Impact of Bank-Specific, Industry-Specific and Macroeconomic Variables on Profitability: An Empirical Study on Indian Banks

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Abstract

The present study estimates the impact of economic variables influencing the profitability of 37 Indian banks from 2004–2005 to 2019–2020 using a random-effects model and GMM estimator. The estimation result shows that bank-specific determinants, viz. capital adequacy, net interest income to total assets, diversification, and employee productivity have influenced Indian banks' profitability positively, whereas, higher amount of operating expenses and poor asset quality eroded profitability during the study period. Market competition is evident to be significant determinant of profitability for the Indian banking industry, whereas, bank merger has an insignificant positive impact. The banking regulators could not anticipate inflation accurately and consequently, failed to adjust the interest rate and bank managers also failed to curtail expenses during the inflationary period. The fluctuation of the exchange rate reduced banks' profitability significantly during the study period.

Keywords: Bank Profitability, Determinants, Random Effects model, GMM estimator

JEL Classification: C22, G21, G28, L19

Introduction

The financial sector, being a backbone of the growth and development of an economy, promotes growth through stimulating the capital formation process and increasing the level of investment (Taghipour, 2009). In this context, banksplay a crucial role in channelizing public savings into productive investments through the intermediation process. The globalised and competitive banking business environment has made the role of banks dynamic and market-oriented. During the last four decades, the unprecedented developments and changes in the Indian banking operation because of reforms measures ushered in by the regulators and external market forces have driven Indian banks to move towards earning fee-based income along with their traditional mode of business. The survivability of a bank, in the long run, depends upon its profit earning ability. It measures a bank's efficiency in operation. Further, an efficient bank exhibits less susceptibility to risk factors to the regulators; provides multi-featured products and better cost-effective services to the customers; ensures reasonable returns to the shareholders; and a greater degree of sustainability and competitiveness to the management (Kumar and Gulati, 2008).Thus,the performance evaluation of banks in general and profitability study, in particular, is crucial for economic growth. Most of the empirical studies determining bank profitability have therefore been carried out in developed

economies. However, there are only a few studies that have

been carried out in India on investigating significant

profitability determinants of banks(Al-Homaidi et al., 2018). During the last two decades, the transformations in the banking business environment propelled as well as retarded the growth of the Indian banking sector to a large extent.Recently, the regulators and policymakers undertook the decision to merge the Indian commercial banks in order to gain the advantages of economies of scale and synergy effect. As a result of consolidation, the Indian banking industry would be able to render ubiquitous financial services excellently in both domestic and global markets. The issue of non-performing assets has always been at forefront of theregulators' concerns. Some of the comprehensive measures taken up by the central bank of India, i.e. Reserve Bank of India and bankers, inter alia include the enactment of the SARFAESI Act, Corporate Debt Restructuring Mechanism and improved risk management practices contributed to enhancingthe asset quality of commercial banks. Further, the movement toward digital India by the Indian government has affected banking operations extensively. The growing rate of penetration of fintech companies in the area of financial services has intensified competition in the market.Apart from that, the reform in indirect taxation by introducing the Goods & Service Tax Act, the announcement of demonetization in November of 2016 and spiralling bank frauds have convulsed banking operations. During the period under consideration, the ebb and flow of the state of the macro environment and internal business environment

contracted the financial performance of Indian commercial banks. Thus, the dropping backdrop underpins the current research topic as important and relevant for bankers and policymakers.

Literature Review

Tan (2016) found that bank size, liquidity, and diversification significantly and negatively affect profitability, whereas labour productivity and Lerner Index have positive impact. While Garcia-Herrero et al. (2009) argued that Inflation, GDP and market competition significantly and positively affect he profitability of Chinese banks. Sufian (2009) and Tan and Floros (2012) conducted study on Chinese banks and confirmed positive impact of GDP and inflation on bank profitability.Similarly,Petria et al. (2015)also found that GDP and market competition positivelyaffects bank profitability. Sufian (2011), further, found that network embeddedness, capitalization, and stock market capitalization significantly influence the profitability of Korean banks. Curak et al. (2012) claimed that operating expenses, liquidity and solvency risk are the significant determinants of profitability. Tarus et al. (2012) concluded that credit risk and operating expenses have significantly positive influence on the net interest margin whereas economic growth and market concentration have a significantly negative influence. Albulescu (2015) showed that non-performing loans and non-interest expenses negatively influence the banks' profitability. Alarussi and Alhaderi (2018) found that size, working capital, and asset turnover ratio generate more profitability, whereas liquidity and debt-equity ratio negatively relate to banks' profitability. Besides, Al-Harbi (2019) showed that capital adequacy, loans, off-balance sheet activities and foreign ownership contribute significantly to the bank's profitability.

