

NPAS AND PROFITABILITY IN INDIAN BANKS: AN EMPIRICAL ANALYSIS

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Abstract:

The paper examines the impact of non-performing assets (NPAs) on the profitability of Indian public sector and leading private banks, using data from 2005 to 2019. NPAs, defined by the Reserve Bank of India as loans overdue for more than ninety days, are categorized into substandard, doubtful, and loss assets. High NPAs reduce bank profitability due to declining interest margins and rising operating costs. This study uses panel data from 39 banks, estimating profitability determinants through both bank-specific factors (non-performing advances, deposits, non-interest income, interest income, operational efficiency, capital adequacy) and macroeconomic factors (GDP growth, inflation, interest rates). The findings indicate that increasing NPAs negatively affect profitability, while non-interest income, interest income, capital adequacy, and GDP growth positively contribute. The study suggests reducing NPAs and operating costs to enhance profitability. Though data for 2020 is available, it was excluded due to recent mergers among Public Sector Banks, reducing their number from 20 to 12. Future studies may incorporate the effects of these mergers over a longer period to understand their impact on NPAs and profitability.

Keywords: NPA, Profitability, Operating Cost, Merger

1. Introduction:

Growing rates of nonperforming loans or advances could have a negative effect on banks' performance by pinching their profits and lowering their profitability. Non-performing assets (NPAs) are typically defined as loans or advances that are not repaid in full or that are unable to be serviced by the borrower. Not only does an NPA render an asset unproductive, but banks are also unable to recoup their original capital. The bank's ability to generate income is reduced on the one hand, but there is also a chance that the principal will be recovered. While declining interest revenue has a direct effect on a bank's profitability, a bank's capital base may erode if principal capital is not recovered.

Assets for which interest payments due for more than ninety days are classified as non-performing assets (NPAs) by the Reserve Bank of India (RBI). Within this category, the RBI has categorized three different kinds of assets such as ; substandard assets, doubtful assets, and loss assets.

An asset is classified as substandard when the payment has not been realised for less than or equal to a year and it is considered an NPA. Similarly, an asset that has remained non-performing for longer than a year is considered as questionable asset. When an asset is lost, the loss has already been determined and the associated cost has not been written off it is considered as loss

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asset. Total non-performing assets (NPAs) of a bank are the sum of the three asset classes mentioned above. These NPAs make the banks less profitable because their interest margins are declining and their operating costs are rising. According to studies, banks with high NPA levels typically have to pay "carrying costs" on their non-performing assets, which lower their profitability. Additionally, as a significant portion of operational profits must go toward funding provisioning obligations, an increase in non-performing assets (NPA) is likely to have a negative effect on bank profitability. Thus, the provisioning and carrying expenses associated with non-performing assets (NPAs) deplete the banks' profitability.

There are several factors, including non-performance of loans that can potentially affect the profitability of the banks. It can broadly be categorised into the bank specific, and macroeconomic factors. The bank-specific factors include non-performing advances deposits non-interest income, interest income, operational efficiency and capital adequacy. The macroeconomic factor includes GDP growth, rate of inflation, and interest rate,

The present paper empirically analyses the impact of NPAs on the profitability of Indian public sector and leading private banks. Accordingly, the determinants of profitability have been estimated. The paper spreads over five sections. The introduction section has provided the background of the paper. The methodology section elaborates on the empirical strategy, data, variables and estimation model.

2. Literature Review:

Prior research consistently shows that non-performing assets (NPAs) negatively impact bank profitability. NPAs, though just one of many factors affecting profitability, have been widely studied.

Martin's analysis of the US banking industry from 1970 to 1976 found that increasing NPAs hurt bank profits. Masood and Ashraf's study of 25 Islamic banks across 12 countries from 2006 to 2010 showed that non-performing loans reduced bank profitability and performance. Similarly, Ongore and Kusa's study of Kenyan commercial banks from 2001 to 2010 identified a negative correlation between non-performing loans and bank profitability.

Al-Jafari and Alchami's analysis of 17 Syrian banks from 2004 to 2011 found that higher credit risk, measured by loan loss provisions, negatively affected profitability. Cucinelli studied 488 Italian banks from 2007 to 2013, revealing that increased credit risk led banks to reduce lending, harming profitability due to the need for higher provisioning. Duraj and Moci's study of Albanian banks from 1999 to 2014 also confirmed this negative relationship.

