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THE DETERMINANTS OF PROFITABILITY OF SCHEDULED COMMERCIAL BANKS IN INDIA: A TIME SERIES AND CROSS-SECTIONAL ANALYSIS

KEY WORDS:

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ABSTRACT

The current study examines the determinants of profitability of Indian scheduled commercial banks. The analysis is conducted over a period of 17 years in which the Indian banking sector has faced different challenges such as implementation of Basel II (2008), Basel III (2013) accord and issues related to demonetization (2016), banking sector sustainability and financial crisis in U.S (2008). The analysis is based on balanced panel data over a period ranging from 2005 to 2021 for 33 scheduled commercial banks of India. Profitability of Indian banks is measured by two proxies, namely, return on assets (ROA) and return on equity (ROE), whereas bank size, assets quality, capital adequacy, liquidity, operating efficiency, deposits, leverage, and assets management are used as bank-specific factors. Further, a set of macroeconomic determinants such as gross domestic product, inflation rate, export, import, interest rate, and financial crisis are used as independent variables. Stationary test along with correlation matrix, pooled, fixed, random effect models and Hausman test are used in this study. The results revealed that bank size; assets management ratio, and operational efficiency, are the most important bank-specific determinants have positively and significantly affect the profitability of Indian commercial banks as measured by ROA as well as ROE. However, leverage ratio and asset quality have significant and negative impact on ROA and ROE during the period of study. With regard to the macroeconomic determinants, the results revealed that the GDP, export, and interest rate are found to have a positive significant impact on ROA and ROE. However, inflation rate and crisis have significant and negative impact on ROA and ROE during the period of study.

1. INTRODUCTION:

The banking sector, as a proliferating financial institution, plays an active part in a country's economic development (Babu, 2018; Iskandar et al., 2019). Banks play a vital and important role in the development of any country's economy (Menicucci & Paolucci, 2016). The performance of a country's economy mostly depends on the performance of its banking sector. After the banking sector reform in 1991, the Indian banking sector has become a fast growing industry that has contributed to the growth of other major industries (Signh, SIdhu, Joshi, & Kansal, 2016). The banking system in India composes of public sector banks, private sector banks, foreign banks, regional rural banks, urban cooperative banks, rural cooperative banks. Public sector banks represent about 70% of the total assets of the Indian banking system (Shrivastava, Sahu, & Siddiqui, 2018). The financial system of India is dominated by the commercial banks. In a competitive, challenging, and regulatory environment like India, the Indian commercial banks have utilised their assets and liabilities in effectively and efficiently way to increase their profitability (Viswanthan, Rangantham, & Balasubramanian, 2014).

Though the increasing trend of balance sheets, the profitability of Indian banks has varies over the period from 2002 to 2021 instead of increasing or constant growth. As per Reserve bank of India, the Central bank authority, Basel-I accord has been implemented in India from the Financial year 2002-03 and Basel-III accord has been implemented from 2013 to 2019. The aim of implementation of Basel Accord was to mitigate the credit risk, operation risk, and market risk and make the Indian banking sector more stable. The profitability indicators like Return on assets (ROA) and Return on equity (ROE) have varies over the period 2005-2021. In spite of adherence of Basel Accords and expansion of Balance sheets indicators, the profitability of Indian banks varies over the period 2005 to 2021, some critical questions that may arise in this regard "What are the determinants of the profitability of Indian banks? And what are the causes of variation of the profitability during the period of study? The main aim of this paper is to evaluate the impact of bank-specific factors and macroeconomic determinants on profitability of the Indian schedule commercial banks.

This paper is organized as follows: section 2 provides the literature review; Section 3 Variable selection; Section 4 data and methodology of the study. Section 5 data analysis and results; Section 6 concludes the paper and gives suggestions and recommendations.

2. LITERATURE REVIEW:

This section of the current study looked at a variety of related previously published literature that had studied in depth the factors that influence a bank's profitability using a fixed effects model and panel data approach. Dealing with the period from 2013 to 2017, Islam and Rana (2019) looked at those factors that affected a bank's profitability in Bangladesh's commercial banks. They used the same profit measures for all the three factors: return on asset (ROA), return on equity (ROE), and net interest margin (NIM). While earning variables and asset quality have a substantial positive link with ROA, capital strength does not, according to the researchers. They also discovered that earnings and capital strength have a substantial positive relationship with ROE, with gross domestic product (GDP), interest rate, and inflation rate (IR) having nomeaningful impact on the bank profitability. Using the E-views panel data approach, Sarwar et al. (2018) analyzed 21 commercial banks in Pakistan from 2006 to 2015. They discovered that liquidity, asset management quality, and capital adequacy have a significant influence on a bank's profitability. Sanyaolu et al. (2019) used a fixed effect regression model to examine the factors affecting the bank profitability of Deposit Money Banks in Nigeria from 2008 to 2017. According to their research finding, both inflation and profitability are linked.