Narwal and Pathneja(2015) and Ahamed (2017) concluded that diversification significantly influences the profitability of Indian banks. However, Bapat (2017) found an insignificant influence. Barua et al. (2017) concluded that market concentration negatively influences profitability. Bansal et al. (2018) experienced a significant negative impact of the credit deposit ratio and a significant positive impact of capital adequacy and the ratio of advances to loan funds on profitability. Al-Homaidi et al. (2018) empirically observed that assets management ratio, bank size, leverage ratio, the number of branches, operational efficiency, inflation rate, interest rate and exchange rate significantly influence return on assets.

Research Gap

It is witnessed from the review of existing literature that the estimation of banks' profitability is predominantly carried out in developed countries by academicians and finance scholars. However, in India, such studies directed exclusively toward establishing the empirical relationship between the various factors and banks' profitability are very few. The present study aims to add value to the existing Indian literature in respect of empirically testing the influence of all categories of economic variables relating to the individual bank, banking industry and macroeconomic environment on the profitability of banks operating in India. Further, no such study has been conducted in India during the present study period.

Objective of the Study

The present study aims to investigate the influence of select bank-specific, industry-specific and macroeconomic variables on the profitability of Indian Banks.

Hypotheses of the Study

H01: Bank-specific variables, namely, capital adequacy ratio, net interest income to total assets, diversification, operational efficiency, employees' productivity, asset quality and liquidity do not have significant influence on Return on Assets.

H02: Industry-specific variables, namely, market competition and mergers do not have significant influence on Return on Assets.

H03: Macroeconomic variables, namely, inflation, economic growth and exchange rate do not have significant influence on Return on Assets.

Scope and Limitations of the Study

This study undertakes the estimation of profitability of

select scheduled commercial banks considering secondary and quantitative data only for the period under consideration.Based on ownership structure and scope of jurisdiction, Indian commercial banks can be grouped as public sector banks, Indian private sector banks, foreign banks operating in India and regional rural banks.Considering the scope of business jurisdiction, similar attributes of functioning and the same extent of possibility to get controlled by the regulators, the present study has considered only public and private sector banks originating in India. Thus, the limitation of the present study is that the investigation of significant profitability determinants has been carried out by not considering qualitative data for the analysis and the sample banks do not include all the categories of commercial banks operating in India.

Methodology of the Study

Sample selection

Under the present study, 37 Indian commercial banks, including 18 government-owned and 19 privately-owned banks, constitute the sample banks. These sample banks contribute about 89.23% of the scheduled commercial banks' assets.

Sources of Data

The present study has collected all the requisite secondary data from the Reserve Bank of India's annual reports, which include Statistical Tables relating to Banks in India.

Period of the Study

The present studyhas been carried out using a balanced panel data set with 592 yearly observations across 16 years, from 2004–2005 to 2019–20.

Tools used in the Study

The tools used in the present study are the Augmented Dickey-Fuller Fisher and Breitung test for testing stationarity in the panel data; Karl Pearson's coefficient of correlation matrix, Variance Inflation Factor (VIF) and Tolerance (TOL) for the multicollinearity testing; Breusch-Pagan/Cook-Weisberg test for testing heteroskedasticity; and Durbin-Watson d test for diagnosing autocorrelation problem.

