

Performance of Private Banks in India after the Global Financial Crisis

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Abstract

The present study attempts to evaluate the growth and performance of 21 private banks of the Indian banking system using indicators like credit, deposit, return on assets etc. The study also evaluates the overall technical efficiency, pure technical efficiency, scale efficiency, allocative efficiency and cost efficiency between 2009-10 to 2018-19 using non-parametric data envelopment analysis (DEA). The inputs and outputs have been specified using intermediation approach. The inputs used are sum of deposits and borrowings, number of employees and fixed assets. Investments, advances and other income are taken as outputs. Prices of inputs have also been used to evaluate allocative and cost efficiency. The findings of the study indicate that new private banks had better average overall technical efficiency, average pure technical efficiency, average scale efficiency and average cost efficiency. IDFC bank was the only bank efficient in all the types of efficiencies. Further, the negative effect of non-performing assets was also seen on the performance and efficiency of new and old private banks.

Keywords: Performance, Private Banks, Intermediation approach, Technical efficiency, Allocative efficiency, Data envelopment analysis, Non-performing assets.

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INTRODUCTION

Global financial crisis started in the US sub-prime housing market and traversed to the financial and real economies of the global market through the channels of trade, finance, exchange rate and confidence. The effects of the crisis were adverse in the US and the economies in close integration with it. But the Asian economies showed resilience because of almost negligible indulgence in toxic assets which were the core of the crisis. In India, due to the absence of many foreign banks, the minimal use of structured derivatives, and the RBI's supervisory and regulatory procedures, the direct impact of the crisis on the Indian banking sector was virtually non-existent. Yet like most other emerging countries, the Indian financial system was impacted by the crisis in the second half of 2008–2009 with the bankruptcy of Lehman's. The adversity of the crisis was initially felt by the stock market in the January 2008 due to reversal of capital inflows from the foreign institutional investors (FIIs). On Indian banks, in particular, the crisis's unintended consequences were very detrimental. Due to the global market liquidity crisis brought on by the failure of Lehman Brothers,

Indian banks were compelled to shift their loan demand from external sources to the domestic banking industry. The credit crisis, which increased Indian banks' risk aversion, as well as the following loss of confidence brought on by the Lehman Brothers tragedy, ultimately hindered credit expansion in the domestic market.

(Akhilge, McNulty, & Stevenson, 2017) found slight difference in profit efficiency due to the effect of ownership on the US banks between 1996-2006 but there was no significant difference in the profit efficiency of public and private sector banks between 2007-10.

(Gulati & Kumar, 2016) examined the impact of the crisis on the profit efficiency of Indian banks and found that the impact of the crisis across ownership was different. Foreign banks in India performed better in terms of profit efficiency as compared to the domestic banks. Further, the study concluded that the adverse effects of the crisis on the profit efficiency of Indian banks was short-lived and banks were quick to recover from the adverse effects.

(Motlagh & Babacan, 2015) found that the global financial crisis had negative effect on the pure technical as well as scale efficiency of Australian banks but the impact of the crisis on all the Australian banks varied. Most of small banks were both pure technically inefficient as well as scale inefficient. Medium sized banks were scale efficient while the larger banks were mostly operating under decreasing returns to scale during the crisis.

(Maredza & Ikhide, 2013) concluded from their study that even though the efficiency of South African banks could not remain insulated from the adverse effects of the crisis, the deterioration in the efficiency was mild.

The findings of (Sufian & Habibullah, 2010) suggested that the global financial crisis had negative impact on the efficiency of Thai banks and the domestic banks performed better in terms of technical efficiency as compared to the foreign banks in the Thailand banking system.

(Park & Shin, 2017) investigated and found that the extent of capital outflows from a country during a crisis may be influenced by its direct and indirect exposures to crisis-affected nations. Generally, the most significant factor influencing capital outflows during the crisis is the country's level of direct exposure to the crisis-affected countries through the banking sector. Their findings also implied that the global banking system's aggregate cross-border lending may provide a route for a global liquidity crisis to disperse a financial shock around the world. For emerging market economies that significantly rely on foreign borrowing, the liquidity issue of lender banks can be particularly severe. Expansion in the global banking system can make economies who are not directly affected by a crisis more susceptible to its effects and adversely affect their financial stability.