Research consistently shows that non-performing loans (NPLs) negatively affect bank profitability across various regions and periods. Islam and Nishiyama (1997-2012) found a negative correlation between NPLs and profitability in 259 commercial banks in South Asia, including India. Hashem (2004-2014) discovered that higher loan loss provisions, indicating higher credit risk, lower asset quality, and profitability in Egyptian banks. Bace (2014-2015) examined 13,000 deposit-taking institutions worldwide and found a similar negative correlation. Etale et al. (1994-2014) also reported a negative relationship between NPLs and profitability. Ozurumba (2000-2013) concluded that NPLs negatively impacted the profitability of Nigerian commercial banks, while Ozgur and Gorus (2006-2016) found a negative correlation between NPLs and profitability in Turkish banks. Overall, higher non-performing loans consistently lead to lower bank profitability across different countries and time periods.

2.1 Macro-economic Determinants of Profitability:

GDP growth Rate: It is the value of all final goods and services produced in a country in a given period of time. During higher economic growth, profitability of banks would be higher because it encourages banks to lend more and charge higher interests.

Inflation: It is the rate at which general price level of goods and services rises and the purchasing power of currency falls. Studies have found that profitability of banks will be higher with inflation. It has been used by prior studies on banks' profitability.

Interest rate: There has been mixed evidence with respect to the relationship between interest rate and profitability. Low interest rates along with stiff competition among banks put pressure on interest margins of banks and hence negatively affect bank profitability (Trujillo-Ponce 2013). Studies such as Demirguç-Kunt and Huizinga, Bourke have found a positive relationship between interest rates and bank profitability. The repo rate has been used as it reflects the lending rate of banks.

There are very few studies that cover current phase of NPAs with the revised definition while analysing the NPAs and profitability in Indian banks. The present study not only covers the recent phase of NPAs crisis, but also covers the time period with revised or new definition of NPAs. The definition of NPAs in the present study follows uniformity.

3. Method of Study:

3.1 Collection of Data:

In this study, we have drawn a sample of 39 scheduled commercial banks, out of which 20 are Public sector Banks (PSBs) and 19 are domestic private banks. As per the recent data, these 39 banks constitute more than 90 percent of the

banking operation in terms of assets, and close to 95 percent in terms of deposits and credit disbursement in India.

In case of Public Sector Banks (PSBs), the overall management responsibility lies with the Government, as it remains the majority stakeholder. The PSBs are governed by specific acts (banking acts) passed by the parliament. On the other side, the private banks are registered under the Companies Act and governed as per that act. Their management lies with the majority promoters or shareholders. In terms of NPA volume, it is largely the PSBs and some private banks that have been badly affected by the NPA crisis. Few small private banks were dropped from the analysis due to unavailability of data. The time period of the study is from 2005 to 2019. The period of the study has been chosen as the definition of NPA underwent a change in 2004, and the NPA data from 2005 onward follow uniformity with the new definition. Annual data for the sample of 39 banks was collected from a Reserve Bank of India (RBI) publication Statistical Tables Relating to Banks in India. The bank specific determinates or factors that potentially explain the profitability of banks were obtained the above report. The data for macroeconomic variables were collected from the Handbook of capital adequacy. The study has used the following macroeconomic predictors of bank profitability—economic growth, inflation and interest rate to estimate the determinants of profitability.

3.2 Model Applied:

To understand how NPAs impact the profitability, we have estimated the determinants of profitability of Indian scheduled commercial banks. We have employed the panel data estimation procedure to estimate the factors that have affected the profitability of banks in India. The following functional relationship has been employed to analyse the determinants of profitability.

$$\text{profitability}_{i,t} = \beta_0 + \beta_1 \text{Non-performing advances}_{i,t} + \beta_2 \text{deposits}_{i,t} + \beta_3 \text{non-interest income}_{i,t} + \beta_4 \text{interest income}_{i,t} + \beta_5 \text{operational efficiency}_{i,t} + \beta_6 \text{capital adequacy} + \beta_7 \text{economic growth}_{tmm} + \beta_8 \text{inflation rate}_t + \beta_9 \text{interest rate}_t + \varepsilon_{i,t}$$

Statistics on Indian Economy a publication of the RBI.