Estimation Model

The general linear regression model used by Athanasoglou et al. (2008) to empirically research the impact of factors that affect bank profitability is as follows.:

where, Πit is the profitability of bank i = 1, ..., N; at time t= 1,..., *T*, *c* is a constant term, X*it* are k explanatory economic variables and ε it is the disturbance with v_i the unobserved bank-specific effect and u_i the idiosyncratic error. The general specification model (1) with grouping explanatory variables is rewritten as follows:

$$\prod_{it} = c + \sum_{j=1}^{l} \beta_{j} X_{it}^{j} + \sum_{l=1}^{L} \beta_{l} X_{it}^{l} + \sum_{m=1}^{M} \beta_{m} X_{it}^{m} + \varepsilon_{it} \dots \dots \dots (2)$$

where the three categories of variables associated with the characteristics of individual banks, industry, and the macroeconomic environment are denoted by the X*it* with the superscripts *j*, *l* and m respectively.

For robustness, the present study has estimated a dynamic regression model by adding a one-period lag of return on

assets as an explanatory variable. The study has followed the Generalized Method of Moments (GMM) estimator, also known as Arellano–Bond approach to dynamic estimation model since the system GMM estimator overcomes the unit root problem as well as addresses other estimation problems like endogeneity, unobserved heterogeneity, autocorrelation and profit persistence (Tan, 2016).According to Judson and Owen (1999), one-step GMM estimator results in a lesser bias and a lower standard deviation of the estimation.Therefore, besides fixed and random effects models, one-step system GMM estimator has also been used in the current study. The equation followed under thestudy with one-period lag of the dependent variable is

where $\Pi_{i,t-1}$ indicates one-period lagged profitability and δ ranging from 0 to 1 explains the rate of adjustment to equilibrium. A value closer to 1 denotes a very slow adjustment, which indicates a less competitive market in the industry, while, a value approximately equal to 0 means a high speed of adjustment signifying fairly competitive market in the industry.

Variables	Notation	Measurement					
Dependent Variable:							
Deturn on Acceta	DOA	Net Profit					
Return on Assets	KUA	Total Average Assets × 100					
		Bank-specificIndependent variables:					
Control A democra	CADY	(Tier 1 capital + Tier 2 capital)					
Capital Adequacy	CADY	$\frac{1}{Risk Weighted Assets} \times 100$					
Net Interest Income to	NIII	Total Interest Income – Interest Exenses					
Total Assets	NII	Total Average Assets X 100					
Disconsificantian	DIV	Non – Interest Income					
Diversification		Total Average Asset					
On anotional Efficiency	OPE	Total Operating Expenses					
Operational Efficiency		Total Average Assets × 100					
Enveloper Due de stierites	EMDD	Net Profit					
Employee Productivity	EMPD	$\overline{Total number of Employees} \times 100$					
A goot Quality		Net Non – Performing Assets					
Asset Quality	AQLY	Net Advances × 100					
Liquidity	LOTY	Total Cash and Cash Equivalents \times 100					
Erquidity	LUII	Total Demand Deposits					

Table 1: Variables used in the estimation

Variables	Notation	Measurement					
	Industry-specificIndependent variables						
Market Competition	MCOMP	Herfindahl – Hirschman Index (HHI) =					
Market Competition	WICOWIF	Sum of squares of market share of Total Assets					
Merger	MRGR	Dummy variable(0=Merger, 1= No Merger)					
	Маст	roeconomic-specific Independent variables					
Inflation	INFLN	CPI for Industrial workers Growth Rate (%)					
Economic Growth EGRW Real GDP Growth Rate (%)		Real GDP Growth Rate (%)					
Exchange Rate	EXCHR	Exchange Rate of INR to US Doller					

Source: Compiled from Literature

Data Analysis and Interpretation

Unit Root Analysis

Table 2 presents the result of unit root testat level, i.e. I (0). Both Augmented Dickey-Fuller Fisher Type test and Breitung test confirms stationarity in the present panel data except the exchange rate, however, which is proved to be stationary in the Breitung test. Thus, all the variables considered for the estimation are found stationary.