Ever since the global financial crisis happened, the studies on performance of banks have been widely done and hence to contribute to the already existing literature, this study has been done to evaluate the efficiency of private banks after the global financial crisis.

OBJECTIVES OF THE STUDY

The objective of the paper is to evaluate the growth and performance of private banks of the Indian banking system using indicators like branch growth, non-performing assets, return on assets, etc. Further, this paper also estimates the overall technical efficiency, pure technical efficiency, scale efficiency, allocative efficiency and cost efficiency of 21 Indian private banks (11 old and 10 new private banks) between 2009-10 to 2018-19.

DATA AND METHODOLOGY

Ratio analysis and economic measures are the two main categories of approaches used to assess bank performance. Because they are simple to understand, ratio analysis is widely applied in financial analysis. It is a potent instrument for forecasting, planning, and signalling a specific level of efficiency and has predictive value. Nevertheless, because it only considers one component at a time, it does not take into account various inputs and outputs and is not a good indicator of a firm's overall efficiency.

Another approach that circumvents the limitations of ratio analysis is economic measure. This metric takes into account a variety of inputs and outputs, represents the overall efficiency of banks, and allows for both intra- and inter-firm efficiency comparisons. The two types of economic metrics are parametric and non-parametric. Inputs and outputs must take on a functional shape for parametric measurements to distinguish between statistical noise and inefficiency. On the other hand, non-parametric measurements don't need inputs and outputs to have a prior functional shape. These metrics do not include an error term either. Instead, inefficiency is defined as the distance between an inefficient bank and the efficiency frontier.

In this study, both the ratio analysis and economic measure have been used. The study uses non-parametric data envelopment analysis.

Data envelopment analysis (DEA) is a non-parametric method for assessing the effectiveness of decision-making units using linear programming. Based on the premises of constant returns to scale and convexity, it was first developed by (Charnes, Cooper, & Rhodes, 1978) utilising Farrell's concept of efficiency assessment as a foundation. It is commonly known as the CCR model. The best frontier observations—those that utilise the fewest inputs to achieve the specified level of output or that generate the greatest amount of output from the specified level of inputs—are those that use the least inputs to measure relative efficiency. Lower-performing firms are located below the frontier. The efficiency is bounded by 0 and 1 where 0 means that the firm is inefficient and unity denotes full efficiency of firms. The CCR model of DEA was expanded by (Banker, Charnes, & Cooper, 1984) to take into account the scale of operations. This is known as the BCC model. The CCR model gives the overall technical efficiency of the firms where the inefficiency of firms is either explained by managerial inefficiency or scale inefficiency. The BCC model using the same data splits the efficiency of firms into mutually exclusive and non-additive pure technical efficiency and scale efficiency of firms. Both the models can either be input oriented or output oriented.

The linear form of the CCR model is given as

$$(LP_o) \max \Theta_{(u)} = x_1 w_{10} + \dots + x_n w_n$$

$$\begin{aligned} &\text{subject to: } y_1 z_{10} + \dots + y_m z_m = 1 \\ &x_1 w_{1j} + \dots + x_n w_n \leq y_1 z_{1j} + \dots + y_m z_m \\ &\text{where } j = 1, \dots, q \\ &y_1, y_2, \dots, y_m \geq 0 \\ &x_1, x_2, \dots, x_n \geq 0 \end{aligned}$$

Where, x and y are output and input weights which are greater than or equal to zero. There are ‘ n ’ outputs and ‘ m ’ inputs. Further, ‘ q ’ denotes the number of DMUs. The output and input for DMU j are $w_{1j}, w_{2j}, \dots, w_{nj}$ and $z_{1j}, z_{2j}, \dots, z_{mj}$. Respectively.

The linear programming equation for a given DMU through input-oriented BCC model is given as:

$$\begin{aligned} &(\text{BCC}_o) \min d_B(d_B, \lambda) \\ &\text{Subject to } d_B x_o - X \lambda \geq 0 \\ &Y \lambda \geq y_o \\ &e \lambda = 1 \\ &\lambda \geq 0 \end{aligned}$$

Where d_B is a scalar.

