Credit Risk Management and Performances of Banks in India: The CAMELS Rating Model

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Abstract

Bank is a financial institution and it also acts as a financial intermediary to accept deposits and channel those deposits into lending activities, either directly by loaning or indirectly by capital markets. The present study was to assess the performance of Indian banks using the CAMELS model. The model is an acronym of Capital adequacy, Asset quality, Management Efficiency, Earning, Liquidity, and Sensitivity. A total of 10 private banks in India were selected for the study for a period of nine years. The dependent variable used for the study was the financial performance of the banks measured by Return on Equity (ROE) whereas the independent variables were the CAMELS component. A standard multiple regression was used to ascertain the relationship between the CAMELS components and performance measure (ROE). The overall performance ranking of selected banks during the study period reveals that HDFC bank is on the top performance level followed by ICICI Bank and Axis bank. Furthermore, DCB bank is on the last level due to the weak performance of profitability and all other CAMELS model variables. The study concluded that earning stood out as a highly significant factor that affects the performance of banks in India a percentage change in earning will leads to a 61.9% increment in the bank performance measured by the ROE. Capital Adequacy, Asset quality, Liquidity was found to be a significant effect on the performance of Indian banks. On the other hand, Management efficiency and Sensitivity were insignificant that affect the performance of the banks in India.

Keywords: *Performance, CAMELS rating, Banks, ROE, India.*

I.   Introduction

A bank is financial institutions which accept deposit from the public and also grant loans which help the private sector that serves as an engine of growth. Even though, a bank incurring losses from the non-payment of loans and other forms of credit which keeps on increasing yearly due to credit risk management. So, measuring the performance of banks in India has become increasingly important due to the continuous fall off in the asset quality of the banks.

Credit Risk Management

Credit is a contractual agreement in which borrowers receive something of value, now and agree to pay the lender at a future date with consideration generally with interest. Credit risk refers to the probability of loss due to the failure of the borrower to make payment on any type of debt. Credit risk management is the practice of reducing the losses by understanding the adequacy of the bank's capital and loan loss reserve at any time. It could be realized that credit creation has been the primary income- generating activity of the banks. However, this important activity involves a considerable risk taken. Thus, the present encompasses the credit risk management and performance of banks in India by using the CAMELS rating model.

CAMELS Rating Model

The Uniform Financial Institutions Rating System (UFIRS) CAMEL model was first adopted by the Federal Financial Institutions Examinations Council (FFIEC) of the United States of America on 13th November1979. Later on, the Federal Deposit Insurance Corporation (FDIC) revised to include a sixth measure (Sensitivity) to the UFIRS in the year 1997 to classify a bank's overall condition (soundness). The term CAMELS is an acronym, which is made up of the following components: Capital Adequacy, Asset Quality, Earning Capacity, Management Efficiency, Liquidity, and Sensitivity.

II.   Literature Review:

1. Roman and Camelia (2013)[1], investigated the financial stability of Romanian commercial banks. The CAMELS framework was implemented in this research. For a period of time, a sample of 15 commercial banks was used (2004 - 2011). After the analyses, the research concluded that Banca Commercial Romana placed among the top five performing banks solely in terms of management quality and profitability indicators, while showing poor performance in terms of liquidity indicators.
2. Jamil et al (2014)[2], analyzed the financial performance of investment banks in Pakistan. The top ten investment banks in Pakistan based on credit rating in 2014 for the period of 2009 to 2013 were selected for the study. Financial ratios and

financial measures were taken. The total asset and total equity are the two financial measures were used in the study. Return on Assets ratio (ROA), Return on Equity ratio (ROE), Admin expense to profit before tax ratio, cash and cash equivalent to total asset ratio, and capital ratio are the financial ratios were chosen. The study concluded that the ranking of banks differs as financial ratios change.