Variable	Augmented Dickey-Fuller Fisher Type	Breitung				
Dependent Variable						
ROA	3.1775*	-1.6409**				
Bank-specific Independent	[•] Variables					
CADY	7.4268*	-3.1375*				
NII	4.3659*	-2.7239* *				
NII	17.7894*	-4.2435*				
OPE	6.3357*	-1.4256***				
EMPD	3.6196*	-3.2538*				
AQLY	1.6215**	-2.7913**				
LQTY	13.5915*	3.4503*				
Industry-specific Independ	lent Variable					
MCOMP	5.5927*	-3.8740 *				
Macroeconomic Independe	ent Variables					
INFLN	10.6841*	-7.7214*				
EGWRT	2.4453**	-10.6150*				
EXCHR	1.0326	-3.3351*				

Table 2: Result of Stationarity Test

Source: Author's calculation Note: *, ** and *** indicate significance at .01, .05 and .10 level

Multicollinearity diagnostics

The correlation matrix as depicted in Table 3 clearly demonstrates the weak association between the explanatory variables.Generally, a correlation coefficient value greater than .70 indicates the existence of a multicollinearity problem.Thus, there is no multicollinearity issue in the present study due to the absence of a strong correlation between the explanatory variables. Moreover, as a rule of thumb, if the VIF is below 10, suggests no multicollinearity (Gujarati et al., 2018). As depicted in Table 4 the VIF values range from 1.02 to 2.48 and TOL values are closer to 1 meaning thereby the absence of multicollinearity among the explanatory variables.

	CADY	NII	DIV	OPE	EMPD	AQLY	LQTY	мсомр	MRGR	INFLN	EGWRT	EXCHR
CADY	1											
NII	.410**	1										
DIV	.167**	.247**	1									
OPE	.100*	.433**	.354**	1								
EMPD	.286**	.328**	.198**	082*	1							
AQLY	322**	475**	179**	097*	519**	1						
LQTY	025	179**	313**	128**	121**	.147**	1					
MCOMP	035	.004	.161**	.200**	274**	.316**	.075	1				
MRGR	.020	.057	.111 **	.030	.027	033	015	.056	1			
INFLN	.163**	.032	051	119**	.239**	469**	081*	581**	019	1		
EGWRT	.046	.018	.000	031	005	141**	031	106**	.045	088*	1	
EXCHR	089*	167**	044	055	138**	.515**	.108**	.170**	052	399**	502**	1

Table 3: Correlation Matrix of Explanatory Variables

Source: Author's calculation Note: * and ** indicate significance at .01 and.05 level

Variables	VIF	Tolerance
CADY	1.33	0.752020
NII	1.93	0.517054
DIV	1.39	0.717263
OPE	1.51	0.662342
EMPD	1.61	0.621663
AQLY	2.48	0.403385
LQTY	1.16	0.863948
MCOMP	1.86	0.538123
MRGR	1.02	0.980914
INFLN	2.42	0.413997
EGWRT	1.74	0.574560
EXCHR	2.34	0.428232

Source: Author's calculation

Heteroskedasticity Testing

The result of the heteroskedasticity test as presented in Table 5 provides that p-value is equal to 0.000. Thus, the null hypothesis of constant variance across cross-section error term, i.e. homoskedasticity assumption is rejected at 0.01 level of significance. This result concludes that the estimated model suffers from the heteroskedasticity problem. Stated differently, if thevariances are not consistent, the inferences to be drawn from the OLS estimators will no longer be valid. In this regard, Gujarati et al., (2018) suggested Generalized Least Square (GLS) model which solves the heteroskedasticity problem because, unlike the Ordinary Least Square model, it produces BLUE estimator despite heteroskedasticity. Further, Lotto (2018) stated that with regard to panel data, either a fixed effect or random effect regression model should be estimated to tackle the heterogeneity problem.

Table 5:	Result	of Breusch	-Pagan /	' Cook-	Weisberg	test fo	or hetero	oskedast	icity
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Dependent Variable	χ2 statistic	Prob
Return on Assets	161.71*	0.000

Source: Author's calculation Note: * indicates significance at .01level

Autocorrelation Test

The estimated Durbin-Watson d value from OLS estimation is found to be 1.473, suggesting that there is first-order positive autocorrelation in the residuals. In order to deal with this problem, random-effect and fixed-effect models with first-order autocorrelation disturbances have been estimated based on Durbin -Watson method of autocorrelation.