Bank's profitability has been extensively investigated in different countries around the world. AL-Omar and AL-Mutairi (2008),-Bougatef (2017), Dietrich and Wanzenried (2014), Francis (2013), Marijana, Poposki, and Pepur (2012), Menicucci and Paolucci (2016), Naeem, Baloch, and Khan (2017), Ongore and Kusa (2013), Pasiouras and Kosmidou

(2007), and Petria, Capraru, and Ihnatov (2015) have investigated the determinants and factors affecting bank's profitability in different countries and from different regions. Similarly, Garcia and Guerreiro (2016) and Saona (2016) have focused their research on internal and external factors affecting bank's profitability. Further, Anbar and Alper (2011), Athanasoglou, Brissimis, and Delis (2008), Louzis, Vouldis, and Metaxas (2012), Masood and Ashraf (2012), Rani and Zergaw (2017), Rjoub, Civcir, and Resatoglu (2017), A. Singh and Sharma (2016), and Zampara, Giannopoulos, and Koufopoulos (2017) have examined bank-specific and macroeconomic factors affecting bank's profitability. These studies used ROA, ROE, or both as measurements and proxies of banks profitability (e.g., Chowdhury & Rasid, 2017; Jara-Bertin, Moya, & Perales, 2014; Menicucci & Paolucci, 2016; Naeem et al., 2017; Pathneja, 2016; A. Singh & Sharma, 2016; Tiberiu, 2015; Zampara et al., 2017). Banks profitability investigated by these studies is commonly explained by both internal and external determinants. The internal determinants are sometimes called microeconomic determinants (Louzis et al., 2012; Rjoub et al., 2017; Saona, 2016; A. Singh & Sharma, 2016) that are specific to each bank and that, in many cases, are the direct result of managerial decisions. These determinants have basically revealed the policy of provisioning, liquidity levels, operational efficiency, bank size, capital adequacy, and expenses management (Menicucci & Paolucci, 2016). In majority of prior studies, variables such as capital adequacy, liquidity, deposits, asset quality, operating efficiency, and bank size are used as a function of internal determinants and micro or bank-specific factors of banking profitability (e.g., Bougatef, 2017; Chowdhury & Rasid, 2017; Garcia & Guerreiro, 2016; Menicucci & Paolucci, 2016; Naeem et al., 2017; Pathneja, 2016; Petria et al., 2015; Rani & Zergaw, 2017; Rashid & Jabeen, 2016; Rjoub et al., 2017; Salike & Ao, 2017; A. Singh & Sharma, 2016; Tiberiu, 2015; Zampara et al., 2017).

External factors are called macroeconomic determinants (Athanasoglou et al., 2008; Louzis et al., 2012; Masood & Ashraf, 2012; Rani & Zergaw, 2017; Rjoub et al., 2017; A. Singh & Sharma, 2016). These are the factors that reflect economic, industry, and legal environment that are out of the control of bank's management (Ongore & Kusa, 2013). Factors such as inflation rate, gross domestic product (GDP), exchange, and interest rate are some external determinants of banks profitability that are considered by previous studies (Acaravci & Çalim, 2013; Chowdhury & Rasid, 2017; Francis, 2013; Jara-Bertin et al., 2014; Marijana et al., 2012; Masood & Ashraf, 2012; Menicucci & Paolucci, 2016; Ongore & Kusa, 2013; Pasiouras & Kosmidou, 2007; Saona, 2016).

Different studies are conducted and focused their investigation on single or several countries. For example, some evidence drawn from these studies were focused on countries including Europe (Menicucci & Paolucci, 2016; Pasiouras & Kosmidou, 2007; Petria et al., 2015), Gulf Cooperation Council (GCC) countries (AL-Omar & ALMutairi, 2008; Chowdhury & Rasid, 2017), South Asian, East Asian, Middle East and African countries (Masood & Ashraf, 2012), Latin American, Argentina, Brazil, Chile, Colombia, Mexico, Paraguay, Peru, and Venezuela (Jara-Bertin et al., 2014), Greek (Athanasoglou et al., 2008), Chile, Colombia, El Salvador, Honduras, Mexico and Paraguay (Tiberiu, 2015), Pakistan (Rashid & Jabeen, 2016), 12 Asian economies (Salike & Ao, 2017), Tunisia (Bougatef, 2017), Portugal (Garcia & Guerreiro, 2016), and Macedonia (Marijana et al., 2012).

Although the prior literature is attempted to do analyses on different countries, evidence from developing and emerging countries either still yielding mixed results or ambiguous evidence. However, there is no evidence of bank-specific and macroeconomic factors that determine the profitability of Indian schedule commercial banks. Very few evidence focus on the Indian context such as A. Singh and Sharma (2016) that

investigated bank-specific and macroeconomic factors that determined the liquidity of Indian banks. They suggested that bank-specific and macroeconomic factors such as bank size, deposits, profitability, capital adequacy, GDP, and Inflation significantly affects bank liquidity. Further, they found that bank size and GDP have a negative effect on bank liquidity. On the other hand, deposits, profitability, capital adequacy, and inflation showed a positive effect on bank liquidity.