To specify the inputs and outputs, intermediation approach is used in the study. Under the intermediation model, banks are financial entities that act as an intermediary between savers and investors in order to maximise profits. Since this technique takes into account both operations and interest expenses,

(Berger & Humphery, 1997) recognized the advantages of the intermediation approach for assessing the performance of financial institutions. The inputs taken are sum of deposits and borrowings, number of employees and fixed assets. investments, advances and other income are taken as outputs. The prices of the inputs, including the interest paid per unit deposit, staff wages, and expenditures per fixed asset, have also been used to assess allocative efficiency.

The data has been obtained from the various issues of the ‘Performance Highlights of the Private Sector Banks’ by Indian Banks’ Association (IBA).

RESULTS AND DISCUSSIONS

From the Table below, increasing trend for the growth of bank branches was seen for private banks. The mean number of private banks was 19923.10 with compound annual growth rate (CAGR) of 13.71 percent. The number of old private banks was slightly less than the new private banks but the gap widened after 2010-11. The mean number of old private banks was 8332 while the mean number of new private banks was 13591.10. The CAGR for old private banks was 4.48 percent and for new private banks, it was 19.19 percent.

Table 1: Number of Bank Branches

YEAR	PRIVATE BANKS	OLD PVT. BANKS	NEW PVT. BANKS
2009-10	10182	5064	5118
2010-11	11719	4885	6834
2011-12	13581	5462	8119
2012-13	15651	6072	9579
2013-14	18091	6616	11475
2014-15	19454	6509	12945
2015-16	22843	6835	16008
2016-17	24689	7050	17639
2017-18	30666	7312	23354
2018-19	32355	7515	24840
MEAN*	19923.1	6332	13591.1
CAGR*	13.71%	4.48%	19.19%

Source: Various issues of the Performance Highlights of the Private Banks by IBA.

Note* calculated by the author

The deposit of private banks was ₹822800.72 crore in 2009-10 and it increased to ₹3770012.73 crore in 2018-19. The mean deposit of private banks was ₹ 1912765.66 crore with CAGR of 18.43 percent. The mean deposit of old private banks was ₹ 417541.01

crore which was less than the mean deposit of new private banks that was ₹ 1539088.04 crore. From 2016-17 to 2017-18, high deposit was registered on account of demonetisation in India in December 2016.

Table 2: Deposits of Private Banks (in crore)

YEAR	PRIVATE BANKS	OLD PVT. BANKS	NEW PVT. BANKS
2009-10	822800.72	229896.94	592903.79
2010-11	1002758.85	264157.10	738601.75
2011-12	1395835.53	315891.37	858696.04
2012-13	1174587.41	373896.43	1021939.10
2013-14	1395835.53	407406.22	1184287.49
2014-15	1591693.71	446889.75	1387579.96
2015-16	2147673.31	443259.16	1704414.14

YEAR	PRIVATE BANKS	OLD PVT. BANKS	NEW PVT. BANKS
2016-17	2564838.96	507183.42	2057655.54
2017-18	3261619.85	559224.82	2702394.83
2018-19	3770012.73	627604.87	3142407.85
MEAN*	1912765.66	417541.01	1539088.04
CAGR*	18.43%	11.81%	20.36%

Source: Various issues of the Performance Highlights of the Private Banks by IBA.

Note* calculated by the author

There was an increasing trend in the credit disbursement of private banks. The mean credit of private banks was ₹ 167859.87 crore. The credit disbursement of new private banks was higher than that of old private banks. The mean credit of old private

banks was ₹ 308437.13 crore and the mean credit of new private banks was ₹ 1370322.73 crore. The CAGR of credit for old private banks was 13.89 percent and the CAGR of credit for new private banks was 21.84 percent.

Table 3: Credit of Private Banks (in crore)

YEAR	PRIVATE BANKS	OLD PVT. BANKS	NEW PVT. BANKS
2009-10	632440.94	154085.32	478355.61
2010-11	797533.74	184647.31	612886.43
2011-12	966402.95	230079.48	736323.47
2012-13	1143248.58	269937.3	873311.28
2013-14	1342934.62	299262.33	1043672.30
2014-15	1584314.42	329250.50	1255063.92
2015-16	1939339.42	324354.88	1614984.55
2016-17	2219563.02	364209.68	1855353.34
2017-18	2834493.01	431954.33	2402538.68
2018-19	3327328.06	496590.26	2830737.80
MEAN*	1678759.87	308437.13	1370322.73
CAGR*	20.26 %	13.89%	21.84%

Source: Various issues of the Performance Highlights of the Private Banks by IBA.

