development in the country. Therefore, it is positioned as a focal point of industrial and social and economical wellbeing. This is a major cause for banks to be nationalized as periodical

regulations are given to these banks by governments. Commercial banks are obliged to lend up at 40% of their total lending to priority sector as per the working group of lending recommendation and priority sector.

Henderson (2015) has analyzed the success of quasi-nationalization by undertaking two UK listed banks, including Lloyds Banking Group and Royal Bank of Scotland. The study has analyzed that quasi-nationalization is a positive development towards a rescue mechanism. On the contrary, the study has shown that a lost opportunity is represented for changing the profitability culture through the state arm's length approach to management.

Ara and Haque (2015) have focused on the asset liability mismatch and its impact on the Bangladeshi nationalized commercial banks. The data was collected from the selected nationalized banks annual reports. A gap analysis is used to analyze the liquidity. The findings have shown that there was a highest negative liquidity gap exhibited by Sonali bank as compared to other banks. The study has shown a statistically significant difference between the nationalized banks with respect to liquidity variation.

Rahman et al. (2014) have analyzed the performance of nationalized commercial banks with respect to productivity and profitability analysis. The data has been collected from secondary sources for three selected nationalized commercial banks over the period of 2008 to 2012. The findings have indicated that the soundness of banking system remains unimpaired that increases the financial strength of nationalized commercial banks. In contrast, there were no encouraging results obtained through the ratio analysis.

The profitability of banks is highly determined by the consequences of nationalization. Panel data estimation has been used to significantly measure the performance of Indian banking industry over the period of six years. Profitability factor is considered to be the most significant factor that influences the performance of Indian banking industry. Bank size and ownership are other significant variables that have moderate impact on the nationalization of banks (Fujii et al., 2014). Gupta



et al. (2014) have examined the performance of bank branches by considering their strengths and weaknesses along with the profitability and production aspects. Data Envelopment Analysis has been used to measure the significance of these variables. The results have indicated that efficiency attributes of bank branches were significant under profitability and productivity aspects as they both possess comparative tendencies. On the contrary, the size of branch decreases if branch efficiency and productive scale increase. Thereby, nationalization of banking industry significantly reflects the financial performance in terms of profitability and productivity.

## 2. AIM OF THE STUDY

This study aims to examine the privatization and nationalization effect on Indian banking industry using financial data of selected Indian banks from 1998 to 2016.

### 2.1. Research questions

**Question 1:** What is the impact of privatization on the performance of Indian banks?

**Question 2:** What is the impact of nationalization on the performance of Indian banks?

**Question 3:** What is the impact of nationalization and privatization on growth of Indian national banks?

### 2.2. Research hypothesis

*H0: There is an impact of privatization and nationalization on the performance of Indian banks in terms of efficiency.*

## 3. METHODS

### 3.1. Period of study

The nationalization and privatization effect on Indian banking industry has been examined through Data Envelopment Analysis (DEA). Data was collected from the financial reports of selected nationalized and privatized banks. Return on

assets, return on equity, and debt to total assets, advances to deposits, and operating profit are the variables, which were used to measure the efficiency of selected banks since 1998–2016.

### 3.2. Source of study

The secondary data of the selected banks was collected from the annual reports for the period of 1998–2016. Moreover, different financial websites were also used to collect data for the specified period. Furthermore, CMIE database and Indiastat.com were also used for the data collection. The input variables were usually under the control of organization. Input variables were considered as significant factors that contributed significantly to outputs of decision-making unit. Return on assets, return on equity, debt to total assets, and advances to deposits were the input variables for the study. Output variables were significant factors that defined the acquired outcomes of input variables for the decision-making units. Operating profit was the output variable for all the selected banks. Descriptive statistics is presented for input and output variables in Table 1. The banks selected for the study include HDFC Bank Ltd, ICICI Bank Ltd, Bank of Baroda, Punjab National Bank, Oriental Bank of Commerce, IDBI Ltd, Centurion Bank Ltd, Federal Bank Ltd, Indian Overseas Bank, and Kotak Mahindra Bank.