3. Ab-Rahim & Chiang (2016)[3], in their study on "Market Structure and Performance of Bangladesh Banking Industry: A Panel Data Analysis" examined the degree of concentration and performance of the Bangladesh banking industry from1999 to 2011. The random effects (RE) estimator was used. Two competing hypothesis of the traditional industrial organization theory e.g. the structure conduct performance (SCP) paradigm and efficient structure hypothesis (ESH) was applied to investigate the relationship between concentration and competition in the banking sector. The finding reveals that Bank performance is positively associated with capitalization, liquidity and asset size of the banks.

4. Ahsan (2016)[4], investigated the performance of selected Islamic banks in Bangladesh by using the CAMEL ratio framework. After analyzing the data, it can be concluded that all the selected Islamic banks are in a strong position. The banks were found to be good in all the components of CAMEL (i.e. capital adequacy, asset quality, management efficiency, earning capacity and liquidity condition).

5. Aliyu (2017)[5], assessed the predicaments of Jaz bank Plc in Nigeria over the period of three years from 2012-2014. The CAMELS was used to evaluate the performance of the banks. After analysing the data, the result indicates that the bank perform well in respect to Capital Adequacy, Asset and Management quality whereas it suffers more on an average in respect to earning quality and liquidity.

6. Alemu (2017)[6], measured the performance of private banks in Ethiopia. A panel regression model was used for analyzing the data. The finding of the study reveals that capital adequacy and liquidity were positive and significantly related to the performance of Ethiopian. Asset quality was found to be insignificant. Earning capacity was a negative and significant relationship with the performance of the banks.

7. Rastogi (2017)[7], analysed the performance of public and private sector banks using CAMEL model. Statistical sample consists of four major public and private sector banks in India. They were State Bank of India, Punjab National Bank, HDFC Bank and AXIS Bank, being in the list of top five banks in India. HDFC Bank has in 1st rank, SBI have secured 2nd Position PNB also succeeded in managing its 3rd position and Axis Bank are 14th position.

8. Gorbunova (2018)[8], evaluated the activities of the Commercial Banks of the Russian Federation by using the CAMELS Model. A total of five banks namely JSC Raiffeisenbank, JSC Russian Agricultural Bank, VTB (PC), Post Bank (PC) and Sberbank of Russia (PC) banks were chosen for the year 2017. After analyzing the data, the study concluded that PJSC Sberbank and Raiffeisen bank, which received ten and nine points, respectively. Next to them is Post Bank, which scored eight points according to the rating. Russian Agricultural Bank and VTB (PC) banks are with a lower score.

9. Srivastava & Rana (2019)[9], studied the Risk Management Issues in NBFC's in India. T-Test and CAMEL Model were used. The Study examines the relationship between risk management methods and risk variables. In this research, 14 NBFCs from various categories were selected randomly as a sample. The period taken is the year 2011 to 2018.Risk management methods as dependent variables and Variables risk like credit risk, market risk and operational risk as Independent Variables were used for the study .It is observed that there is a significant relationship between Risk Management Methods and Risk Variables.Risk acceptance or risk mitigation strategies are used by NBFCs with strong financial backing. Risk avoidance is used by NBFCs that do not have any back support. In India, NBFCs primarily followed these two strategies.

10. Zaidanin (2020)[10], focused on the impact of the CAMEL model variables on the profitability and financial soundness of thirteen Jordanian commercial banks. The study employs the CAMEL model variables of capital adequacy, asset quality, management efficiency, earnings ability, and liquidity management to rank banks based on their overall performance and to assess their impact on banks' profitability measures of Return on Assets and Return on Equity separately using a fixed effect regression model for the peiod of seven years (2013-2019). The ranking approach concludes that the Bank of Jordan was in first place, followed by the Capital Bank of Jordan. Jordan Ahli Bank was ranked last in most categories. Furthermore, the empirical findings show that Non-Interest Income to Total Assets and Net Interest Income to Total Loans and Advances have significant positive relationships with both profitability measures, whereas cost to Total Income and Non-Interest Income to Total Assets have strong negative relationships. Furthermore, the ratio of equity to total assets has a high negative correlation with ROE.

III. Statement of the problem.

In recent times, The Indian banking industry (both bank and Non- Banking Financial Companies (NBFCs) has been struggling with the problem of credit risk management. These resulted in the collapse, liquidation, and consolidation of banks and NBFCs in the country. This makes the public losing confidence in the banking sector. In this scenario, the present study was framed to ascertain the relationship between credit risk management and the performance of banks in India using the CAMELS model.