Note* calculated by the author

Return on assets (ROA) is an indicator of profits for banks which tells the amount of profit a company generates from its assets. The private banks had a mix trend of increase and decrease of return on assets. In the year 2015-16, the ROA had declined to 1.20 percent for private banks from 1.27 percent in 2014-15 due to an increase in the amount of non-performing assets (NPA). The Reserve Bank of India (RBI) had conducted the Asset Quality Review (AQR) in 2015 to identify the under-reported NPAs of Indian

banks. NPAs not only hamper the profit of banks but also lower the cost efficiency of banks.

The mean ROA of private banks was 1.21 percent. The mean ROA of new private banks was 1.58 percent and the mean ROA of old private banks was 0.96 percent. The ROA of old private banks declined from 2012-13 to 2017-18 with an increase in 2018-19. The ROA of new private banks had declined in 2015-16 to 1.57 percent and in 2017-18 to 1.64 percent.

Table 4: Return on Assets (in percentage)

YEAR	PRIVATE BANKS	OLD PVT. BANKS	NEW PVT. BANKS
2009-10	0.94	0.87	1.09
2010-11	1.09	0.95	1.38
2011-12	1.31	1.21	1.51
2012-13	1.31	1.15	1.62
2013-14	1.33	1.12	1.72
2014-15	1.27	0.99	1.81
2015-16	1.20	0.92	1.57
2016-17	1.23	0.85	1.74
2017-18	1.14	0.73	1.64
2018-19	1.25	0.83	1.76
MEAN*	1.21	0.96	1.58

Source: Various issues of the Performance Highlights of the Private Banks by IBA.

Note* calculated by the author

Non-interest income is the income earned by banks through non-core activities. It is the income earned from transaction and deposit fees, service charges and other non-intermediation activities.

The non-interest income to total income ratio was 19.78 percent in 2009-10 and declined to 15.72

percent in 2018-19 for private banks. The ratio increased to 18.52 percent in 2015-16 which may be due to transactions done during demonetisation in December 2016. The mean non-interest income to total income ratio was 16.79 percent for private banks. The mean ratio for new private banks was 18.47 percent and the mean ratio for old private banks was 10.87 percent.

Table 5: Non-interest income to total income (in percentage)

YEAR	PRIVATE BANKS	OLD PVT. BANKS	NEW PVT. BANKS
2009-10	19.78	13.33	21.70
2010-11	17.63	11.50	19.40
2011-12	15.69	9.44	17.51
2012-13	15.18	9.41	16.85
2013-14	15.81	9.28	17.66
2014-15	16.30	10.17	17.94
2015-16	16.69	9.56	18.14
2016-17	18.52	11.90	19.78
2017-18	16.62	12.20	19.40
2018-19	15.72	11.93	16.33
MEAN*	16.79	10.87	18.47

Source: Various issues of the Performance Highlights of the Private Banks by IBA.

Note* calculated by the author

Operational expenses consist of the establishment expenses, like the cost of staff wages and benefits in addition to costs for printing, stationery, advertisements, depreciation etc. Better bank performance is correlated with lower ratios, and vice-versa.

The mean operating costs to total assets was 2.07 percent for private banks. The mean ratio was

higher for new private banks as compared to the mean ratio of old private banks. The mean ratio was 1.94 percent for old private banks and for the new private banks, the mean ratio was 2.18 percent. The ratio had increased for both the bank groups in 2016-17 as compared to 2015-16 which may be due to demonetisation of Indian currency in 2016.

Table 6: Operating costs to total assets ratio (in percentage)

YEAR	PRIVATE BANKS	OLD PVT. BANKS	NEW PVT. BANKS
2009-10	2.05	1.76	2.34
2010-11	2.11	1.96	2.26
2011-12	2.10	1.88	2.32
2012-13	2.06	1.84	2.27
2013-14	2.12	1.99	2.25
2014-15	2.13	2.05	2.22
2015-16	2.02	1.94	2.04
2016-17	2.10	1.98	2.12
2017-18	1.96	1.97	1.96
2018-19	2.06	2.08	2.05
MEAN*	2.07	1.94	2.18

Source: Various issues of the Performance Highlights of the Private Banks by IBA.

