

An empirical analysis of the causal relationship between NPA and its determinants in Yes Bank

Anuj Gupta¹
Sarswati Chandra Gupta²
Afsha Afreen³

Abstract

The economy has always hinged on the banking sector for rational financial support in adverse situations. Dissemination of loans and advances is one of the most prominent functions of banks. The problem arises when banks face Non-Performing Assets (NPAs) which lead to upheavals in the economy. This is the situation in case of the turmoil in Yes Bank since September 2018. The study focuses on the relationship between NPA and its determinants in case of Yes Bank. The study was performed using data from 2010-11 to 2018-19 through econometric tools like KPSS unit root, OLS regression, Granger causality test, Breusch-Godfrey test, Breusch-Pagan-Godfrey test, CUSUM test, and others. It was found that profitability and growth of loans and advances had a significant impact on NPAs of Yes Bank in the long run while in the short-run causality, there was a unidirectional

relationship of NPA-led bank rate, and loans and advances-led NPA. Further, the study involved only a single bank; hence, the literature was confirmed or rejected related with similar variables. The model formed was appropriate for both sample and population, which was free from serial correlation, heteroscedasticity, instability, and abnormality. Policymakers are suggested to frame a high-level research committee to analyse the lack of managerial effectiveness and NPA levels, as well as to tackle these problems using model framed by the researchers. The glory of Yes Bank will be back again with positive news of investment, expansion and performance stability.

Keywords: *NPA, causal, econometrics, managerial effectiveness, stability*

1 *Doctoral Scholar, Faculty of Commerce, Banaras Hindu University, Varanasi-221001, Uttar Pradesh*

2 *Doctoral Scholar, Faculty of Commerce, Banaras Hindu University, Varanasi-221001, Uttar Pradesh*

3 *Doctoral Scholar, Faculty of Commerce, Banaras Hindu University, Varanasi-221001, Uttar Pradesh*

Introduction

Non-Performing Assets (NPAs) have become the focus while assessing any bank's success and managerial efficiency. These assets are the chief determinant of a bank's financial statements and effectiveness. NPAs refers to those loans and advances on which interest or principal remain unpaid for a period of 90 days and above from the due date (Dhar et. al. 2015). The problem of NPAs became more pronounced after the crisis of 2008 when banks started providing more loans to keep the economy strong. But the opposite happened to the banks when their gross NPAs to gross advances rose to 3.6 percent in the year 2012-13 (Roy, 2014). Further studies were done for analysing the determinants and assessing the causal effect of determinants on the NPAs of banks. Among them, studies related to the determinant of NPAs were categorized into two, micro and macro. Studies considering micro determinants were banks' internal parameters like profitability (Mester, 1996; Bhatia, Mahajan and Chander, 2012; Louiz et. al. 2012), loans and advances growth (Clair, 1992; Keeton, 1999; Borio et. al. 2001; Salas and Sourina, 2002; Hess et. al. 2009), banks' capital (Gonzalez-Hermosillo et. al. 1997; Rajaraman et. al. 1999; Das and Ghosh, 2006; Khemaj and Pasha, 2009; Greenidge and Grosvenor, 2010; Louiz et. al. 2012; Klien, 2013) efficiency (Brever, 2006; Li et. al. 2007; Podpiera and Weile, 2008) and others. Macro factors affecting NPAs include growth rate, interest rate, bank rate, inflation rate, and others (Adebola et. al. 2011, Yadav, 2011; Park, 2011; Roy and Bhattacharya, 2011; Siddiqui, 2012; Roy, 2014). Taking these variables as its pivot, studies on the banking sector as a whole have been done with further segmentation of private, public and foreign banks in the past, but no specific study of a particular bank has been done so far. In this study, Yes Bank has been selected for analysis to draw inferences about the acceptance or rejection of previous studies done on related grounds. It was found from the analysis that managerial turmoil leads to the downfall of a bank. Favouritism and reckless lending by officials led to a huge heap of NPAs in most of the Indian banks.

A brief Profile of Yes Bank

The banking sector has always been a major driver of economic growth in any nation. It adds value to the nation's economy by mobilizing funds and contributing significantly towards capital formation. Yes Bank is a significant pillar of the Indian banking sector and since its inception, the bank has worked towards strengthening this sector. Yes Bank was incorporated in the year 2003 by Rana Kapoor and Ashok Kapoor as its founders. The bank started operations in the year 2004 with its first branch in Mumbai. Presently, the bank occupies 5th position in the list of top private banks in India. By the end of FY 2018-19, the bank had 1,120 branches, 21,130 employees and a net profit of Rs.17,200 million.

