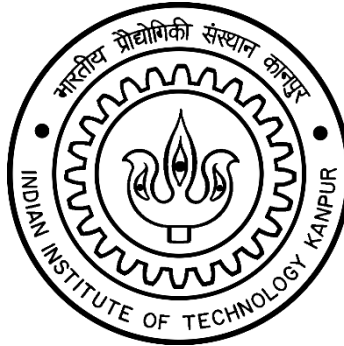# INDIAN INSTITUTE OF TECHNOLOGY KANPUR

Asset Quality, Non-Interest Income and Profitability of Indian Banks – A Brief Overview

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INTRODUCTION

A healthy financial credit lending system is the backbone of any developing economy. Banks are the most important source of credit in the current financial system of the world. Hence the health of these banks, primarily the bank balance sheets, directly reflects the strength of the financial system. India being an emerging market economy, is no exception to this fact.

The government of India announced a huge bank-merger plan in August'19 owing to the decreasing health of the balance sheets and increased pressure faced by these banks. The plan came into effect on 1st April, 2020 when ten public sector banks merged into four public sector banks reducing the number from 27 in 2017 to just 12 in 2020. This mega-merger followed in from the example of State Bank of India being merged with all its associate branches and the separate merger of Bank of Baroda, Vijaya Bank, and Dena Bank in 2019. The government also distributed Rs 68,855 Crores to the 10 banks being merged.

But what led to the finance ministry to take such bold steps? A clear answer is the deteriorating health of the PSB's balance sheets. The health of a bank is nothing but the risk inherent in the loan portfolio of a bank i.e. the lower the probability of a bank's asset turning in to a non performing asset, the healthier and stronger the bank. Hence higher the asset quality of a bank, lower is the credit risk of the loan portfolio and lower is the probability of a bank asset turning into NPA.

In this report, the major focus has been on the credit risk of Indian Banks and the after effects of the Asset Quality Review (AQR) carried out in July, 2015 which revealed that many banks in India were hiding the true health of their balance sheets. Two major exercises have been carried out on Indian banks to have a brief understanding of current financial scenario.

The main focus of these exercises is to get a general idea of asset quality of Indian banks and to look at their profitability post AQR period. It has been found that non-interest income activities have not been deteriorating the asset quality of banks. Moreover, weak evidence has also been found regarding decreasing profitability of banks after the AQR in 2015.

LITERATURE REVIEW

In banking literature, there are two common variables to measure profitability i.e. efficiency in financial intermediation of banks – Net Interest Margin (NIM) and Spread measures. Given that banks price risk prudently, a low NIM is interpreted as having low transaction

costs. The scope for growth lies in boosting savings and investment for such banks. A high NIM. High NIM is linked with having a high risk-premium nature and signals pressure of maintaining profits due to high NPAs (Claeys and Vennet, 2008; Schwaiger and Liebeg, 2008; and Dumicic and Ridzak, 2013). While data on NIM is generally directly available, spread measures have to be created using the difference between lending and deposit rates or some similar method.

There have been many studies which try to find determinants of NIM in emerging and developed markets. However very few studies try to link asset quality of banks with profitability. One such study published in RBI Occasional Papers Vol 37 in 2016 by John J, Mitra A, Raj J and Rath DP (hereby John et al) links asset quality with monetary transmission in India. They quote The Reserve Bank's Sixth Bi-Monthly Monetary Policy Statement of 2016-17 (February 2017), "the environment for timely transmission of policy rates to banks' lending rates will be considerably improved if the banking sector's non-performing assets (NPA) are resolved more quickly and efficiently…" and claim that the asset quality of SCBs has deteriorated consistently since 2011 and that the pace accelerated when withdrawal of regulatory forbearance on restructured advances and asset quality review (AQR) took place in 2015.