Hausman Test

For the specification of the model, both the random effects and fixed effects models have been estimated. After

estimation, the significant difference between the estimates of the two models has been tested employingthe Hausman test to decide upon the panel data model which gives more consistent estimates. The result of the model specification test is depicted in Table 6. At 0.10 level of significance, the Hausman test result with a p-value of 0.0622 is found significant. Thus, the null hypothesis, i.e. the estimated coefficients of the Random Effect Model is consistent, cannot be rejected. Therefore, the random effect model has been considered for the final inference of the estimation result.

 Table 6: Result of the Hausman Test

Dependent Variable	χ2 statistic	Prob	
Return on Assets	20.27***	0.0622	

Source: Author's calculation Note: ***indicates significance at .10 level

Result of Random Effect GLS estimation

The R-square value of the regression model, which is 0.8352 as per the findings of the Random Effect GLS regression model presented in Table 7, indicates that 83.52 percent of the variation in the return on assets is determined by the explanatory factors included in the model.Besides, thetable also shows that the value of Wald $\chi 2$ is 1706.22 with p-value of 0.000 which is less than the statistical significance value of 0.05. Hence, the present estimated model is a good predictor of the impact of variation in the independent variables on the dependent variable.

Concerning the impact of the explanatory variables on return assets, capital adequacy, net interest to total assets, diversification, and employee productivity have statistically significant and positive influences. On the contrary, operating efficiency, asset quality, market competition, inflation and exchange rate have statistically significant and negative influences on ROA. Moreover, the influence of liquidity and merger is found to be insignificantly positive. On the other hand, it is observed that economic growth has in significantly negative impact on profitability.

Explanatory Variables	Coefficient	Std. Error	Z	Prob	
Constant	3.088226*	.4881248	6.33	0.000	
Bank-specific variables					
CADY	.0136937**	.0063703	2.15	0.032	
NII	.490754*	.0436554	11.24	0.000	
DIV	.3265759*	.0507944	6.43	0.000	
OPE	6006032*	.0533858	-11.25	0.000	
EMPD	.0401556*	.0023382	17.17	0.000	
AQLY	0938562*	.0122192	-7.68	0.000	
LQTY	.0001906	.0002321	0.82	0.412	
Industry-specific variables					
MCOMP	0019188*	.0003529	-5.44	0.000	
MRGR	.0860946	.1213866	0.71	0.478	
Macroeconomic Variables	·				
INFLN	0515214*	.0114986	-4.48	0.000	
EGWRT	0066328	.0161154	-0.41	0.681	
EXCHR	0208903*	.0029456	-7.09	0.000	
R ²		0.8352			
Wald $\chi 2$	1706.22*				
Prob	0.000				
No. of observation	592				
Modified Bhargava et al. Durbin-Watson	1.3073935				
Baltagi-Wu LBI		1.8133888			

Table 7: Result of the Random Effect Generalized Least Squares regression

Source: Author's calculation Note: *and ** indicate significance at .01 and .05 level

Result of the Arellano-Bond dynamic panel data estimation

The result of dynamic panel-data regression is reported in Table 8. From the table, it can be observed that the value of Wald $\chi 2$ is 994.04 with p-value of 0.000 which is less than the statistical significance value of 0.05. Hence, the present estimated dynamic panel-data model explains the joint significance of the variables. The estimates are consistent despite the model having first-order positive autocorrelation because there is no second-order autocorrelation issue in the model (Arellano and Bond, 1991), as evidenced by p-value of second-order autocorrelation test i.e.0.224 which is greater than 0.05 level of significance.

With regard to the statistically significant impact on return assets, net interest income to total assets, diversification, and employee productivity have positive influence. However, operating efficiency, asset quality, market competition, inflation and exchange rate are negatively related to ROA. Moreover, the influence of capital adequacy, merger, liquidity and economic growth on profitability is found statistically insignificant.