IV. Objective of the Study.

1. To analyze the financial soundness of the selected banks in India.
2. To find out the relationship between the parameters of the CAMELS rating model and performance of the selected banks in India.

V. Hypothesis.

H_{01}: There is no significant relationship between capital adequacy and performance.

H_{02}: There is no significant relationship between asset quality and performance

H_{03}: There is no significant relationship between management efficiency and performance

H_{04}: There is no significant relationship between earning capacity and performance

H_{05}: There is no significant relationship between Liquidity and performance

H_{06}: There is no significant relationship between sensitivity and performance.

VI. Research Methodology.

a. Data and Sources.

The data have been collected mainly from the secondary source i.e. from the annual report of the selected sample banks.

b. Study Variable.

The independent variable used for the study was the financial performance of the banks measured by Return on Equity (ROE) whereas the independent variables were the CAMELS component.

Return on Equity (ROE)

ROE is a measure of the profitability of a business in relation to the equity shares. It can calculate by using the following formula.

$$ROE = \frac{\text{Profit after- Tax (PAT)}}{\text{Total Equity Capital (Total shareholders fund)}} *100$$

Capital Adequacy (C)

It refers to the amount of capital the bank has to hold as required by its financial regulator. It is expressed as the capital adequacy ratio which can be calculated as follows:

$$\text{Capital adequacy} = \frac{\text{Tier1 capital + Tier 2 capital}}{\text{Risk-weighted Assets}} *100$$

Asset Quality (A)

It evaluates the quality of assets/loans the banks offers. Asset quality provides the stability of the banks when it is facing a particular risk. Loans and advances make up a large portion of bank assets. So, the study will use this ratio.

$$\text{Asset Quality} = \frac{\text{Net Non- Performing Assets}}{\text{Net Advances}} *100$$

Management Efficiency (M)

It is the critical measure and can be analyzed through the subjective evaluation of management system, organisation culture and so on. Even though, the performance of management can also be measured with the help of ratios.

$$\text{Management Efficiency} = \frac{\text{Total Advances}}{\text{Total Deposits}} *100$$

Earning Capacity (E)

It is an essential component for analysing the risk and recovery of the banks. Return on Assets (ROA) will be used as the measure of earning capacity.

$$\text{Earning Capacity} = \frac{\text{Net Profit}}{\text{Average total assets}} *100$$

Liquidity (L)

The banks must maintain liquid cash and assets to meet unexpected withdrawals from the depositors without affecting the daily operation. Loans and advances to deposit ratio will be used as a measure of liquidity.

$$\text{Liquidity} = \frac{\text{Liquid assets}}{\text{Total Deposits}} *100$$

Sensitivity(S)

It refers to an effect on banks due to market conditions. Bank sensitivity to changes in interest rate, foreign exchange rate, etc. is measured.

$$\text{Sensitivity} = \frac{\text{Rate Sensitive Assets (RSA)}}{\text{Rate Sensitive Liabilities (RSL)}}$$

RSA = sum of the net advances, net investment and money at call.

RSL= sum of deposits and borrowings of the banks.

c.   Sampling Selection.

A total of 10 Private Banks in India namely HDFC Bank, Kotak Mahindra, ICICI Bank, Axis Bank, Yes Bank, Induslnd Bank, City Union Bank, Federal Bank, RBL Bank, DCB bank was chosen for the study from the year 2011 to 2019. The basis of selection was purely based on the availability of data. A regression analysis of the components of the CAMELS rating model was used because it clearly identifies institutional strengths and weaknesses in all facets of financial and managerial abilities.

d.   Research Model.