### 3.3. Procedure

The efficacy of banks is computed from DEA based on the estimated piece-wise linear frontier performed by a set of specific input and output variables. Effective practices of banks were treated under the front-end list of the Indian banking industry; and therefore, it revealed the efficiency score with regard to the defined benchmark. Technical efficiency is considered as an effective approach in which inputs are used to measure the efficiency of an output. The technical efficiency is efficient when the maximum output of an organization is produced with minimal quantity of inputs including labor, technology and capital. By considering the selected decision-making units in this study, the technical efficiency of an organization is dependent on its workers and up-to-date technology.

**Table 1.** Descriptive statistics

Variable	No.	Minimum	Maximum	Mean	Std. deviation
Advances to assets	17	35.6780	89.7300	48.205118	11.2301275
Debt to total assets	17	.5240	17.3220	9.147706	5.5200644
ROA	17	.5200	2.6320	1.361706	.6453230
ROE	17	4.7400	13248.0000	790.950235	3210.1118518
Operating profit	17	1.5000	34.0560	10.490353	10.5655853

Productive efficiency is directly associated with the notion of technical efficiency. Thereby, the productivity of selected DMUs is based on the technical efficiency. If an organization fails to be technically efficient then productive efficiency is alarmed to produce short-run average cost curve.

## 4. RESULTS

DEA has been employed to measure the efficiency and efficacy of the selected banks. Input and output variables have been listed to estimate the efficiency of banks after being privatized. The output variables, considered for the analysis, were advances to assets, debt to total assets, ROA, and ROE. Input variables are deliberated as significant factors that are utilized to contribute to the output variables of decision making units. Operating profit of the selected banks was the output variable. The available fluctuations in input variable permitted the modifications and improvements in output variables, which are ultimately dependent on the performance evaluation. The significance of output variables defined the outcomes of input variables. The output variables consist of management console information of decision making unit. DEA model estimates efficiency, depending on the extent of operations in decision making units to offer services to the beneficiaries during the measurement period. Moreover, the model secures the probability of constant fluctuation in returns of the effective units, which resulted from the variations in the quantity of input variables to attain the efficiency (Helal & Elimam, 2017). The results have presented the increasing patterns for Centurion Bank Ltd, IDBI Bank Ltd, Indian Overseas Bank Ltd, and ICICI Bank Ltd (see Appendix, Table 2). Table 3 (see Appendix) has presented Slack-based model and input target efficiency. The efficiency of Slack-based model has been identified for output target through loans and investments. Table 4 (see Appendix) represented Slack report, showing

input slacks, which mainly included advances to assets, debt to total assets, ROA, and ROE. The results have evaluated the efficiency of HDFC Bank, which was observed efficient as compared to other banks after privatization. Following the HDFC Bank Ltd, Bank of Baroda and Federal Bank were the efficient banks after being privatized. HDFC Bank, Bank of Baroda, and Federal Bank were the most efficient banks based on optimal multipliers model.

### 4.1. Discussion

Improving the performance and efficiency of public sector banks is a main goal of economic reforms in several countries, including India. It has been believed that performance and efficiency of banks can be improved by private ownership (Sathye, 2005). Sathye (2005) examined the influence of privatization on the performance and efficiency of banks using data of Indian banks for the period of five years (1998–2002). It was observed that partially privatized banks performed better than public sector banks in terms of certain efficiency parameters and financial performance. Partially privatized banks were observed catching up with the private sector banks. There was no significant difference found regarding performance and efficiency in the two cohorts of banks. Indian partial privatization appeared to have resulted with positive outcomes. Indian government is already considering a step to take its stake down to 33%.

