

SEMINAR PAPER

TOPIC: IMPACT OF NPA ON PROFITABILITY OF SCHEDULED COMMERCIAL BANKS

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Abstract

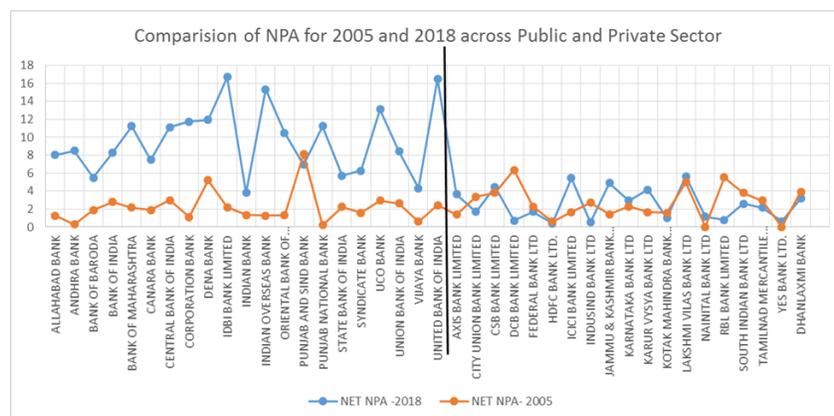
Healthy financial sector is necessary for the growth of the economy. Indian banks have been burdened with the problem of rising NPAs over the past decade. Higher NPA translates into lower profits for banks as it reduces the interest income and also causes capital erosion. This study focuses on looking at the impact of non-performing assets of 40 scheduled commercial banks - public sector and private sector banks across the time period 2005-2018. The main findings include - NPA have a significant negative impact on profitability of scheduled commercial banks measured using return on assets and return on equity. Besides this, several other bank specific characteristics were also included showing that while net interest margin and non-interest income have a positive effect on bank profits, rising wage bill (or lower operational efficiency) has a negative impact on Return on equity and Return on assets.

Introduction

India aims to become a \$5 trillion economy by the year 2024-25 – and for this purpose it needs to expand its infrastructure capabilities exponentially. To support its infrastructure growth, a healthy financial sector – in particular a healthy banking sector is needed. The growth of any economy largely depends on its banking sector (Liang & Reichert, 2006). An efficient banking system has to achieve three goals: profit, high-quality service to customers, and sufficient funds to lend to borrowers. Furthermore, a profitable banking sector also has more capacity to absorb shocks and provide relative stability to the economy. For this purpose, it is important to analyze the impact of bad loans on the performance of the banking sector.

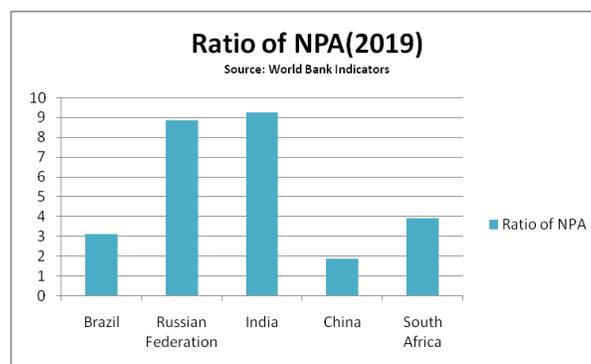
Growing Non-performing assets (NPA) may have a potentially significant impact on bank's profitability. RBI has defined NPA as those assets for which the principal or interest payment remains overdue for a period of 90 days. Within NPA there are 3 sub-category- substandard assets, doubtful assets and loss assets depending upon the number of days the loan has remained overdue. If assets are NPA for a period less than or equal to 12 months then it is a substandard asset. Similarly, a doubtful asset is defined as an asset which has remained as an NPA for a period of more than 12 months. The combination of the above three types of assets forms total NPAs in a bank.

Through NPA, an asset becomes unproductive and also the bank is unable to recover the initial loan amount. So while the earnings of banks fall as interest income falls, there is also the cost of capital erosion of banks. This means that banks have to keep a larger amount as provision to account for this NPA – which means there is impact on the future earning ability of banks. Non-performing loans have a negative impact on operating costs and cost efficiency of banks (Allen N. Berger, 1997). A rise in NPA beyond the risk threshold can have significant effects on the stability of bank, reducing consumer confidence in functioning of these banks.



The figure above shows the difference in level of NPA over the period of 2005 and 2018 between public sector and private sector banks. We can clearly observe that while private sector banks have managed to contain their NPA, it is the Public sector banks - (left side of black line) that need to focus on consolidation and have shown a significant rise in NPA over the period 2005-2018.