Accordingly, the present study aims to evaluate the determinants of profitability of Indian scheduled commercial banks. Specifically, it empirically examines both bank-specific and macroeconomic factors that affect the banks' profitability as measured by ROA and ROE. This study bridges a gap in financial performance and profitability literature in India. Furthermore, the current study extends and contributes to prior studies from different countries as it employs panel data of 33 Indian commercial banks over a period ranging from 2005 to 2021 and using different bank-specific and macroeconomic variables.

3. VARIABLES SELECTION:
Two common measures were used by prior studies to measure the profitability of banks which are ROA and ROE. Following prior studies (e.g., Athanasoglou et al., 2008; Garcia & Guerreiro, 2016; Naeem et al., 2017; Pathneja, 2016; A. Singh & Sharma, 2016; Tiberiu, 2015; Zampara et al., 2017), this study uses ROA and ROE as proxies of banks' profitability. ROA is used to evaluate bank's ability to generate returns from available sources of funds. ROE is used to analyse the return generated by the funds that shareholders have invested. Two categories of independent variables were used in this study. Bank-specific (independent) variables were considered as internal factors, which include bank size, assets quality, capital adequacy, liquidity, operating efficiency, deposits, leverage, and assets management. Another category of independent variables is macroeconomic (external) determinants of profitability, which includes GDP, inflation rate, export, import, interest rate, and financial crisis. Explanation of both categories of independent variables is presented in the table no.1.

Table No. 1: Definitions of profitability Variables.

Variables	Acronym	Measure	Expected effect
Dependent Variables Profitability	ROA	Net Profit / Total Assets	
	ROE	Net Profit / Total Equity	
Independent Variables: Bank-Specific			
Asset Size	LNTA	Natural logarithm of total assets	+/-
Capital Adequacy	CAD	Equity/Total Assets	+
Asset Quality	AQ	Net Non-performing Assets / Net Advances	-
Deposit	DEPTA	Deposit/Total Assets	+/-
Operating Efficiency	OPRTA	Operating profit/ Total Assets	+
Asset Management	NIIM	Net Interest income/Total Assets	+
Financial Risk	LEV	Total Liabilities/Total Assets	+/-
Independent Variables: Macroeconomic			
Economic Activity	GDP	Annual real GDP growth rate	+/-
Inflation	INF	Annual inflation rate	+/-
Export	EXP	Export of goods and services as percentage of GDP	+/-

Import	IMP	Import of goods and services as percentage of GDP	+/-
Interest rate	INTR	Lending interest rate	+/-
Financial Crisis	CRISIS	Financial crisis is a dummy variable of 0 for the years of financial crisis and 1 otherwise	+/-

4. DATA AND METHODOLOGY
In this section, data sources and sample selection are provided. Then, the methodology and used models are discussed.

4.1. Data collection and Sample size
The dataset for the bank-specific variables used for this study is fetched from RBI database, which provides all information regarding all banks working in India. Thus, it is considered the most common and authenticated database for banking system information for India. The sample of this study is based on panel data that consists of 33 commercial banks with 561 observations for a period of 17 years from 2005 to 2021. 12 public sector banks (after merger and acquisition), 16 private sector banks, 5 foreign banks were considered for this study. Importantly, the study covered all public-sector banks that include both Nationalized and State Bank of India and its Associates, which accounts for about 70% of the banking system assets. The criteria for selection of these banks are based on the availability of data for the period covered by this study. Further, the current study considers only the commercial banks whereas regional rural banks and urban rural cooperative banks were excluded. Macroeconomic data were collected from IMF and World Bank database; the reliable and authentic sources of data.

4.2. Model Specification and Econometric tools
Prior studies of banks' profitability either used a linear regression models (pooled, fixed, or/and random effect models;e.g., AL-Omar & AL-Mutairi, 2008; Pathneja, 2016; Rjoub et al., 2017; Salike & Ao, 2017; Tiberiu, 2015) or both generalized moments method (GMM) and linear regression models (e.g., Athanasoglou et al., 2008; Bougatef, 2017; Chowdhury & Rasid, 2017; Dietrich & Wanzenried, 2014; Louzis et al., 2012; Masood & Ashraf, 2012; Rashid & Jabeen, 2016; Saona, 2016; Tiberiu, 2015). The advantages of adopting panel data analysis are confirmed by researchers. The first advantage is its efficiency of econometric estimates over pure cross-sectional or pure time-series data analysis techniques (Baltagi, 2005; Hsiao, 2003). The second one is its ability to control for individual heterogeneity and multicollinearity (Kyereboah-Coleman, 2007). Panel data of 17 years for 33 Indian commercial banks is used to analyse the impact of bank-specific and macroeconomic factors on bank's profitability. Following Anbar and Alper (2011), Brooks (2014), Chowdhury and Rasid (2017), and Masood and Ashraf (2012), the essential structure and context of the panel data is defined as per the following regression model:

$$Y_{it} = \alpha + \beta x_{it} + u_{it} \qquad \text{........ (1)}$$

Where Y_{it} denotes the dependent variable (Profitability), a is the intercept term on the explanatory variables, β is a k x 1 vector of parameter to be estimated, and vector of observations is , which is l x k, t=1….., T; i=1,…., N. The practical and operational form, the aforementioned model can be expressed as follows:

Profitability = f (Bank-specific variables; Macroeconomic variables) …………(2)
Profitability is measured by ROA and ROE. Bank-specific variables include asset size, capital adequacy, assets quality, liquidity, deposits, assets management, operational efficiency, and leverages. Macroeconomic variables include GDP, inflation, export, import, interest rate, and financial crisis. Expanding the proxies used in Model 2, two models have been developed to investigate the factors that may determine banks' profitability in India. The models hypothesize that the banks' profitability in India depends on internal factors (bank-specifics) and external factors (macroeconomic) that are as follows:

$$\begin{aligned} ROA_{it} = {} & \alpha_{it} + \beta_1 AQ_{it} + \beta_2 CA_{it} + \beta_3 DEPTA_{it} + \beta_4 NIIM_{it} \\ & + \beta_5 LEV_{it} + \beta_6 OPRTA_{it} + \beta_7 LNTA_{it} + \beta_8 GDP_{it} \\ & + \beta_9 INF_{it} + \beta_{10} EXP_{it} + \beta_{11} IMP_{it} + \beta_{12} INTR_{it} \\ & + \beta_{13} CRISIS_{it} + u_{it} \end{aligned}$$
$$\text{........ (3)}$$

$$\begin{aligned} ROE_{it} = {} & \alpha_{it} + \beta_1 AQ_{it} + \beta_2 CA_{it} + \beta_3 DEPTA_{it} + \beta_4 NIIM_{it} \\ & + \beta_5 LEV_{it} + \beta_6 OPRTA_{it} + \beta_7 LNTA_{it} + \beta_8 GDP_{it} \\ & + \beta_9 INF_{it} + \beta_{10} EXP_{it} + \beta_{11} IMP_{it} + \beta_{12} INTR_{it} \\ & + \beta_{13} CRISIS_{it} + u_{it} \end{aligned}$$
$$\text{…………(4)}$$

where i refers to an individual bank; t refers to year; $\beta 1 : \beta 13$ are the coefficients of determinant variables and u_it is the error term; and all other variables are as defined in Table 1.

Both models are estimated through pooled, random, and fixed effect regression. Further, the Hausman test is applied to determine whether to select fixed effect model or random effect model. Pasiouras and Kosmidou (2007) indicated that if the value obtained by the Hausman test is larger than the critical chi-square x^2 0.5,10 = 9.341 or x^2 0.005,10 = 25.182, then the fixed effects estimator is the appropriate choice.

5. DATA ANALYSIS AND RESULTS
5.1. Descriptive statistics:

Table 2: Descriptive Statistics

Variables	Obs.	Maximum	Minimum	Mean	Median	Std. Dev.
Panel A: dependent variables						
ROA	561	4.00	-7.92	0.76	0.88	1.11
ROE	561	28.14	-63.79	8.30	11.21	13.27
Panel B: bank specific determinants						
AQ	561	15.33	0.07	2.21	1.45	2.33
CAD	561	105.81	1.12	14.46	13.23	7.11
DEPTA	561	92.57	20.85	78.55	83.90	13.01
NIIM	561	6.40	-1.23	2.90	2.79	0.88
LEV	561	5.86	-5.44	0.73	0.76	0.84
OPRTA	561	8.26	-3.58	2.16	2.03	1.09
LNTA	561	7.54	2.48	5.81	5.96	0.85
Panel C: macroeconomic determinants						
GDP	561	23.83	7.21	13.87	13.38	4.19
INF	561	11.99	3.33	6.78	6.37	2.61
EXP01	561	17.74	10.91	14.23	13.91	2.21
IMP	561	28.98	14.15	21.27	21.95	4.25
INTR	561	13.31	8.33	10.36	10.17	1.36
CRISIS	561	1.00	0.00	0.06	0.00	0.24

Sources: Author's Calculation

5.2. Unit root Test
As a prerequisite requirement and the starting point for the econometric analysis of the models of the study, stationarity of the panel data using a unit root test is conducted. Stationarity of the variables is tested by Levin, Lin, and Chu, Im, Pesaran, and Shin, Augmented Dickey–Fuller, and PP–Fisher tests. As shown in Table 3, all variables used in the models are found to be stationary at the first difference in all the applied tests. This leads to reject the null hypothesis of a unit root.

