International Journal for Multidisciplinary Research (IJFMR)
E-ISSN: 2582-2160 ● Website: www.ijfmr.com ● Email: editor@ijfmr.com

Analysing the Impact of Macroeconomic Determinants on Asset Quality in Indian Commercial Banks

Shagufta Khatoon Sheikh[1], Dr. Arpan Parashar[2]

[1]Research Scholar, Banasthali Vidyapeeth, Rajasthan.
[2]Assistant Professor, Dept. of Commerce & Management, Banasthali Vidyapith

ABSTRACT

The Increasing trend of non-performing assets (NPAs) in the Indian finance sector is reducing its profit-earning capacity and efficiency. Non-performing assets (NPAs) are advances or interest dues that borrowers are not capable of repaying due to economic or other reasons. Various factors like bank-specific factors, macroeconomic and institutional factors affect NPAs. In this paper, an empirical study is carried out to examine how macroeconomic variables affect NPAs of scheduled commercial banks of India. For the study, data of 23 years, i.e. from 2000-2001 to 2022-2023 have been taken and an Autoregressive Distributed Lag (ARDL) method and bounded F-test have been used to analyse the effect of macro-economic variables on GNPA of Indian scheduled commercial banks. The macroeconomic variables like FDI, CPI, IIP, GDP and unemployment rate of India was taken. In the study it was concluded that a long-run causal link exists between the macro-economic variables and GNPA. GDP is found to be negatively associated with GNPA, indicating that economic growth helps lower the NPAs of banks. CPI is significantly negatively associated with GNPA, showing that as price level rises, the GNPA of banks decreases, as inflation reduces the real value of money, making loan repayment easier. Furthermore, the unemployment rate and IIP are found to be negatively correlated with GNPA, while FDI shows positive relation.

KEYWORDS: Non-performing Assets, ARDL model, macroeconomic variables, scheduled commercial bank, India.

INTRODUCTION

The ability of any nation to maintain economic stability depends heavily on the banking industry's profitability and stability. Non-Performing Assets (NPAs) represent a major concern for banks, especially in developing economies such as India. Non-performing assets (NPAs), or advances or loans that are overdue or in default, are crucial sign of bank's effectiveness and soundness financially. Increased levels of NPAs can reduce bank profitability, weaken balance sheets and negatively affect the broader economy. For many years Indian banking sector (public sector, private sector and foreign banks) are suffering from large NPAs. This situation has raised concerns among financial institutions, regulators, lawmakers. The increase in NPAs necessitates analysing the underlying causes and factors influencing them. While various factors such as bank-specific and institutional factors contribute to NPAs, macroeconomic variables significantly influence banks non-performing assets.

The current article aims to empirically analyse the link between macroeconomic variables and NPAs of Indian scheduled commercial banks. Macroeconomic indicators such as GDP growth rate, unemployment rate, consumer price index (CPI), Index of Industrial Production (IIP) and foreign direct investment (FDI) taken into account to determine their influence on NPAs. It is necessary to identify this relationship in order to develop effective policies to control and reduce NPA-related risks.

The Autoregressive Distributed Lag (ARDL) model and the bound F-test are applied in this paper to look into the long-term and short-term correlations among macroeconomic factors and non-performing assets (NPAs). The data collected for the years 2000–2001 to 2022–2023. The findings will provide insights into how economic fluctuations impact the quality of bank assets and provide recommendations for enhancing the banking sector's resilience against macroeconomic shocks.

In summary, this paper adds to current body of literature by offering a thorough assessment of the interplay among macroeconomic variables and NPAs in Indian commercial banking. It emphasizes the importance of a stable macroeconomic environment to ensure the long-term viability of the banking sector and underscores the need for vigilant monitoring and proactive management of economic indicators to maintain financial stability.