Credit is required for faster growth of the economy but any kind of macroeconomic shock can impact those outstanding advances badly and may turn them non-performing. Causes of rise in NPA are related to – low scrutiny by banks, wilful defaults, low earnings affecting ability of entities to pay back loans, economic slowdown, government policies, etc. It has been observed that a major portion of NPAs is contributed by several top industrialists- dirty dozen in case of India. Generally, the NPAs in agriculture and priority sector is comparatively lower than that of the corporate houses (Sikdar, 2020). Most of the current NPA originated during the mid-2000s, during the period of high economic growth and positive business outlook. This led to an easy flow of credit. But post Global Financial crisis of 2008, the economy stagnated and so did the repayment capacity of these businesses. This contributed to what is now known as India’s Twin Balance Sheet problem, where both the banking sector (that gives loans) and the corporate sector (that takes and has to repay these loans) have come under financial stress. (Union Budget-2014) The banks then took ‘evergreening’ of loans, where fresh loans were given to some promoters to enable them to pay off their interest. This effectively pushed the recognition of these loans as non-performing to a later date, but did not address the root causes of their unprofitability. Further, recently there have also been frauds of high magnitude that have contributed to rising NPAs. As the figure given below shows, there has been a significant rise in NPA in India as compared with other BRICS economies for the year 2019.



There are several potential factors, including non-performance of loans, affecting the profitability of banks- which have been taken as bank specific characteristics – like NPA, costs of deposits, non-interest income, interest income, operational efficiency (measured as total wages to total income) (Allen N.Berger, 1997), capital adequacy ratio, level of priority sector advances (Bhargav Pandya, 2015).

The paper aims to study the impact of NPAs and other bank specific characteristics on profitability of Indian public sector banks and private sector banks over the period of 2005-2018. The introduction of the paper has given the background of the paper, the next sections covers literature review, analysis of data, introduction to the model, regression analysis, discussion of results and final conclusion.

Literature Review

Previous studies show a negative relationship between the non-performance of loans and profitability of banks, concluding that NPAs have adverse impact on the profitability of the banks.

Paper by Kumar Das and Utpal (Das & Utpal, 2021) finds that NPA have a negative impact on Return on assets for Indian commercial banks using a Random effects model and also including Economy wide characteristics like inflation and GDP rate of growth.

Paper by Ripon Bepari and Subhas Chandra Sarkar (Ripon Bepari & Subhas Chandra Sarkar, 2020) analyze profitability performance of selected public and private sector banks in India for 2010 to 2018 and find a significant negative impact of NPA for public sector banks, while a positive impact for private sector banks while a positive impact of net NPAs on profitability of private sector banks.

Paper by Chetan Dudhe (Dudhe, 2017) looks at 7 selected Public sector banks for period 2007-2016 and shows that except for SBI and PNB all other banks show a negative correlation between gross NPA and net profits.

The study by Jaslene Kaur Bawa and Sankarshan Basu (Bawa et al., 2016) examines panel data for 46 Indian banks with 31 bank specific financial ratios over eight years (2007 to 2014) that reflect operating capability, liquidity, solvency, profitability, capital adequacy and business development capacity aspects across Indian banks that affect non-performing assets (NPAs). They find a negative significant relationship between intermediation cost ratio, Return on Assets and NPAs.

In their paper (Karunakar, 2008), M. Karunakar, Mrs. K. Vasuki and Mr. S. Saravanan talk about economic reform and impact of NPA on banking sector operations. Besides capital to risk weighted assets ratio of public sector banks, management of credit risk and measures to control the menace of NPAs are also discussed.

The paper by Seeaiah K and Badri Narayan Rath (K et al., 2015) studies the profitability of Indian banking sector in the post-reform period using the data from 1995 to 2012. The results indicate that operating profits, wage bills, non-performing assets and net interest margin affect the profitability of Indian banks, while the priority sector lending does not have any impact on bank profitability in India.

A study by Islam and Nishiyama (Shahidul Islam & Shin-Ichi Nishiyama, 2016), using data for 259 commercial banks in South Asian countries including India, for the period from 1997 to 2012, found that there is a negative relationship between non-performing loans and bank

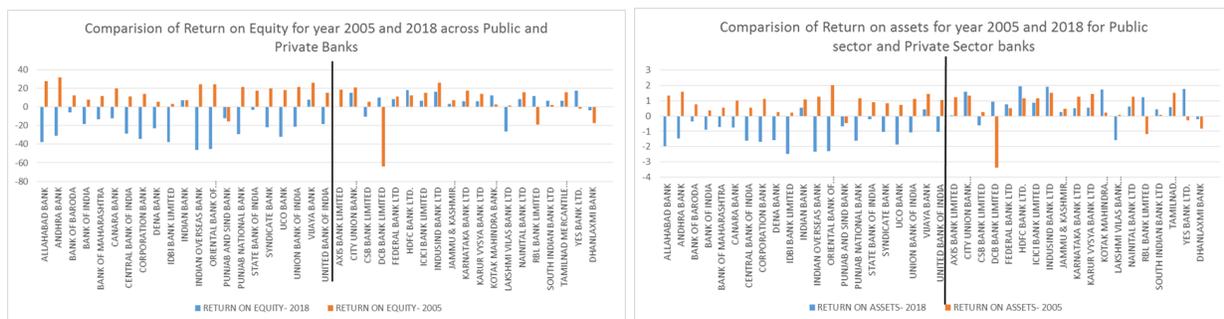
profitability. In a study of banking sector of the US, for years 1970-1976, Martin (Martin, 1977) concluded that a rise in NPAs hurt the earnings of the banks, which reduces the profitability of banks.