Model specification of the study

To ascertain the relationship between the CAMELS components and performance measure (ROE), a regression model was adopted. The study used standard multiple regression because of more than one independent variable for analyzing the data. The model for the study is the following form:

$ROE = \beta_0 + \beta_1 C + \beta_2 A + \beta_3 M + \beta_4 E + \beta_5 L + \beta_6 S + \varepsilon$

Where

ROE = Return on Equity (Performance measure)

C   = Capital Adequacy

A   = Asset Quality

M   = Management Efficiency

E   = Earning Capacity

L   = Liquidity

S= Sensitivity

β_0 = Constant term

ε = the error term

$\beta_1, \beta_2, \beta_3, \beta_4, \beta_5, \beta_6$ are the coefficient of the respective independent variables

VII. Results and Discussions

Table 1: Overall Performance Ranking of selected banks during the period 2011-2020

Company Name	C	A	M	E	L	S	Average	Rank
HDFC Bank	2	4	8	7	8	4	5.50	1
ICICI Bank	7	8	5	4	3	2	4.83	2
Axis Bank	7	5	1	8	2	6	4.83	2
Kotak Mahindra	7	3	5	3	7	3	4.67	4
Yes Bank	4	6	3	3	5	6	4.50	5
Federal Bank	6	2	3	2	4	8	4.17	6
Induslnd Bank	2	3	2	7	6	4	4.00	7
City Union Bank	1	6	5	6	3	1	3.67	8
RBL Bank	2	6	2	1	5	5	3.50	9
DCB bank	5	1	5	5	1	1	3.00	10

Source: Computed

Table 1 show that HDFC bank is on the top performance level followed by ICICI Bank and Axis bank. Furthermore, DCB bank is on the last level due to the weak performance of profitability and all other CAMELS model variables.

Descriptive Statistics

Table2:Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation	Variance
ROE	90	.43	.921	.31012	.172239	.031
C	90	.0120	.560	.16311	.064366	.006
A	90	.01000	.08000	.040800	.08115607	.007
M	90	.00063	.02908	.079450	.00682573	.000
E	90	.00040	.01760	.0424764	.00410323	.000
L	90	.70195	1.07180	.8547308	.08812139	.008
S	90	.99977	1.45555	1.0650513	.05378530	.003
Valid N (list wise)	90					

Source: Computed

From table 2, it could be observed that some banks recorded ROE 0.43% while others as high as 92% during the study period. A mean value of 31% indicates that most of the banks are performing well in effectively using the contribution of equity investors to generate profit to the investors. According to Investopedia, Return on Equity (ROE) between the ranges from 15% to 20 % will be favourable for the purpose of investment. The Average capital adequacy shows 16.3% which is higher than the regulatory requirement of 9%.Asset quality of 4.1% is below the acceptable ratio which states that lesser NPLs. The Earning capacity of the banks was on average of 4.2% is a good returning which reveals that management of the banks is utilizing the assets employed judiciously. Average liquidity was 85.47% which signifies that the mobilized deposits are used to finance the lending activities of the banks. The average sensitivity ratio was 1.06% implies a balance position, says the amount of maturity asset is offset by the maturity liabilities.

Test for Multicollinearity among variables

One of the assumptions of regression analysis is there should be no multicollinearity among the study variable. A correlation coefficient should not be more than 0.80 between any two variables which indicates the absence of co linearity (Nagaraju and Boateng, 2018)[11]. From the below table 3, it indicates that none of the correlation coefficient is more than 0.80.

Table 3: Correlations

		ROE	C	A	M	E	L	S
Pearson Correlation	ROE	1.000	-.291	-.474	.800	.794	-.313	-.209
	C		1.000	-.008	-.093	-.128	.237	.800
	A			1.000	-.397	-.351	.312	-.196
	M				1.000	.971	.058	.128
	E					1.000	.069	.113
	L						1.000	.274
	S							1.000

Source: Computed.

Model fit Evaluation

The R^2 measure the variations in the dependent variable which attributed to the independent variables. From the below table 4, the value of R^2 is .873 which indicate the model is capable explaining 87.3% variations in the dependent variable (ROE). From the table 4, it also shows that the F statistics attained the level of significance of .000 which reveals that regression model is significant at 5 % level.