LITERATURE REVIEW

Anshu & Gakhar, (2019) using ARDL model analyzed the effect of macroeconomic indicators on financial outcome of Indian commercial banks. The paper revealed that GDP, lending interest rate and inflation rate show positive relationship with ROA while exchange rate negatively associated with ROA. Ardely & Ekananda, (2023) used ARDL method to see the effects of independent factors over dependent variable in short and long period of time. This method also helps distinguish between independent and dependent variables. It was noted that the ARDL method cannot be used for data that is stationary data at 2nd difference. Beck et al., (2015) studied the influence macroeconomic parameters (exchange rate, lending interest rate, share prices, and real GDP growth) on NPAs of 75 nations for the period 2000 to 2010. The study concluded that real GDP growth is the primary factor influencing NPAs, meaning a drop in the economic activity will result in deteriorating asset quality of banks. Furthermore, exchange rate depreciation and share prices negatively impact asset quality.

Mishra et al., (2021) using the GMM model, analyzed the influence of macroeconomic parameters (unemployment, exchange rate, inflation, and interest rates) on asset quality of Indian commercial banks. Result revealed that all macroeconomic factors significantly affect banks' asset quality, suggesting that policymakers should take precautions when drafting banking and monetary policies. Nayak, (2022) analyzed Odisha's state cooperative banks performance for the span from 1949-50 to 2014-15. The Phillips Perron (PP), Augmented Dickey Fuller (ADF), and Autoregressive Distributed Lag (ARDL) tests were applied. The outcome indicates that deposits, share capital, and reserves have a significant long-term impact. To achieve growth proactive capital management should be implemented, resulting in higher deposit creation and larger advances. Swamy, 2012 used panel data analysis to look at the influence of endogenous and exogenous factors on the NPAs in the Indian banking sector. The data from 1997 to 2009 were taken. Bank assets, CAR, ROA, the ratio of priority sector loans to total loans and the credit to deposit ratio were considered as endogenous factors. The following macroeconomic variables were taken into account: growth rates for market capitalization, GDP, IIP, inflation, savings, and per capital income in NNP. The study concludes that the impact of priority sector lending on NPAs is insignificant. Bank size

matters, as large banks tends to have more effective risk management, and bank ownership also decide better credit risk management; private banks and foreign banks are efficient in managing default risk

Syed & Tripathi, (2020) investigated the impact of macroeconomic indicators such as unemployment, inflation, economic growth and interest rate on non-performing loans of Indian banking sectors for the years 2000 through 2018 using the GMM model. Study revealed that public sector banks, including SBI and its associates, are significantly affected by all macroeconomic variables and private sectors are affected by growth rate, interest rate and inflation whereas foreign banks are significantly affected by exchange rate. It was suggested that, while drafting banking and monetary policies assisting bankers and policy makers should take precautionary measures. T.K. et al., (2018) empirically analysed the influence of microeconomic and macroeconomic factors on NPAs of Indian public and private sector banks for 16 years i.e., 60 quarterly observations (1999-2015) by using ADRL (autoregressive distributed lag) method. It was found that there is an indirect relationship between RGDP and NPA; that is, a rise in RGDP will raise business and household income, which will reduce the NPA. Further study showed a direct correlation between gross advances and NPA whereas inflation and NPA have strong positive relation and bank's total operating expenditure are positively related with NPA in short term but inversely related in long term. Zheng et al. 2019 assessed how macroeconomic and industry-specific factors affected Bangladesh's non-performing loan portfolio. Employed the vector error correction (VEC) approach to verify the result's robustness after applying the ARDL method for interpretation. The findings showed that NPL and domestic credits, exchange rates, bank lending rates, and liquidity are positively correlated. Furthermore, GDP growth rate, unemployment, deposit rates, bank loan growth and net operating profits negatively affect NPL.

These research papers highlight the influence of macroeconomic determinant on the fiscal condition of banks, particularly in relation to NPAs. The findings provide the policymakers and banking institutions in developing effective strategies to manage and mitigate the risks associated with macroeconomic fluctuations.

OBJECTIVE AND METHODOLOGY

Research Objective

The current research paper aims to determine how macroeconomic factors affect the GNPA of Indian scheduled commercial banks. The short-term and long-term influence of macroeconomic variables on GNPA were analysed using the Autoregressive Distributed Lag (ARDL) model. The conclusion will add in identifying the underlying causes of NPAs in India and will assist banks and the government in taking corrective action.

Hypothesis

Following hypothesis were formulated:

Null Hypothesis (H01): LGGDP and LGNPA are not statistically and significantly related.