Arora (2014) examined the Indian banks' performance under different ownership possessions for the years 2011–2012. Data Envelopment Analysis was implemented to evaluate the efficiency scores, and it was found that only ten out of forty-four selected banks were efficient. Efficiency frontiers were defined by ten banks. Andhra bank, Indian bank, and Punjab National bank were from the nationalized category. ICICI Bank Ltd, Axis Bank Ltd, Kotak Mahindra Bank Ltd, and Tamilnad

Mercantile Bank Ltd were from private sector. Bank of America NA, Barclays Bank PLC, and The Royal Bank of Scotland were the foreign banks considered in the study. Least OTE score was observed for foreign banks; whereas, private sectors have outperformed the public-sector banks slightly. The performance of public sector banks is at par with private sector banks as evaluated by Kumar et al. (2012) in terms of efficiency. Banks of different categories have been observed performing equally well (Dwivedi & Charyulu, 2011). Ownership structure has a weak impact on the performance of banks. Public sector banks have seen gradual reduction in the government control with the liberalization of the banking sector. A satisfactory performance has been ensured by the banks of India in terms of adopting improved risk management

factors; such as stringent RBI norms, focus on improved customer service quality and superior role of information technology, etc. (Arora, 2014). The influence of privatization between public and private banks in India has been studied by Sankar and Maran (2015). The profitability and efficiency of the banks have been revealed, which indicated that public banks were lower in terms of efficiency than private banks. In the financial sector of India, emerging influence of privatization and nationalization has been revealed. Profitable factors can be driven towards the improvement of banking sectors through the appealing impact of privatization and nationalization. Several factors have been studied through privatization and nationalization, enduring influence on the efficiency and imperative impact on the banking industry of India.

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## CONCLUSION

The study intends to examine the consequences of privatization and nationalization for Indian banking industry. The results obtained from DEA analysis have shown an increasing pattern for IDBI Bank Ltd, Centurion Bank Ltd, and Indian Overseas Bank. The efficiency of Indian banking industry after privatization and nationalization process is emerged from loans and investments. Similarly, the efficiency of HDFC Bank, Bank of Baroda, and Federal Bank was higher as compared to other selected banks after being privatized. Privatization can be considered as the crucial factor after technological forces, which expand the profitability and productivity of banks, as observed through the analysis. Capital structure can be further improved after spending massive revenue in the domestic and international capital markets. Indian Overseas Bank, Punjab National Bank and Oriental Bank of Commerce have a broad perception towards their financial performance during 1998–2016. There is a positive influence of privatization on the profitability and efficiency of Indian private banks. Additionally, the study revealed that the performance of private banks sustained to increase after acquiring targeted banks. The outcomes of the present study could further be examined by increasing the extent of input and output variables. Future studies may recruit greater sample size to evaluate the privatization and nationalization effects of Indian banking industry. Greater number of banks will provide more precise results, using data envelopment analysis. CAMEL approach can also be employed on greater sample size to evaluate the privatization and nationalization effects. Future studies may recruit national and private banks separately and compare their financial performance before and after privatization empirically. The comparison will assist to comprehend the future strategies for banking sector in a more precise manner.

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## CONFLICT OF INTEREST

The authors declare no conflict of interest.