4. Analysis of Variables:

In this study, we have estimated the determinants of profitability of Indian Scheduled Commercial Banks. The dependent variable is profitability, which is determined by a set of bank specific and macroeconomic factors (Table 1). In the study, the Return on Assets (ROA) has been used as the variable for profitability. In literature, the ROA is widely used as indicator or proxy for bank profitability. It is an appropriate indicator of profitability, as it measures the earnings of a bank

in relation to its total assets. Therefore, it has been used as the dependent variable. We have used the following bank specific explanatory variables like Net NPA, total deposit, interest income, non-interest income, operational efficiency and where i = bank, 1,...,0.39, and t = time, 1,...,15. $\varepsilon_{i,t}$ is the error term.

In the above equation, six bank specific factors and three macro-economic factors collectively determine the profitability of a bank. In the paper, we have employed both the fixed and random effect approach to estimate the determinants of bank profitability. By using fixed effect (FE) model, the impact of variables those are time variant can be analysed. The FE estimation also controls for all time invariant heterogeneity among the sample banks. Therefore it is likely to produce unbiased coefficient estimates due to omitted time invariant characteristics.

Table 1: Description of Variables Used in the Study

Notation	Variable	Description	Expected effect
Dependent Variable	Profitability	Ratio of Net Income to Total Assets (%)	ROA
NNPA	Net Non-Performing Assets	Ratio of Net NPA to Net Advances (%)	Negative
Ln TD	Total deposit	Natural Logarithm of Total Deposit	Positive
NII	Non-Interest Income	Ratio of Non- Interest Income to Total Income (%)	Positive
II	Interest Income	Net Interest Margin (%)	Positive
OCTII	Operating Cost	Ratio of Operating Cost to Total Interest Income (%)	Negative
CapT1	Capital Adequacy	Tier 1 capital as per Basel norm (%)	Positive
GDPGr	GDP growth rate	Annual Economic Growth rate (%)	Positive
INF Inflation	Inflation	Annual rate of Inflation (%)	Positive
IR	Interest rate	Annual Average Repo Rate (%)	Positive

The general form of the fixed effects model can be expressed in the following equation.

In Eq.(2), the dependent variable ‘profitability’ is $P_{i,t}$ for i -th bank and t -th year. The dependent variable $P_{i,t}$ is determined by a set of exogenous regressor that includes both the bank specific and

$$P_{i,t} = C + \beta X_{i,t} + \mu_i + u_{i,t} \quad (2)$$

macroeconomic variables, $X_{i,t}$, for i -th bank and t -th year; and β s are model parameters. Beta value in regression is the estimated coefficients of the independent or explanatory variables. It indicates a

change in the dependent variable as a result of a unit change in explanatory variables keeping other independent or explanatory variables constant. The unobserved individual bank effect is μ_i , and the

random error is, $u_{i,t}$. It is assumed that the set of explanatory variables is uncorrelated with the error term $u_{i,t}$, and the error term is normally distributed, $u_{i,t} \sim N(0, \sigma^2)$, where $\sigma^2 > 0$.

Table2: Summary Statistics of the Dependent and Explanatory Variables

Variables	Obs	Mean	SD	Min	Max
ROA	585	0.65	0.96	— 5.49	2.13
NNPA	585	2.41	2.72	0.01	16.69
lnTD	585	4.84	0.62	2.82	6.46
NII	585	1.17	0.46	0.16	3.57
II	585	2.70	0.71	0.23	5.61
CAPT1	585	10.27	4.12	4.88	55.93
OCTII	585	0.24	0.08	0.11	1.33
GDPGr	585	6.80	1.49	3.09	8.50
INF	585	6.01	2.57	2.28	10.53
IR	585	6.82	0.93	5.08	8.00

We have estimated the following random effect (RE) model to analyse the determinants of profitability in Indian scheduled commercial banks.

The general form of the RE model can be expressed in the following equation .

$$P_{i,t} = C + \beta X_{i,t} + \mu + u_{i,t} + \varepsilon_{i,t} \quad (3)$$

In Eq. (3), the random error, $\varepsilon_{i,t}$ is with in entity error term and $u_{i,t}$ is between entity error term. μ is the bank specific random independent variables. More clearly, it assumes that the unobserved heterogeneity is uncorrelated with each explanatory variable across in all time period. Then, if the random effect model is significant, it indicates that the unobserved individual (cross-sectional) effects are uncorrelated with all the explanatory variables across all time-period.