Null Hypothesis (H02): LGCPI and LGNPA are not statistically and significantly related.

Null Hypothesis (H03): LGUNEMP and LGNPA are not statistically and significantly related.

Null Hypothesis (H04): LGIIP and LGNPA are not statistically and significantly related.

Null Hypothesis (H05): LGFDI and LGNPA are not statistically and significantly related.

Model

The model for testing the hypotheses is formulated as follows:

LGGNPA = f (LGGDP, LGCPI, LGUNEMP, LGIIP, LGFDI)

Where: LGGNPA = log of gross non-performing assets as percent of gross advances
LGGDP= log of GDP growth rate
LGCPI = log of consumer price index
LGUNEMP = log of unemployment rate
LGIIP = log of index of industrial production growth rate
LGFDI = log of Foreign direct investment (net inflow)
Equation: Pesaran, Shin, and Smith (2001) developed ARDL model. ARDL equation given below:

$$LGGNPA_t = \alpha_0 + \sum_{i=1}^{p} \beta_i LGGNPA_{t-i} + \sum_{i=0}^{q1} \gamma_i LGGDP_{t-i} + \sum_{i=0}^{q2} \delta_i LGCPI_{t-i} + \sum_{i=0}^{q3} \phi_i LGUNEMP_{t-i} + \sum_{i=0}^{q4} \theta_i LGIIP_{t-i} + \sum_{i=0}^{q5} \lambda_i LGFDI_{t-i} + \varepsilon_t$$

Where:

- $LGGNPA_t$ is dependent variable at time t.
- $LGGDP_{t-i}$, $LGCPI_{t-i}$, $LGUNEMP_{t-i}$, $LGIIP_{t-I}$, and $LGFDI_{t-i}$, are the independent variables with their respective lags up to q_1, q_2, q_3, q_4 and q_5 periods.
- α_0 is the constant term.
- β_i, γ_i, δ_i, ϕ_i, θ_i, λ_i are the coefficients associated with the lags of the dependent and independent variables.
- P is the number of lags of the dependent variable and q_1, q_2, q_3, q_4 and q_5 are the lag lengths for each independent variable.
- ε_t is the error term at time t.
  Note- the values of p, q_1, q_2, q_3, q_4 and q_5 are chosen based on model selection criteria called Akaike info criterion (AIC).

Methodology

Unit Root Test is used for the Augmented Dickey-Fuller test (ADF) to determine whether the time series is stationary before applying the ARDL model. Following this, the autoregressive distributed lag (ARDL) model is utilized to investigate the correlations among the parameters in both the short term and long term. In this model, the bounds testing approach—which is predicated on the F-test—is utilized. If the F-statistic exceeds the upper bound critical value of the bounds test, the null hypothesis of no cointegration is rejected, suggesting that the variables are cointegrated (Narayan, 2005). Diagnostic test used are:

- Serial correlation: Breusch-Godfrey test is utilized.
- Hetroscedasticity: Breusch-Pagan-Godfrey test is applied to identify whether time series data exhibit heteroskedasticity.
- Histogram normality test.
- To find direction of causality between two variables Granger Causality test is applied.
- Long run stability of parameters are tested by Cusum test.

RESULTS AND DISCUSSION

Before running a co-integration test, it is essential to confirm if the parameters are stationary at their first difference or at the level. Variables stationary at the second difference cannot be subject to the ARDL model (Pesaran et al., 2001; Nayak, 2022). To ascertain stationarity unit root test (Augmented Dickey-Fuller test) is employed. Table 1 demonstrates that while the variables LGIIP and LGFDI are stationary at the first difference, the factors such as LGGNPA, LGGDP, LGCPI, and LGUNEMP are stationary at

the level. Consequently, we can conclude that all variable is stationary, allowing us to move on to the ARDL model, the next phase.

Table 1: Augmented Dickey-Fuller test (ADF)

Variables	Status	t-statistics	P value*
LGGNPA	I(0)	-3.912035	0.0090*
LGGDP	I(0)	-3.826286	0.0096*
LGCPI	I(0)	-4.378377	0.0035*
LGUNEMP	I(0)	-2.321878	0.0231**
LGIIP	I(1)	-4.158474	0.0045*
LGFDI	I(1)	-5.148169	0.0005*

Note: * and ** Indicate significant at the 1% and 5% significance level.
Source- Researcher's contribution, calculated using EViews.