They point out certain mechanisms through which changes in NIM and spreads help banks to cope with credit risks. Certain studies on advanced economies and a few emerging market economies like that of Angbazo, 1997; Maudos and De Guevara, 2004 (on EU); and Maudos and Solis, 2009 (on Mexico) point out that increase in NPAs are associated with higher spreads. The inherent mechanism being that banks absorb losses in risky exposures by appropriately setting the spread over deposit rates in lending rates (Marinkovic and Radovic, 2014).

However many studies find a negative relation between NIM and NPAs. This results due to inadequate loan loss provisioning or a highly competitive banking industry. Non-performing loans could lead to smaller spreads because as higher NPAs lead to reduction in banks' income, a low loan loss provision prevents banks to give out new loans on higher lending rates to absorb the loss due to NPAs. A highly competitive industry directly hampers the ability of banks to charge higher spreads from their customers.

METHODOLOGY

Two main regression exercises have been done in this report. The first one aims to find whether non-interest income activities carried out by banks lead to imprudent lending in Indian banks. The second one is a regression discontinuity design exercise to find evidence regarding decrease in profit earning capability of banks after 2015 in the light of increased NPAs revealed by AQR.

The data has been collected from Database of Indian Economy by RBI and CEIC India premium database. Due to unavailability of continuous data for a large number of banks and variables over the years, a tradeoff had to be made between the number of banks and the years for study. In order to maximize the amount of data, 31 banks have been finally selected and the years of study is between 2006 and 2018. The data forms a panel with n = 31 and t = 12 hence 402 rows in total. For the RDD exercise, the number of years have been reduced to 8 ranging from 2011 to 2018 with 248 rows. The cutoff time period has been decided at 2015 owing to implementation of AQR.

NON-INTEREST INCOME AND CREDIT RISK

In this exercise, the asset quality of the bank will be used as a measure of prudent lending. Asset quality is measured using measures of NPA like NPA to Gross Advances Ratio or Loan Loss Provision to Gross Loans Ratio. The variables of interest would be the ones capturing non-interest income activities.

Current theories on banking activities give contrary views. While some believe that carrying out various other activities leads to conflict of interest and moral hazard problems in some banks, others find engaging in such activities help realize economics of scope. Many studies have found that diversification into non-interest income activities tend to generate greater standalone risk and systematic risk for financial institutions. Whether such relations exist in India or not is a relevant question to ask in the light of depreciating asset quality of SCBs.

Econometric Specification:

$$\text{Credit\_Risk}_{i,t} = \alpha_i + \beta_1 * \text{Fiduciary}_{i,t} + \beta_2 * \text{Sale\_Investments}_{i,t} + \beta_3 * \text{Exchange\_Transactions}_{i,t}$$

$$+ \beta_4 * \text{Size}_{i,t} + \beta_5 * \text{Loan\_Growth}_{i,t} + \beta_6 * \text{NPL}_{i,t} + \beta_7 * \text{Inefficiency}_{i,t} + \epsilon_{i,t}$$

Here, asset quality has been measured using Loan Loss Provision to Gross Loan Ratio termed as Credit_Risk. For Indian banks, the data for non-interest income collected by RBI is divided into five activities – securities commission and exchange (Fiduciary); sale and revaluation of investments (Sale_Investments); exchange transactions (Exchange_Transactions); sale of fixed assets and miscellaneous income. Out of these five, continuous data is available only for the first three activities hence the last two have been dropped.

The control variables include natural logarithm of Total Assets as Size; the yearly growth rate of gross loans as Loan_Growth; non-performing loans as NPL and ratio of interest expense to total assets as Inefficiency.

Size as a control variable is important because large and small banks can have different loan portfolios. Larger banks can afford more risky loan portfolios as they have relatively larger loan loss provisions. As literature shows a negative relation between credit expansion and loan quality hence growth rate of average gross loans has been included in the model. Non-performing loans have been included as higher the NPAs of a bank, higher the provisioning requirements. Inefficiency measures cost inefficiency of a bank. Higher the Inefficiency variable, less efficient is the bank and to cover for this cost inefficiency they may give out riskier loans decreasing the asset quality.

