A Study on Determinants of Non-Performing Assets in Indian Banks

Swathi M P[1] and Dr. Mahesha M[2]

[1]Research Scholar, Department of studies in Economics and Cooperation, University of Mysuru, Manasagangothri, Mysuru, Karnataka, India-570006

[2]Professor of Economics, Department of studies in Economics and Cooperation, University of Mysuru, Manasagangothri, Mysuru, Karnataka, India-570006

ABSTRACT

The purpose of this paper is to empirically examine the effect of macroeconomic determinants on non-performing assets (NPAs) in the India's commercial banks using a panel regression model. This study considers all public, private, and foreign sector scheduled commercial banks during a period of seventeen years from 2004-05 to 2021-22, and uses four macroeconomic variables- GDP growth rate, inflation rate, interest rate and global volatility index- to assess the impact of these variables on NPAs. The findings show that NPAs have a negative relationship with GDP growth rate, confirming a increase in economic growth would rise the incomes of people and businesses and improve the ability of repayment of loans to the banks. Remaining three macroeconomic determinants negatively associated with NPAs but they were statistically insignificant. The result of the empirical study suggests that efficient management policies at the macro level are required to reduce the level of NPAs and to maintain the stability of the performance of banks in India.

1. Introduction

Banking sector plays a vital role in the development of the economy. Banks are the bridges between the savers and investors. Banks helps the people in productive investments through loans and advances as part of their business activity. The banking sector is an indispensable financial service sector supporting development plans through channelizing funds for productive purpose, intermediating flow of funds from surplus to deficit units and supporting financial and economic policies of government. The importance of bank stability in a developing economy is noteworthy as distress affects the development plans thereby the economic progress.

Stability and development of the banking sector may disturb by many factors like financial crisis, inefficient management, bad loans etc., Non-performing assets are a major obstacle to the development of the banking system of any country. According to RBI- An asset, including a leased asset, becomes non-performing when it ceases to generate income for the bank. A 'non-performing asset' (NPA) was defined as a credit facility in respect of which the interest and/ or instalment of principal has remained 'past due' for a specified period of time. With effect from March 31, 2004, a non-performing asset (NPA) shall be a loan or an advance where interest and/ or instalment of principal remain overdue for a period of more than 90 days in respect of a term loan.

Non-performing assets are a major obstacle to the development of the banking system of any country. Non-performing assets are affected by several factors. To manage NPAs effectively, it is very important to know the determinants of NPAs. In this paper, the macro level determinants of non-performing assets in the public sector, private sector, and foreign sector banks in India are discussed. There have been several studies on the determinants of non-performing assets, and these factors can be broadly divided into two categories namely macroeconomic variables and bank specific variables. Macro variables are factors external to the banking system such as the GDP growth rate, the inflation rate, the exchange rate, the repo rate, etc. Bank specific determinants include credit-deposit ratio, bank size, total advances, priority sector lending, ratio of secured advances to total advances, return on assets, return on assets, capital adequacy ratio, etc. A global variable like the CBOE VIX index-global volatility index-has also been used by few research papers (Roy Ghosh, 2014, Lee and Peter Rosenkranz, 2019) to measure the impact of global volatility on the NPAs. In this chapter, the determinants of non-performing assets of Indian scheduled banks are discussed on the basis of past research and the availability of data.

2. Objectives of the study

1. To estimate macroeconomic determinants of NPAs in Indian banks.

3. Methodology

3.1 Data and data sources

The study includes the commercial banks operating in India under different ownership groups. Sample consists of a panel of public sector banks, private banks and foreign banks. Although the banks belong to different ownership groups, they are similar in their functioning and are subject to the same regulatory obligations. For analysis purposes, the present chapter uses panel data for three ownership banks which are public sector banks, private sector banks, and foreign banks in India. 18 years of time series data are collected from financial year 2004-05 to financial year 2021-22.

The data for net NPAs collected from various issues of the "Report on Trend and Progress of Banking in India' published by the RBI. The data related to the GDP growth rate, inflation rate, and repo rate are collected from various issues of the "Handbook of Statistics on the Indian Economy," published by the RBI. The data for the global variable, change in the CBOE volatility index (VIX), is based on the S&P 500 index and collected from the CBOE (Chicago Board Option Exchange).