The outcome of the ARDL F-Bound test is shown in Table 2. At the 5% level of significance, the F-statistic is 3.842421, which is exceeds the critical value of upper-bound. This indicates that there is an equilibrium link between the independent parameters and LGGNPA over the long run, indicating cointegration between them.

Table 2: ARDL F-Bound Test

Significance	I(0) Bound	I(1) Bound
1%	3.06	4.15
2.5%	2.7	3.73
5%	2.39	3.38
10%	2.08	3
F-statistics	3.842421	

Source- Researcher's contribution, calculated using EViews.

Table 3 depicts that LGGNPA and LGGDP are indirectly associated. The estimated coefficient of LGGDP is -0.307302, indicating that with the one percent increase of LGGDP, LGGNPA decreases by 0.307302%. This means that as the economy grows, NPAs decrease. Hence, it can be said that NPAs decrease as GDP growth increases the income of households and businesses, enhancing their ability to repay their debt. The findings similar to that of T.K. et al., (2018).

The Results confirm that LGCPI significantly impacts LGGNPA, and Negative sign of Coefficient of LGCPI indicates that higher inflation leads to lower NPAs. During periods inflation, the cost of production and wages takes time to match new price levels. This lag in cost adjustments allows businesses to earn profits and makes loan repayment of loan easier as the real value of money decreases (Bayar, Y. 2019). Furthermore, LGUNEMP shows insignificant impact on LGNPA. The negative relationship explains that banks do not grant loans to unemployed individuals and have effective mechanisms in place to secure loan repayments if a borrower becomes unemployed. Additionally, LGIIP shows insignificant negative impact on LGGNPA, while LGFDI depicts an insignificant positive impact on LGGNPA.

Table 3: Long-term coefficients using ARDL model

Dependent Variable is LGGNPA			
Variables	Coefficient	t-Statistic	P-value
LGGDP	-0.307302	-1.496028	0.1853
LGCPI	-0.994785*	-8.341528	0.0002
LGUNEMP	-0.492084	-0.297905	0.7758
LGIIP	-0.272438	-0.510229	0.7758
LGFDI	0.033555	0.155707	0.8814
constant	6.039319	1.365586	0.2210

Note: * Indicate significant at the 1% level of significance.
Source- Researcher's contribution, calculated using EViews.

The ECM (Error Correction Model) coefficient can be used to analyze the short-term adjustment process. When coefficient falls between 0 and -1, it indicates that the system is gradually moving towards the long-run equilibrium path, even as it responds to external disturbance (Nayak, 2022). Table-4 depict that the lagged error-correction term's coefficient, which is -0.900594, is extremely significant at the 1% significance level (p-value = 0.0003). This means that any shift from the equilibrium position of LGGNPA in this time period will be corrected by 90.0594% in the following period to return to equilibrium. Additionally, the statistical significance of the error correction term where dependent parameter is LGGNPA suggests a long-term causal relationship among the parameters and LGGNPA.

Table 4: Error correction short-run ARDL model-

Dependent Variable is LGGNPA			
Variable	Coefficient	t-Statistic	P-Value
CointEq(-1)	-0.900594*	-7.334432	0.0003
LGGNPA	0.943623*	6.678810	0.0005
LGGDP	-0.013015	-0.188768	0.8565
LGFDI	0.128494	1.508038	0.1823
LGUNEMP	-1.195869**	-3.072906	0.0219

Note: * and ** Indicate significant at the 1% and 5% level of significance.
Source- Researcher's contribution, calculated using EViews.

Robustness of the Study

The diagnostic tests performed to evaluate the empirical model's dependability are listed in Table 5. The residuals exhibit serial correlation, as indicated by the Breusch-Godfrey Lagrange Multiplier (LM) test. The homoskedasticity of the errors is demonstrated by the Breusch-Pagan-Godfrey test. As a result, we conclude that the ARDL model used for the study was reliable.