Yes Bank has achieved numerous milestones. In the year 2008, the bank got the tag of 'emerging market sustainable bank of the year'. In the year 2009, it got the 'Fastest Growing Bank' award. It bagged the award of India's number 1 mid-sized bank in the year 2010 and Sustainable Bank of the Year (Asia/Pacific) in the year 2011. In the year 2015, the bank was added to the Nifty 50 index. However, for the past few months, the bank has witnessed turmoil. The bank booked a maiden loss of Rs. 15,600 million in the 4th quarter of FY 2018-19 with GNPA of Rs. 78,330 million. In the first quarter of FY 2019-20, the bank earned a profit of Rs. 1,137.6 million, but this profit was 91 percent lower than the previous year's profit of the same period. The market capitalization of Yes Bank has fallen from Rs. 26,68,100 million on 3rd April 2019 to its lowest level of Rs. 69,650 million (6th March, 2020). The bank's shares were assigned the status of 'downgrade' by prominent credit rating agencies. Yes Bank's plight can be gauged from the fact that it has been included (7th position) in the list of the worst performing top-10 banks in India, as per a report by Bloomberg in 2019. Yes Bank's total exposure may be more than Rs. 22.5 lakh million, but according to Enforcement Directorate (ED) officials, Yes Bank's non-performing assets (NPAs) are around Rs. 420,000 million. Rs. 200,000 million were allegedly lent to some corporates as well as NBFCs on Rana Kapoor's directions. Yes Bank's gross NPAs showed an

increase of 18.87 percent as compared to 2.10 percent in the same period of FY 2019. In absolute terms, the gross NPA figure for the December quarter stood at Rs. 407,090 million compared with ₹ 51,180 million in the third quarter of FY 2019. It was an increase of over 600 percent. At the end of the second quarter of FY 2019, the bank's gross NPA was 7.39 percent. The bank's net NPA was 5.97 percent at the end of the December quarter. In the third quarter of FY 2019, the bank reported a net NPA of 1.18 percent. The RBI proposed a draft reconstruction plan on 6th March 2020 envisaging that the bank could write additional Tier 1 ('ATL') securities up to Rs. 86,950 million in equity. There is no scope for ATL Securities to be written down in the final scheme issued by the Government of India. State Bank of India approved investment of Rs. 72,500 million in the form of Rs.10 apiece shares in Yes Bank Limited under the rescue plan for the troubled bank. SBI's stake in Yes Bank will remain within 49 percent of the paid-up capital of the bank. Under RBI's supervised "Yes Bank Limited Reconstruction Scheme, 2020", SBI is required to retain at least 26 percent stake in Yes Bank for a period of three years. SBI's proposed plan is to invest a minimum of Rs. 24,500 million and a maximum of Rs. 100,000 million for a 49 percent stake in the bank. This information motivated the researchers to study the micro and macro determinants of the bank for further development or verification of literature.

Review of literature

Upadhyay et. al (2019) assessed the impact of credit risk on the profitability of HDFC Bank and SBI during the period 2009-2018. Multiple regression analysis was employed to meet this objective, taking return on capital as the dependent variable and capital adequacy ratio, loan to deposit ratio, NPA, cost per loan ratio, provision coverage ratio, leverage ratio, problem asset ratio, and loan asset ratio as the independent variables. Atman's Z score was employed to assess financial health. HDFC's Z score was higher than SBI's score throughout the study period. A significant relationship was found between credit risk and profitability in case of SBI. In the case of HDFC, the

statistical model was not found significant.

Gaur et.al (2019) performed a comparative study to examine the trends of NPA in priority and non-priority sectors of public and private banks of India, giving special focus on the priority sector. During the period of study (2012-2017), it was found that there exists a significant difference in the NPA of the priority sector between public banks and private banks. NPA of the priority sector in private banks grew at a higher rate than public banks. Also, NPA in the priority sector was higher than the average NPA level.

Bawa et. al (2018) assessed the effect of some financial ratios of banks on their NPAs. 31 financial ratios were taken in the study, some of them being CD ratio, NNPA to advances, owned capital to total asset, ROA, etc. Each variable was classified into six categories - liquidity, operating capability, profitability, solvency, business development capacity, and capital adequacy. GMM model was employed to meet the objective. A significant positive relationship was found between asset growth, total liability by total asset, lagged NPAs, and NPA. A negative relationship existed between ROA, intermediation cost ratio and NPA.

Shukla et. al (2018) conducted a study which focused on determining the cost of capital required by Indian banks to follow Basel-III norms specified in terms of Common Equity Tier (CET) -1 ratio, Tier-1 and total capital ratio. The data required for the analysis was extracted from the RBI database, periodicals and financial statements of various banks published from time to time. Risk Weighted Assets (RWA), CET-1, Additional Tier (AT) -1, Tier-2 Capital and Group of State Bank of India, 21 Public Sector Banks as well as 19 Private Sector Banks for year 2016 were considered for this study. Present value approach has been used in this analysis to give better estimates for the implementation of the Basel-III agreement and the comparison of additional costs associated with future benefits. The result of the analysis estimated that the implementation of the Basel-III agreement for Indian banks would require additional capital of ₹ 5.56 trillion

by 2019. The present value of the said essential capital is ₹ 4.78 trillion which is sufficient in relation to the Indian economy.

Saxena (2020) performed a study to evaluate various models for the effectiveness of training programs in general and critically evaluate the problems associated with these models. He also assessed their relevance in the service industry in the current scenario and advised a unique model to make the evaluation of the effectiveness of training easier and affordable for the banking industry. The new model has been tested at a national level banking organization, involving 332 participants in 18 varied training programs from different branches across India. 40 variables, both dependent and independent, have been tested with the help of 80 hypotheses. The reliability and validity of the results were tested by means of the chi-square and Z-test. The major findings have produced a new model for evaluating the effectiveness of training programs.

Bhaarathi et. al (2018) performed a study to determine the factors affecting the NPA in public sector banks, private sector banks and foreign banks of India. The variables (determinants) taken for the study were – size of the bank, per capita income, inflation rate, interest rate, and credit diversification. Hausman test was employed to meet this objective. The study revealed that determinants of NPA differ with respect to ownership type. Factors like interest rate affect NPAs in public sector banks while the inflation rate and per capita income affect NPAs in private sector banks. No variable was found significant in the case of foreign banks.