The following fixed effects (FE) model has been estimated to analyse the determinants of profitability.

$$ROA_{i,t} = C + \beta_1 NNPA_{i,t} + \beta_2 TDi_{i,t} + \beta_3 NII_{i,t} + \beta_4 II_{i,t} + \beta_5 OCTII_{i,t} + \beta_6 CapT1_{i,t} +$$

$$\beta_7 GDPGr_{i,t} + \beta_8 INF_{i,t} + \beta_9 IR_{i,t} + \mu_i + u_{i,t} \quad (4)$$

In Eq. (4), the dependent variable is $ROA_{i,t}$. It is determined by a set of exogenous regressors that includes both the bank specific and macroeconomic variables. The unobserved individual bank effect is μ_i , and random 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 results show that the return on profitability (ROA) ranges from 5.49 to 2.13, with a mean ROA value of 0.65.

Similarly, the minimum and maximum values of the explanatory variables range low to high. The mean and standard deviation values of the variables suggest that there is variation between the two.

The correlation matrix with correlation coefficients of the variables used is presented in Table 3. The results suggest that there is no multi-collinearity problem in the data. The results show a negative association of ROA with NNPA and CapT1. The

rest of the explanatory variables exhibit positive association with ROA.

Table-3 Co-relation Matrix:

	ROA	NNPA	lnTD	NII	CapT1	OCTII	GDPGr	INF	IR	II
ROA	1.000									
NNPA	- 0.770	1.000								
lnTD	- 0.099	0.264	1.000							
NII	0.373	- 0.195	- 0.019	1.000						
CapT1	0.277	- 0.205	- 0.250	0.162	1.000					
OCTII	- 0.093	- 0.025	- 0.350	0.388	0.178	1.000				
GDPGr	0.050	0.015	- 0.075	0.021	- 0.074	0.064	1.000			
INF	0.357	- 0.458	- 0.307	0.083	0.003	0.050	- 0.169	1.000		
IR	0.215	- 0.265	- 0.031	- 0.146	-0.033	- 0.130	- 0.388	0.128	1.000	
II	0.516	- 0.399	- 0.206	0.327	0.411	0.319	0.018	0.089	0.072	1.000

Unlike the fixed effects model, in the random effects (RE) model, it is assumed that the error term is uncorrelated with the explanatory variables. It allows the time invariant variables to act as similar to the predictors in the model.

The benefit of RE is that the inferences can be generalized , beyond the sample drawn in a model.

We have estimated the following random effect (RE) model to analyse the determinants of

profitability in Indian scheduled commercial banks.

The general form of the RE model can be expressed in the following equation.

$$ROA_{i,t} = C + \beta_1 NNPA_{i,t} + \beta_2 TD_{i,t} + \beta_3 NII_{i,t} + \beta_4 II_{i,t} + \beta_5 OCTII_{i,t} + \beta_6 CapT1_{i,t} + \beta_7 GDPGr_{i,t} + \beta_8 INF_{i,t} + \beta_9 IR_{i,t} + \mu + u + \epsilon_{i,t} \quad (5)$$

Table 4: Determinants of bank profitability: panel regression, time period: 2005–2019

Variables	Fixed effect model		Random effect model	
Dependent variable: ROA	Coefficient	SE	Coefficient	SE
<i>Explanatory variables</i>				
NNPA	— 0.2136***	0.0258	— 0.2083***	0.0207
lnTD	0.0978	0.3103	0.1640***	0.0505
NII	0.4911***	0.1051	0.5266***	0.0740
II	0.2687***	0.0866	0.3097***	0.0635
CAPT1	0.0282***	0.0092	0.0291***	0.0097
OCTII	— 2.9788**	1.2694	— 3.3055***	1.1504
GDPGr	0.5507***	0.1737	0.5126***	0.1629
INF	— 0.4228	0.4191	— 0.3160	0.2167
IR	1.3884	1.2767	1.0733	0.7345
C	— 10.5673	5.8362	— 9.2618	4.5848

Number of observations	585			585	
Number of Banks	39			39	
R-Square	0.735			0.734	
Prob [F Statistics]	0			0	
*** $p < 0.001$; ** $p < 0.05$; * $p < 0.01$					

We have estimated both the fixed effect (Eq. 4) and random effect (Eq. 5) models to analyse the determinants of profitability in Indian scheduled commercial banks. The estimation result of the FE model shows that there is an inverse relationship between the rate of profit (ROA) and non-performing loans (NNPA), and the association is statistically significant (Table 4). Non-interest income (NII), interest income (II), capital adequacy (CAPT1) and GDP growth (GDPGr) are

found to be positively associated with the rate of profit (ROA). The estimates are found to be statically significant. Ratio of operating cost to interest income (OCTII) shows negative relationship with profitability (ROA). The other macroeconomic variables like rate of inflation and interest rate show negative and positive associations, respectively. However their association is not statistically significant.