## REFERENCES

1. Acharya, V., & Subramanian, K. V. (2016). State intervention in banking: the relative health of Indian public sector and private sector banks, in *Monetary Policy in India*, (pp. 195-230). Springer, India. [https://doi.org/10.1007/978-81-322-2840-0\\_7](https://doi.org/10.1007/978-81-322-2840-0_7)
2. Ara, U. H. A., & Haque, E. (2015). Asset Liability Mismatch – An Empirical study on nationalized commercial banks in Bangladesh. *Asian Business Review*, 4(2), 11-19. <https://doi.org/10.18034/abr.v4i2.269>
3. Arora, G. K. (2014). Evaluating the Efficiency of Indian Banking Industry Using Data Envelope Analysis. *International Journal of Economics, Commerce and Management*.
4. Berkowitz, D., Hoekstra, M., & Schoors, K. (2014). Bank privatization, finance, and growth. *Journal of Development Economics*, 110, 93-106. <https://doi.org/10.1016/j.jdeveco.2014.05.005>
5. Brown, J. D., & Earle, J. S. (2015). *The productivity effects of privatization in Ukraine: Estimates from comprehensive manufacturing firm panel data, 1989–2005*. Upjohn Institute Working Paper No. 07-137. <https://doi.org/10.17848/wp07-137>
6. Chaudhary, G. M., & Arshad, A. (2016). Impact of Privatization upon Efficiency of Enterprises: Evidence from the Banking Sector of Pakistan. *Journal of Business Studies Quarterly*, 7(3), 47.
7. Dwivedi, A., & Charyulu, K. D. (2011). *Efficiency of Indian Banking Industry in the Post-Reform Era* (No. 2011-03, p. 01), Working Paper.
8. Ferrao, M. M., & Ansari, A. (2015). A Comparative Study on Credit card usage behavior across leading private sector banks. *Reflections-Journal of Management*, 4.
9. Fujii, H., Managi, S., & Matousek, R. (2014). Indian bank efficiency and productivity changes with undesirable outputs: a disaggregated approach. *Journal of Banking & Finance*, 38, 41-50.
10. Geetharaj, S., & Paramasivan, C. (2014). Asset Quality of Nationalised Banks and New Private Sector Banks on Priority Sector Lending. *SELP Journal of Social Science*, 5(21), 22-26.
11. Ghosh, S. (2016). Partial privatization, lending relationships and executive compensation: Evidence from Indian state-owned banks. *South Asian Journal of Global Business Research*, 5(1), 125-153. <https://doi.org/10.1108/sajgbr-11-2014-0075>
12. Gupta, P., Kumar, P., & Joshi, A. (2014). A Comparative Analysis of Indian State Cooperative Banks and Scheduled Commercial Banks. *International Journal of Global Management*, 5(1).
13. Hagemeyer, J., Tyrowicz, J., & Svejnar, J. (2014). *Measuring the Causal Effect of Privatization on Firm Performance*. University of Warsaw, Faculty of Economic Sciences Working Paper (No. 14(131)).
14. Henderson, E. (2015). Quasi-Nationalisation in the UK Banking Crisis: A Problematic Policy Option. *Financial Accountability & Management*, 31(4), 463-481. <https://doi.org/10.1111/faam.12065>
15. Jiang, C., Yao, S., & Feng, G. (2013). Bank ownership, privatization, and performance: Evidence from a transition country. *Journal of Banking & Finance*, 37(9), 3364-3372. <https://doi.org/10.1016/j.jbankfin.2013.05.009>
16. Kausar, A., Gul, F., Khan, R. M., & Iqbal, M. (2014). The impact of privatization on the financial performance of banking industry: A comparison of privatized and public banks in Pakistan. *First International Conference on Emerging Trends in Engineering, Management and Sciences (ICETEMS-2014)*. Peshawar, Pakistan.
17. Kumar, M., Charles, V., & Mishra, C. S. (2016). Evaluating the performance of Indian banking sector using DEA during post-reform and global financial crisis. *Journal of Business Economics and Management*, 17(1), 156-172. <http://dx.doi.org/10.3846/16111699.2013.809785>
18. Mariappan, P., Lakshmi, S., & Sreearthi, G. (2013). A Study on Performance Efficiency of Nationalized Banks of India: A DEA Approach. *Abstract of Economic, Finance and Management Outlook*, 1.
19. Mohsni, S., & Otchere, I. (2014). Risk taking behavior of privatized banks. *Journal of Corporate Finance*, 29, 122-142. <https://doi.org/10.1016/j.jcorpfin.2014.07.007>
20. Natarajan, P., & Naser, V. A. (2014). Financial Calibration of Indian Banks during Pre- and Post Crisis Period: A Study Based on CAMEL Framework. *Asian Journal of Research in Business Economics and Management*, 4(8), 69-81.
21. Patel, R. J., & Patel, M. K. (2015). Does Merger Be Prolific? A Study of Selected Indian Banks. *International Journal of Applied Financial Management Perspectives*, 4(3), 1965-1970. <https://doi.org/10.5958/2249-7323.2014.01448.5>
22. Paul, J., & Das, K. (2015). Efficiency of Commercial Banks in India: A Non-parametric study using Data Envelopment Analysis. *Asian Journal of Research in Banking and Finance*, 5(6), 37-48.
23. Rahman, M. I., Adhikary, D., & Yousuf, S. (2014). Productivity and profitability analysis of nationalized commercial banks (NCBs) in Bangladesh. *International Journal of Economics, Finance and Management Sciences*, 2(2), 197-205.
24. Sankar, S., & Maran, K. (2015). Performance Evaluation of Select Leading Public-Sector Banks in India. *International Journal of Management & Behavioural Sciences (IJMBS)*, 6, 326.
25. Sathye, M. (2005). *Privatization, performance, and efficiency: A study of Indian banks*. Vikalpa, 30(1), 7-16.
26. Zhang, J., Jiang, C., Qu, B., & Wang, P. (2013). Market concentration, risk-taking, and bank performance: Evidence from emerging economies. *International Review of Financial Analysis*, 30, 149-157. <https://doi.org/10.1016/j.irfa.2013.07.016>