Table 5: Diagnostic Test Results

Tests performed	Nature of Tests	p-value	Interpretation
Breusch-Godfrey LM test	Serial Correlation test	0.0016	Residuals are serially correlated

Breusch-pagan-Godfrey test	Hetroskedasticity test	0.2912	Residual are homoscedastic

Source- Researcher's contribution, calculated using EViews.

Histogram- normality test

It is evidence from the figure 1 that the p-value of the residuals is 0.991550, which exceeds 5% threshold of significance level. As a result, the null hypothesis claiming that the residuals have a normal distribution—is not successfully rejected. Thus, the residuals are normally distributed, which is a favourable condition for good fit of the model.

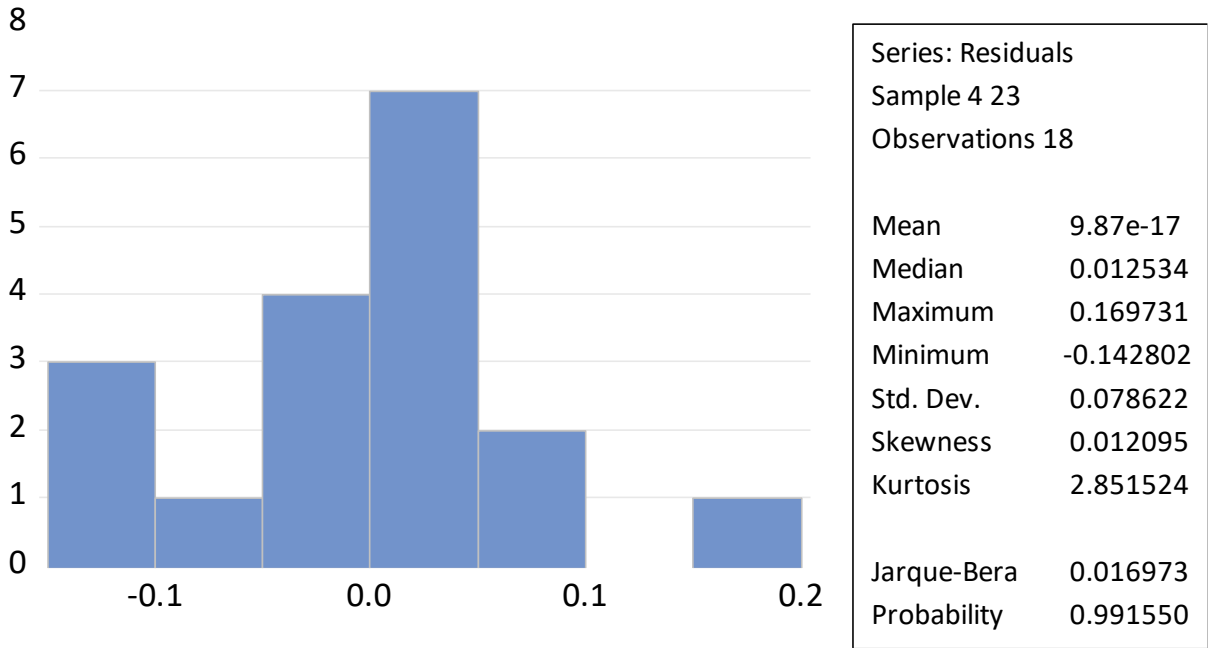

Figure 1 Histogram Normality Test

Source- Researcher's contribution, calculated using EViews.

Further Granger causality testing has been employed to assess the direction of any potential relationship among variables. Table 6 depict that only LGGNPA found to granger cause LGCPI and for all other pairs, the test suggests neither direction of granger causality appears to be significantly present.

Table 6: Granger Causality Test

Null Hypothesis	Observation	F-Statistics	Probablity
LGGDP is not LGGNPA's Granger cause	18	0.21806	0.8070
LGGNPA is not LGGDP's Granger cause		0.16101	0.8530
LGFDI is not LGGNPA's Granger cause	21	0.12656	0.8820
LGGNPA is not LGFDI's Granger cause		1.42602	0.2692
LGCPI is not LGGNPA's Granger cause	21	0.44569	0.6481
LGGNPA is not LGCPI's Granger cause		4.41058	0.0298
LGIIP is not LGGNPA's Granger cause	21	0.15322	0.8592
LGGNPA is not LGIIP's granger cause		0.45424	0.6429

LGUNEMP is not LGGNPA's Granger cause	21	0.05787	0.9440
LGGNPA is not LGUNEMP's Granger cause		1.10774	0.3544

Source- Researcher's contribution, calculated using EViews.