This study adds to existing literature by taking the set of 40 Indian scheduled commercial banks (21 private and 19 public) over the period of 2005-06 to 2018-19 and trying to find the impact of Return on assets and return on equity on NPA along with other bank specific characteristics like priority sector lending, CAR, operational efficiency, cost of deposits, etc.

Data

All banks which are included in the Second Schedule to the Reserve Bank of India Act, 1934 are Scheduled Banks. These banks comprise Scheduled Commercial Banks and Scheduled Cooperative Banks. Scheduled Commercial Banks in India are categorized into six different groups according to their ownership and / or nature of operation. These bank groups are (i) Public Sector Banks, (ii) Private Sector Banks, (iii) Foreign Banks, (iv) Small Finance Banks, (v) Payments Banks and (vi) Regional Rural Banks.

The data source for the variables is the Statistical Tables Relating to Banks in India which are compiled on the RBI Database on Indian economy. The data was compiled over the years 2005-06 to 2018-19 for a period of 14 years for 40 Scheduled commercial banks- 21 Public sector banks and 19 Private sector banks. The variables include dependent variables which act as indicators of profitability of SCB – Return on Assets and Return on equity. These indicators have been commonly used in the literature in the past. The figures below show change in Return on Equity (LHS) and Return on Assets (RHS) for the entire set of 40 banks- for the period 2005 and 2018. It shows that the profitability of Public sector banks has turned negative for the year 2018 while it was positive in 2005. No such change is observed for private sector banks.

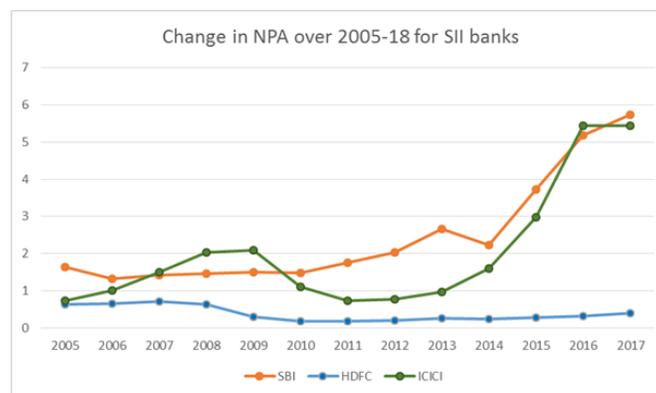


The independent variables which cover a bank's characteristics are Net Non-performing assets, Priority sector advances, Net interest margin, non-interest income, wage bill, cost of deposits, capital adequacy ratio.

NET NON PERFORMING ASSETS (NNPA)

- NNPA shows the share of SCB's total advances that have become NPA in a given year.

- NPA has been defined as a loan or advance for which the principal or interest payment remained overdue for a period of 90 days.
- A higher NPA is expected to reduce bank's profitability because according to regulations, banks have to account for these NPA and keep larger provisions- so a part of their capital cannot be lent further.
- Further, if a bank has a higher proportion of income generating assets, its income will be higher. But as NPA rises, the proportion of income generating assets falls, consequently having a negative impact on bank's profitability.
- The graph below shows changes in NNPA over the years 2005 to 2018 for the three systemically important banks in India - SBI, ICICI, HDFC and we observe a sudden rise in NPA in 2015 post Asset quality review for SBI and HDFC.



PRIORITY SECTOR ADVANCES PSL

- This shows the amount of funds banks have to channel to Priority sectors (as defined by RBI) under regulations.
- RBI mandates that for SCB 40% of their advances should be directed towards priority sectors.
- The expected impact is that since this credit is directed there are little considerations of profitability taken into account, so higher PSL should lead to lower profits. However, the rate of interest is determined by banks themselves- and this might mask the impact.

NET INTEREST MARGIN/ INTEREST INCOME

- Interest income is the difference between the interest rate a bank pays to its depositors and the interest rate it charges to its borrowers.
- It shows income from the bank's core business of lending. Profits of banks should increase with increase in interest income.

NON INTEREST INCOME

- The non-interest income is the income of banks from sources other than interest bearing assets. It consists of commission, service charges, and fees, guarantee fees, net profit from sale of investment securities, and foreign exchange profit.
- Higher non-interest income is expected to have a positive impact on bank's profits.