4. Variables Selected for the study

(A) Dependent variable (NPAs)

In this chapter, we have considered NPAs as dependent variable. We used net NPAs as a percentage of net advances as a proxy for NPAs that is NNPA (Roy Ghosh, 2014). Net NPAs shows the actual burden on the balance sheet of banks due to loan non-repayment issues.

(B) Explanatory variables

From the past literature, it is confirmed that the NPAs of commercial banks have been determined by both macroeconomic and bank-specific determinants. We have selected 4 macroeconomic determinants and 7 bank-specific determinants as independent variables.

These variables and their expected relationship with dependent variable (NPAs) on the basis of past studies are explained below.

Gross Domestic Product (GDP)

Gross domestic product is an important macro variable determining NPAs. A negative relationship is found between gross domestic product and NPAs, as gross domestic product indicates economic growth in any economy when the economy is functioning well and borrowers have the ability to repay loans on time when economic activities are good. This point has been proven by several researchers in their studies (Koju et al, 2018, Roland, Petr, and Anamaria, 2013, Lee and Peter Rosenkranz, 2019).

Inflation Rate

A situation in which the prices of goods and services are continuously increasing and the value of money is continuously decreasing in the economy is called inflation. A low level of inflation is conducive to economic growth. Also a positive relationship can be identified between the level of inflation and NTAs. Because when the level of inflation is high, people have to spend most of their income on buying goods and services, and the amount of money left to repay the loans is less and MPAs increase. This fact has been found by researchers like However, some studies

have found a negative relationship between the level of inflation and NPAs. Increasing inflation may make the real value of loans to go down and hence, make it easier for the borrowers to fulfil their financial commitments (Chaibi and Ftiti, 2015; Kjosevski and Petkovski, 2017, Koju et al, 2018). In India, the Consumer Price Index is commonly used to measure inflation. So the Consumer Price Index is used here to indicate inflation rate.

Interest Rate

Interest rate is an important macro variable that determines NPAs. When interest rates are high, the amount of NPAs increases as it becomes costlier for people to repay their loans. Thus, when interest rates are low, debt burden is reduced and loan repayments are higher, resulting in lower NPAs. The repo rate decided by the RBI is used to represent the interest rate.

Global Volatility Index (VIX)

Due to the increase in trade between nations after globalization, the effect of the financial crisis from one country to another can be observed. Therefore, the effect of fluctuation of economic factors at the global level can have a negative effect on the banking sector. So to take in account the effect of the external sector the "Global Variable", CBOE VIX, an index of global fluctuations, change in CBOE Volatility Index (VIX), based on S&P 500 Index is used as an important macroeconomic variable. Gosh Roy (2015) and Lee and Peter Rosenkranz (2019) considered CBOE (VIX) index as one of the important macroeconomic determinants of NPAs in their study. NPAs also increase when there are more global economic fluctuations. But Gosh Roy (2015) found a negative relationship between NPA and VIX in their study. He opined that though the volatility is increasing globally Indian banks are able to maintain the NPAs level at a declining trajectory.

Table no.1 Description of the Explanatory Variables selected for the study and their expected relationship with dependent variable.

Name of the variables		Description	Expected relationship with dependent variable(NPAs)
I Dependent variable NNPAs			
II Explanatory Variables **Macroeconomic variables**			
1	GDP	Annual Economic growth rate	Negative
2	Inflation rate	Annual consumer price index	Positive
3	Interest rate	Annual average of Repo rate	Positive

4	VIX	Global volatility index	Positive

Source: Author's compilation

5. Econometric methodology

To find out the major determinants of NPAs in Indian banks, we used a panel regression model. To estimate the effect of macroeconomic, and global-level variables on NPAs at Indian banks an econometric model have been specified. The following model is used to measure the impact of macroeconomic variables on NPAs.

$$Y_{it} = \alpha_{it} + \beta_1 X_{1it} + \beta_2 X_{2it} + \beta_3 X_{3it} + \beta_4 X_{4it} + u_{it}$$

Where,

- Y_{it}=Net non-performing assets of Indian banks

- X_{1it}=GDP

- X_{2it}=Inflation rate

- X_{3it}=Interest rate

- X_{4it}=VIX global volatility index

- u_{it}=Disturbance term

- α and βs=Parameters to be estimated

- 'it' represents i^{th} bank in t^{th} period.