Table 4: Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.934[a]	.873	.864	1.742	1.109

a. Predictors: (Constant), Sensitivity, Earning capacity, Liquidity, Asset quality, Capital Adequacy, Management Efficiency

b. Dependent Variable: Return on Equity

Table 5 : ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	1732.823	6	288.804	95.135	.000[b]
	Residual	251.966	83	3.036		
	Total	1984.789	89			

a. Dependent Variable: Return on Equity

b. Predictors: (Constant), Sensitivity, Earning capacity, Liquidity, Asset quality, Capital Adequacy, Management Efficiency

Table 6 : Coefficients[a]

Model		Unstandardized Coefficients B	Std. Error	Standardized Coefficients Beta	t	Sig.	Correlations Zero-order	Partial	Part	Collinearity Statistics Tolerance	VIF
1	(Constant)	0.9453	.063		4.495	.019					
	C	.396	.087	.389	4.548	.000	-.291	.447	.178	.209	4.776
	A	-1.139	.273	-.208	-4.178	.000	-.474	-.417	-.163	.619	1.616
	M	9.012	.011	.244	1.420	.159	.800	.154	.056	.052	4.346
	E	2.682	.919	.619	3.601	.001	.794	.368	.141	.052	5.335
	L	-12.203	.421	-.228	-5.040	.000	-.313	-.484	-.197	.749	1.334
	S	-5.346	.732	.190	-.229	.110	.209	.611	.275	.197	5.070

a. Dependent Variable: ROE

The regression equation was based on the analysis of the result in the above table as stated below:

ROE= .9453+.396 C -1.139 A+9.012 M+ 2.682E -12.203L -5.346S

From the above table, the Capital adequacy recorded a standard coefficient of .389 with a sig. value of .000.It means there is a positive relationship between Capital Adequacy of the bank and its performance. A unit increase in the Capital Adequacy will result in a 38.9% increase in the ROE of the bank.

Asset Quality indicated a coefficient of -.208 with Sig. value of .000.It shows that Asset quality has negative relationship with the performances of banks. In evidence that a unit decrease in the loan impairment charges will leads into 20.8% decrease in ROE of the banks.

Management efficiency showed a standard coefficient of .244 and Sig. value of .159. It means, though a unit increase in management efficiency will result in 24.4% and it is not significant.

Earning capacity recorded a standard coefficient of .619 and Sig. value of .001.It indicates a positive relationship between earning of the banks and its performance such that a unit improvement in the earning of the banks will amount to 61.9% jump in ROE.

Liquidity had a coefficient of -.228 with a Sig.value of .000.This is an indication of negative and significant relationship between liquidity and profitability. It means that a unit decrease in the liquidity will result in 22.8% decline in ROE of the banks.

Sensitivity recorded a standard coefficient of .190 with Sig. value of .110. It means that though a unit increase in the sensitivity will result in 19%, it is not significant.

Table 7: Hypothesis Testing

Hypothesis	Sig.	Remarks
H_{01}: There is no significant relationship between capital adequacy and performance	0.000**	Rejected
H_{02}: There is no significant relationship between asset quality and performance	0.000**	Rejected
H_{03}: There is no significant relationship between management efficiency and performance	0.159	Accepted
H_{04}:There is no significant relationship between earning capacity and performance	0.001**	Rejected
H_{05}: There is no significant relationship between Liquidity and performance	0.000**	Rejected
H_{06}: There is no significant relationship between sensitivity and performance.	0.110	Accepted

**Significance at 5% level

VIII. Conclusion

The objective of the banks was to assess the performance of Indian Banks using the CAMELS rating model. The overall performance ranking of selected banks during the study period reveals that HDFC bank is on the top performance level followed by ICICI Bank and Axis bank. Furthermore, DCB bank is on the last level due to the weak performance of profitability and all other CAMELS model variables. After analyzing the data, the finding of the study concluded that earning stood out as the highly significant factor that affects the performance of banks in India. A percentage change in earning will leads to a 61.9% increment in the bank performance measured by the ROE. Capital Adequacy, Asset quality, Liquidity was found to be significant affect the performance of Indian banks. On the other hand, Management efficiency and Sensitivity were insignificant that affect the performance of the banks in India.

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