Plots of Stability Test

In this study, the CUSUM test was applied to inquire into the reliability of short-term and long-term characteristics (Nayak, 2022). At 5% significance level, the CUSUM test plot (Figures 2) is within critical boundaries. This confirms that the long-term and short-term parameters are stable in relation to the LGGNPA of Indian commercial banks. This ensures the appropriateness and stability of the model.

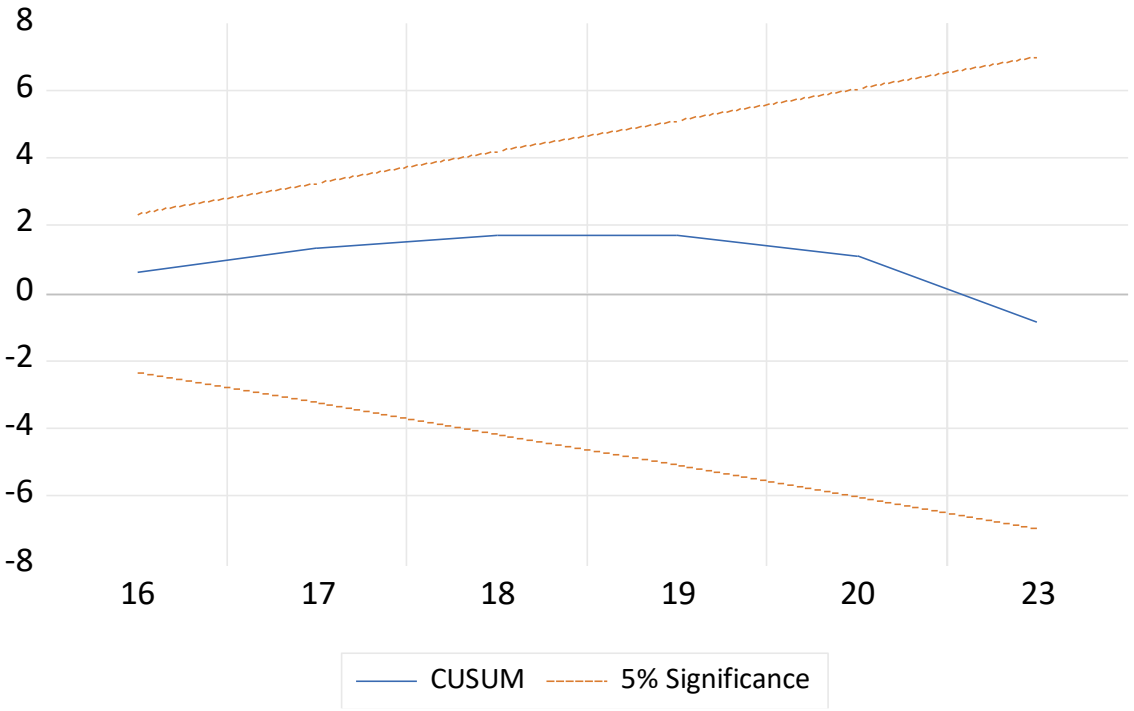

Figure 2 CUSUM Test

Source- Researcher's contribution, calculated using EViews.

CONCLUSION

The intent of this paper was to empirically analysis the influence of macroeconomic factors on NPAs of Indian commercial banks over a 23-year period, from 2000–2001 to 2022–2023. Employing the Autoregressive Distributed Lag (ARDL) technique, the effect of macroeconomic factors on nonperforming assets was examined. It was found that GDP and NPAs were linked indirectly, indicating that an increase in GDP would increase household incomes and corporate cash flows, thereby strengthening their ability to repay debt.