6. Results and Discussion

6.1 Summary statistics

As a first step in the analysis, in this paper the variables we have used for the study are described. Describing all of these variables will provide a picture of the state of the economy at the international and national levels, as well as context for the Indian banking system's growth and performance during the study period. The analysis of the data was done using the mean value of the variables, the variation in the value of the data, i.e., the standard deviation, and the minimum and maximum value of the variables, and this value was also related to the study period from 2005 to 2022.

Table no.2 Summary statistics of the variables selected for the study.

Sl. No.	Name of the variables	Mean	Standard deviation	Min value	Max value
1	Net non-performing assets	1.677778	1.54451	0.4	8
2	GDP	6.157388	3.496944	-6.596081	8.681229
3	Inflation rate	6.816556	3.388027	2.07181	13.91304
4	Interest rate	6.435	1.172091	4.2	7.9
5	VIX	19.47	6.521042	11.09	32.69

Source: Author's calculation (STATA 17.0)

The results of the data summary have been consolidated in Table No.2. The result shows that over the study period, the sample bank has experienced net non-performing assets of about 1.68% of the total loans granted. Some of the banks have been able to manage their assets well and maintain their net of non-performing assets at a 0.4% level. Contrary to this, some of the banks have experienced net non-performing assets as high as 8% of their total advances. That shows there are a lot of differences in the level of net non-performing assets across the banks, and every bank is suffering from the non-performing assets problem, though the percentage varies.

India recorded an average GDP growth rate of 6.15% during the study period, i.e., 2005 to 2022. In some years, the GDP growth rate reached a maximum of 8.68 percent, but it can be recognized from the minimum value that the GDP growth is negative at times. The average inflation rate during the study period in India was 6.81%. The gap between the maximum value of 13.91 and the minimum value of 2.07 shows the largest fluctuations in inflation over these 18 years. The average repo rate for the study period was 6.435, and the RBI also adjusted its repo rate between a minimum of 4.2% and a maximum of 7.9% in line with inflationary fluctuations.

The mean value of the Global Volatility Index is 19.47 for the period 2005–2022. The period from 2005 to 2022 is the time when the world economy saw a major financial crisis. The index's minimum value of 11.09 for Global Volatility indicates a few years of low-risk environments, while the maximum value of 32.69 indicates higher volatility. These values clearly indicate that the period of our study was the one that experienced the most fluctuations in the world economy.

6.2 Correlation between NPAs and Macroeconomic determinants

Pair wise correlation analysis has been used to evaluate how several variables are related to one another. Spearmen's correlation technique, a non-parametric test that does not rely on the assumption of normality of the distribution, has been used for this purpose. Table lists the relationships between the NPAs and the macroeconomic explanatory variables.

Table no. 3 Correlation of Explanatory variables with Dependent variable

Sl.no	Variables	NNPA	P value
1	GDP growth rate	-0.0096	0.9450
2	Inflation Rate	-0.2530	0.0649
3	Interest Rate	-0.0838	0.5469
4	Global Volatality Index	-0.1837	0.1837

Source: Author's calculation (STATA 17.0)

From the results shown in the above table it can be noticed that there is negative relationship between non-performing assets and GDP growth rate which is confirmed by the correlation coefficient -0.0096.This result assures that when economy performing well the level of NPAs will be lower. The correlation coefficient between non-performing assets and inflation rate is -0.2530 shows the negative relationship between these two variables. In India in the study period higher inflation rate has resulted with lower level of NPAs. -0.0838is the correlation coefficient between NPAs and Interest rate of banks in India. That shows an inverse relationship between rate of interest and NPAs. Global volatility index's correlation coefficient with NPAs level in India during study period is also negative, that affirms Indian banking system not much affected by global economic variations.

6.3 Panel Regression Results of Macroeconomic determinants

In this part, we present the panel regression results of our first model that examines the effect of macroeconomic determinants on non-performing assets. Net non-performing assets are used as a proxy for non-performing assets, which is a dependent variable in our model. As explanatory variables, we considered four macroeconomic determinants, namely GDP growth rate, Inflation rate, Interest rate and Global volatility index. Table number gives a picture of the results of panel regression analysis of macroeconomic determinants of NPAs in the Indian public sector, private sector, and foreign sector banks from 2004–05 to 2021–22.