Jayaraman et. al (2018) performed an empirical study to explore the bank's specific and macroeconomic factors of NPAs and assess their effect on NPAs. To meet this objective, the Autoregressive Distributed Lag model and Bounds F test was employed. Granger's Causality was used to investigate the short run causality between variables. Variables taken for the study were real GDP, Consumer Price Index, gross

advances and total operating expenditure. The study disclosed a positive long run relationship between NPAs and inflation. A negative long run relationship was found between NPAs and GDP. Advances and NPAs also disclosed a positive long run relationship. Operating expenses showed a mixed result. In the short run, a positive relationship was found between NPAs and operating expenses. However, an inverse relationship was disclosed in the long run.

Dhar et. al (2015) investigated the effect of bank-specific factors on the NPAs in public sector banks of India for a period of five years from 2001 to 2005. Panel regression was employed to investigate the impact of bank-specific variables like CD ratio, capital adequacy ratio, and profit per employee, unsecured loans, net interest, ROA, investment-deposit ratio, lending to sensitive sectors and lending to the priority sector. Hausman test was used to make a choice between fixed effect model and random effect model. F-test indicated use of fixed-effect firm and time model. The result indicated that variables like lending to sensitive sector, CARs and interest were found significant in controlling the problem of NPAs. Variables like CD ratio, unsecured loan, ROA, profit per employee indicated an inverse relationship while lending to sensitive and priority sector indicated a positive relationship with NPAs. The study opined that the variables affecting NPAs are generally country specific due to variations in rules and regulations in the banking sector.

Bag et. al (2017) conducted a study to analyse the trends of NPAs in public and private banks of India and Bangladesh for the period 2010-11 to 2015-16. The impact of NPAs on ROI and ROA was also assessed with reference to both the countries. The study opined that the share of public sector banks showed an increasing trend in both the countries whereas, the trend of private sector banks was steady. An inverse relationship was found between NPAs-ROI and NPAs-ROA in public as well as private sector banks of both the countries.

Dey (2018) threw light on the recovery mechanism of NPAs in India. The objective of the study was to identify various recovery channels and evaluate their effectiveness from 2003-04 to 2016-17. Three recovery wings namely Lok Adalat, Debt Recovery Tribunal (DRTs), and Securitization and Reconstruction of Financial Assets and Enforcement of Security Interest Act (SARFASEI) of 2002 were reviewed. The study concluded that there is a significant difference between the performances of the three channels. Recovery through DRTs is highest and the most stable one as compared to recovery through Lok Adalat and SARFASEI. Also, it was found that throughout the study period, the rate of NPAs was higher than the amount recovered, which signified that recovery mechanism is not up to the mark in India. The researcher suggested the need for an adequate pre-sanctioning appraisal system and post-disbursement supervision system.

Biradar (2019), Sharma (2013) and Sharma and Bansal (2019) did a comparative study on the performance between privately and publicly owned Indian banks in NPAs management during the period 2005-16, 2003-13 and 2010-15. The study revealed that the performance of private sector banks was better than public sector banks in terms of NPAs.

Objective of the study

The main objective of the study was to analyse any presence of relationship between the variables. Following were the main objectives of the study:

1. To assess the impact of micro and macro determinants of NPAs on Yes Bank's NPAs.
2. To analyse the causal relationship between the selected variables in Yes Bank.

Research Methodology

The study was based on NPAs and its determinants. These determinants were of two categories - micro and macro. Micro determinants include those variables which were part of the internal environment of Yes Bank viz. plans and policies, managerial efficiency, profit and loss, capital, loans sanctioned,

provisions made, etc. Macro determinants include the external environment which affects NPAs (dependent variable) viz. growth rate, inflation rate, ease of doing business, GDP, bank rate, government policies, taxation, etc. Out of these numerous variables, six determinants (independent variables) were selected, three each from micro and macro determinants. Loans and advances, profit and loss after tax and bank capital were micro determinants whereas bank rate, inflation rate and growth rate were macro determinants. Data was collected from the annual reports of the bank, RBI's publications, previous research studies, magazines, online articles in Economic Times and Business Today and other websites. The period of study was from 2010-11 to 2018-19, dealing with financial year data. Selection of Yes Bank was a challenging task as it possesses a short history since it was established only in 2004 and the NPAs data was available only from 2010-11. Yes Bank has been the most traded share of Nifty-50 in the recent past; its share price has fallen from ₹ 286 per share on April 3rd 2019 to ₹ 29 per share on October 1st 2019 with 89.96 per cent sharp fall in share price within 5 months. There have been huge defaults and negative news for the bank due to managerial inefficiency, losses, high NPAs, economic slowdown, etc. Rana Kapoor has been held liable for large scale fraud of public money, illegal transactions, mismanagement, layering and favourable loaning by the bank. He was arrested by Enforcement Directorate (ED) on 5th March 2020 for further investigation under the allegation of money laundering to the extent of ₹ 43,000 million. RBI put a moratorium on 5th March 2020 on withdrawal of money from Yes Bank to ₹ 50,000 per depositor which was lifted on 18th March 2020. Yes Bank's reconstruction scheme 2020 was framed by the government with SBI picking up 49 percent stake in Yes Bank. Other investors participating in the reconstruction exercise include HDFC Bank, ICICI Bank, Kotak Mahindra Bank, Axis Bank, Bandhan Bank and some wealthy individual investors.