# APPENDIX

**Table 2. Efficiency report**

Source: Researcher's calculated values based on the data from CMIE database and Indiatat.com.

No.	Name	CRS	Sum of lambdas	RTS	Optimal lambdas with benchmarks	Rank	Score	Rank	Score	Rank	Score	Rank
1	HDFC Bank Ltd	0.29066	0.083	Increasing	0.047	Punjab National Bank	0.036	Kotak Mahindra Bank				
2	ICICI Bank Ltd	1.00000	1.000	Constant	1.000	ICICI Bank Ltd						
3	ICICI Bank Ltd	0.87340	0.871	Increasing	0.833	ICICI Bank Ltd	0.007	Punjab National Bank	0.024	Oriental Bank of Commerce	0.007	Kotak Mahindra Bank
4	Bank of Baroda	0.09969	0.051	Increasing	0.051	Punjab National Bank						
5	Punjab National Bank	1.00000	1.000	Constant	1.000	Punjab National Bank						
6	Bank of Baroda	0.11961	0.055	Increasing	0.055	Punjab National Bank						
7	Oriental Bank of Commerce	1.00000	1.000	Constant	1.000	Oriental Bank of Commerce						
8	IDBI Ltd	0.10528	0.053	Increasing	0.042	Punjab National Bank	0.011	Kotak Mahindra Bank				
9	Centurion Bank Ltd	0.12873	0.131	Increasing	0.071	Punjab National Bank	0.045	Oriental Bank of Commerce	0.015	Kotak Mahindra Bank		
10	Federal Bank Ltd	0.09419	0.068	Increasing	0.015	ICICI Bank Ltd	0.037	Punjab National Bank	0.017	Kotak Mahindra Bank		
11	IDBI LTD	0.10576	0.044	Increasing	0.044	Punjab National Bank						
12	Indian Overseas Bank	0.40604	0.251	Increasing	0.073	Punjab National Bank	0.179	Kotak Mahindra Bank				
13	ICICI Bank Ltd	0.96931	0.892	Increasing	0.000	ICICI Bank Ltd	0.014	Punjab National Bank	0.010	Oriental Bank of Commerce	0.868	ICICI Bank Ltd
14	Centurion Bank of Punjab Ltd	0.11477	0.135	Increasing	0.054	Punjab National Bank	0.082	Oriental Bank of Commerce				
15	HDFC Bank Ltd	0.09141	0.093	Increasing	0.041	Punjab National Bank	0.015	Oriental Bank of Commerce	0.038	ICICI Bank Ltd		
16	ICICI Bank Ltd	1.00000	1.000	Constant	1.000	ICICI Bank Ltd						
17	Kotak Mahindra Bank	1.00000	1.000	Constant	1.000	Kotak Mahindra Bank						

**Table 3.** Slack-based model

Source: Researcher's calculated values based on the data from CMIE database and Indiatat.com.