WAGE BILL

- Wage bill shows payments and provisions made for employees of the banks.
- It shows the operating costs of a bank, and a higher cost is expected to translate into lower profits.

COST OF DEPOSITS

- Deposits are the cheapest source of funds for banks. More deposits would imply more funds being available to channel into loans and investments.
- However, the cost of deposits allows us to measure how much a bank is paying on each deposit – so it also acts as a measure of operational efficiency.
- Higher the cost of deposit should lower the profitability of banks.

CAPITAL ADEQUACY RATIO

- High capital reserve requirement leads to higher profitability for banks because of lower costs of financial risk for banks. Lower financial risks attract higher deposits and boost the banking business, thereby leading to higher rates of profit.
- However, as higher regulatory requirements means part of a bank's funds cannot be used for investment and lending purposes, it might also translate into lower profits. This paper uses Tier-2 CAR under Basel-3 norms.

The variables along with formulas used for their calculation have been described in the table below.

Variable	Formula	Definition
Return on Assets	$=100 * (\text{Net profit}) / \text{Total assets}$	Measure of bank profitability
Return on Equity	$= 100 * (\text{Net Profit for the year}) / \text{average (Capital + Reserves and Surplus) for Current and Previous Years.}$	Measure of bank profitability

NNPA (Net Non-Performing Assets)	=100*(Net Non Performing assets/Total Assets)	Shows the share of Non performing assets in total assets post accounting for provisioning by banks
Priority Sector Advances	= 100*(Advances to Priority Sectors) / (Total Advances).	Shows the share of Priority sector advances (as mandated by RBI) in total advances
Net Interest Margin	100*(Interest Earned – Interest Expended)/average (Total Assets) for Current and Previous Years.	Shows the Interest income of banks
Non Interest Income	100*(Other Income)/average (Total Assets) for Current and Previous Years.	Shows income other than interest income
Wage Bill to Total Income	= 100*(Payments to and provisions for employees)/(Interest Earned + Other Income).	Shows the operating efficiency of banks. Higher ratio would indicate higher costs and lower efficiency
Cost of Deposits	100*(Interest on deposits)/average (Deposits) for Current and Previous Years	Measures costs of deposits
CAR-Tier II	Capital Adequacy Ratio	Under RBI and Basel Norms

The descriptive statistics of the variables that have been used in the estimation of determinants of profitability is presented in Table 01 given below. The descriptive statistics of both the dependent and explanatory variables for the time period between 2005 and 2019 is presented in the form of mean, standard deviation, minimum and maximum. The dependent variable Return on Equity varies from -68.7 to 31.6 while Return on Asset varies from -3.38 to 2.13.

Variable	Obs	Mean	Std. Dev.	Min	Max
RETURNONEQ~Y	560	9.956134	12.48032	-63.78709	31.62095
RETURNONAS~S	560	.741214	.809838	-3.38	2.13
NNPA	546	2.260433	2.643033	.01	16.69
PRIORITYSE~S	560	34.11707	7.294661	3.285242	60.84909
NETINTERES~N	560	2.710014	.6842478	.3780683	4.690294
NONINTERES~E	560	1.153247	.4593475	.163009	3.569971
WAGEBILLTO~E	560	11.80376	4.307922	3.837125	44.18124
CARTierII	560	3.049518	1.619996	.17	8.8
COSTOFDEPO~S	560	6.07022	1.099929	1.342223	8.738627

The Correlation Matrix is shown in the Table 02 for both Return on assets and return on equity.

	RETURN~Y	RETURN~S	NNPA	PRIORI~S	NETINT~N	NONINT~E	WAGEBI~E	CARTie~I	COSTOF~S
RETURNONEQ~Y	1.0000								
RETURNONAS~S	0.9258	1.0000							
NNPA	-0.7915	-0.7883	1.0000						
PRIORITYSE~S	-0.1513	-0.1625	0.2230	1.0000					
NETINTERES~N	0.4177	0.5494	-0.4073	0.2259	1.0000				
NONINTERES~E	0.1993	0.3596	-0.1656	-0.0848	0.2997	1.0000			
WAGEBILLTO~E	-0.1578	-0.2254	0.0732	0.2824	0.2738	-0.1825	1.0000		
CARTierII	0.2161	0.0523	-0.1287	-0.2686	-0.2004	0.0449	0.0269	1.0000	
COSTOFDEPO~S	-0.0085	0.0232	-0.0719	0.0817	-0.1955	-0.0858	-0.3627	-0.2512	1.0000

Research Question

Q. What is the impact of rising NPA across on Bank profitability measured by return on assets and return on equity?

Q. What other bank specific factors- such as Priority sector lending, net interest margin, non-interest income, operational efficiency impact return on assets and return on equity?