Table 3 Unit root test

	Level_____	1st difference_____

Variables	ADF - Fisher Chi-square	Im, Pesaran and Shin W-stat	Levin, Lin, & Chu t	PP-Fisher Chi-Square	ADF - Fisher Chi-square	Im, Pesaran and Shin W-stat	Levin, Lin, & Chu t	PP-Fisher Chi-Square
P:anel A: dependent variables								
ROA	0.080	0.207	0.161	0.000	0.000	0.000	0.000	0.000
ROE	0.054	0.153	0.148	0.000	0.000	0.000	0.000	0.000
Panel B: bank specific determinants								
AQ	0.190	0.099	0.097	0.001	0.000	0.000	0.000	0.000
CAD	0.319	0.331	0.304	0.003	0.000	0.000	0.000	0.000
DEPTA	0.044	0.023	0.211	0.000	0.000	0.000	0.000	0.000
NIIM	0.006	0.001	0.000	0.020	0.000	0.000	0.000	0.000
LEV	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
OPRTA	0.062	0.019	0.009	0.000	0.000	0.000	0.000	0.000
LNTA	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Panel C: macroeconomic determinants								
GDP	0.918	0.313	0.039	0.000	0.000	0.000	0.000	0.000
INF	0.999	0.797	0.542	0.952	0.000	0.000	0.000	0.000
EXP	1.000	0.996	1.000	0.977	0.000	0.000	0.000	0.000
IMP	0.886	0.262	0.663	0.214	0.000	0.000	0.000	0.000
INTR	0.615	0.083	0.000	0.827	0.000	0.000	0.000	0.000

Sources: Author's calculation

5.3 Pearson correlation
Table 4 shows the correlation matrix and diagnostics of multicollinearity for the above used variables in the study. The results depict that there is a positive and negative relationship between dependent and independent variables. With regard to bank-specific variables, there is a positive/negative correlation between bank-specific variables and both ROA and ROE.

All independent variables have a low correlation that indicates the absence of multicollinearity issues in this study. For more reliable analysis, Variance Inflation Factor (VIF) test is conducted to test multicollinearity issues. According to Gujarati (2016), if VIF is more than 10 then, multicollinearity may be assumed. As it is shown in Panel B of Table 4, VIF values do not exceed 6.37 for all variables that indicate that there is no multicollinearity between independent variables.

Table 4: Correlation Matrix

	AQ	CAD	DEPTA	EXP	GDP	IMP	INF	INTR	LEV	LNTA	NIIM	OPRTA	ROA	ROE	CRISIS
Panel A: Pearson Correlation															
AQ	1.00														
CAD	-0.10	1.00													
DEPTA	-0.02	-0.22	1.00												
EXP	-0.12	-0.10	-0.06	1.00											
GDP	-0.17	0.04	-0.03	-0.22	1.00										
IMP	-0.13	-0.06	-0.05	0.89	-0.37	1.00									
INF	-0.08	0.02	-0.12	0.62	-0.17	0.64	1.00								
INTR	-0.10	-0.03	-0.16	-0.29	0.21	-0.32	-0.28	1.00							
LEV	0.13	0.07	-0.13	-0.11	0.11	-0.08	-0.10	0.04	1.00						
LNTA	-0.03	-0.03	-0.11	0.14	0.04	0.04	0.07	0.06	-0.16	1.00					
NIIM	-0.09	0.08	0.11	0.03	0.02	0.03	0.03	0.10	-0.01	0.08	1.00				
OPRTA	-0.07	-0.07	0.16	0.04	0.00	0.05	0.05	-0.01	-0.26	0.04	0.68	1.00			
ROA	-0.35	0.01	0.20	-0.01	0.11	-0.02	-0.01	0.07	-0.50	0.09	0.13	0.21	1.00		
ROE	-0.42	0.05	0.10	0.02	0.09	0.03	0.03	0.08	-0.35	0.08	0.11	0.14	0.78	1.00	
CRISIS	-0.03	-0.05	-0.08	0.21	0.07	0.17	0.27	0.09	-0.16	0.09	0.01	0.05	0.04	0.04	1.00
Panel B: diagnostics of Multicollinearity															
VIF	1.15	1.15	1.18	5.83	1.38	6.37	1.88	1.27	1.25	1.11	2.09	2.16			1.12

Sources: Author's calculation

5.4. Breusch-Godfrey Serial Correlation LM Test:
The presence of autocorrelation is checked by using LM test applied on result of pooled regression model represented by equation (3) and (4) and found the p value of observed R-square is 0.182 and 0.164 respectively, which is more than 0.05 not rejecting the null hypothesis of no serial autocorrelation and confirmed the absence of autocorrelation in the error terms in the model.

5.5. White's heteroskedasticity:
The status of heteroskedasticity is tested by using White's heteroskedasticity applied on result of pooled regression model represented by equation (3) and (4) and found that the p value of observed R square is 0.099 and 0.083 respectively retaining the null hypothesis of homoskedasticity.