Table 5: Hausman test

Chi-Sq. statistics	Chi-Sq. d.	Prob
23.7	20	0.255

The regression estimates of the RE model also give a similar result (Table 3). NPAs and operating cost (OCTII) are negatively associated with the rate of profit (ROA). Their relationship is statistically significant. On the other side, deposit (lnTD), non-interest income (NII), interest income (II), capital adequacy (CAPT1) and GDP growth (GDPGr) exhibit positive association with profitability (ROA). Their association is statistically significant. The other two macro- economic explanatory variables, the rate of inflation and interest rate exhibit negative and positive associations, respectively. While total deposit was found to be significant in RE, it is found to be insignificant in FE model. In order to arrive at an appropriate test

between FE and RE, the Hausman test was conducted. The results of Hausman test suggest that the RE estimate will be appropriate for the sample as the $_p$ value is greater than 0.05 (Table 5).

5. Discussion:

In this paper, we have examined the impact of NPAs on the profitability of Indian banks. Using set of bank specific and macroeconomic variables, we have estimated the determinants of profitability of 39 commercial banks in India. The estimation result suggests that growing incidence of NPA is likely to reduce the profitability of the banks considerably. Results also suggest that increase in

operating cost has negative impact on the profitability in Indian banks. The negative association between profitability (ROA) and NPA (NNPA); and profitability (ROA) and operating cost (OCTII) is statistically significant. The results show that there is a positive relationship between profitability (ROA), and interest earning (II) and non-interest earnings (NII). Their association is found to be statistically significant. The results further show that the volume of deposit (lnTD) is positively associated with the profitability (ROA). As financial intermediaries, commercial banks largely rely on interest earnings as their major source of income. In order to boost up their interest earnings, the banks must reduce their NPA volumes. The result suggests that Indian banks must reduce NPAs and operating cost in order to enhance their profitability.

The findings of the empirical estimation are similar to the findings of the studies by Kannan et al. , Sensarma and Ghosh , and Sinha and Sakshi. A study by Kannan et al. , using data for 86 Indian banks, for the period from 1995–96 to 1999–2000 found that banks with higher NPAs have relatively lower profit margins. A study by Sensarma and Ghosh of Indian commercial banks, for the period from 1997– 98 to 2000–01, reported that a rise in NPA adversely affects the interest margins for banks and hence reduces bank profitability. Similarly, Sinha and Sakshi, in their study of 42 Indian commercial banks for the period from 2000 to 2013, found that higher credit risk, as measured by provision non-performing assets, negatively impacts bank profitability. Analysing NPAs in 46 Indian commercial banks from 2007 to 2014, Bawa et al. found a negative relationship between NPAs and return on assets.

6. Conclusion:

The paper has empirically estimated the factors that determine the profitability of Indian scheduled

commercial banks, in order to understand the relationship between increasing non-performing advances and the rate of profit. The determinants of profitability have been estimated by taking a set of bank specific and macroeconomic explanatory variables. From the panel data estimation of 39 Public Sector and private banks, we found that the increase in non-performing advances has negative impact on the rate of profit. Operating cost is also found to be negatively associated with profitability. The estimates of both the FE and RE model suggest that non-interest income, interest income, capital adequacy and GDP growth rate have positively contributed to the rate of profit of the Indian banks. Given that, banks to a large extent depend on the performance of their loan assets as a critical source of income and profit, the rising NPAs is a cause of concern. It on the one hand reduces their interest earning and on the other side also affects their future deposits and increases their operating cost as the cost of recovery of NPAs will go up. The study suggests that the banks must reduce their NPAs and operating cost to improve their profitability.

7. Limitation of the study and Avenues for Future Research:

The findings of the study are based on a sample of banks that mostly covers the PSBs and the private banks, covering the time period from 2005 to 2019. Though data for the year 2020 are available, it could not be incorporated due to recent bank mergers in India. Between 2020 and 2021, several mergers took place within the Public Sector Banks (PSBs). Post-merger, the number of PSBs has declined from 20 to 12. While it would be interesting to include the mergers into the empirical analysis. However one year is a too short time period to make any meaningful conclusion. The effect of merger in the analysis of NPAs and

profitability of banks can be studied in future, with the availability of data for a longer time period.