This led the researchers to select Yes Bank as the sample bank. Time series analysis was performed for

building and verifying literature. Appropriate econometric tools were used viz. KPSS unit root test, OLS method of regression, Granger causality test, Breusch-Godfrey test of serial correlation, Breusch-Pagan-Godfrey test of heteroskedasticity, CUSUM stability test, Jarque-Bera normality test and others. These econometric tools and hypotheses were supported by previous related literature and possess significant outcome for further research. Only Yes Bank has been considered for thorough study of the variables and other aspects. The study could be done on quarter basis; additionally, a comparative study was done with other private or public sector bank/s. Due to the researchers' constraints and resource limitations, only a small segment of the Indian Banking Industry

has been taken with the aim of causal research for such a bank, with a track record, tracing its survival.

Major findings and discussions

1. Unit root test

In the study, KPSS test of unit root has been used. This test possesses a very low amount of type II error, i.e., accepting the null hypothesis when it is wrong. The test confirms a variable stationary or non-stationary at levels or differences. Acceptance of null hypothesis proclaims stationary variable, while alternate refers to non-stationary series.

H_{01} : There is no unit root in the variable.

H_{11} : There is unit root in the variable.

Table-1: KPSS Test of unit root

S.N.	Nature of Variable	Variables		LM-Stat.	Asymptotic critical values at 5 percent level
1.	Dependent	NPAs	Level	0.441538*	
2.	Independent	Bank Capital	Level	0.396188*	
3.	Independent	Profit and loss	Level	0.385882*	
4.	Independent	Loans and advances	Level	0.404274*	0.463000
5.	Independent	Bank rate	Level	0.259146*	
6.	Independent	Inflation rate	Level	0.389455*	
7.	Independent	Growth rate	Level	0.175515*	

Source: Authors' calculations using E-views *significance at 5 percent level of significance

Table-1 connotes all the variables were stationary as the KPSS test shows the LM statistic less than KPSS (1992). The stationary behaviour at levels shows normal time invariant feature, as in case of regression, which infers predictable behaviour of the variables. Critical value at 5 per cent significance level, given by KPSS (1992) was used to determine the unit root in the variables. Critical values higher than KPSS statistic was treated as significant decision while opposite as

insignificant at 5 per cent significance level. It was found that all the variables were stationary at levels signifying data free from spurious regression or erratic behaviour. The p-values for all the variables were less than KPSS Statistic of 0.46300 at 5 per cent significance level which accepts the null hypotheses of no unit root. Hence, the variables were stochastic in nature with pattern free from time dependency.

2. OLS Model of regression

Table-2: Ordinary least square regression model

Variable	Coefficient	Std. Error	t-stat.	p-value
Bank capital	0.984510	9.204862	0.106955	0.9246
Bank rate	-3188167.	1894545.	-1.682814	0.2344
C	75775364	44004460	1.721993	0.2272
Growth rate	-3882155.	2063286.	-1.881540	0.2006
Inflation	-2713807.	982467.1	-2.762237	0.1099
Loan & advances	0.030097	0.005496	5.476483	0.0318*
Profit & loss	-1.320626	0.186963	-7.063578	0.0195*
Other analysis				
R-squared	0.995999	Durbin-Watson stat	1.932050	
F-statistic	82.98588	p-value (F-statistic)	0.011954*	

Source: Authors' calculation *Significant at 5 percent level of significance

Table-2 shows OLS model of regression with NPAs as dependent variable and other six variables as independent variables. The model was established to assess the cause and effect of the independent variables on dependent variable for the given period. It was found from the analysis that loans and advances (p-value=0.0318) and profit and loss after tax (p-value=0.0195) of Yes Bank had a significant impact on its NPAs. Loans and advances were directly proportional (t-statistic= 5.476483) to the NPAs while the profit and loss of the bank was inversely proportional (t-statistic= -7.063578). It connotes that any increase in NPAs was due to increase in loans and advances of the bank, which reflect suspicious or inefficient management of the bank. Whereas in profit and loss of the bank, simple theory of NPAs was applied, i.e., larger the NPAs lower will be the profitability of the bank due to losses and provisions. Other variables like bank capital, prevailing bank rate, growth rate and inflation rate did not have any statistically significant effect on NPAs. The model

applied on the sample was found significant for population as the f-statistic for the model was significant at 5 per cent level of significance with p-value 0.0119. R-square signifies that independent variables explained 99.59 per cent of the dependent variable. Durbin-Watson statistic was 1.932050, close to 2, implying and re-verifying (Breusch-Godfrey LM test) the model free from auto correlation.

3. Basic model of the study

NPAs of Yes Bank = 0.984509899164*bank capital - 3188167.15385*bank rate + 75775364.2247 - 3882154.8662*growth rate - 2713806.70668*inflation + 0.0300970859739*loan & advances - 1.3206255083*profit & loss after tax

From the least square analysis, the basic model of the study was developed which will be helpful in forecasting the dependent variable using the mentioned independent variables with their respective coefficients.