Table 5: Model estimation results summary

ROA	Pooled				Fixed Effect Model				Random Effect Model			
Variable	Coeff.	Sd.Err.	t	Prob.	Coeff.	Sd.Err.	t	Prob.	Coeff.	Sd.Err.	t	Prob.
C	0.20	0.10	11.98	0.00	0.40	0.15	2.64	0.00	0.18	0.11	11.65	0.00
Bank-specific determinants												
AQ	-0.16	0.02	-6.76	0.00	-0.15	0.02	-6.44	0.00	-0.15	0.02	-6.17	0.00
CAD	0.01	0.01	1.18	0.24	0.01	0.01	1.13	0.26	0.01	0.01	1.40	0.16
DEPTA	0.03	0.01	3.85	0.00	0.03	0.01	3.61	0.00	0.04	0.01	3.89	0.00
NIIM	0.06	0.05	1.29	0.00	0.07	0.08	0.90	0.00	0.05	0.05	1.15	0.00
LEV	-0.68	0.06	-11.86	0.00	-0.65	0.07	-9.11	0.00	-0.71	0.06	-12.15	0.00
OPRTA	0.01	0.04	4.14	0.00	0.08	0.08	4.03	0.00	0.01	0.04	4.24	0.00
LNTA	0.21	0.31	8.66	0.00	0.23	0.32	8.70	0.00	0.01	0.38	8.04	0.00
Bank-specific determinants												
GDP	0.02	0.01	12.64	0.00	0.02	0.01	12.49	0.00	0.02	0.01	11.71	0.00
INF	-0.04	0.02	-0.17	0.86	-0.01	0.02	-0.23	0.82	-0.04	0.04	-0.11	0.92
EXP	0.04	0.04	4.83	0.00	0.03	0.05	4.76	0.45	0.03	0.07	4.45	0.00
IMP	-0.01	0.02	-3.55	0.00	-0.01	0.02	-3.46	0.00	0.01	0.04	-3.32	0.00
INTR	0.04	0.03	6.33	0.00	0.03	0.03	6.20	0.00	0.04	0.04	6.91	0.00
CRISIS	-0.10	0.13	-4.80	0.00	-0.11	0.13	-4.80	0.00	-0.11	0.21	-4.53	0.00
Adjusted R	0.36				0.78				0.35			
F-statistic	23.62				23.75				23.19			
Prob (F-statistic)	0.00				0.00				0.00			
Hausman test					0.000							

Table 6: Model estimation results summary

ROE	Pooled				Fixed Effect Model				Random Effect Model			
Variable	Coeff.	Sd.Er.	t	Prob.	Coeff.	Sd.Er.	t	Prob.	Coeff.	Sd.Er.	t	Prob.
C	2.03	1.24	11.63	0.00	3.51	1.84	11.90	0.06	2.03	1.27	11.60	0.00
Bank-specific determinants												
AQ	-2.45	0.28	-8.66	0.00	-2.39	0.29	-8.20	0.00	-2.45	0.29	-8.48	0.00
CAD	0.11	0.10	1.18	0.24	0.14	0.10	1.36	0.18	0.11	0.10	1.16	0.25
DEPTA	0.20	0.11	1.80	0.00	0.20	0.11	1.73	0.00	0.20	0.11	1.76	0.00
NIIM	0.77	0.57	8.35	0.00	1.45	8.99	1.47	0.00	0.77	0.58	8.32	0.00
LEV	0.38	0.70	7.65	0.00	0.65	0.87	6.50	0.00	0.38	0.72	7.49	0.00
OPRTA	0.27	0.48	8.56	0.00	0.51	0.95	8.53	0.00	0.27	0.49	8.55	0.00
LNTA	0.38	3.81	1.89	0.00	3.72	3.94	1.94	0.00	3.38	3.90	1.87	0.00
Bank-specific determinants												
GDP	0.12	0.08	11.57	0.00	0.13	0.08	11.58	0.00	0.12	0.08	11.53	0.00
INF	0.08	0.27	0.29	0.77	0.06	0.27	0.22	0.82	0.08	0.27	0.29	0.77
EXP	0.66	0.55	8.20	0.00	0.67	0.56	8.20	0.00	0.66	0.56	8.17	0.00
IMP	-0.30	0.30	-1.01	0.00	-0.31	0.30	-1.02	0.00	-0.30	0.30	-0.99	0.00
INTR	0.41	0.33	1.24	0.00	0.36	0.34	1.05	0.00	0.41	0.34	1.22	0.00
CRISIS	-0.83	1.57	-3.53	0.00	-0.83	1.61	-3.52	0.00	-0.83	1.61	-3.52	0.00
Adjusted R	0.27				0.74				0.37			
F-statistic	15.75				15.59				15.75			
Prob (F-statistic)	0.00				0.00				0.00			
Hausman test					0.000							

5.6. Results of model estimation

Tables 5 and 6 show the estimation results of pooled Ordinary Least Squares (OLS), fixed and random effect models in Equations (3) and (4). Hausaman test is applied to select the most appropriate model from fixed effect model and random effect model. If Result: H0: Select RE (p> 0.05), H1: Select FE (p <0.05). In this study we select FE Model as p<0.05 is the most appropriate model.

The analysis of the results is presented below and categorized into two groups; bank-specific and macroeconomic determinants of profitability using both ROA and ROE as dependent variables that are regressed independently against both categories of explanatory variables as explained in Equations (3) and (4). Following is the discussion of the results based on these two categories.