Explanatory Variables	Coefficient	Robust Std. Error	Z	Prob			
One period lag of ROA	.1740453*	.051032	3.41	0.001			
Bank-specific variables							
CADY	.0090039	.0071071	1.27	0.205			
NII	.4206204*	.0780036	5.39	0.000			
DIV	.3092515*	.0874858	3.53	0.000			
OPE	6816578*	.165677	-4.11	0.000			
EMPD	.0453541*	.0117745	3.85	0.000			
AQLY	0410434**	.0197718	-2.08	0.038			
LQTY	0000107	.0005498	-0.02	0.988			
Industry-specific variables							
МСОМР	0014234*	.0003931	-3.62	0.000			
MRGR	.1237915	.0837369	1.48	0.139			
Macroeconomic Variables							
INFLN	048684*	.0110138	-4.42	0.000			
EGRWT	0108901	.0099485	-1.09	0.274			
EXCHR	0239155*	.0033975	-7.04	0.000			
Wald $\chi 2$	994.04*						
Prob	0.000						
AR(1)	Z=-2.12, p=0.034						
AR(2)	Z= -1.2171, p=0.224						
No. of observation		518					

Table 8: Result of the Arellano-Bond dynamic panel data estimation

Source: Author's calculation Note: *and ** indicate significance at .01 and .05 level

Findings of the study

The results of both RE GLS with AR(1) disturbances and Arellano-Bond dynamic panel data estimation, portray consistent results. However, no robust result is found in respect of the impact of liquidity on banks' profitability. Both models conclude that capital adequacy, net interest income to total assets, diversification, employee productivity and mergerpositively affect banks' profitability. However, the impact of bank mergers is found insignificant. On the other hand, operating efficiency, asset quality, market competition, inflation, economic growthand exchange ratenegatively affect the banks' profitability. Further, the comparative analysis of the estimates reveals that among the explanatory variables affecting significantly the banks' profitability, the estimated impact of operating efficiency is found to be the highest. However, the coefficient value of the ratio of net interest income to total assets is the highest among the factors contributing positively and significantly to return on assets, followed by diversification and employee productivity.

Suggestions of the study

The findings relating to the estimates of bank-specific

determinants suggest that to enhance the profit earning ability, bankers need to concentrate more on earning interest income along with diversifyingthe banking business. However, at the same time, unnecessary operating expenses are needed to be curtailed and the present asset quality controlling mechanism is required to be strengthened further. In other words, all the banks' resources are to be used efficiently by the bank managers to accelerate financial performance as measured by profitability. Further, while assessing the performance parameters all types of economic variables explaining the attributes of the bank, industry and macro-economic environment are equally decisive.

Conclusion

The main contribution of the current study is to investigate the impact of economic variables on the profitability of Indian banks during 2004-05 to 2019-20. The empirical results conclude that a bank having well capitalized and diversified business is more profitable. Further, highly productive human resource capital benefits a bank toearn a greater extent of profit. However, to attain this benefit, a bank needs to curtail excessive operating costs. A bank also needs to act prudently while granting loans otherwise it will erode the earning of interest income. At the same time, it is required to be always heedful to the customer's creditworthiness and conditions prevailing in the banking business environment. The higher degree of market power does not benefit Indian banks to earn more profits. This finding infers that increased level of competition meaning thereby decline in individual banks' market power in the Indian banking sector drives the banks to carry out their operational and financial activities more efficiently including quality control mechanisms for competitive banking products and services, as well as the risk management aptitude, influencing significantly, therefore, the bottom line of the business.From the viewpoint of strengthening the financial soundness of weak banks, the strategic decision of merging the weak banks with a financially sound bank is successful to some extent. The positive economic growth paves the way for advancing more loans to the business houses and thereby earning more interest income. However, at the same time, demand for the fund duringan economic boom period maycause conscious of the risk perception of the investors. Stated differently, there is a possibility of having increased cases of bank fraud that eventually affect the profitability adversely. It is also concluded that banking regulators could not anticipate inflation accurately and consequently, failed to adjust the interest rate and bank managers also failed to curtail expenses during the inflationary period, which led to the deceleration of profit. The fluctuation of the exchange rate during the study period eroded banks' profitability significantly.

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