4. Directional relationship

Table-3: Pair-wise Granger Causality Tests

S.N.	Null Hypotheses	F-stat.	P-value	Result
1.	Bank Rate doesn't lead Bank Capital	0.41783	0.5465	Accepted
2.	Bank Capital doesn't lead Bank rate	60.1034	0.0006*	Not accepted
3.	Growth Rate doesn't lead Bank Capital	0.16774	0.6991	Accepted
4.	Bank Capital doesn't lead Growth Rate	1.52950	0.2711	Accepted
5.	Inflation doesn't lead Bank Capital	4.95775	0.0765	Accepted
6.	Bank Capital doesn't lead Inflation	2.71556	0.1603	Accepted
7.	Loans & Advances don't lead Bank Capital	0.00267	0.9608	Accepted
8.	Bank Capital doesn't lead Loans & Advances	5.44512	0.0669	Accepted
9.	NPAs don't lead Bank Capital	0.11574	0.7475	Accepted
10.	Bank Capital doesn't lead NPAs	0.15884	0.7067	Accepted
11.	Bank Capital doesn't lead NPAs	0.15884	0.7067	Accepted
12.	P & L doesn't lead Bank Capital	0.38557	0.5618	Accepted
13.	Bank Capital doesn't lead P & L	5.37777	0.0681	Accepted
14.	Growth Rate doesn't lead Bank Rate	5.3E-08	0.9998	Accepted
15.	Bank Rate doesn't lead Growth Rate	1.12127	0.3381	Accepted
16.	Inflation doesn't lead Bank Rate	16.0139	0.0103*	Not accepted
17.	Bank Rate doesn't lead Inflation	0.06717	0.8058	Accepted
18.	Loans & Advances don't lead Bank Rate	14.4811	0.0126*	Not accepted
19.	Bank Rate doesn't lead Loans & Advances	0.00283	0.9596	Accepted
20.	NPAs don't lead Bank Rate	14.9339	0.0118*	Not accepted
21.	Bank Rate doesn't lead NPAs	8.4E-05	0.9930	Accepted
22.	P & L doesn't lead Bank Rate	34.4171	0.0020*	Not accepted
23.	Bank Rate doesn't lead P & L	0.00848	0.9302	Accepted
24.	Inflation doesn't lead Growth Rate	1.96995	0.2194	Accepted
25.	Growth Rate doesn't lead Inflation	0.00192	0.9668	Accepted
26.	Loans & Advances don't lead Growth Rate	0.51691	0.5044	Accepted
27.	Growth Rate doesn't lead Loans & Advances	0.13292	0.7303	Accepted
28.	NPAs don't lead Growth Rate	0.11874	0.7444	Accepted
29.	Growth Rate doesn't lead NPAs	0.02122	0.8899	Accepted
30.	P & L doesn't lead Growth Rate	0.68896	0.4443	Accepted
31.	Growth Rate doesn't lead P & L	0.88741	0.3894	Accepted
32.	Loans & Advances don't lead Inflation	2.77993	0.1563	Accepted
33.	Inflation doesn't lead Loans & Advances	8.82529	0.0311*	Not accepted

S.N.	Null Hypotheses	F-stat.	P-value	Result
34.	NPAs don't lead Inflation	0.71252	0.4371	Accepted
35.	Inflation doesn't lead NPAs	1.27119	0.3107	Accepted
36.	P & L doesn't lead Inflation	1.89717	0.2269	Accepted
37.	Inflation doesn't lead P & L	9.16192	0.0292*	Not accepted
38.	NPAs don't lead Loans & Advances	2.38277	0.1833	Accepted
39.	Loans & Advances don't lead NPAs	7.11675	0.0445*	Not accepted
40.	P & L doesn't lead Loans & Advances	7.53367	0.0431*	Not accepted
41.	Loans & Advances don't lead P & L	3.21349	0.1330	Accepted
42.	P & L doesn't lead NPAs	0.37219	0.5685	Accepted
43.	NPAs don't lead P & L	0.26771	0.6269	Accepted

Source: Authors' calculations using E-views *significant at 5 percent level of significance

In Table-3, pair-wise Granger causality test was done to assess short-run causal relationship between the variables. Out of 42 null hypotheses, 9 stood accepted at 5 per cent level of significance. Bank rate, as a macro factor, was influenced by the NPAs rate, as for tackling NPAs problems, bank rates were reduced. It was found that there was causal effect from NPAs-led bank rate with p-value of 0.0118. Non-performing assets of the bank had a unidirectional relationship with loans and advances (p-value= 0.0445), signifying higher the loans more would be the chances of NPAs in the short run. Bank rate was caused by the bank capital (0.0006), inflation rate (0.0103), loans and advances (0.0126) and profit and loss (0.0020) of the bank, with unidirectional relationship. Inflation rate prevailing in the economy influences the loans and advances (0.0311) and profit and loss (0.0292) of the bank. Profit and loss of the bank led to loans and advances (0.0431) during the period. All the remaining null hypotheses stood accepted signifying no short run causal relationship between the variables.