1. Bank-specific determinants of Indian banks' Profitability

As shown in Table 5, ROA is used as a dependent variable and a function of both categories of bank-specific and macroeconomic determinants. To some extent, all the three models conducted show similar results. The results in these models demonstrate that AQ, DEPTA, NIIM, LEV, OPRTA, and LNTA have a significant impact on profitability measured by ROA in all the three models. As expected in Table 1, across the three models, it has been found that DEPTA, NIIM, OPRTA, and LNTA affect significantly and positively the profitability of Indian banks as measured by ROA at the level of 1% level of significance (P value < 0.01). This is consistent with some earlier studies (e.g., AL-Omar & AL-Mutairi, 2008; Athanasoglou et al., 2008; Chowdhury & Rasid, 2017; Menicucci & Paolucci, 2016) who agreed that banks with

larger assets size lead to greater profitability. On the contrary, Francis (2013) reported that bank size has a negative effect on banks' profitability and Athanasoglou et al. (2008) found that bank size does not affect bank profitability significantly. AQ and LEV affects significantly ROA at the level of 1% (P value < 0.01). Expectedly, the coefficient of AQ and LEV are found to have a negative value. The results are similar with the studies of Yahya et al. (2017) and Jara-Bertin et al. (2014) who revealed that LEV is negatively related to banks' profitability (ROA).

In addition, the results in Table 5 demonstrate a significant impact of OPRTA on ROA in the three models at the level of 1% (P value < 0.01). The coefficient has the expected positive sign that reveals a positive impact on ROA. Consistently, AL-Omar and AL-Mutairi (2008), Marijana et al. (2012), Petria et al. (2015), Rashid and Jabeen (2016), and Salike and Ao (2017) agreed that operating expenses ratio is significant and is one of the most important determinants of banks' profitability. This argument is supported also by Jara-Bertin et al. (2014) and Salike and Ao (2017) who proved that operational efficiency is a significant determinant in explaining banks' profitability. Contradictory, Chowdhury and Rasid (2017), Francis (2013), and Yahya et al. (2017) found that OPRTA ratio has statistically significant negative impact on ROA but Naeem et al.(2017) reported a negative as well as insignificant relationship with ROA.

Similarly, AQ ratio has the expected (negative) sign in all the three models. This indicates that AQ ratio has a significant negative impact on ROA at the level of 1% (P value < 0.01). This is contradictory with AL-Omar and AL-Mutairi (2008) who concluded a significant and positive relationship between AQ and ROA. Inconsistently, Naeem et al. (2017) found a negative relationship between AQ and ROA.

Regarding CAD ratio, the results of this study is in accordance with Naeem et al. (2017) who stated that CAD ratio has a positive but insignificant impact on the profitability of banks. Differently, Bougatef (2017) and Salike and Ao (2017) reported a significant positive impact whereas Yahya et al. (2017) declared a negative impact on the bank's profitability. In the same vein, a similar result regarding DEPTA ratio was found by Menicucci and Paolucci (2016) who suggested that banks with higher deposits tend to be more profitable but the effects on profitability are statistically insignificant in some cases.

With regard to the impact of bank-specific variables on the profitability of Indian banks as measured by ROE, the results indicate that AQ, DEPTA, NIIM, LEV, OPRTA, and LNTA are found to be significant and have an impact on ROE. AQ has negative significant impact on ROE at the level of 1% (P value < 0.01) in all the three models. LNTA has positive and significant impact on ROE at the level of 1% (P value < 0.01) in all the three models. This finding is consistent with Masood & Ashraf, 2012 and Jara-Bertin et al. (2014) who indicated that bank size is an important determinant of bank's profitability. CAD and INF have insignificant impact on the profitability of Indian banks as measured by ROE across the three models.

For the reliability of the three used models, the adjusted R square in case of ROA is 36% for the pooled model, 78% in the fixed effect model, and 35% in the case of the random effect model. It shows that both bank-specific and macroeconomic determinants are explaining about 36% to 78% of the variation of a bank's profitability as measured by ROA. Similarly, the value of the adjusted R square in case of ROE is 27% in the pooled model, 74% in the fixed effect model, and 37% in the random effect model exhibiting that both bank-specific and macroeconomic determinants are contributing about 27% to 74% to the profitability. To evaluate and compare the results of the three models applied, it is clearly seen from the results of Tables 5 and 6 that all models have a P value of less than 1% revealing that all models are fit and

significant. Furthermore, Hausman test was conducted for deciding the appropriate estimated model between both fixed and random effect models. The P value suggests that fixed effect model is superior and appropriate than random effect model as the P value of Hausman test is less than 0.05 (P value = 0.00 < 0.01). Accordingly, Hausman test suggests that fixed effect model is more appropriate than random effect model.