As a robustness check the Credit Risk variable would be replaced with Non-Performing Loans to Gross Loans Ratio as a separate proxy for asset quality. Results would be discussed in next section.

RDD ON SPREAD WITH TIME AND NPA

In order to see the impact of rise in NPAs on the profitability of SCBs, a regression discontinuity design has been setup. The dependent variable would be Spread, a measure of profitability and financial efficiency. It has been calculated using the methodology given in Lepetit et al, 2008 and equals the difference between the two ratios: (interest income/earning assets) and (interest expense/ total deposits). Earning assets are simply calculated as difference between gross loans and non-performing loans as explicit data is not completely available.

Econometric Specification:

$$Spread_{i,t} = \alpha_i + \gamma_1 * D_{i,t} + \gamma_2 * Z_{i,t} + \gamma_3 * D_{i,t} * Z_{i,t} + \gamma_4 * D_{i,t} * Z_{i,t}^2 + \beta_1 * Fiduciary_{i,t} +$$

$$\beta_2 * Sale\_Investments_{i,t} + \beta_3 * Exchange\_Transactions_{i,t} + \beta_4 * Size_{i,t}$$

$$+ \beta_5 * Inefficiency_{i,t} + \beta_6 * Credit\_Risk_{i,t} + \epsilon_{i,t}$$

Here, γ_1, the coefficient of dummy variable $D_{i,t}$ is the coefficient of interest. $D_{i,t}$ takes the value 1 for banks in experimental group and 0 for those in control group. $Z_{i,t}$ is the variable which measures the effect of rise in NPA due to AQR. It stands for two variables for two separate sets of models. For the first set $Z_{i,t}$ is equal to $NPL_{i,t}$ used in first exercise and for second set it is simply equivalent to time. Instead of a cutoff based on $Z_{i,t}$, $D_{i,t}$ takes value of 1 for years 2015 to 2018 in all the models.

There are two ways in which the 31 banks have been divided into control and experimental group. The first way is that of ownership. All public sector banks of the 31 banks fall in the experimental group. This has been done because it was a widely accepted view that except for some private banks, the public sector banks were the ones whose balance showed increased NPAs after the AQR.

The second way was to separate banks into groups based on which banks were worst hit due to AQR and showed highest increases in NPAs. Hence each of the two sets of models described above further have two variations which brings the overall number of RDD models to four. The controls for all the four models remain the same. Non-interest income activities also need to be controlled for as revenue generated from these activities can help the banks to attract more customers by giving out cheaper loans at reduced spreads.

EMPERICAL RESULTS AND DISCUSSION

Table 1: CREDIT RISK: FIXED EFFECTS MODELS

Variables	(1) Credit_Risk	(2) Credit_Risk	(3) NPL/Gross Loans	(4) NPL/Gross Loans
Fiduciary (β_1)	-0.0016** (0.0007)	-0.0022*** (0.0005)	-0.0008*** (0.0002)	-0.0008*** (0.0002)
Sale_Investments (β_2)	0.00004*** (0.00000)	-0.00002*** (0.00000)	0.0001*** (0.0000)	0.0001*** (0.0000)
Exchange_Transactions (β_3)	0.00009** (0.00003)	-0.00006** (0.00002)	0.00048*** (0.00013)	0.0003** (0.0001)
Size (β_4)		0.253** (0.104)		-0.073 (0.503)
Loan_Growth (β_5)		-0.016*** (0.003)		-0.096*** (0.015)
Non-Performing Loans (β_6)		0.0000*** (0.0000)		
Inefficiency (β_7)		0.00001*** (0.00000)		0.0000* (0.0000)
Constant (α)	1.038*** (0.103)	-3.657* (2.165)	3.421*** (0.393)	7.341 (10.489)
R-sq (Overall)	0.1055	0.4795	0.0892	0.2443
F-stat	19.7	59.66	17.16	18.37

*, **, *** indicate significance at 10%, 5% and 1% respectively.