The findings also established that Consumer Price Index (CPI) significantly influences the GNPA. The negative coefficient of CPI suggests that higher inflation would lower the GNPA. During periods of inflation, the production costs and wages take time to adjust to new price levels. This delay in cost adjustments allows businesses to earn profits and makes loan repayment easier, as the real value of money decreases. Furthermore, an insignificant negative correlation was found between unemployment and GNPA. This means that when unemployment increases, the NPAs of banks decrease, which can be justified

by the fact that banks do not provide loans to unemployed individuals; thus, when unemployment increases, GNPA decreases. Lastly, LGIIP shows an insignificant negative impact on LGGNPA and LGFDI depict insignificant positive impact on LGGNPA.

The implications for policy are clear in accordance with these findings. During the loan evaluation process, banks should provide thoughtful consideration to economic forecasts provided by domestic organizations, such as the central bank. This consideration should focus not only on the repayment capacity of potential borrowers but also on the overall stability of the banking system. Additionally, banks should improve their loan assessment processes and recovery strategies due to the negative influence of NPAs on the economy.

Declaration

"It is hereby declared that the current research paper entitled "Analysing the Impact of Macroeconomic Determinants on Asset Quality in Indian Commercial Banks" is a genuine work and has not been published elsewhere. All the resources have been duly acknowledged"

Bibliography

1. Anshu, & Gakhar, K. (2019). Impact of Macroeconomic Variables on Financial Performance of Indian Banking Sector. International Journal of Engineering Applied Sciences and Technology, 4(3), 259–265. https://doi.org/10.33564/IJEAST.2019.v04i03.043
2. Ardely, N. P., & Ekananda, M. (2023). Loan to Value Ratio, KPR and KPA in Indonesia: An ARDL Approach. Journal of Developing Economies, 8(1), 218–230. https://doi.org/10.20473/jde.v8i1.39737
3. Bayar, Y. (2019). Macroeconomic, Institutional and Bank-Specific Determinants of Non-Performing Loans in Emerging Market Economies: A Dynamic Panel Regression Analysis. Journal of Central Banking Theory and Practice, 8(3), 95–110. https://doi.org/10.2478/jcbtp-2019-0026
4. Beck, R., Jakubik, P., & Piloiu, A. (2015). Key Determinants of Non-performing Loans: New Evidence from a Global Sample. Open Economies Review, 26(3), 525–550.
5. Dickey, D. A., & Fuller, W. A. (1979). Distribution of the Estimators for Autoregressive Time Series With a Unit Root. Journal of the American Statistical Association, 74(366), 427–431. https://doi.org/10.2307/2286348
6. Mishra, A. K., Jain, S., Abid, M., & R L, M. (2021). Macro-economic determinants of non-performing assets in the Indian banking system: A panel data analysis. International Journal of Finance & Economics, 26(3), 3819–3834. https://doi.org/10.1002/ijfe.1989
7. Narayan, P. K. (2005). The saving and investment nexus for China: Evidence from cointegration tests. Applied Economics, 37(17), 1979–1990. https://doi.org/10.1080/00036840500278103
8. Nayak, R. K. (2022). Performance of Odisha State Co-operative Bank: An ARDL Approach. Arthaniti: Journal of Economic Theory and Practice, 21(1), 7–26. https://doi.org/10.1177/0976747920941769
9. Pesaran, M. H., Shin, Y., & Smith, R. J. (2001). Bounds testing approaches to the analysis of level relationships. Journal of Applied Econometrics, 16(3), 289–326. https://doi.org/10.1002/jae.616
10. Swamy, V. (2012). Impact of Macroeconomic and Endogenous Factors on Non Performing Bank Assets (SSRN Scholarly Paper 2060753). https://doi.org/10.2139/ssrn.2060753
11. Syed, A., &Tripathi, R. (2020). Nonperforming Loans in BRICS Nations: Determinants and Macroeconomic Impact [SSRN Scholarly Paper]. https://doi.org/10.2139/ssrn.3528097

12. T.K., J., Makun, K., & Sharma, A. (2018). Determinants of Non-performing Assets of Commercial Banks in India: An Econometric Study. International Journal of Engineering and Technology, 10(3), 774–783. https://doi.org/10.21817/ijet/2018/v10i3/181003071
13. Zheng, C., Bhowmik, P. K., & Sarker, N. (2019). Industry-Specific and Macroeconomic Determinants of Non-Performing Loans: A Comparative Analysis of ARDL and VECM. Sustainability, 12(1), 1–17.