2. Macroeconomic determinants of Indian banks' profitability
Regarding the set of external factors affecting the profitability of Indian banks as measured by ROA, the findings of this study reveal that GDP, EXP, IMP, INTR, and CRISIS have significant impact on ROA at the level of 1% (P value < 0.01) in all the three models and they are found to have statistically significant impact on ROE also. Although INF exhibited a insignificant impact on ROA and ROE.

Although CRISIS has a significant impact on ROE at the level of 1% (P value < 0.01) across the three applied models, other significant factors have different directions of impact from a model to another a model. Consistently, Bogdan and Ihnatov (2014) and Maria et al. (2017) found a negative and significant impact of CRISIS with profitability measured by ROA and ROE. Further, Dietrich and Wanzenried (2014) stated that the financial crisis has statistically negative significant in high-income countries. On the contrary, Saona (2016) revealed that the financial crisis is positively and statistically significant. GDP has statistically significant impact on ROE at the level of 1% (P value < 0.01) in all the three models. This result is consistent with Garcia and Guerreiro (2016) and Rashid and Jabeen (2016) who reported that the real GDP growth has a negative impact on profitability. However, a contradictory result is found by Acaravci and Çalim (2013) and Yahya et al. (2017) who stated that banks performance are positively related to economic growth. Similarly, INTR rate is found to have a significant impact at the level of 1% (P value < 0.01) in all the three models at the level of 1% (P value < 0.01). Unexpectedly, it shows a positive coefficient that indicates a positive impact on ROE. This is in contradictory with Rashid and Jabeen (2016) who revealed that interest rate is negatively related to bank's performance. Differently, from the aforementioned external factors, INF rate has a statistically insignificant impact in all the three models at the level of 1% (P value < 0.01). This is in contradictory with Jara-Bertin et al. (2014) and Yahya et al. (2017) who declared that INF has a positive and significant impact on banks' profitability.

Overall, and in connection with the Hausman Test, fixed effect model should be considered superior than the random effect model. In this view, it can be concluded that all macroeconomic factors investigated by this study except INF are substantial determinants of profitability of the Indian banks measured by ROE.

6s. CONCLUSION AND RECOMMENDATIONS
The Indian banking sector has witnessed significant challenges and changes. Different challenges such as implementation of banking sector reform, Basel accords, digitalization, and sustainability are recently noteworthy issues that affect the performance of Indian banks. Further, the increasing trend of the balance sheet indicators especially deposits, borrowings, loans and advances, and the declining in profitability over the few last years, imposition of Prompt Corrective Action (PCA) on five nationalized banks raises a major concern on the performance of Indian banks. This study examined bank-specific and macroeconomic determinants of 33 Indian commercial banks' profitability over a period ranging from 2005 to 2021. ROA and ROE were taken as dependent variables, whereas independent variables were divided into two categories. The first category includes bank-specific variables (internal), namely, assets

size, capital adequacy, asset quality, liquidity, deposit, asset management, and operating efficiency. The second category represents macroeconomic variables such as GDP, inflation rate, export, import, interest rate, and financial crisis.

The results indicate that bank-specific factors such as bank size, assets management ratio, and operational efficiency have a positive impact on ROA. On the other hand, there is a negative impact of leverage on ROA. With regard to the impact of macroeconomic determinants on ROA, the results revealed that inflation rate has a negative impact on ROA. Concerning the bank-specific and macroeconomic determinants of profitability of Indian banks measured by ROE, the results indicate that bank size, assets management ratio, liquidity ratio, and GDP are found to have a significant positive impact on ROE. Further, there is a negative relationship between leverage, inflation rate and the financial crisis on the profitability of Indian banks measured by ROE.

The findings of this study have considerable implications for bankers, policymakers, regulator, analysts, and academicians. Bankers and policymakers should focus on the bank-specific factors that play an important role in the profitability of Indian banks. More emphasis should be given to the deposits and liquidity ratios for efficient utilization and effective performance of the Indian banks. Further, minimizing the costs, increasing the portfolio of the equity financing over the debt financing, and an efficient managing of the financial risk are some important bank-specific factors that should be given more consideration by bankers and policymakers. Banks' managers, bankers, and other professionals should focus on the bank-specific factors for effectively utilizing their resources in such a way that affect positively the financial performance of the Indian banks. In addition, policymakers and regulators should give more consideration to the macroeconomic factors especially interest rate, export, import and, inflation rate which proved that have an important role in the profitability of Indian banks. It is recommended that regulators and policymakers should consider the macroeconomic factors in such a way that improve the profitability of the Indian banks. Finally, future research could investigate this issue by including more variables or using other techniques of analysis such as GMM, ARDL or other techniques. Further, future studies may compare the profitability of Indian banks with the private and public sectors.

This study sought to bridge a gap by providing new empirical evidence on the bank-specific and macroeconomic determinants that affect the profitability of Indian commercial banks. The findings of the present study have considerable contributions to the existing stock of prior studies by comprehensively explaining and empirically analysing the current state of profitability among the commercial banks of India. It focuses on a major and important sector in an emerging economy like India. It gives attention to the sustainability of the country's banking system, severe stress, bad loans, and an increase in banking frauds.

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