CREDIT RISK:

The results of first exercise are reported in Table 1. Overall four regressions have been done to check the effect of non-interest income on asset quality. Column (1) reports results of the equation without any control variables. Column (2) includes all the variables. Column (3) and (4) correspond to check for robustness of the estimates of β_1, β_2 and β_3. All the three estimates are significant but only the estimate of Fiduciary income is negatively related and appears to lower Credit Risk. Note that Fiduciary income has been measured in Rs. Crores and Investment Sales and Exchange Transactions have been measured in Rs. Lakhs.

Keeping the units in mind only the Fiduciary income estimate is a bit economically meaningful. When evaluated at mean, a one percent increase in the share of fiduciary income in the total operating income, lowers Credit Risk by 0.002% approximately. The average of Credit Risk is 1.32%, so the effects are meaningful and equal to a 0.002/1.32 = 0.15% decrease.

Since the other two coefficients are even lower in magnitude and change signs across models, the effect is not economically meaningful. Coming to the robustness checks, the measure for asset quality has been replace from Credit Risk to Non-Performing Loans to Gross Loans Ratio. Although the estimates retain their significance, they reduce in magnitude making the economic impact negligible.

RDD on SPREAD:

The results of RDD exercise on Spread variable are given in Table 2. The coefficient of interest is γ_1, the coefficient of the dummy. As mentioned earlier, four models in total resulted out of the selected methodology of grouping the banks and measuring the effect of AQR.

In Column (1) and column (2), grouping of banks was done based on ownership of banks: PSBs in experimental group, rest in control group. In Columns (3) and (4), the grouping of banks was done based on which banks saw relatively greater increase in NPAs than others. Out of the four models, only columns (2) and (4) show favorable result with the estimate γ_1 being negative and significant. In Column (1), γ_1 is significant but positive and in column (3) it is insignificant.

TABLE 2: RDD USING FIXED EFFECTS MODEL

Variables	(1) Zi, t = NPLi, t Ownership	(2) Zi, t = Time Ownership	(3) Zi, t = NPLi, t Worst Hit	(4) Zi, t = Time Worst Hit
Dummy (γ_1)	0.008*** (0.002)	-0.102** (0.044)	0.004 (0.003)	-0.097* (0.055)
Z (γ_2)	-0.000 (0.000)	0.001 (0.001)	0.000 (0.000)	0.003*** (0.001)
Fiduciary (β_1)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)
Sale_Investments (β_2)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)
Exchange_Transactions (β_3)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)
Size (β_4)	-0.014*** (0.003)	-0.025*** (0.007)	-0.011*** (0.003)	-0.032*** (0.007)
Inefficiency (β_5)	-0.000 (0.000)	-0.000 (0.000	-0.000 (0.000)	-0.000 (0.000)
Credit Risk (β_6)	0.005*** (0.000)	0.004*** (0.000)	0.005*** (0.000)	0.005*** (0.000)
Constant (α)	0.367*** (0.063)	-0.578*** (.154)	0.299*** (0.064)	0.739*** (0.146)
R-sq (Overall)	0.3059	0.1844	0.3124	0.1360
F-stat	22.31	23.99	20.01	23.60

*, **, *** indicate significance at 10%, 5% and 1% respectively.

A negative and significant γ_1 implies that compared to control group, the experimental group showed a larger decrease in spread in post AQR period. Combined with the findings of John et al, 2016, who conclude that the monetary transmission has been hampered post AQR period due to slow credit growth, this result finds evidence regarding the decreased profitability of certain group of banks.

CONCLUSION

In the light of mega-mergers of ten PSBs into four, we have found weak evidence regarding the factors promoting such bold decisions in current scenario. In the recent literature concerning banks of India, evidence has been found regarding decreased monetary transmission and slow credit growth in an effort to maintain Net Interest Margin at higher levels to give a rosy picture instead of true facts.