5. Diagnostic tests of the model

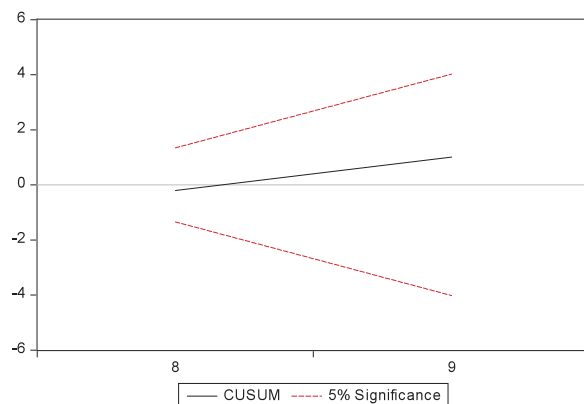
Table-4.1: LM Test of serial correlation

F-stat.	P-value (F)	R-square	P-value(Chi-square)
0.004712	0.9564	0.042213	0.8372

Source: Authors' calculations using E-views

In Table-4.1, test of serial correlation in the residuals was shown. Breusch-Godfrey LM test was found statistically insignificant, verifying the absence of serial correlation in the residuals. The p-value for f-statistic and chi-square was 0.9564 and 0.8372, respectively, which accepts the null hypothesis.

Figure-1: CUSUM test of stability



Source: Authors' calculations using E-views

Figure-1 shows the stability test for the model with NPAs as a dependent variable. It was found that the model was stable at 5 per cent significance level with CUSUM between the significance lines (red colour). Hence, the model was free from any stiff variation or instability from the side of variables.

Table-4.2: Breusch-Pagan-Godfrey test of heteroskedasticity

F-statistic	P-value (F)	Obs. R-squared	P-value(Chi-square)
1.588178	0.4354	7.438729	0.2822

Source: Authors' calculations using E-views

The hypotheses of Breusch-Pagan-Godfrey test were:

H_0 : There is no heteroskedasticity in the model

H_1 : There is heteroskedasticity in the model

Table-4.3 : Normality test

Statistic	Value	p-value
Jarque-Bera Statistic	0.458197	0.795250
Skewness	0.516095	N/A
Kurtosis	2.604473	

Source: Authors' calculations using E-views

The hypotheses of Jarque-Bera test were:

H_0 : There is no abnormality in the model

H_1 : There is abnormality in the model

Table-4.3 shows the test of normality of the residuals of the model. It was found that there was normality in the residuals as p-value of Jarque-Bera test was 0.795250 which was a good sign of model. Kurtosis was found to be less than 3 and Skewness was within 0.5 to 1 which shows moderately skewed normal distribution in the residuals.

Applicability and Generalizability of the study

As per the literature, determinants of banks mainly affect the NPAs, but in the current study, such extensive literature was found irrelevant since it was managerial turmoil that resulted in the downfall of Yes Bank. The study revealed that for long run regression analysis, loans and advances (0.0318), and profit and loss (0.0195) of the bank had a significant impact over the level of NPAs, confirming some literature (Bhatia, Mahajan and Chander, 2012; Louiz et. al. 2012; Salas and Sourina, 2002; Hess et. al. 2009). The study found macroeconomic variables insignificant in terms of NPAs generated (p-value > 0.05). Yes Bank faced managerial turmoil and had a heap of bad loans which significantly reduced the bank's earnings. Rana Kapoor's family member, who held the highest equity stake of the bank as promoter (as on 28th September

Table 4.2 shows the Breusch-Pagan-Godfrey test of heteroskedasticity for the residuals in the model. It was found that the model was free from heteroskedasticity as the p-value for f-statistic and chi-square was 0.4354 and 0.2822, respectively. Hence, the null hypothesis of no heteroskedasticity stood accepted.

2018) once described Yes Bank's holding as 'Diamonds are forever', but sold the shares (18th September 2019) due to his concerns (Yes Capital, MCPL, etc.) about insolvency. It's a matter of fact that just after RBI denied Rana Kapoor extension as CEO of the bank on 18th October 2018, the quarterly results recorded losses for most successive quarters. QIP issue (more than ₹ 20,000 million) in the month of August 2019 too had not laid strong support for the growth and expansion of the bank. The study revealed that the short run causal relationship between NPAs and other variables were not significant at five percent level of significance, except for NPAs led bank rate and loans and advances led NPAs. The model framed was free from serial correlation, heteroskedasticity, and stable in nature with normal distribution. The bank officials must focus on managerial efficiency which previous literature confirmed to be important (Brever, 2006; Li et. al. 2007; Podpiera and Weill, 2008) while the macroeconomic factors were not significant as confirmed in some literature (Yadav, 2011; Park, 2011; Roy and Bhattacharya, 2011; Siddiqui, 2012). Long term growth of profitability could be positively maintained through proper mortgage of loans, vigilance in sanctioning corporate loans and efficient recovery mechanism. NPAs level should also be maintained through proper scrutiny of investments in various projects and diversification in business profile. This will further contribute to profitability and prosperity of the bank.