Note* calculated by the author

Capital adequacy ratio (CAR) is the minimum amount that banks keep from their own fund to use it in case of loss of unexpected situations. It is an indicator of soundness of banks. The minimum CAR prescribed by Basel II is 8 percent and by the RBI, it is 9 percent.

The private banks, both old and new had CAR well-above the prescribed minimum limit. The CAR of new private banks was more than the CAR of old private banks. The mean CAR of old private banks was 13.33 percent and that of new private banks was 14.99 percent. In totality, the mean of private banks was 14.06 percent.

Table 7: Capital Adequacy Ratio (in percentage)

YEAR	PRIVATE BANKS	OLD PVT. BANKS	NEW PVT. BANKS
2009-10	13.51	15.34	11.17
2010-11	12.52	13.96	11.01
2011-12	14.89	14.18	15.51
2012-13	15.02	13.73	15.59
2013-14	12.29	12.02	12.80
2014-15	12.41	12.09	13.01
2015-16	14.69	12.28	17.89
2016-17	14.55	12.54	17.22
2017-18	15.36	13.35	17.78
2018-19	15.36	13.90	17.10
MEAN*	14.06	13.33	14.99

Source: Various issues of the Performance Highlights of the Private Banks by IBA.

Note* calculated by the author

Non-performing assets (NPA) are those assets which have ceased to generate income for the banks. Net NPA is the amount left after deducting the unpaid and doubtful assets from the gross NPA. It is the actual loss incurred by a bank.

The net NPA of private banks was more in 2009-10 for both the bank groups. The amount declined in 2010-11. But the decreasing trend did not last for long. There was drastic increase in net NPA of old and new private banks in 2015-16. The increase was due to

the AQR done by the RBI in 201. The net NPA of old private banks was ₹ 6751.90 crore and for the new private banks, it was 19920.57 crore. Hence, for the private banks in totality, the net NPA was ₹ 39686.08 crore in 2015-16 in comparison to ₹ 14128.32 crore in 2014-15.

The mean net NPA of old private banks was ₹ 5523.82 crore and for new private banks, the mean net NPA was ₹ 21089.07 crore.

Table 8: Net Non-Performing Assets (in crore)

YEAR	PRIVATE BANKS	OLD PVT. BANKS	NEW PVT. BANKS
2009-10	6505.06	1271.22	5234.85
2010-11	4432.16	983.68	3448.48
2011-12	4401.82	1336.26	3065.56
2012-13	6003.09	2095.16	3907.93
2013-14	8861.54	2861.23	6000.31
2014-15	14128.32	4646.81	9481.50
2015-16	39686.08	6751.90	19920.51
2016-17	47782.62	8096.65	26672.41
2017-18	93045.62	12429.93	80615.69
2018-19	67308.90	14765.40	52543.50
MEAN*	29215.52	5523.82	21089.07

Source: Various issues of the Performance Highlights of the Private Banks by IBA.

Note* calculated by the author

The table below shows the average overall technical efficiency (AOTE), average pure technical efficiency (APTE), average scale efficiency (ASE), average allocative efficiency (AAE) and average cost efficiency (ACE) of old and new private banks.

Overall technical efficiency is the technical efficiency of banks under constant returns to scale (CRS). Technical efficiency is the ability of banks to produce a given level of outputs with the minimum usage of inputs or, the production of maximum outputs with the given level of inputs. OTE details into two mutually exclusive efficiencies that is pure technical efficiency and scale efficiency. Pure technical efficiency is the technical efficiency of banks under

variable returns to scale (VRS). It is devoid of scale efficiency.

Scale efficiency is achieved when banks work on the optimal level of scale of production. It is the ratio of TE under CRS and TE under VRS.

Further, the allocative efficiency (AE) is the ability of banks to choose the optimum mix of inputs and outputs given their respective prices. TE and AE together give the cost efficiency (CE) of banks which is the ability of banks to reduce costs of production without sacrificing on the amount of outputs. A firm is cost efficient if it is totally technically as well as allocatively efficient.

All the efficiency scores are bounded by 0 and 1 where the firms lying on the efficiency frontier have score of unity and the inefficient firms lie below the efficiency frontier.