Regression Model

The Equation(1) below gives the Pooled OLS model for panel data regression analysis.

$$\begin{aligned}
 \text{Profitability}_{i,t} &= \alpha + \beta_1 \text{Non - performing assets}_{i,t} \\
 &+ \beta_2 \text{Priority sector advances}_{i,t} \\
 &+ \beta_3 \text{Noninterest income}_{i,t} + \beta_4 \text{Net Interest margin}_{i,t} \\
 &+ \beta_5 \text{Wage Bill}_{i,t} + \beta_6 \text{capital adequacy}_{i,t} \\
 &+ \beta_7 \text{Cost of deposits}_{i,t} + \varepsilon_{i,t}
 \end{aligned}$$

where i = bank, 1, ..., 40, and t = time, 1, ..., 14. $\varepsilon_{i,t}$ is the error term.

The paper uses panel regression analysis using both fixed and random effects models to analyze the impact of independent variables on bank profitability.

Fixed effects model:

$$\text{Prof}_{i,t} = \alpha + \beta X_{i,t} + \mu_i + u_{i,t}$$

Here, Profit represents profitability, X represents the set of independent variables. The unobserved individual bank effect is $\mu(i)$, and the random error is, $u(i,t)$. The error is composed of two parts – which is the idiosyncratic error $\mu(i,t)$ and error due to bank-level characteristics $\mu(i)$.

Fixed effects model assumes that error due to bank-level characteristics is linked with the regressors. When using FE we assume that something within the individual may impact or bias the predictor or outcome variables and we need to control for this. Another important assumption of the FE model is that those time-invariant characteristics are unique to the individual and should not be correlated with other individual characteristics.

Random effects model:

$$Profiti, t = \alpha + \beta Xi, t + \mu + ui, t$$

Here, Profit represents profitability, X represents the set of independent variables. $u(i,t)$ is error term. μ is the bank specific random effect which is assumed is distributed independently of X variables. It captures the unexplained heterogeneity which is assumed that each X is uncorrelated with. It indicates that the unobserved individual (cross-sectional) effects are uncorrelated with all the explanatory variables across all time-period. An advantage of random effects is that we can include time invariant variables.

Regression Analysis and Discussion

Sub- Section 01: Return On Assets:

Panel data regression analysis was used to estimate impact of NNPA on Return of assets which is used as a measure of profitability for SCB's of India over the years 2005-06 to 2018-19. This is because this will allow us to account for differences between banks (cross sectional level) and over time (time series).

Pooled panel regression was run first, as shown below. The Pooled OLS technique estimates equation (1) with the implicit assumption of homogeneity across banks. This means that fixed effects or bank-specific effects are not included in the equation.

```

Random-effects GLS regression           Number of obs   =       546
Group variable: No                     Number of groups =       40

R-sq:                                  Obs per group:
  within = 0.7497                       min =           3
  between = 0.8076                       avg =          13.7
  overall = 0.7641                       max =           14

Wald chi2(7) = 1643.11
corr(u_i, X) = 0 (assumed)              Prob > chi2     = 0.0000

```

RETURNONASSETS	Coef.	Std. Err.	z	P> z	[95% Conf. Interval]	
NNPA	-.1919206	.007677	-25.00	0.000	-.2069672	-.176874
PRIORITYSECTORTOTALADVANCES	-.0043835	.0033344	-1.31	0.189	-.0109188	.0021518
NETINTERESTMARGIN	.4360479	.0377915	11.54	0.000	.3619779	.510118
NONINTERESTINCOME	.2633549	.0485985	5.42	0.000	.1681037	.3586062
WAGEBILLTOTOTALINCOME	-.044739	.0062193	-7.19	0.000	-.0569286	-.0325493
CARTierII	-.004069	.0132118	-0.31	0.758	-.0299636	.0218256
COSTOFDEPOSITS	-.0115092	.0191709	-0.60	0.548	-.0490835	.0260651
_cons	.4356312	.2212165	1.97	0.049	.0020548	.8692075
sigma_u	.18410874					
sigma_e	.34430714					
rho	.2223515	(fraction of variance due to u_i)				

However, on using LM test or the Bruesch Pagan test, it was found that pooled model is not suitable. This is because at 1% significance, we can reject the null hypothesis that the pooled regression model is better than the random effects regression model. These results are shown in the table below.

Bruesch and Pagan Lagrangian multiplier test for random effects

```

RETURNONASSETS[No,t] = Xb + u[No] + e[No,t]

Estimated results:

```

	Var	sd = sqrt(Var)
RETURNO-S	.655262	.8094826
e	.1185474	.3443071
u	.033896	.1841087

```

Test:  Var(u) = 0
      chibar2(01) = 141.04
      Prob > chibar2 = 0.0000

```

Post this, fixed effects panel regression model and random effects model were run. Fixed effects model allows introduction of heterogeneity across banks. Fixed effects improves pooled OLS when there is heterogeneity across banks and it is reasonable to assume that bank-specific effects are correlated to the regressors.