Appendix:

S. no.	Name of bank	Category	S. no.	Name of Bank	Category
1	ALLAHABAD BANK	PSB	21	AXIS BANK	Private
2	ANDHRA BANK	PSB	22	CATHOLIC SYRIAN BANK LTD	Private
3	BANK OF BARODA	PSB	23	CITY UNION BANK LIMITED	Private
4	BANK OF INDIA	PSB	24	DCB BANK LIMITED	Private
5	BANK OF MAHARASHTRA	PSB	25	THE DHANALAKSHMI BANK LTD	Private
6	CANARA BANK	PSB	26	FEDERAL BANK	Private
7	CENTRAL BANK OF INDIA	PSB	27	HDFC BANK	Private
8	CORPORATION BANK	PSB	28	ICICI BANK	Private
9	DENA BANK	PSB	29	IDBI BANK LIMITED	Private
10	INDIAN BANK	PSB	30	INDUSIND BANK	Private
11	INDIAN OVERSEAS BANK	PSB	31	JAMMU & KASHMIR BANK LTD	Private
12	ORIENTAL BANK OF COMMERCE	PSB	32	KARNATAKA BANK LTD	Private
13	PUNJAB AND SIND BANK	PSB	33	KARUR VYSYA BANK	Private
14	PUNJAB NATIONAL BANK	PSB	34	KOTAK MAHINDRA BANK LTD	Private
15	SYNDICATE BANK	PSB	35	LAKSHMI VILAS BANK	Private
16	UCO BANK	PSB	36	RBL	Private
17	UNION BANK OF INDIA	PSB	37	SOUTH INDIAN BANK	Private
18	UNITED BANK OF INDIA	PSB	38	TAMILNAD MERCANTILE BANK LTD	Private
19	VIJAYA BANK	PSB	39	YES BANK LTD	Private
20	STATE BANK OF INDIA & ITS ASSOCIATES	PSB			

References:

1. Al-Homaidi EA, Tabash MI, Farhan NHS, Almaqtari FA (2018) Bank-specific and macro-economic determinants of profitability of Indian commercial banks: a panel data approach. Cogent Econ Finance 6(1):1–26
2. Al-Jafari MK, Alchami M (2014) Determinants of bank profitability: evidence from Syria. J Appl Finance Bank 4(1):17–45
3. Bace E (2016) Bank profitability: liquidity, capital and asset quality. J Risk Manag Financ Inst 9(4):327–331
4. Batra S (2003) Developing the Asian markets for non-performing assets- developments in

- India. 3rd Forum on Asian Insolvency Reform, Seoul, Korea
5. Bawa JK, Goyal V, Mitra SK, Basu S (2019) An analysis of NPAs of Indian Banks: using a comprehensive framework of 31 financial ratios. *IIMB Manag Rev* 31(1):51–62
 6. Berger A (1995) The relationship between capital and earnings in bank- ing. *J Money Credit Bank* 27(2):432–456
 7. Berger AN, DeYoung R (1997) Problem loans and cost efficiency in com- mercial banks. *J Bank Finance* 21(6):849–870
 8. Bourke P (1989) Concentration and other determinants of bank profit- ability in Europe, North America and Australia. *J Bank Finance* 13(1):65–79
 9. Chowdhury MAF, Rasid MESM (2017) Determinants of performance of Islamic banks in GCC countries: dynamic GMM approach. In: Mutum DS, Butt MM, Rashid M (eds) *Advances in Islamic finance, marketing, and management*. Emerald Group Publishing Limited, Bingley, pp 49–80
 10. Cucinelli D (2015). The impact of non-performing loans on bank lending behavior: evidence from the italian banking sector. *Eurasian J Bus Econ* 8(16):59–71
 11. Demirguc-Kunt A, Huizinga H (1999) Determinants of commercial bank interest margins and profitability: some international evidence. *World Bank Econ Rev* 13(2):379–408
 12. Duraj B, Moci E (2015) Factors influencing the bank profitability-empirical evidence from Albania. *Asian Econ Financ Rev* 5(3):483–494
 13. Etale LM, Ayunku PE, Etale E (2016) The impact of non-performing loans and bank performance in Nigeria. *Int J Humanit Soc Sc Invent* 5(4):1–5
 14. Hashem HY (2016) Determinants of Egyptian banking sector profit- ability: time-series analysis from 2004–2014. *Int J Bus Econ Sci Appl Res* 9(2):73–78
 15. Islam MdS, Nishiyama S (2016) The determinants of bank profitability: dynamic panel evidence from South Asian countries. *J Appl Finance Bank* 6(3):77–97

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