References

- Adebola, Solarin Sakiru, Wan Sulaiman B. Wan Yusoff, and Jauhari Dahalan. 2011. "An ARDL Approach to the Determinants of Non-performing Loans Arabian." *Journal of Business and Management Review*, 1(2): 20-30.
- Annual Report of Yes Bank 2018-19 retrieved from https://www.yesbank.in/pdf/annualreport_2018_19_pdf
- Bag, Sudin, and Sajjilul Islam. .2017. "Non-Performing Assets a biggest challenge in Banking Sector: a comparative study between India and Bangladesh banking sector." *ICTACT Journal on Management Studies*, 3(4): 620-624.
- Bawa, Jaslene Kaur, Vinay Goyal, S. K. Mitra, and Sankarshan Basu. 2019. "An analysis of NPAs of Indian banks: Using a comprehensive framework of 31 financial ratios." *IIMB Management Review* 31(1): 51-62.
- N., Bhaarathi, and M. Thilagavathi. 2018. "The Factors Influencing the Non-Performing Assets in the Indian Banking Sector: An Economic Analysis". *International Journal of Contemporary Research and Review* 9 (10): 21080-86.
- Biradar, Jagadish. (2019). "The problem of rising Non-performing assets in Banking Sector in India: Comparative Analysis of Public and Private sector banks". *IOSR Journal of Business and Management* 21(5):01-05.
- Bhatia, Aparna, Poonam Mahajan, and Subhash Chander. 2012. "Determinants of profitability of private sector banks in India." *Indian Journal of Accounting* 42(2): 39-51.
- Borio, Claudio, Craig Furfine, and Philip Lowe. 2001. "Procyclicality of the financial system and financial stability: issues and policy options." *BIS papers* 1(3): 1-57.
- Breuer, Janice Boucher. 2006. "Problem bank loans, conflicts of interest, and institutions." *Journal of Financial Stability* 2(3): 266-285.
- Briec, Walter, and Qi Bin Liang. 2011. "On some semilattice structures for production technologies." *European Journal of Operational Research* 215(3): 740-749.
- Brissimis, Sophocles N., Manthos D. Delis, and Efthymios G. Tsionas. 2010. "Technical and allocative efficiency in European banking." *European Journal of Operational Research* 204(1): 153-163.
- Charnes, Abraham, William W. Cooper, and Edwardo Rhodes. 1978. "Measuring the efficiency of decision making units." *European Journal of Operational Research* 2(6): 429-444.
- Clair, Robert T. 1992. "Loan growth and loan quality: some preliminary evidence from Texas banks." *Economic Review, Federal Reserve Bank of Dallas, Third Quarter*: 9-22.
- Cobb, Barry R. 2013. "Mixture distributions for modelling demand during lead time." *Journal of the Operational Research Society* 64(2): 217-228.
- Cole, Rebel A., and Jeffery W. Gunther. 1995. "Separating the likelihood and timing of bank failure." *Journal of Banking & Finance* 19(6): 1073-1089.
- Das, Abhiman, and Saibal Ghosh. 2005. "Size, non-performing loan, capital and productivity change: evidence from Indian state-owned banks." *Journal of Quantitative Economics* 3(2): 48-66.
- Das, Sulagna, and Dutta Abhijit. 2014. "A Study on NPA of Public Sector Banks in India." *IOSR Journal of Business and Management* 16(11): 75-84.
- Dey, Surojit. 2018. "Recovery mechanisms of non-performing assets in Indian commercial banks: an empirical study." *NSOU Open Journal* 1(2).

- Dhar, Satyajit, and Avijit Bakshi. 2015. "Determinants of loan losses of Indian Banks: a panel study." *Journal of Asia Business Studies*. 9(1): 17-32.
- Gaur, Dolly, and Dipti Ranjan Mohapatra. "Non-Performing Assets In India: Priority Vs Non-Priority Sector Lending." *NMIMS Management Review*, 37(3): 53-65.
- Gonzalez-Hermosillo, Brenda, Ceyla Pazarbaşıoğlu, and Robert Billings. 1997. "Determinants of banking system fragility: A case study of Mexico." *Staff Papers* 44(3): 295-314.
- Greenidge, Kevin, and Tiffany Grosvenor. 2010. "Forecasting Non-Performing Loans in Barbados." *Journal of Business, Finance & Economics in Emerging Economies* 5(1): 80–107.
- Hess, Kurt, Arthur Grimes, and Mark Holmes. 2019. "Credit losses in Australasian banking." *Economic Record* 85(270): 331-343.
- Indian Institute of Banking & Finance. 2015. Master Circular on Basel III Capital Regulations. Retrieved from <http://iibf.org.in/documents/BASEL-III.pdf>.
- Iyer, V. R. 2015. "Risk Management & Regulation in Indian Banking Sector-New Paradigm'." *Bank Quest, The Journal of Indian Institute of Banking & Finance* 86(3): 17-23.
- Jayaraman, T. K., Keshmeer Makun, and Ajeshni Sharma. 2018. "Determinants of Non-performing Assets of Commercial Banks in India: An Econometric Study." *International Journal of Engineering and Technology* 10(3): 774-783.
- Keeton, William R. 1999. "Does faster loan growth lead to higher loan losses?" *Economic review-Federal Reserve Bank of Kansas City* 84: 57-76.
- Khemraj, Tarron, and Sukrishnalall Pasha. 2009. "The determinants of non-performing loans: an econometric case study of Guyana" retrieved from <https://mpr.a.ub.uni-muenchen.de/id/eprint/53128>.
- Klein, Nir. 2013. "Non-performing loans in CESEE: Determinants and impact on macroeconomic performance." International Monetary Fund: 13-72.
- Li, Hongbin, Scott Rozelle, and Li-An Zhou. 2007. "Incentive contracts and bank performance: Evidence from rural China." *Economics of Transition* 15(1): 109-124.
- Louzis, Dimitrios P., Angelos T. Vouldis, and Vasilios L. Metaxas. 2012. "Macroeconomic and bank-specific determinants of non-performing loans in Greece: A comparative study of mortgage, business and consumer loan portfolios." *Journal of Banking & Finance* 36(4): 1012-1027.
- Lovejoy, Dzomba Cosmas. 2018. "Trend and Occurrences of NPA on NIFTY Indexed Banks in India." *International Journal of Social Science and Economic Research* 3(7): 3539-3554.
- Lucky, A. L., and Anele Andrew Nwosi. 2015. "Asset Quality and Profitability of Commercial Banks: Evidence from Nigeria." *Research Journal of Finance and Accounting* 6(18): 26-34.
- Mester, Loretta J. 1996 "A study of bank efficiency taking into account risk-preferences." *Journal of Banking & Finance* 20(6): 1025-1045.
- Park, Jung Chik. 2011. "Business cycle and bank loan portfolio performance: empirical evidence from Brazilian banks." PhD diss.
- Podpiera, Jiří, and Laurent Weill. 2008. "Bad luck or bad management? Emerging banking market experience." *Journal of Financial Stability* 4(2): 135-148.
- Prasanna, P. Krishna, M. Thenmozhi, and Nimit Rana. 2014. "Determinants of non-performing advances in Indian banking system." *Banks & Bank Systems* 9(2): 65-77.