The AOTE of new private banks was higher than the AOTE of old private banks in all the years. Mean OTE was 0.935 for old private banks and 0.988 for new private banks. The AOTE was lowest for old private banks in 2017-18 that is 0.913 or 91.3 percent. It meant that overall technical inefficiency was 8.70 percent. Banks could have used reduced 8.70 percent of inputs usage without compromising on the output to lie on the efficiency frontier. The OTE was lowest (0.974) in 2018-19 for new private banks and highest (0.999) in 2014-15 and 2015-16.

The APTE of old private banks was lowest (0.963) in 2011-12 and highest (0.981) in 2014-15. The APTE of new private banks was higher than the old private banks. Highest APTE was 1 for new private banks in 2013-14, 2014-15, 2015-16 and 2017-18. The APTE was lowest (0.989) in 2009-10. The mean PTE of old private banks was 0.970 and mean PTE of new private banks was 0.996.

The ASE of old private banks was highest (0.985) in 2009-10 and lowest (0.944) in 2017-18. The ASE of new private banks was highest that is 0.999 in 2014-15 and 2015-16. The ASE of new private banks was lowest (0.985) in 2018-19. The mean SE of old private banks was 0.964 and that of new private banks was 0.992. From the mean PTE and SE of old private banks as well as new private banks, it was deduced that the mean overall technical inefficiency was more due to comparatively low mean SE.

The mean AE of old private banks was 0.972 and the mean AE for new private banks was 0.949. The mean PTE of old private banks was 0.970 and for new private banks, the mean PTE was 0.996. As stated above, cost efficiency is arrived at by the evaluating TE and AE of banks. Thus, the inefficiency in costs of banks was more due to managerial inefficiency for old private banks (PTE) and for the new private banks, poor regulation (AE) was dominant in causing cost inefficiency. The mean cost efficiency of new private banks was 0.971 and for old private banks, the mean CE was 0.911.

Table 9: Average Efficiencies of Private Sector Banks

YEAR/BANK GROUP	OLD PRIVATE BANKS					NEW PRIVATE BANKS				
	AOTE	APTE	ASE	AAE	ACE	AOTE	APTE	ASE	AAE	ACE
2009-10	0.956	0.971	0.985	0.960	0.919	0.981	0.989	0.992	0.995	0.977
2010-11	0.932	0.963	0.968	0.933	0.872	0.982	0.991	0.991	0.872	0.969
2011-12	0.938	0.964	0.974	0.989	0.929	0.990	0.997	0.993	0.994	0.985
2012-13	0.946	0.967	0.978	0.983	0.931	0.990	0.997	0.992	0.998	0.989
2013-14	0.951	0.979	0.971	0.980	0.934	0.997	1	0.997	0.998	0.996
2014-15	0.940	0.981	0.958	0.988	0.930	0.999	1	0.999	0.987	0.987
2015-16	0.929	0.971	0.957	0.961	0.894	0.999	1	0.999	0.951	0.950
2016-17	0.929	0.970	0.958	0.969	0.902	0.984	0.993	0.990	0.902	0.953
2017-18	0.913	0.968	0.944	0.978	0.893	0.986	1	0.986	0.893	0.955
2018-19	0.922	0.974	0.947	0.980	0.904	0.974	0.995	0.985	0.904	0.953
MEAN	0.935	0.970	0.964	0.972	0.911	0.988	0.996	0.992	0.949	0.971

Source: Calculated by the author

The AOTE of Yes Bank, IDFC and, ICICI Bank was 1 which meant that these banks were fully overall technically efficient. Nainital Bank had the least AOTE score of 0.791. Tamil Nad Mercantile was fully pure technically efficient. Nainital Bank, HDFC Bank, Yes Bank, IDFC and ICICI were also on the pure technical efficiency frontier. J&K Bank had the least (0.946) pure technical efficiency. The ASE of Yes

Bank, IDFC and IDBI was unity meaning that these banks were operating at the optimal level of scale. The ASE of Nainital Bank was least that is 0.791 or 79.1 percent. AAE and ACE score was 1 for only IDFC Bank and the AAE was least for Bandhan Bank that is 0.798. The ACE was also least for Bandhan Bank that is 0.779. Hence, IDFC bank was the only bank to be on lying on all the efficiency frontiers.