The error is composed of two parts – which is the idiosyncratic error and error due to bank-level characteristics. In the fixed effects model it is assumed that error due to bank-level characteristics is linked with the regressors, whereas in the random effects model, it is not correlated to the regressors, hence, it is a random variable.

The tables below show the results of 1. Random effects model and 2. Fixed effects model.

Random-effects GLS regression
 Group variable: No
 Number of obs = 546
 Number of groups = 40
 R-sq:
 within = 0.7497
 between = 0.8076
 overall = 0.7641
 Obs per group:
 min = 3
 avg = 13.7
 max = 14
 Wald chi2(7) = 1643.11
 Prob > chi2 = 0.0000
 corr(u_i, X) = 0 (assumed)

RETURNONASSETS	Coef.	Std. Err.	z	P> z	[95% Conf. Interval]	
NNPA	-.1919206	.007677	-25.00	0.000	-.2069672	-.176874
PRIORITYSECTORTOTALADVANCES	-.0043835	.0033344	-1.31	0.189	-.0109188	.0021518
NETINTERESTMARGIN	.4360479	.0377915	11.54	0.000	.3619779	.510118
NONINTERESTINCOME	.2633549	.0485985	5.42	0.000	.1681037	.3586062
WAGEBILLTOTOTALINCOME	-.044739	.0062193	-7.19	0.000	-.0569286	-.0325493
CARTierII	-.004069	.0132118	-0.31	0.758	-.0299636	.0218256
COSTOFDEPOSITS	-.0115092	.0191709	-0.60	0.548	-.0490835	.0260651
_cons	.4356312	.2212165	1.97	0.049	.0020548	.8692075
sigma_u	.18410874					
sigma_e	.34430714					
rho	.2223515	(fraction of variance due to u_i)				

Fixed-effects (within) regression
 Group variable: No
 Number of obs = 546
 Number of groups = 40
 R-sq:
 within = 0.7509
 between = 0.7953
 overall = 0.7582
 Obs per group:
 min = 3
 avg = 13.7
 max = 14
 F(7,499) = 214.86
 Prob > F = 0.0000
 corr(u_i, Xb) = -0.2607

RETURNONASSETS	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
NNPA	-.1955278	.008086	-24.18	0.000	-.2114146	-.179641
PRIORITYSECTORTOTALADVANCES	-.0054855	.0038385	-1.43	0.154	-.0130271	.0020562
NETINTERESTMARGIN	.4545289	.0410778	11.07	0.000	.3738222	.5352356
NONINTERESTINCOME	.3117256	.0556471	5.60	0.000	.2023942	.421057
WAGEBILLTOTOTALINCOME	-.0415675	.0073233	-5.68	0.000	-.0559557	-.0271793
CARTierII	-.0183924	.0147328	-1.25	0.212	-.0473383	.0105535
COSTOFDEPOSITS	-.004468	.0205432	-0.22	0.828	-.0448298	.0358938
_cons	.338124	.2396938	1.41	0.159	-.1328094	.8090575
sigma_u	.23181527					
sigma_e	.34430714					
rho	.31191394	(fraction of variance due to u_i)				

F test that all u_i=0: F(39, 499) = 5.09 Prob > F = 0.0000

- In both the models, the impact of Net Non-performing assets is -0.191 for random effects model and -0.195 for fixed effects model, and in both cases it is highly statistically significant at 1% level. Thus, it can be seen that Non-performing assets have a negative impact on profitability (return on assets) of banks.
- The impact of Priority sector advances on bank profitability comes out to be statistically insignificant in both models. This shows that regulation of RBI channeling funds towards

particular sectors in the economy does not have a statistically significant impact on bank profitability.

- As expected, both Net interest margin and non-interest income have a statistically significant positive impact on return on assets.
- While wages to total income ratio (measure of operational efficiency) has a statistically negative impact.
- Capital adequacy ratio CAR Tier-2 ensures banks have a buffer as it shores up the capital reserves. Both models show that higher CAR Tier-2 has a statistically insignificant impact on bank profitability.
- Cost of deposits has a negative but statistically insignificant impact on bank profitability.
- For the RE model, ‘rho’ which is known as the intra-class correlation shows that 31% of variance is due to differences across panels.

Hausman’s test tests whether there is a significant difference between the fixed and random effects estimators. We are able to reject the hypothesis that the Fixed effects model is better than the Random effects model. The results are shown below.