DMU no.	DMU name	Efficient input target		ROA	ROE
		advances to assets	debt to total assets		
1	HDFC Bank Ltd	4.52094	0.05407	0.25177	0.70329
2	ICICI Bank Ltd	47.58200	2.03000	0.75400	9.89000
3	ICICI Bank Ltd	23.61524	2.14800	0.81600	7.57017
4	Bank of Baroda	3.18888	0.03814	0.17758	0.49607
5	Punjab National Bank	35.67800	17.32200	1.67600	23.91400
6	Bank of Baroda	3.46043	0.04138	0.19271	0.53832
7	Oriental Bank of Commerce	43.81500	0.52400	2.44000	6.81600
8	IDBI Ltd	3.13017	0.03743	0.17431	0.48694
9	Centurion Bank Ltd	7.04930	0.08431	0.39257	1.09661
10	Federal Bank Ltd	3.38704	0.04051	0.18862	0.52690
11	IDBI LTD	2.75220	0.03291	0.15327	0.42814
12	Indian Overseas Bank	12.38856	0.14816	0.68990	1.92720
13	ICICI Bank Ltd	44.02182	2.47600	1.42800	12.93830
14	Centurion Bank of Punjab Ltd	6.93921	0.08299	0.38644	1.07949
15	HDFC Bank Ltd	4.77048	0.05705	0.26566	0.74211
16	ICICI Bank Ltd	51.14800	2.48700	1.54000	15.11700
17	Kotak Mahindra Bank	89.73000	7.85000	2.01500	6.96500

**Table 4. Slack report**

Source: Researcher's calculated values based on the data from CMIE database and Indiatat.com.

CRS results	DMU name	Input slacks		Output slacks			Sum of lambdas	Optimal lambdas		Rank	Score	Rank	Score	Rank
		advances to assets	debt to total assets	ROA	ROE	Operating profit		RTS	with benchmarks					
1	HDFC Bank Ltd	37.94706	8.20593	0.26823	4.03671	0.00000	0.10318	Increasing	0.103	Oriental Bank of Commerce				
2	ICICI Bank Ltd	0.00000	0.00000	0.00000	0.00000	0.00000	1.00000	Constant	1.000	ICICI Bank Ltd				
3	ICICI Bank Ltd	24.00076	0.00000	0.00000	2.28983	0.00000	0.49090	Increasing	0.070	Punjab National Bank	0.056	Oriental Bank of Commerce	0.365	ICICI Bank Ltd
4	Bank of Baroda	43.26512	13.41386	0.68042	13.95393	0.00000	0.07278	Increasing	0.073	Oriental Bank of Commerce				
5	Punjab National Bank	0.00000	0.00000	0.00000	0.00000	0.00000	1.00000	Constant	1.000	Punjab National Bank				
6	Bank of Baroda	45.44757	13.50662	0.58329	13247.46	0.00000	0.07898	Increasing	0.079	Oriental Bank of Commerce				
7	Oriental Bank of Commerce	0.00000	0.00000	0.00000	0.00000	0.00000	1.00000	Constant	1.000	Oriental Bank of Commerce				
8	IDBI Ltd	40.37983	13.56857	0.71169	9.84706	0.00000	0.07144	Increasing	0.071	Oriental Bank of Commerce				
9	Centurion Bank Ltd	38.22470	11.27369	1.61743	15.22739	0.00000	0.16089	Increasing	0.161	Oriental Bank of Commerce				
10	Federal Bank Ltd	43.54096	8.42149	0.93938	11.59310	0.00000	0.07730	Increasing	0.077	Oriental Bank of Commerce				
11	IDBI LTD	40.88780	14.15109	0.54473	11.72986	0.00000	0.06281	Increasing	0.063	Oriental Bank of Commerce				
12	Indian Overseas Bank	35.49744	16.52184	0.49610	5.41280	0.00000	0.28275	Increasing	0.283	Oriental Bank of Commerce				
13	ICICI Bank Ltd	2.74618	0.00000	0.00000	1.00570	0.00000	0.88041	Increasing	0.029	Punjab National Bank	0.076	Oriental Bank of Commerce	0.775	ICICI Bank Ltd
14	Centurion Bank of Punjab Ltd	40.94879	12.25101	2.24556	14.98251	0.00000	0.15838	Increasing	0.158	Oriental Bank of Commerce				
15	HDFC Bank Ltd	39.42352	8.74295	1.52034	17.37789	0.00000	0.10888	Increasing	0.109	Oriental Bank of Commerce				
16	ICICI Bank Ltd	0.00000	0.00000	0.00000	0.00000	0.00000	1.00000	Constant	1.000	ICICI Bank Ltd				
17	Kotak Mahindra Bank	0.00000	0.00000	0.00000	0.00000	0.00000	1.00000	Constant	1.000	Kotak Mahindra Bank				