Table 10: Average Efficiencies of Individual Banks

BANKS/EFFICIENCIES	AOTE	APTE	ASE	AAE	ACE
CITY UNION	0.967	0.972	0.990	0.988	0.955
TAMIL NAD MERCANTILE	0.995	1	0.995	0.979	0.975
CSB	0.901	0.951	0.949	0.968	0.873
DHANLAXMI	0.880	0.948	0.929	0.981	0.864
FEDERAL BANK	0.971	0.984	0.986	0.971	0.943
J&K BANK	0.938	0.946	0.992	0.984	0.923

BANKS/EFFICIENCIES	AOTE	APTE	ASE	AAE	ACE
KARNATAKA BANK	0.958	0.962	0.995	0.980	0.941
KARUR VYSYA	0.965	0.973	0.991	0.983	0.949
NAINITAL	0.791	1	0.791	0.896	0.705
RATNAKAR	0.994	0.998	0.995	0.991	0.986
SOUTH INDIAN	0.931	0.947	0.983	0.973	0.906
AXIS BANK	0.986	1	0.986	0.984	0.971
DCB	0.966	0.993	0.972	0.984	0.960
HDFC	0.997	1	0.997	0.985	0.983
ICICI	0.990	0.998	0.991	0.997	0.987
INDUSIND	0.984	0.986	0.997	0.997	0.981
KOTAK MAHINDRA	0.998	0.999	0.999	0.996	0.994
YES BANK	1	1	1	0.971	0.971
BANDHAN BANK	0.974	0.988	0.985	0.798	0.779
IDFC	1	1	1	1	1
IDBI	1	1	1	0.971	0.971

Source: Calculated by the author

CONCLUSION

Global financial crisis had indirect effects on the performance of Indian banks. While the effects did not last for long and recovery had started from 2009 onwards. But the efficiency of banks was once again marred by the mounting NPAs, especially between 2015-16 and 2016-17. To sum up, it can be said that new private banks were comparatively better than the old private banks in terms of AOTE, APTE, ASE and ACE. IDFC bank which is a new private bank was the only bank efficient in all the types of efficiencies. The Indian private banks were burdened with mounting NPA which took a toll on their profits. The allocative and cost efficiency also had declined. Low efficiency of banks also indicates that there is scope of improvement in performance and efficiency of all banks.

REFERENCES

- Akhibge, A., McNulty, J. E., & Stevenson, B. A. (2017). Does the form of ownership affect firm performance? Evidence from US bank profit efficiency before and during the financial crisis. *The Quarterly Review of Economics and Finance*, 120-129.
- Banker, R., Charnes, A., & Cooper, W. W. (1984). Some Models for Estimating Technical and Scale Inefficiencies in Data Envelopment Analysis. *Management Science*, 30(9), 1078-1092.
- Berger, A. N., & Humphery, D. B. (1997). Efficiency of Financial Institutions: Internatioanl Survey and Directions for Future Research. *European Journal of Operational Research*, 1-51.
- Charnes, A., Cooper, W., & Rhodes, E. (1978). Measuring the efficiency of decision making units. *European Journal of Operational Research*, 429-444.
- Farrell, M. (1957). The Measurement of Productive Efficiency. *Journal of the Royal Statistical Society*, 120(3), 253-290.
- Gulati, R., & Kumar, S. (2016). Assessing the impact of the global financial crisis on the profit efficiency of Indian banks. *Economic Modelling*, 167-181.
- Maredza, A., & Ikhide, S. (2013). *The Impact of the Global Financial Crisis on Efficiency and Productivity of the Banking System in South Africa*. Capetown: Economic Research Southern Africa (ERSA).
- Motlagh, A. M., & Babacan, A. (2015). The Impact of the global financial crisis on the efficiency of Australian banks. *Economic Modelling*, 397-406.
- Park, C.-Y., & Shin, K. (2017). *A Contagion Through Exposure to Foreign Banks During the Global Financial Crisis*. Manila: Asian Development Bank.
- Sufian, F., & Habibullah, M. S. (2010). Developments in the efficiency of the Thailand Banking Sector: a DEA approach. *International Journal of Development Issues*, 9(3), 226-245.