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. hausman fixed random
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	Coefficients		(b-B) Difference	sqrt(diag(V_b-V_B)) S.E.
	(b) fixed	(B) random		
NNPA	-.1955278	-.1919206	-.0036072	.0025391
PRIORITYSE~S	-.0054855	-.0043835	-.001102	.0019016
NETINTERES~N	.4545289	.4360479	.0184809	.0160992
NONINTERES~E	.3117256	.2633549	.0483707	.0271069
WAGEBILLTO~E	-.0415675	-.044739	.0031715	.0038665
CARTierII	-.0183924	-.004069	-.0143234	.0065194
COSTOFDEPO~S	-.004468	-.0115092	.0070412	.0073824

b = consistent under Ho and Ha; obtained from xtreg
B = inconsistent under Ha, efficient under Ho; obtained from xtreg

Test: Ho: difference in coefficients not systematic

$$\text{chi2}(7) = (b-B)'[(V_b-V_B)^{-1}](b-B)$$

= 35.92
Prob>chi2 = 0.0000

Sub- Section 02: Return On Equity

Pooled OLS regression analysis was repeated on the same set of independent variables with indicator of profitability being Return on Equity. Again, the implicit assumption here is of homogeneity across banks. The results of the regression are shown below-

```

Random-effects GLS regression           Number of obs   =       546
Group variable: No                     Number of groups =       40

R-sq:                                  Obs per group:
    within = 0.7358                      min =           3
    between = 0.5490                      avg =          13.7
    overall = 0.6792                      max =           14

corr(u_i, X) = 0 (assumed)              Wald chi2(7)    =    1385.77
                                           Prob > chi2     =     0.0000

```

RETURNONEQUITY	Coef.	Std. Err.	z	P> z	[95% Conf. Interval]	
NNPA	-3.40636	.136201	-25.01	0.000	-3.673309	-3.139411
PRIORITYSECTORTOTALADVANCES	.0497808	.0588815	0.85	0.398	-.0656249	.1651865
NETINTERESTMARGIN	4.46774	.6689255	6.68	0.000	3.15667	5.77881
NONINTERESTINCOME	2.064162	.8582319	2.41	0.016	.3820581	3.746265
WAGEBILLTOTOTALINCOME	-.5438286	.1096187	-4.96	0.000	-.7586773	-.32898
CARTierII	.9510433	.2335948	4.07	0.000	.4932058	1.408881
COSTOFDEPOSITS	-.3500922	.3395821	-1.03	0.303	-1.015661	.3154766
_cons	6.96639	3.91079	1.78	0.075	-.6986177	14.6314
sigma_u	3.0808261					
sigma_e	6.0144272					
rho	.20785122	(fraction of variance due to u_i)				

In order to test for suitability of Pooled OLS, Breusch Pagan test was used. We are able to reject the Null Hypothesis at 1% level of significance that the pooled OLS regression is better suited. The results are shown below-

Breusch and Pagan Lagrangian multiplier test for random effects

```

RETURNONEQUITY[No,t] = Xb + u[No] + e[No,t]

Estimated results:
-----
                Var      sd = sqrt(Var)
RETURNO~Y      158.3206      12.58255
e               36.17333       6.014427
u               9.491489       3.080826

Test:  Var(u) = 0
          chibar2(01) = 140.21
          Prob > chibar2 = 0.0000

```

Post this, FE and RE models were run, the results of which are shown below-

Random-effects GLS regression
Group variable: No

Number of obs = 546
Number of groups = 40

R-sq:
within = 0.7358
between = 0.5490
overall = 0.6792

Obs per group:
min = 3
avg = 13.7
max = 14

corr(u_i, X) = 0 (assumed)

Wald chi2(7) = 1385.77
Prob > chi2 = 0.0000

RETURNONEQUITY	Coef.	Std. Err.	z	P> z	[95% Conf. Interval]	
NNPA	-3.40636	.136201	-25.01	0.000	-3.673309	-3.139411
PRIORITYSECTORTOTALADVANCES	.0497808	.0588815	0.85	0.398	-.0656249	.1651865
NETINTERESTMARGIN	4.46774	.6689255	6.68	0.000	3.15667	5.77881
NONINTERESTINCOME	2.064162	.8582319	2.41	0.016	.3820581	3.746265
WAGEBILLTOTOTALINCOME	-.5438286	.1096187	-4.96	0.000	-.7586773	-.32898
CARTierII	.9510433	.2335948	4.07	0.000	.4932058	1.408881
COSTOFDEPOSITS	-.3500922	.3395821	-1.03	0.303	-1.015661	.3154766
_cons	6.96639	3.91079	1.78	0.075	-.6986177	14.6314
sigma_u	3.0808261					
sigma_e	6.0144272					
rho	.20785122	(fraction of variance due to u_i)				