- Raina, Dalip, Supran Kumar Sharma, and Archana Bhat. 2019 "Commercial Banks Performance and Causality Analysis." *Global Business Review* 20(3): 769-794.
- Rajaraman, Indira, Sumon Bhaumik, and Namita Bhatia. 1999 "NPA variations across Indian commercial banks: Some findings." *Economic and Political Weekly*: 161-168.
- Roy, Saikat Ghosh. 2014. "Determinants of non-performing assets in India-Panel Regression." *Eurasian Journal of Economics and Finance* 2(3): 69-78.
- Niyogi Sinha Roy, Tanima, and Basabi Bhattacharya. 2011. "Macroeconomic stress testing and the resilience of the Indian banking system: A focus on credit risk." *MPRA Paper* 30263: 1-41.
- Salas, Vicente, and Jesus Saurina. 2002. "Credit risk in two institutional regimes: Spanish commercial and savings banks." *Journal of Financial Services Research* 22(3): 203-224.
- Saxena, Praveen. 2020. "A New Model for Training Evaluation in the Banking Industry." *NMIMS Management Review* 37(1): 102-122.
- Sharma, Preeti, & Bansal, A. 2019. "A study of Non-performing assets management with reference to selected Indian public sector banks and private sector banks." *International Journal of Technical Research & Science* 4(1): 08-16.
- Sharma, Vikas. 2015. "A Comparative Study on Non-Performing Assets of Selected Public and Private Sector Banks." *International Research Journal of Management Sociology & Humanities* 4 (3): 628, 642.
- Shukla, Siddharth. & Patel, Akash. 2018. "BASEL-III Cost-Benefit analysis for Indian Banks." *NMIMS Management Review* 36(3): 27-45.
- Siddiqui, Saad, S. K. Malik, and Shah, S. Z. 2012. "Impact of interest rate volatility on non-performing loans in Pakistan." *International Research Journal of Finance and Economics* 84: 66-70.
- Upadhyay, Hiteksha, Bhavsar, Malhar, & Doshi, Charmi. 2019. "Credit risk analysis of HDFC Bank and SBI Bank using credit analysis ratios and Atman's Z score." *NMIMS Management Review* 37(4): 45-57.
- Wanke, Peter, Md Abul Kalam Azad, and Carlos Pestana Barros. 2016. "Financial distress and the Malaysian dual banking system: A dynamic slacks approach." *Journal of Banking & Finance* 66(1): 1-18.
- Yadav, Mahipal Singh. 2011. "Impact of Non Performing Assets on Profitability and Productivity of Public Sector Banks in India." *AFBE Journal* 4(1): 232-239.

Anuj Gupta is pursuing his Ph.D. on the topic related to marketing of agro-based units at Faculty of Commerce, BHU. He completed his B.Com (Finance specialisation) and M.Com (Marketing specialisation) from BHU and qualified UGC-JRF in the first attempt. He has presented his research papers in 25 national and international conferences and got published 24 research papers in various refereed and indexed international journals including some in USA and Germany. He has presented his work on the topic related to agro-based units, regional and bilateral trade, marketing strategies, women entrepreneurship, business ethics and demonetization. He possesses proficiency in econometric analysis and SEM modelling. He can be reached at anujwhbhu@gmail.com.

Sarwati Chandra Gupta is pursuing his Ph.D. on the topic related to the appraisal of State Trading Corporation from Faculty of Commerce, BHU. He has qualified UGC-JRF and completed his graduation from V.B.S. Purvanchal University and his M.Com (marketing specialisation) and B.Ed. from BHU. He has six years of teaching experience at PGT level. He has presented research papers on international trade, public corporation, e-marketing, and GST, etc. in 10 national and international conferences. Besides, he has published 2 research papers in international journals and attended 4 national workshops on research methodology and data analysis. He can be reached at sarwati.gupta1@bhu.ac.in

Afsha Afreen, a JRF recipient, is pursuing her Ph.D. on the topic related to marketing of Banarasi sarees from the Faculty of Commerce, Banaras Hindu University. She has completed her B.Com (Accounting specialisation) from Patna Women's College, Patna University and M.Com (Marketing specialisation) from Faculty of Commerce, Banaras Hindu University. She worked as an Assistant Professor in Khandra College, Khandra (West Bengal) in 2018-19. Her areas of research interest include consumer behaviour, marketing, and foreign trade. Besides, she has presented papers at international conferences and has been published in the field of foreign trade. She can be reached at afreenafsha23@gmail.com.