However, decreasing asset quality and absence of efforts to recapitalize such assets has led to many banks incur losses. The Government of India has decided to rejuvenate the strength of the Indian financial sector by carrying out mergers. It would be interesting to see whether the new institutions learn from their past mistakes or carry out their business the same way they have done in recent years.

In this work, focus has been mainly on the fact that decreased asset quality has led to decrease in profitability of Indian banks in recent years. The reasons so as to why this has taken place has not been touched upon. In this regard, there is a lot of scope for future improvement in this work. One could look at reasons such as lending corruption, the data on which is collected by World Business Environment Survey, an initiative by World Bank. The problem of willful defaulters may also be a reason for increase in NPAs. The econometric methodology used in this work is simple fixed effects model. One can use complex techniques like dynamic panel models, as suggested by many researchers of the same field, or quantile regression models to deal with multicollinearity which is prevalent between banking variables.

APPENDIX

Banks included in asset quality exercise: HDFC BANK LIMITED, STATE BANK OF INDIA, KOTAK MAHINDRA BANK, ICICI BANK LIMITED, AXIS BANK, INDUSIND BANK LTD YES BANK LTD, BANK OF BARODA, IDBI BANK LTD, PUNJAB NATIONAL BANK, BANK OF INDIA, CANARA BANK, CITY UNION BANK LTD,

FEDERAL BANK LTD, INDIAN BANK, ALLAHABAD BANK, ANDHRA BANK, BANK OF MAHARASHTRA, CENTRAL BANK, CORPORATION BANK, DCB BANK LTD, INDIAN OVERSEAS BANK, JAMMU & KASHMIR BANK, KARNATAKA BANK, LAKSHMI VILAS BANK, ORIENTAL BANK OF COMMMERCE, SOUTH INDIAN BANK, SYNDICATE BANK, UCO BANK LTD, UNION BANK OF INDIA, UNITED BANK OF INDIA.

Bank groups according to Ownership criteria:

Control Group: HDFC BANK LIMITED, KOTAK MAHINDRA BANK, ICICI BANK LIMITED, AXIS BANK, INDUSIND BANK LTD, YES BANK LTD, CITY UNION BANK LTD, FEDERAL BANK LTD, DCB BANK LTD, JAMMU & KASHMIR BANK, KARNATAKA BANK, LAKSHMI VILAS BANK, SOUTH INDIAN BANK.

Experimental Group: STATE BANK OF INDIA, BANK OF BARODA, IDBI BANK LTD, PUNJAB NATIONAL BANK, BANK OF INDIA, CANARA BANK, INDIAN BANK, ALLAHABAD BANK, ANDHRA BANK, BANK OF MAHARASHTRA, CENTRAL BANK, CORPORATION BANK, INDIAN OVERSEAS BANK, ORIENTAL BANK OF COMMMERCE, SYNDICATE BANK, UCO BANK LTD, UNION BANK OF INDIA, UNITED BANK OF INDIA.

Bank Groups according to Worst Hit criteria:

Control Group: HDFC BANK LIMITED, KOTAK MAHINDRA BANK, INDUSIND BANK LTD YES BANK LTD, BANK OF BARODA, PUNJAB NATIONAL BANK, BANK OF INDIA, CITY UNION BANK LTD, FEDERAL BANK LTD, INDIAN BANK, CENTRAL BANK, CORPORATION BANK, DCB BANK LTD, JAMMU & KASHMIR BANK, KARNATAKA BANK, LAKSHMI VILAS BANK, SOUTH INDIAN BANK, SYNDICATE BANK, UNION BANK OF INDIA.

Experimental Group: STATE BANK OF INDIA, ICICI BANK LIMITED, AXIS BANK, IDBI BANK LTD, CANARA BANK, ALLAHABAD BANK, ANDHRA BANK, BANK OF MAHARASHTRA, INDIAN OVERSEAS BANK, ORIENTAL BANK OF COMMMERCE, UCO BANK LTD, UNITED BANK OF INDIA.

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