Fixed-effects (within) regression
Group variable: No

Number of obs = 546
Number of groups = 40

R-sq:
within = 0.7399
between = 0.5133
overall = 0.6556

Obs per group:
min = 3
avg = 13.7
max = 14

corr(u_i, Xb) = -0.3572

F(7, 499) = 202.78
Prob > F = 0.0000

RETURNONEQUITY	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
NNPA	-3.485689	.1412477	-24.68	0.000	-3.763203	-3.208176
PRIORITYSECTORTOTALADVANCES	.0155982	.0670521	0.23	0.816	-.116141	.1473374
NETINTERESTMARGIN	5.191499	.7175548	7.23	0.000	3.781698	6.6013
NONINTERESTINCOME	4.187863	.9720544	4.31	0.000	2.278039	6.097687
WAGEBILLTOTOTALINCOME	-.5695407	.1279241	-4.45	0.000	-.8208769	-.3182046
CARTierII	.6329254	.2573548	2.46	0.014	.1272929	1.138558
COSTOFDEPOSITS	-.2245882	.3588527	-0.63	0.532	-.9296366	.4804601
_cons	4.427158	4.18702	1.06	0.291	-3.799204	12.65352
sigma_u	4.9509881					
sigma_e	6.0144272					
rho	.40392244	(fraction of variance due to u_i)				

F test that all u_i=0: F(39, 499) = 6.01 Prob > F = 0.0000

- The impact of Non-performing assets is negative and significant as expected. For the Random effects model it is -3.4 while for Fixed effects model it is -3.48. This means that rise in share of NPA in total assets leads to significant fall in return on equity.
- For Priority sector advances, we see that the impact is statistically insignificant for both fixed and random effects models.

- Net interest income and non-interest incomes show a positive and significant impact on return on equity.
- Wage bill to total income represents operational efficiency of banks. As expected, rise in wage bill ratio has a negative and statistically significant impact on return on equity in both fixed and random effects models.
- Capital adequacy ratio (Tier-2) has a positive impact which is statistically significant at 5% level. CAR has to be maintained under the Basel norms as a capital buffer by the banks.
- Cost of deposits has a statistically insignificant impact on return to equity.

Hausman's test is used to test for the suitable model between fixed and random effects. It shows that we are able to reject the null hypothesis, hence we are able to choose the fixed effects model over the random effects model. The results for the test are shown below.

	Coefficients			
	(b) fixed	(B) random	(b-B) Difference	sqrt(diag(V_b-V_B)) S.E.
NNPA	-3.485689	-3.40636	-.0793288	.0489773
PRIORITYSE~S	.0155982	.0497808	-.0341826	.0354115
NETINTERES~N	5.191499	4.46774	.7237594	.3052772
NONINTERES~E	4.187863	2.064162	2.123701	.5055897
WAGEBILLTO~E	-.5695407	-.5438286	-.0257121	.0718845
CARTierII	.6329254	.9510433	-.3181179	.1223925
COSTOFDEPO~S	-.2245882	-.3500922	.125504	.1410836

b = consistent under Ho and Ha; obtained from xtreg
B = inconsistent under Ha, efficient under Ho; obtained from xtreg

Test: Ho: difference in coefficients not systematic

chi2(7) = (b-B)'[(V_b-V_B)^(-1)](b-B)
= 31.72
Prob>chi2 = 0.0000

Regression Results

Variable	RETURN ON EQUITY		RETURN ON ASSETS	
	Coef.	P>t	Coef.	P>t
Net NPA	-3.48569	0	-0.19553	0
PRIORITY SECTOR ADVANCES	0.015598	0.816	-0.00549	0.154
NET INTEREST MARGIN	5.191499	0	0.454529	0
NON INTEREST INCOME	4.187863	0	0.311726	0
WAGE BILL	-0.56954	0	-0.04157	0

Capital adequacy ratio Tier-II	0.632925	0.014	-0.01839	0.212
COST OF DEPOSITS	-0.22459	0.532	-0.00447	0.828
_cons	4.427158	0.291	0.338124	0.159

The above table shows the compiled results of Fixed effects regression for both Return on Equity and Return on assets.

- What is clearly observable is that regardless of the method used to measure profitability of banks- the impact of net NPA is negative. The larger the size of NPA the lower is bank profitability.
- Priority sector advances – which was included as ratio of priority sector to total advances shows a statistically insignificant impact on profitability of banks
- Net interest margin and non interest margin show a statistically significant and positive impact.
- CAR has a positive and statistically significant impact on Return on equity while having statistically insignificant impact on return on assets.

Conclusions

The analysis done above points towards the centrality of Non-performing assets in ensuring the stability of scheduled commercial banks. Non-performing assets have an impact not only via capital erosion but also through reducing the net interest margin of banks and impacting its profitability. Addressing the issue of NPA can lead to successful restoration of commercial banks. The ability of banks to successfully function depends upon its ability to generate low cost funds and channelise these savings to investors and firms. This will also allow the Indian Economy to grow.

The other significant result of this paper points towards the priority sector lending share in total advances. A rise in share of priority sector lending does not have a negative impact on the profitability of commercial banks. This can provide significant scope to RBI to direct the funding of commercial banks towards sectors that can be influential in directing the growth of the economy.

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