Table no. 4 Panel regression results of Macroeconomic determinants of NPAs

Sl no.	Name of the variable	Coefficient	P value
1	GDP growth rate	-0.061599	0.037
2	Inflation Rate	-0.0646063	0.427
3	Interest Rate	-0.1722334	0.117
4	Global Volatality Index	-0.0088214	0.006
	Wald chi2	3804.04	
	Prob>chi2	0.000	

Source: Author's calculation (STATA 17.0)

The above table shows the estimating regression results of the macroeconomic determinants of NPAs in Indian scheduled commercial banks from 2005 to 2022. All coefficients have a negative sign. Some of the variables have an expected relationship with the dependent variable, and some do not.

As anticipated based on earlier research, the GDP growth rate regression coefficient value of -0.061599 indicates a negative association between the GDP growth rate and the amount of non-performing assets in the banks of scheduled commercial banks in India. This is also statistically significant at the 5% level of significance. One percent increase in GDP growth will help reduce 0.061599 units of NPAs.

The regression coefficient value of -0.0646063 indicates that the inflation rate had a negative effect on non-performing assets (NPAs) in India over the study period, although this effect was not statistically significant. In their analysis of nonperforming loans made by Italian banks, Marcello Bofondi and Tiziano Ropele (2002) also discovered a negative correlation between NPAs and the inflation rate. Other research, such as Shu (2002) and Fofack (2005), has likewise discovered a negligible impact of inflation rate on non-performing assets.

The correlation coefficient of interest rate -0.1722334 shows interest rate has also a negative effect on the NPAs. This is not significant. Park (2011), in his study related to the determinants of NPAs in Brazilian banks, also found a non-significant effect of interest rate on NPAs.

-0.0088214, the coefficient of global volatility shows a negative relationship between the NPAs of Indian scheduled commercial banks and global-level economic fluctuation, which is also highly significant at the 1% level of significance. Gosh Roy (2015) found a negative relationship between NPA and VIX in their study. In his opinion, Indian banks are able to keep the NPA level on a downward trend even when global volatility is rising.

7. Conclusion

Stability of the economy is the prerequisite for the development of the any sectors in the country. Stable economic growth, stable price level and favourable international conditions helps the banks to develop more. The findings show that NPAs have a negative relationship with GDP growth rate, confirming a increase in economic growth would rise the incomes of people and businesses and improve the ability of repayment of loans to the banks. Inflation rate, interest rate and global volatility index were negatively associated with NPAs but they were statistically insignificant. The result of the empirical study suggests that stable and increasing growth of the economy is required to reduce the level of NPAs and to maintain the stability of the performance of banks in India.

References

Bardhan and Mukherjee(2016) 'Bank-specific Determinants of Non-performing assets of Indian banks', *Int econ Econ Policy* , Vol.13, PP.483-498.

Bardhan and Mukherjee(2013), 'Willful Deafault in Developing Country Banking System: A Theoretical Exercise', *Journal of Economic Development*, 38(4), pp 101-122.

Das S K(2021), 'What Explains NPAs in Indian Banks?, ISID Working paper-235.

Dhar S. and Bhakshi A.(2015), 'Determinants of loan losses of Indian Banks:A Panel Study', *Journal of Asia Business Studies*, Vol.9, No.1, pp 17-32.

Ghosh(2014), 'Asset quality of Banks: Evidence from India'

Koju et al.,(2018) 'Macroeconomic and Bank Specific Determinants of Non-Performing Loans: Evidence from Nepalese Banking System', *Journal of central Banking Theory and Practices,* 3, PP.111-138.

Lee and Rosenhranz(2019) 'Non-Performing Assets in Asia:Determinants and Macrofinancial Linkages', *ADB Economics Working Paper*.

Louzis et al.(2012), 'Macroeconomic and Bank-specific Determinants of Non-Performing Loans in Greece: A Comparative Study of Mortagage, Business and Consumer Loan Portfolios', *J Bank Financ*, 36(4), pp. 1012-1027.

Makri V. Tsangkanas A. and Bellas A.(2014), Deetrminants of Non-Performing Loans: The Case of Eurozone', *Panoeconomics*, 61, pp 193-206.

Roy(2014), 'Determinants of Non-Performing Assets in India - Panel Regression' *Eurasian Journal of Economics and Finance, 2(3),* 2014, pp 69-78